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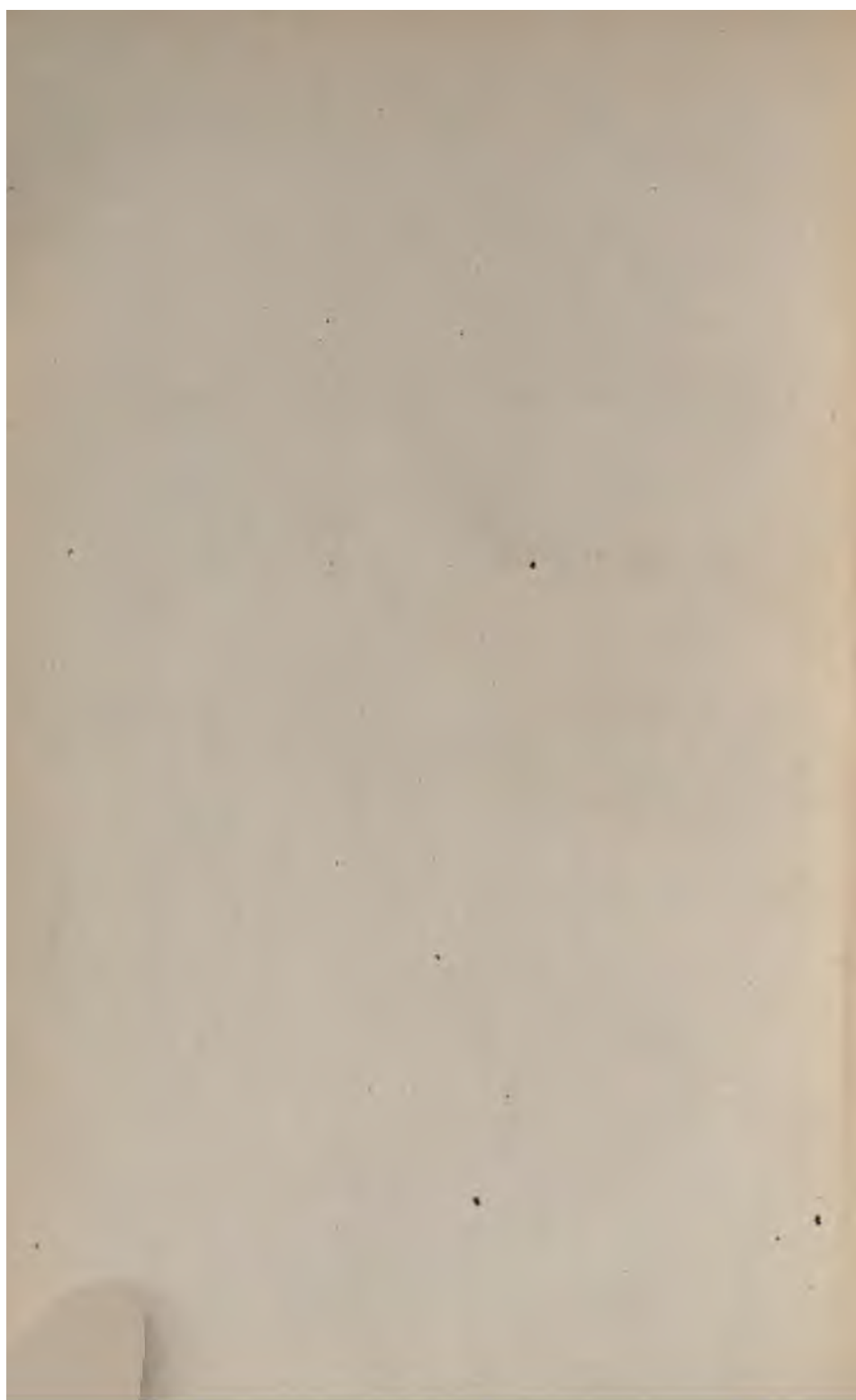


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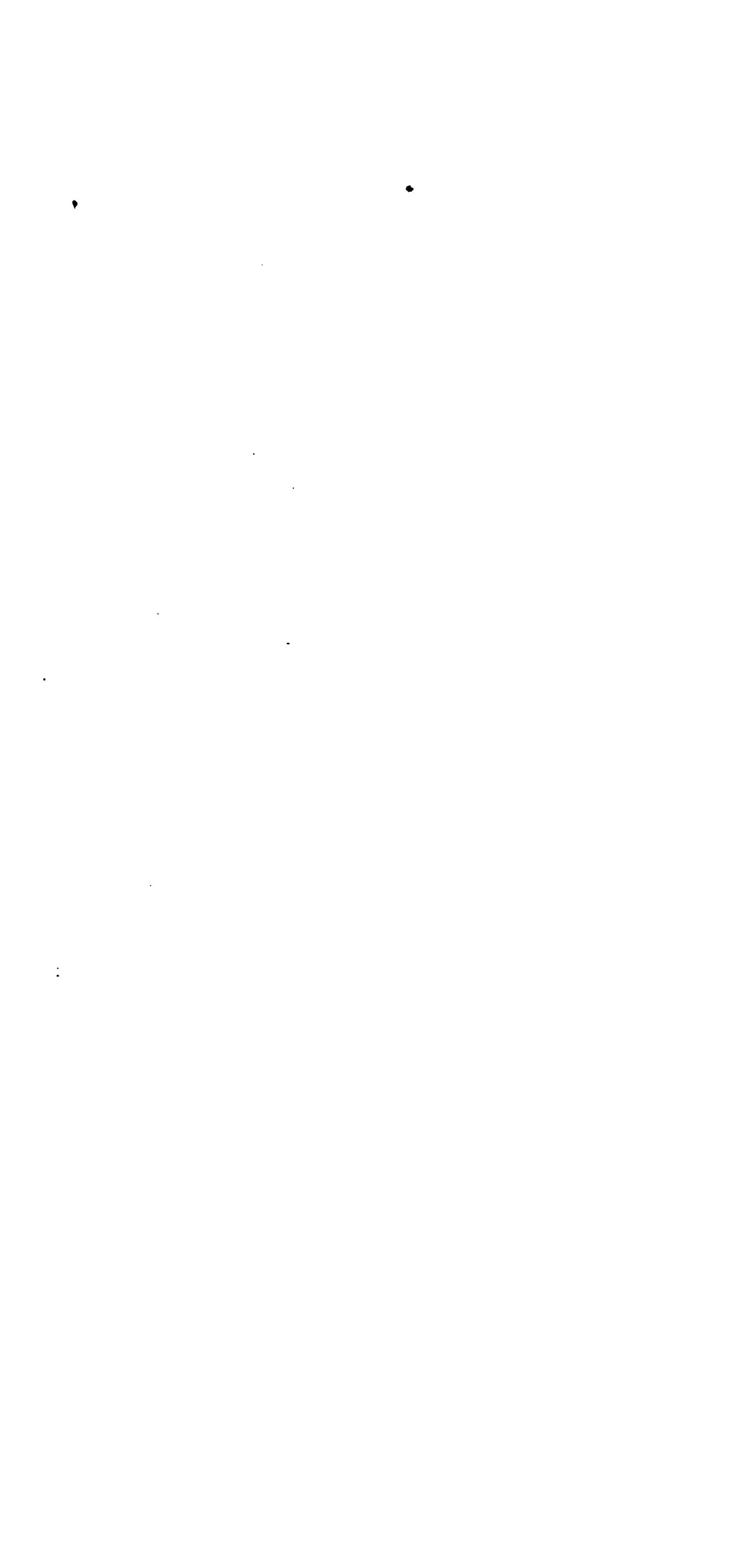


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THE HIP

AND ITS

DISEASES

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BY

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OUT OF
GRATITUDE TO A FRIEND
AND
ADMIRATION FOR AN HONORED MEMBER OF A PROFESSION
WHICH RECOGNIZES HIM AS
An Authority
IN
THREE DISTINCT BRANCHES OF MEDICINE,
THE WRITER DEDICATES THIS VOLUME
TO
C. MACNAMARA, F.R.C.S., ENG.
SURGEON TO AND LECTURER ON SURGERY AT THE WESTMINSTER HOSPITAL,
SURGEON TO THE ROYAL WESTMINSTER OPHTHALMIC HOSPITAL,
SURGEON MAJOR H. M. INDIAN MEDICAL SERVICE.

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AND H. M. INDIAN MEDICAL SERVICE.



PREFACE.

For nearly thirteen years I have resided in the Hospital for the Ruptured and Crippled, all of my time being devoted to daily service in both the in-door and the out-door departments. This hospital is well known for the large number of orthopedic cases that come under observation and treatment. For instance, during my term of service the annual reports show that up to the present time 2048 cases of "hip-disease" alone have been treated, and a very large proportion of this number have been under my own observation.

The hospital is further known as an extremely conservative institution. Dr. Jas. Knight, its founder and surgeon-in-chief, has been led by his extensive experience to adopt a plan of treatment which coincides, in many respects, with the definition I have elsewhere given of the term expectant.

It will therefore be readily seen that the writer of this book has enjoyed unusual facilities for the study of the clinical history of bone and joint diseases. A large number of our cases in the wards are of this nature, and many remain in hospital for two or three years.

The record of signs and symptoms as they occur has been made without any bias, and it is seldom that any interpretation even, of these changes appears on the books. My aim, in other words, has been to picture every case from its beginning to its close.

Our case books, which now number several volumes, will show how well we have succeeded, and they will show too that the notes have been made by or at the dictation of myself.

My observations have not been confined especially to cases under the non-mechanical treatment. My relations with those gentlemen who are fully committed to mechanical therapeutics have been close enough to permit from time to time personal examination of their own cases; and

many of these cases I have seen and recorded my diagnosis, with reasons therefor, before the splints have been applied. The privilege therefore has thus been afforded me of studying this disease under the various methods of treatment; and the fulness of my notes at different periods as the cases progress has made it quite unnecessary for me to rely on impressions not based on fact.

For unusual facilities in the pursuit of my studies I am under many obligations to my very good friend Dr. Jas. Knight the distinguished surgeon-in-chief of the hospital.

To the members of our house staff Drs. S. M. Taylor, H. P. Cooper, and H. J. Bogardus I am very much indebted for assistance in the preparation of this work for the press.

With general surgeons I have likewise had many opportunities of studying the results of operative procedures.

It therefore gives me much pleasure to thus publicly thank Drs. Taylor, Judson, Shaffer, Yale, and Stillman for privileges extended me in examining their apparatus as well as cases under their care; Drs. W. T. Bull, C. T. Poore, Jno A. Wyeth, F. S. Dennis, and other surgeons for similar acts of kindness.

I feel that I can thus present a pretty accurate picture of the clinical features of bony lesions of the hip, both under the expectant and the mechanical forms of treatment. That such a book is needed none will deny; that the writer of the present volume has succeeded in producing such a book my readers will decide.

The limited time at my disposal, the hard work of hospital life, the opportunities that city life affords for recreation after a day of toil, mental and physical, must be my apologies for the many imperfections contained herein.

V. P. GIBNEY.

23 PARK AVENUE, NEW YORK,
November, 1883.

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THE HIP AND ITS DISEASES.

CHAPTER I.

THE INTRODUCTION.

In studying any subject connected with the science of medicine necessary attention to detail should be the chief consideration. And in a subject like the present, when there is so much that is not clear, so much that is taken for granted, it seems to me that the diseases of the hip are certainly worthy of extended study.

There are certain points about these diseases that I claim to have made myself familiar with; there are certain facts that I have gathered here and there that enable me to speak with a positiveness that sometimes borders on dogmatism.

In the whole range of surgery there is very little that is really positive on this subject. Year after year witnesses the introduction of new forms of apparatus, new methods of treatment, or revivals of the same principles in old apparatus, and year after year witnesses the failure of the same to meet the diseases set forth.

Not that I am aiming to depreciate the progress in the treatment of joint diseases, but there are certain stubborn facts that cannot be overlooked.

It is a fact that physicians, as a rule, still call all the lesions in or about the hip, whether they be acute or chronic, hip-disease.

It is a fact that many children grow up to adult life with short limbs and stiff hips.

It is a fact that an exceedingly small number of cases of what is looked upon as "genuine hip-disease" get well without deformity or lameness, let them come under the most approved mechanical treatment early or late.

It is a fact that the lay public still looks with disfavor, or at least with apathy, on the mechanical treatment of diseases of the hip.

On the other hand, it is a fact that the majority of children in the better walks of life receive mechanical treatment when their hips are diseased.

It is also a fact that the orthopedic surgeons, with few exceptions, have discarded what is known as the old expectant method.

My earnest endeavor in the pages of this book has been to contribute something toward the classification of diseases about this articulation. I shall feel that some good will have been accomplished if I can succeed in establishing at least two grand divisions; if I can set on one side all those lesions of the soft parts, without and within the joint, many of which are of an acute nature; and on the other side, that lesion which gives the results we all dread so much—that lesion beginning in the bones, entering into the formation of the joint, and known as "true hip-disease."

All orthopedists are working in this direction, and classification is becoming nearer perfect as diagnosis and pathology are more closely studied. Mr. Barwell has done much to simplify the study of joint diseases, and in his last edition such terms as *ostitis*, *epiphysitis*, *chondritis*, in connection with joints, encourages us to believe that the time has come, or is rapidly approaching, when we can recognize these various diseases and intelligently direct treatment. Diagnosis is, after all, one of the most important steps in the management of joint diseases.

The anatomy of the hip is stereotyped, and very little can be given that is not found in Gray, Quain, and Morris. Indeed, the chapter I have introduced is merely a compilation from text-books, and I lay no claim whatever to any originality. But for the need one always feels of anatomical knowledge in studying surgical diseases, I should not say anything about the anatomy of the hip. Much that is not found in the ordinary text-books is found in Morris, on the "Anatomy of the Joints," and as this valuable work is unfortunately not found in many American libraries

I make no further apology for the reproductions to be found in the next chapter.

In the chapter on Sprains and Contusions an effort has been made to render the diagnosis easy, and some suggestion as to prognosis I have ventured to make, although at variance with popular teachings. The impression prevails among the laity, and the profession as well, that a sprain or a contusion of a joint are serious accidents and far-reaching in their results. The introduction of a few cases from the large number that have come under my own observation clearly contradicts this impression, and I am sure they will suggest many similar cases in the practice of other physicians. If I do not make one point strong enough by way of exception in this chapter, I want to emphasize the fact that I am not a disbeliever in the development of chronic joint diseases from slight injuries occurring at a time when the system is in a poor or vicious state of nutrition. Under such circumstances sprains and contusion often lead to grave joint lesions. During a convalescence from a continued fever or from any of the exanthemata, such conditions of the system may often be found to exist. When any injury, however trifling in appearance, occurs at such juncture an early diagnosis is of vital importance, and the treatment by rest during repair is equally important.

Next in order we have a class of symptoms that are grouped under the term neuroses, and I have made a chapter on Neuroses of the Hip. It may seem that such lesions belong to neurology, but inasmuch as these cases come frequently under the observation of the orthopedist, and questions of differential diagnosis come up for settlement, I have deemed it highly important to class this ailment under the diseases of the hip. We hear much now of hysterical joints, of neuromimesis, and of the old Brodie-joint. These all depend on some altered condition of the spinal nerves, and their recognition saves much valuable time to the patient. These are the cases that "go the rounds," see all physicians, and are finally cured either by heroic treatment or by the magic touch.

It is quite true that neurological science is furnishing much that is of value to us in the study of joint diseases, and in no affection is the connection between the two specialties more marked than in neuroses.

I have had the courage to introduce a chapter on Rheu-

matism among the diseases of the hip. All of us are taught to look with a deep sense of pity on a man who calls a "hip-disease" "rheumatism," and we begin to think that this is one of the errors of the dark ages. My sense of pity is not so acute as it formerly was, and I have reached the conclusion from cases in actual practice that subacute and chronic rheumatism, both of the muscular and the arthritic varieties, do exist in the monarticular form in children. I have incorporated several cases that seem to me conclusive. In districts where damp weather prevails and where malaria abounds there are many cases of this nature; and while some clinical lecturer may occasionally find a child at his clinic in whom rheumatism has been diagnosed where a true bone disease exists, there are many more in whom such a diagnosis has been made that do not come to the clinic. Still, this is a not uncommon error, and a chapter on the subject will serve to bring out the points in diagnosis all the more sharply.

On the subject of chronic rheumatic arthritis—the *malum coxæ senile* of some authors—I fear I have not been sufficiently explicit. Many of these cases I have had an opportunity of examining, and have made myself familiar with their clinical history; but I have not had the treatment of the same, because the hospital with which I am connected is exclusively for children. Still, from a study of a few that I have seen under treatment and reported in current literature, I have aimed to set forth principles in treatment that I feel convinced will lead to good results. These are a very unfortunate class of sufferers, and the lesion once being recognized, free passive motion of the joint under an anæsthetic sometimes affords decided relief.

While the term *peri-arthritis*, as originally employed, designated a subacute or chronic lesion limited to the fibrous structure in close proximity to the joint, I have found it very useful to designate by this term an acute cellulitis a little more remote from the joint, yet by contiguity often involving structures more closely related. This periarticular cellulitis, then, I have been in the habit of calling a *coxo-femoral peri-arthritis*. The name seems to me a good one, and I cannot at present recall the name of the author to whom we are indebted for its introduction into our nosology. It is nearly always acute, and nearly always terminates without seriously impairing the joint functions. It is a comparatively

trivial disease, with very alarming signs and symptoms; hence the importance of recognizing the lesion, and distinguishing it from the chronic bone disease in the neighborhood of the hip. Its early recognition is also important, in view of advantage to be gained by early incision of purulent areas. These abscesses in children not suffering from any malnutrition are harmless; but, occurring in patients whose assimilative powers are poor, whose constitution is depraved, the effects at times are very disastrous. In my chapter I have sought to fully illustrate this condition by typical cases taken from our hospital records. If I have not insisted strongly enough in the context on the importance of distinguishing these areas of infiltration from similar conditions occurring in connection with the second stage of a chronic articular osteitis very insidious in its approach, I take the present opportunity of calling attention to the subject, and know of no better way of avoiding error than in the cultivation of a habit of securing reliable histories. One essential point in the history at all times is the existence or not of lameness long prior to the development of the acute symptoms. Another point in connection with this is the presence of the infiltration.

The subject of Bursitis of the Hip has not heretofore, so far as my reading goes, been honored with a special chapter in works on joint disease. The impetus given to the study of the bursæ by Mr. Henry Morris has enabled us to more easily recognize these simple lesions, and the separation of the same from bone diseases renders still simpler the study of the more serious affection. If one meets with a case of primary bursitis and has an opportunity of observing it throughout its course, he will be less disposed to call every swelling bursitis, that occurs in the vicinity of the bursa. The whole subject is to me an extremely interesting one, and the few cases I have had under treatment seemed worthy of collection into a separate chapter. The time may come, when their nature is the more fully understood, and their exact relationship to surrounding structures the better appreciated, that antiseptic surgery will enable us to effect more speedy cures, and thus add another laurel to the wreath that must adorn the brow of the immortal Lister. From the experience I have had I cannot help thinking that a few cases at least are subjected to mechanical treatment by the indiscriminate use of such means in the hands of those

who belittle diagnosis at the expense of joint therapeutics.

Another subject equally important with that of bursitis is acute primary coxo-femoral Synovitis. A case of this occurring in one's practice, and closely studied, will shake one's faith in the current pathology of joint disease. It will show that hip-disease, as popularly understood, does not, as a rule, begin in the synovial membrane. My hospital facilities have enabled me to make a somewhat extended study of this disease, and hence I recognize the importance of differentiating the lesion from the bone lesions—the starting-point, as I believe, of the vast majority of cases of "hip-disease."

In the chapter, however, devoted to this subject I have endeavored to avoid bias, and to recognize the fact that "hip-disease" does sometimes begin in this way. The subject, therefore, has been elaborated as fully as my time would permit, and I trust it is made sufficiently clear to furnish the reader with some suggestions, at least, that will enable him to pursue the study in a satisfactory manner. It will be seen that I have not fully developed the subject of chronic synovitis of the hip, and my apology for not devoting more attention to this lesion is, that I believe when such a lesion does occur its tendency is to involve the deeper tissues and make a genuine hip-disease. Still there are, I fancy, cases of chronic synovitis occurring in adult life where the bone does not become involved. We are prone to regard such as rheumatism, and, for all practical purposes, the classification is not objectionable.

Chapter IX., is devoted to a subject that is growing in importance, thanks to the researches of pathology. We are indebted to English observers for the light that has been thrown upon Epiphysitis, and the recent meeting of the British Medical Association brought out several papers on this subject that must prove of great value in the study of joint diseases. Many cases that we have been in the habit of classing among congenital luxation and among traumatic separation of the epiphysis we can now look upon as due to acute inflammatory diseases occurring in very early life.

Mr. Thomas Smith, in the St. Bartholomew Hospital Reports of 1874, describes quite minutely this affection as "acute arthritis of infants," and I find that my own cases

correspond very closely with those he has reported. It is to him we owe our knowledge of the pathological processes. It is but fair, however, to my own chapter to say that I was not familiar with this contribution to our literature when I recorded my own cases. As remarked in that chapter, I was at a loss for a long while how to classify the material, and in my intercourse with my orthopedic confrères in this city I found very little to help me in my study. The cases seemed to have drifted into my hands, and I knew of only one that had come under the observation of another practitioner in this specialty, and that practitioner was Dr A. B. Judson.

In the same hospital reports—the fifteenth volume—Mr. Eve deals with the pathological aspects of necrosis at the extremity of the diaphysis and in the epiphysis of growing bones, and contributes a valuable addition to the subject of epiphysitis. Mr. W. Marrant Baker, surgeon to St. Bartholomew's, at the last meeting of the British Medical Association, threw out some valuable suggestions as to treatment in a paper on "epiphysal necrosis and its consequences." A reference to these papers from that time-honored hospital will supplement the chapter I have here introduced.

The second part of this chapter deals, in a negative way, with diastasis of traumatic origin, and I much regret my lack of clinical material to make this portion more attractive. Its close relationship, however, with acute epiphysitis and with diastasis, the result of slow pathological changes in chronic diaphyso-epiphysitis, is brought out by illustrative cases, and this relationship may enable us to better recognize those of traumatic origin. In this way then, I fain would believe, the chapter will prove a contribution, at least, to the diagnosis of chronic articular ostitis.

Periostitis of the hip and malignant diseases are considered in Chapter X. This brings us nearer to the lesion of the hard parts, and introduces us to diseases that are often of grave import. This is particularly true of malignant diseases. In selecting a caption for this chapter the term periarticular periostitis occurred to me; but, on reflection, the qualifying adjective seemed to be entirely superfluous. A periostitis is naturally periarticular, and the association of this term with the joint locates the lesion at the hip. I have dealt, however, with the disease as a primary lesion; and while there are cases wherein pus dissects up

the periosteum and where a peripheral osteitis induces a periostitis, these cases would add nothing to the subject from a therapeutic standpoint. These conditions are found occasionally associated with osteitis beginning in the centres of ossification, the inflammation extending to the periphery. Again, we are all familiar with periosteal lesions of the femur, induced by spinal abscesses, but these are interesting only in a differential way. If I have not made myself sufficiently clear in tracing the development of an articular osteitis from a periostitis, it has been because of the lack of pathological data. I want it understood, however, that I am not an unbeliever in this mode of production of a "hip-disease." In the second part of this chapter the only malignant disease that I have attempted to elaborate is the round-celled periosteal sarcoma. The other forms of malignant diseases are very infrequent, and indeed rarely ever occur in childhood. Once recognized the question of therapeutics admits of little discussion. This belongs more properly to the works on general surgery, and to such those interested in this subject can refer.

The larger part of this work is devoted to chronic articular osteitis, and this disease certainly demands a large space. It will be seen in the caption of the chapter on pathology that I make this name synonymous with *morbus coxarius*, *morbus coxæ*, hip-joint disease, etc. The views as to the pathology are undergoing radical changes now, and we are gradually coming to recognize a central osteitis as the lesion, which will explain the more important features of the disease in question. Once a clear idea of the pathogeny and the pathological changes is had the indications to be met can be more readily appreciated, and the case be better conducted to a successful issue. I have purposely devoted considerable space to the pathology, having learned to appreciate its value in all joint-diseases.

Concerning the etiology much has been said in a clinical way, although a little statistical work has been interspersed. I have not collected the number of cases of disease affecting both joints and those affecting the spine as well. These would be interesting from an etiological point of view, but they scarcely merit, it seems to me, a distinct chapter, or even a portion of a chapter.

For the benefit of those who believe that double "hip-disease" is an extremely rare affection, I would say that it

occurs with more frequency than one would imagine. I have seen quite a number of patients examined and treated, even for bone disease affecting one hip, while the same lesion in the other hip would be entirely overlooked, so insignificant did the signs appear by comparison. I have also seen cases with the monarticular form develop the bilateral form several months or a year or two later. I have in mind now two cases that I saw some two and a half years ago, and I am sure that the disease existed only on one side. When I saw them again—one eight months and one two years afterward—they were wearing hip splints for undoubted disease on both sides.

I believe that some of us at least are deceived in this way: We examine a hip, and find signs of the first stage; we also find some obscure signs about the other hip, and delude ourselves into believing these to be sympathetic. I am growing very skeptical concerning sympathetic hips. Still I am free to say that I have never committed myself strongly to that belief. It has become a habit with me to place implicit reliance on certain signs found about a hip, even if all the joints are the seat of disease.

I have not devoted any space in the body of the work to a consideration of hip lesions associated with similar lesions in other joints and in the spine. I have notes of a number of cases of spinal caries with bone lesions of the hip; indeed it is sometimes difficult to tell which was the primary disease. I have under treatment at present a girl aged five years who has lumbar caries, osteitis of both hips, and osteitis of the carpal bones. These are interesting facts to know, in order that one may not set aside signs of diagnostic value because other joints are involved. All such cases would have been mentioned had I undertaken to write a statistical work. I have avoided statistics as far as was practicable in order to make the book more readable.

The questions of trauma and struma have not been placed in antithesis, because I do not believe such a relationship should exist. In describing the etiology I have taken it for granted as settled that the bulk of the profession believe in a strumous diathesis; if not hereditary, then acquired. Given then this strumous diathesis, this cachexia, this evidence of malnutrition, it is very easy for a concussion to induce a hyperæmia of the centres of development, which hyperæmia under certain conditions will result in inflammation.

It is also well established that these foci of disease can originate without even a fall as exciting cause. I am willing, then, to admit that falls which induce a concussion in young children or sprain or contusion in older children are the exciting cause in a large number of cases; but I am not willing to admit that the individuals thus affected are free of a diathesis which we call strumous. The cases and the other facts all go to prove the above two propositions, and I am sure that all unbiased observers will arrive at the same or similar conclusions.

I have deemed it necessary to fully illustrate the clinical history, for the reason that many good surgeons practising this specialty even seem to be at a loss to understand the nature of this disease. They seem to think that it gets well in six months or a year; that the subsidence of acute symptoms means a cure; that an exacerbation yielding to treatment justifies them in applauding the particular means employed. So that I have endeavored to make this chapter especially full. The material at hand encourages me to believe that I can certainly do justice to the clinical history.

The subject of diagnosis too is dealt with at some length, the different stages being accorded special parts in the chapter; and, in view of the importance of a clear understanding, especially in the early stage, no apology is offered.

In discussing treatment I have attempted to explain what is meant by the expectant treatment, giving cases by way of illustration. It does seem though that the time will come when all mechanical treatment will be considered as expectant.

Extreme views may have found a place in this portion of the volume, but they are views based on solid experience and if they are not accepted I can well afford to let them take their course as facts. The physiological treatment is given a place. I feel entitled to speak at some length on this method, for I have had a large proportion of my out patients on crutches and a high shoe. The idea of leaving the hip unprotected save as the reflex spasm in the muscles protects the hip is peculiar to Dr. Hutchison, and there are cases occasionally met with that seem to do well with the shoe and crutches alone.

In this country we are not disposed to accept the treatment advocated by Mr. Hugh Owen Thomas of Liverpool, but it certainly seems to possess advantages over the

strictly physiological. The hip is well fixed, it would seem; though recent writers who have attempted to carry out Mr. Thomas's instructions are very loath to bear testimony to the facility of application of the apparatus. The weight of the steel, the disposition to turn, and various other minor points of detail, so simple to the inventor, are not by any means simple to the practitioner. The true value of the treatment is discussed at length.

Concerning the subject of traction and extension apparatus, there is much that is as yet unsettled. The object is, I take it, to bring about ankylosis in the best position. This is what many of the splints do, and it is immaterial what is claimed for them. The correction of deformity by screws is condemned by some who employ apparatus. The limb is left to take care of itself.

If I have not given all the forms in common use it is because of my limited time in which to collect. Many splints I know are pictured in catalogues, but are no longer in use.

The chapter on operative treatment has been devoted to drilling in the early stage, to excision in the latter stages, and to osteotomy for correction of deformity. There are many cases on record of what seem to be good results, but enough time has not elapsed to make them of any special value for statistical purposes.

In concluding then this chapter let me insist again on the importance of a thorough examination in every case. The object, in the first place, should be to have a proper classification, and to bear this in mind when examining a patient. There are certain signs that can be discovered only when the patient is divested of all clothing. The tape-measure is an essential—the goniometer is useful but above all things a practised eye and an unbiased mind are indispensable. In classifying cases for statistical purposes a few years ago the committee on surgical procedure in the Therapeutical Society met with many difficulties in the way of harmony. I drew up a schedule which was supplemented by several specialists, and the form we finally accepted is submitted for further use.

I would premise by stating that some confusion yet exists concerning the measurement of angles. I have advised with a number of orthopedists, and I find that in recording angles the supplement of a right angle is used when the

deformity is less than 90° . The starting-point is taken from the direction of the head, and the limb is moved over the articulation with the plane of the body as the base. So that when the limb is on a line with the body we have 180° , and not 0 as some estimate angles. It would be better I think, for the sake of unanimity in recording cases, to adopt this method.

The following is the schedule in conformity with which cases may be reported for the use of statisticians:

1. Sex. 2. Age when disease developed. 3. Side affected. 4. Date of first symptoms. 5. Symptoms at invasion. 6. Apparent seat of initial lesion: *bone, including periosteum; or, soft parts, including synovial membrane.* 7. Exciting cause as stated by patient. 8. Interval between this and first symptom. 9. Date of first examination. 10. Detail the signs found; *as shortening, atrophy, angle of deformity, limitation of movements, usefulness of limb, abscess, pain, etc.* 11. Previous treatment: each method, and duration of same. 12. Subsequent treatment, with duration of same. 13. When did the opening take place leading to carious bone? 14. When did the sinus or sinuses close permanently? 15. Extent of carious process. 16. Condition when treatment suspended, with date. (a) Shortening: *real, practical.* (b) Atrophy. (c) Mobility in angles: *flexion, extension, abduction, adduction, rotation.* (d) Position of limb. (e) usefulness of limb. We have aimed to make our examinations in conformity with these questions, and are accumulating some valuable material.

To get the length of a limb there are several points from which to measure. The anterior-superior spinous process is the more usual point. This gives, if the limbs are *symmetrically* placed, the real shortening. From the umbilicus the practical shortening is obtained, also from the perineum. To get the shortening from bone atrophy or arrest of development measure from the tip of the trochanter.

The position of the trochanter and its relative distance from the basin of the acetabulum are certainly important points to note, and Nélaton's line enables one to decide whether the tip of trochanter is above or below the normal position.

In concluding this introductory chapter let me insist upon the necessity of employing all the means at our dis-

posal for thorough examination. The family history, the personal history, the sequelæ of the exanthemata, the suddenness of invasion or the slow insidious invasion—all these should be clearly understood to make physical signs of value in diagnosis and in prognosis.

CHAPTER II.

THE ANATOMY OF THE HIP.

In general terms the word hip is employed to designate not only the immediate structure entering into the formation of the joint, but the structures, both hard and soft, which contribute to the functions of the same. In popular parlance, the integumentary coverings go to complete the full group of tissues embodied in the term hip. If one bruises the skin in the neighborhood of the trochanters the hip is bruised; if a furuncle form in this neighborhood the boil is on the hip. Neither does the profession nor the laity draw a sharp distinction between the different structures in and about the joint when casually discussing this subject. Webster defines the hip as "the projecting part of the trunk of an animal formed by the lateral parts of the pelvis and the hip-joint with the flesh covering them; the haunch." It is an Anglo-Saxon word.

The term, then, hip-disease is a general one, and while many authorities endeavor to have it restricted to lesions primarily involving the immediate joint structures it is really applicable to lesions of any part of the hip. It is in this way that confusion arises. When one says he has cured a case of hip-disease you do not know just what meaning he intends to convey, and if you demand an anatomical diagnosis he will very often find it difficult to tell you just what he does mean. It is, therefore, very necessary to a proper understanding of the diseases in and about this joint that one bear in mind the various anatomical structures entering into its formation. It is well, too, to bear in mind that inflammatory diseases and neoplasms attacking particular structures in this vicinity deal with them just about as they deal with like structures in other vicinities. The early recognition of the tissues involved and the nature of the morbid process will naturally suggest appropriate efforts at least in preventing an extension of the disease to other parts, the involvement of which may or may not be of vital importance.

Looking, then, at a naturally formed hip one must learn by observation the contour of the parts, the appearance of the skin, the folds and dimples into which it is thrown, while the subject assumes different attitudes. Art students naturally become familiar with surface anatomy, and medical men should by all means study the normal appearance, not only of the hip but of all the joints. Indeed, surface anatomy plays a very important part in orthopedic surgery.

The prominence of the nates, of course, stands out most conspicuously as the erect position is assumed; the fulness or the flabbiness indicating health or the reverse. In the normal state we must find absolute symmetry in the prominences and the depressions. The eye then takes in the gluteal fold, which must not deflect to one or the other side; the supra-trochanteric dimples, or depressions, which vary in depth and area according to the leanness or obesity of the subject, preserving, however, in any instance, a symmetrical appearance; the gluteo-femoral folds, marked by fissures or creases, indicating the junction posteriorly of the thigh with the trunk. These creases vary, too, according to the muscular or adipose development of the individual. As a rule the fissure is a bifurcated one, the upper curvilinear being the longer, and extending from the perineum to the junction of the posterior with the outer surface of the thigh, while the lower, nearly straight, being the shorter by one half, and leaving the upper about an inch from its femoral extremity, to extend an inch or two diagonally down the posterior aspect of the thigh. Often, however, we find a third division or fissure much shorter, and taking a course nearly vertical from the curvilinear above. We remember, too, that the law of symmetry must be recognized even in these fissures. Indeed, one cannot but help admire the symmetrical arrangement of the lines and prominences so exquisitely drawn by the hand of Nature in a pair of hips free from disease or deformity.

One must not rest content with studying the parts already mentioned, but the eye will take in at a comparative glance the position of the trochanteric prominences—the sacral region, the ilio-costal spaces, and their relationship to the crista ilii, the size of the thighs in the upper third and, indeed, all the regions immediately connected with the hip. Soon one learns to observe all this at a glance, and easily detects any departure, however slight, from the law of symmetry.

To look through the integument and recognize the muscles and fascia and adipose tissue immediately underlying, another step in anatomy must be taken. The prominence of the nates we know is produced by an accumulation of fat lying over the gluteal muscles.

It is by far the better plan to give the muscles which act upon the hip-joint a classification according to function, and it shall be my aim to enter as little as possible into anatomical details.

THE FLEXORS.—There are two sets; one whose function is pure flexion, and another whose function is principally accessory to the first. The former are the psoas and the iliacus, practically forming a single muscle. Their attachments are extensive, and hence their importance. If disease involve the bodies of the lower vertebræ the psoas is involved, and if the ilium the sacrum or the capsule of the joint is implicated the iliacus is excited often into undue action. Both are inserted at and below the small trochanter. I have purposely omitted the psoas parvus because it has no action on the hip.

The latter group of muscles which assist in flexion under certain circumstances are; the pectineus, the sartorius, and the rectus. The latter two can act only when their action on the leg is completed or prevented. The vastus externus is thought by some anatomists to assist in flexing the thigh through its attachment to the rectus, and the obturator externus is occasionally a decided flexor. This is illustrated when you cross one thigh over the other.

The flexor muscles all arise within, or along the margins of, the pelvis, the psoas alone excepted.

THE EXTENSORS.—The three glutei, and these are assisted by the obturator internus and the hamstring muscles, the latter acting when they have completed the flexion of the leg, or are prevented from so doing. Their action can, however, have little to do with disease at the hip, since they influence both joints simultaneously, as in the first act of rising from a seat.

The extensors arise from the pelvic bones posteriorly—one, the obturator internus taking the greater portion of its origin from the inner surface of the posterior wall.

THE ADDUCTORS.—These pass between the os innominatum and the femur, and are the long, short, and great adductors, assisted by the pectineus and the graciis, and occasionally by the gluteus maximus, the obturator externus and the

quadratus femoris. If the limb be extended the gluteus assists in adduction, if flexed the external obturator assists, and if extreme outward rotation is completed or prevented, then the quadratus acts as an adductor.

THE ABDUCTORS.—The muscles which support the pelvis on one thigh—the gluteus medius and gluteus minimus are strong abductors, and their most powerful action is displayed when one limb becomes the basis of support. The gluteus maximus, with its upper fibres and the tensor vagina femoris are auxiliary to the above act. The sartorius abducts while flexing both hip and knee.

THE INWARD ROTATORS.—The tensor vagina femoris and the anterior portions of the gluteus medius and gluteus minimus are the muscles here employed.

THE OUTWARD ROTATORS.—These muscles occupy places on both sides of the joint, and in front we have the psoas and iliacus—the chief flexors. On the inner aspect the pectineus and the three adductors; on the inferior and posterior aspect the obturator externus. Posteriorly are the quadratus femoris, the gemelli, the obturator internus, the pyriformis, and the posterior portion of the gluteus minimus and gluteus medius. These are all assisted by the gluteus maximus. When the knee is extended the biceps femoris may serve as an outward rotator.

It will be observed that the muscles whose function it is to execute the angular movements of the thigh, act also as outward rotators, and this double function gives a greater range of motion to the thigh, *i.e.*, if one of the functions of a group of muscles is rendered unnecessary the whole force can be directed toward the other. Abduction, however, is an exception.

To sum up, then, the muscles with their functions we have

FLEXORS.

<i>Two Special.</i>	{ Psóas Magnus. Iliacus.
<i>Five Accessory.</i>	{ Pectineus. Obturator Externus Vastus Externus. Sartorius. Rectus.

Nerve supply: The psoas is supplied by anterior branches

of the lumbar nerves, and the iliacus by filaments from the deep branches of the anterior crural.

The accessory obturator—which is not always present—the deep muscular branches from the anterior crural, and occasionally the anterior branches from the obturator, supply the pectineus.

Posterior branches of the obturator supply the obturator externus, while the sartorius gets filaments from the middle, or internal cutaneous nerves, branches of the anterior-crural.

The vastus externus derives its supply likewise from the anterior crural, and from the branch going to the muscles is given off a filament which is distributed to the articular surfaces of the knee.

EXTENSORS.

<i>Three Special.</i>	{	Gluteus Maximus. Gluteus Medius. Gluteus Minimus.
<i>Four Accessory.</i>	{	The long head of the Biceps. Semitendinosus. Semimembranosus. Obturator internus.

Nerve supply: The inferior gluteal, a branch of the small sciatic, is distributed liberally throughout the gluteus maximus, and an additional supply comes from a branch of the sacral plexus.

The superior gluteal of the sacral plexus supplies both the gluteus medius and gluteus minimus. The great sciatic furnishes muscular branches to the biceps, the semitendinosus and the semimembranosus and the sacral plexus similar branches to the obturator internus.

ADDUCTORS.

<i>Three Special.</i>	{	Adductor Longus. Adductor Magnus. Adductor Brevis.
<i>Five Accessory.</i>	{	Pectineus. Gracilis. Gluteus Maximus (when limb is extended). Obturator Externus (when thigh is flexed). Quadratus Femoris.

Nerve supply: The obturator nerve supplies all the

muscles in this group except the quadratus femoris, while the adductor magnus gets additional branches from the great sciatic. The supply of the pectineus has already been given. The quadratus femoris gets its entire supply from the sacral plexus.

ABDUCTORS.

One Special.—Tensor Vaginæ Femoris.

Three Accessory. { Gluteus Maximus.
Gluteus Medius.
Sartorius.

Nerve supply: The tensor vaginæ femoris derives its supply from the inferior branch of the superior gluteal, one of the important divisions of the sacral plexus. The sartorius, as before mentioned, gets filaments from the anterior crural, and the glutei from the small sciatic and the superior gluteal branch of the sacral plexus.

OUTWARD ROTATORS.

Six Special. { Quadratus Femoris.
Gemellus Superior.
Gemellus Inferior.
Obturator Internus.
Obturator Externus.
Pyriformis.

Nine Accessory. { Ilio-psoas.
The Three Adductors.
Pectineus.
Posterior Fibres of the Gluteus Medius.
Posterior Fibres of the Gluteus Minimus.
Gluteus Maximus.
Biceps.

Nerve supply: Branches from the sacral plexus supply all the special muscles in this group, with the exception of the obturator externus, which is supplied, as already stated, by posterior branches of the obturator.

The accessory group has already been treated as to the nerve supply under their respective localities as special muscles, and a repetition is unnecessary.

INWARD ROTATORS.

One Special.—Tensor Vaginæ Femoris.

Two Accessory. { Anterior Fibres of the Gluteus Medius.
Gluteus Minimus.

The nerves supplying this group have already been given as the superior gluteal.

The blood supply of the muscles which control the action of the hip is from the profunda femoris chiefly. This is a large branch of the femoral.

THE FASCIÆ OF THE HIP.

There is a superficial fascia of the thigh described in the works on anatomy, but as this has no special connection with the diseases of the hip I pass to a consideration of the deep fascia—the fascia lata. Deep abscess, acute and chronic, is rendered particularly dangerous by reason of this fascia which furnishes a uniform investment for the whole of the upper third of the thigh, receiving fibrous expansions from the gluteus maximus, the biceps, sartorius, gracilis, semi-tendinosus, and quadriceps, while the tensor vaginæ femoris is inserted between its layers. It is attached above to Poupart's ligament and to the crest of the ilium; behind, to the margin of the sacrum and the coccyx. It is attached to the whole length of the thigh-bone, from the intertrochanteric line to the widening of the linea aspera.

The numerous smaller septa enclose individual muscles and are attached to the main fasciæ. The saphenous opening is simply a large oval aperture in this tissue, and through it abscesses from the deep structures often find their way to the surface.

In this locality the fascia is divided into an iliac and a pubic portion. The former includes all that portion on the outer side of the saphenous opening being attached externally to the anterior superior spine, to Poupart's ligament, and to the pectineal line in connection with Gimbernat's ligament. It forms as it passes down from the spine to the pubis the outer boundary of this opening. The pubic portion lies on the inner side of the saphenous opening. It covers the surface of the pectineus, passing behind the sheath of the femoral vessels, being closely adherent thereto, and is continuous with the sheath of the psoas and iliacus muscles. It is lost finally in the capsule of the hip-joint.

THE BURSÆ ABOUT THE HIP.

The synovial bursæ in this region are nine in number, and subserve an important function. They consist of a thin wall of connective tissue partially covered by epithelium,

and contain a viscid fluid. Naturally they enhance the freedom with which muscles move over bony prominences and tendons. One can readily see how imperfectly these muscles act when their underlying bursæ are not in perfect condition.

Figures 1 and 2 I have had copied from Morris. A large bursa (D, Fig. 1) lies between the iliacus and the thin portion of capsular ligament directly in front of the joint, and it often communicates with the synovial cavity. Its joint connection makes it a very important element in the pathology of disease affecting this articulation.

Between the gluteus medius and the upper and front portion of the trochanter major there is a small bursa (I, Fig. 1). It extends quite a distance between the tendon of this muscle and that of the pyriformis. Occasionally two bursæ instead of one are found; one between the tendon and the bone and the other between the tendon and the pyriformis.

A bursa (F, Fig. 1.) of larger size than the preceding lies between the tendon of the gluteus minimus and the front of the trochanter, sometimes extending between this muscle at its insertion and the vastus externus at its attachment.

Lying in front of the gluteus maximus, and between it and the vastus externus is a bursa (J, Fig. 1) of larger size, over which rides the strong fascia of the buttock as it passes down the thigh towards the insertion of the first named muscle.

At the base of the great trochanter is a large multilocular bursa (A and B, Fig. 2), over which the dense fascia and the tendon of the gluteus maximus play.



FIG. 1.—BURSÆ IN FRONT OF THE JOINT.

A. Bursa between pectineus and femur; B. Adductor brevis; C. Pectineus; D. The bursa between the iliopectineus and the capsule of the hip, often communicating with the joint; E. Iliacus; F. Bursa between gluteus minimus and trochanter; G. Gluteus minimus; H. Gluteus medius; I. Small bursa between gluteus medius and trochanter; J. Small bursa between gluteus maximus and vastus externus; K. Gluteus maximus; L. Vastus externus.

The remaining four bursæ are at the back of the joint and are arranged in the following order:

An unimportant bursa situated between the external obturator and the posterior portion of the neck of the femur.

A large bursa between the quadratus femoris and the posterior surface of the small trochanter.

Frequently an elongated bursa is found between the internal obturator and the gemelli muscles, and capsule of the joint in its posterior portion.

Then there are bursal inter-spaces containing the usual bursal fluid, between the quadratus femoris and the obturator externus, and the capsule posteriorly.



Fig. 2.—BURSÆ AT THE BACK OF JOINT.

A. and B. Two small bursæ between the tendon of gluteus maximus and bone; C. Large bursa between gluteus maximus and trochanter; D. Bursa between obturator internus and capsule of hip; E. Bursa between gluteus medius and pyriformis; F. Pyriformis; G. Gluteus minimus; H. Gemellus superior; I. Bursa between obturator internus and ischium; J. Obturator internus cut across; K. Gemellus inferior; L. and M. Small bursæ in connection with hamstring muscles at their origin.

from the femur about the junction of the neck with the shaft.

2. *The Cotyloid*, a fibro-cartilaginous rim attached to the margin of the acetabulum which it thereby deepens.

3. *The Teres*, or round ligament, an inter-articular flat band extending from the acetabular notch, to the dimple in the head of the femur.

4. *The Transverse*, consisting of a strong flattened band

THE LIGAMENTS.

1. *The Capsular*. This is the enveloping structure of the hip-joint, which derives its attachments from the pelvis at a slightly varying distance from the acetabulum, and

of fibres crossing the notch at the lower part of the acetabulum, thus converting it into a foramen.



Fig. 3.—FRONT VIEW OF CAPSULAR LIGAMENT.

A. Tendinous band between vastus externus and rectus muscles, strengthening capsule; B. Ilio-femoral ligament—the Y-shaped ligament; C. Thin part of the capsular ligament.

These ligaments are deserving of a more detailed description, but they are quite fully described in the works on anatomy.

The capsular (see Figs. 3 and 4) encloses the cotyloid, the ligamentum-teres and the transverse, springing partially from the outer fibres of the last mentioned. The whole of the joint is within its folds and the varied movements at this articulation demand a large loose capsule. In its lower circumference it is attached in front to the spiral or anterior inter-trochanteric line, above to the base of the cervix femoris, and behind to the middle of the cervix, a half inch from the inter-trochanteric line. Its great thick-

ness is in the upper and forepart of the joint where the greatest amount of resistance is required. Below it is thin, loose and longer than in any other part. The fibres run in two directions, a longitudinal and a circular. The circular are collected into a band at the lower and posterior portion, where they embrace the femoral neck, while in front



Fig. 4.—BACK VIEW OF CAPSULE.

A. Zonular fibres at back of capsule, known as the ischio-femoral band; B. Thin part of capsule attached to back of neck of the femur.

they expand and are interwoven with the deeper layers of the strongly developed longitudinal fibres and are by these concealed. The longitudinal are most distinct as thick bands, serving as accessory ligaments; for instance, on the anterior and superior aspects of the capsule, known as the *ilio-femoral ligament* (B. Fig. 3) while these fibres at the lower and posterior portion of the joint are known as the *ischio-femoral* (A. Fig. 4) passing from the furrow on the

ischium below the acetabulum to end in the circular band of fibres. In front likewise there is a band converging to the capsule from the ilio-pectineal eminence to the margin of the obturator foramen and the obturator membrane, known as the pectineo-femoral ligament.

The capsule is additionally strengthened by contact with muscles and tendons being thus supported on all sides. Some are closely connected with the ligament, and serve to raise it during the movement of the joint, thus preventing the ligament from being pushed against the edge of the acetabulum.

The ilio-femoral band, (B. Fig. 3) traverses the joint in front, extending from the anterior superior spinous process of the ilium, to the anterior trochanteric line. This is called the Y-ligament of Bigelow, from its appearance on dissection. Near its centre is an aperture transmitting the transverse branch of the external circumflex artery as it passes to the joint.

This accessory ligament or band limits extension and thus prevents the natural tendency of the trunk to roll backwards when in the erect posture. Muscular power for this purpose, then, is not required.

Every position of extension, except when abduction is combined with it, renders the band tense. Adduction with complete extension, outward rotation even with flexure, and extension with outward rotation render tense the whole ilio-femoral band.

Very strong fibres make up the ischio-femoral band (A. Fig. 4) and pass in almost straight lines to their femoral attachment when the thigh is flexed; but when this member is extended the fibres wind upward in a zonular manner over the back of the head and neck of the femur. This portion of the capsular ligament does not limit simple flexion and is not made tight until adduction or rotation inwards is combined with flexion, otherwise it is quite relaxed.

The pectineo-femoral band—a narrow set of fibres passing from the anterior border of the pectineal eminence to the neck of the femur—is put upon the stretch in abduction, whether combined with flexion or extension, and is very taut both in abduction combined with rotation outward and flexion, and in abduction combined with simple flexion.

A triangular space bounded by the ilio-femoral and the

pectineo-femoral bands and the pubic rim of the acetabulum is the thinnest portion of the whole capsule, but is never tightly stretched in any position of the joint. The ilio-psoas muscle, separated by a bursa which occasionally communicates with the synovial sac, passes over this space.

The cotyloid ligament is more properly called by Morris the *cotyloid fibro-cartilage*, varying in depth and thickness, nowhere more than a quarter of an inch from its attached to its free edge. It is yellowish-white, is convex on its outer surface, while its articular face is concave, contracting somewhat the aperture of the acetabulum, so that it retains the head within its grasp after the capsule and all the muscles have been completely divided. It is so closely blended with the transverse ligament that it is difficult to speak of the two as distinct structures.

In both of its aspects it is covered by the synovial membrane, which is reflected over its free edge from the capsule to the articular cartilage of the acetabulum.

Mr. Henry Morris (*Anatomy of the Joints*, and *Br. Med. Jour.*, Nov. 28, 1882,) has given more study to the ligamentum teres (Fig. 5) than any one of the recent anatomists, and his observations certainly deprive this inter-articular band of much of the importance and mysteriousness with which it has heretofore been enveloped.

The teres, at the acetabulum, has two bony attachments, one on each side of the notch, intermediate fibres springing from the under surface of the transverse ligament being continuous here with the capsular ligament and periosteum of the ischium. Its attachment to the caput femoris is in the anterior part (known as the pit) of the dimple of the head, and to the cartilage forming the margin of this part of the dimple. The ligament is from an inch and a-half to an inch and three-quarters in length, and varies a little in size in proportion to the thickness of the ischio-femoral band.

The fatty tissue at the bottom of the rough recess in the acetabulum forms a thick quadrangular cushion, occupying all the non-articular portion of the cavity, and projecting outwards beneath the transverse ligament through the acetabular notch. The ligamentum teres receives the articular nerves and arteries as they enter the cavity to be transmitted through the round ligament to the femur. The thickness of the synovial membrane in its reflection from this pad, or cushion, to the ligament, gives it the appearance of two triangular planes at right angles with

each other. This interarticular band is shut out from the synovial cavity of the joint, and resembles in this relationship the lungs and the abdominal viscera.

From Mr. Morris' experiments positive proof was obtained "that (1) the ligamentum teres is quite relaxed during extension of the thigh, and that, too, whether the body lies on its back, or is raised into the standing posture; (2) when abduction is combined with extension of the thigh

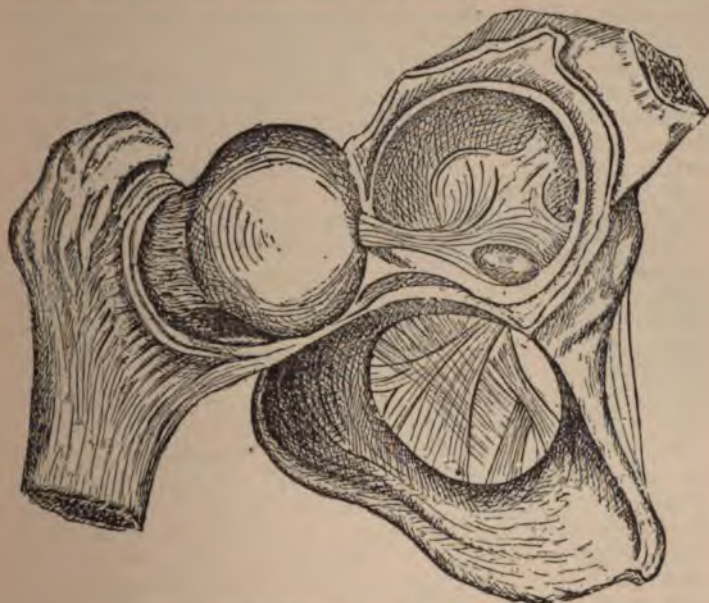


FIG. 5.—LIGAMENTUM TERES.

there is no tension on the round ligament; (3) the ligament is at its tightest when the limb is simultaneously flexed, adducted, and rotated outwards, very nearly as tight when the limb is fully flexed and rotated outwards without being adducted, or fully flexed and adducted without being rotated outwards."

He further concludes that it is not the prime function of this ligament to assist in supporting the weight of the body in the erect position, whether we stand on one leg or on both; and that it does not check adduction in the ex-

tended or nearly extended position, as when standing at ease.

It has been shown by the anatomist, Hyrtl, that the vessels which pass into the ligamentum teres from without, viz., one from the obturator artery, and the other from the internal circumflex, turn back in loops and do not enter the substance of the head at all. This observation has been confirmed by other anatomists, and we are led to doubt seriously whether it is the primary function of the round ligament to convey blood to the head of the femur. In the young subject, before the epiphysis is joined to the diaphysis, the head of the humerus and the extremities of the other long bones receive their blood-supply without any such round ligament, and in the adult the size and number of the vessels entering the neck of the femur seem amply sufficient to nourish also the head of the bone.

It is certainly not necessary to the perfection of the hip-joint in man, by reason of the perfect mobility and security of the joint in persons who have been born without this ligament, and by the successful reduction of the hip after dislocation. Its secondary importance as a controlling structure over the joint is further proven by the fact that it can be divided without causing the slightest jerk or change in the position of the limb so long as the ilio-femoral band is intact. Indeed, comparative anatomy teaches that this ligament is but the tendon of the ambiens muscle.

The SYNOVIAL MEMBRANE lines the capsule and encloses the ligamentum teres in the manner already described. Through an opening in the anterior wall of the capsule it sometimes communicates with the bursa lying beneath the psoas. This membrane is quite extensive, but is well protected from injury by reason of its folds and connection with the mass of fat in the basin of the acetabulum. The fluid contained within its cavity does not differ from synovial fluid in general, viz., either colorless, or of a pale yellowish tinge, so viscid that it is with difficulty poured from one vessel into another. Robin, as quoted by Flint, gives the composition as follows: water, 928.00; synovine, (albumen) 64.00; principles of organic matter, not estimated; fatty matter, 0.60; chloride of sodium and carbonate of soda, 6.00; phosphate of lime, 1.50; ammonio-magnesian phosphate, traces.

THE ARTICULATION.—The hip joint is a ball and socket joint, its class being *diarthrosis*, and its peculiar subdivision

being *enarthrodia*. The innominate bone furnishes the cotyloid cavity—the acetabulum—in which snugly fits the globular head of the femur. The articular portion of the acetabulum is shaped like a horse-shoe, is covered with cartilage, is broader above and behind than in front, and is occupied by adipose tissue covered with synovial membrane. The acetabulum is formed by the ilium, a little less than two fifths; the ischium, a little more than two fifths, and the pubis, the remaining one-fifth. The direction of this cavity is downward, outward, and forward, thus receiving the head of the femur obliquely. At its deepest part the bone is so thin that light is transmitted, while the upper and posterior wall is very strong and very thick. The pelvic surface of the innominate bone corresponding to the floor of the acetabulum, presents a smooth triangular plane, from which the obturator membrane and the internal obturator muscles arise. It is here that perforation takes place in articular disease of the hip, and the course pus takes is well illustrated by the accompanying diagram I have taken from Dr. Clippingdale's essay on hip-joint disease, published in the *Medical Press and Circular*, 1882-1883.

The circumference of the acetabulum is represented by a circle, the attachment of the obturator muscle by a dotted line. It is obvious that a perforation of the acetabulum must appear internally in one of three positions: (A) On the obturator muscle; (B) in front of the muscle; (C) behind it. If the opening extend into the muscle the pus will pass along its substance and emerge with it at the small sciatic notch, and point upon the nates. A, in the figure, indicates its course. If perforation have occurred behind the obturator the matter will pass into the ischio-rectal fossa, and may be discharged



FIG. 6.—DIAGRAM SHOWING THE COURSE PUS TAKES IN PERFORATION OF ACETABULUM.

either through the perineum or into the rectum. The arrow B, indicates the course taken. In most cases, however, the perforation takes place *anterior* to the origin of the muscle, and then the pus passes upwards through the sheath of the obturator vessels and makes its appearance in the groin. Arrow C, indicates the course.

The development of the innominate, as well as the development of all bones entering into the formation of joints, is of prime importance in the pathogeny of bony diseases in the neighborhood of articulating surfaces.

Ossification begins in the cartilage of the ilium just above the sciatic notch in the eighth or ninth week. Bone is deposited similarly in the thick part of the ischium below the acetabulum in the third month, and in the superior ramus of the pubis in the fourth or fifth month. The greater part of the acetabulum, the crest of the ilium, the tuberosity and ramus of the ischium, and the body and inferior ramus of the pubis are still cartilaginous at birth. Ossification from the three primary centres has, however, extended into the margin of the acetabulum. It is not until the seventh or eighth year that the rami of the ischium and the pubis become completely united by bone. Then there is a triradiate strip of cartilage known as the cartilage in the floor of the acetabulum, which does not begin to be ossified until about the age of puberty.

The head of the femur forms two thirds of a sphere, which is very smooth, being covered by articular cartilage. But for the slight bulging at a spot below the dimple for the round ligament it forms a part of a true sphere. The fossa for the ligamentum teres is below and behind the middle point of the articular surface and it is only in the anterior part of the fossa—the pit—that the ligament is attached, while it lies in the posterior part—the groove, when in action, viz., flexion with outward rotation. The neck is cylindrical near the head, becoming flattened as it proceeds outwards. Its inclination to the shaft varies in the different periods of life. In adult life the angle is 125° (Fig. 8). In early life it is about 135° (Fig. 9). The angle is not so obtuse in females as in males. As age advances it approximates a right angle. In bone disease there takes place also this change in the angle. The posterior and upper half of the great trochanter overhangs the neck and in the angle thus produced we have the digital fossa, into which the tendon of the external obturator is inserted.

Numerous large foramina for the passage of nutrient vessels are found on the upper surface of the neck. The length, about two and three-quarters inches behind, and three inches below, together with the obliquity, give great leverage to the muscles inserted into the trochanter, and make possible a wide range of movement. The thigh can be flexed so that its anterior surface rests on the anterior surface of the abdomen. Extension in a child can be carried about ten degrees beyond 180° . Abduction is much more extensive a movement than adduction, the one being limited by the striking of the upper border of the neck of the femur against the upper part of the brim of the acetabulum, while the other is "stopped almost at the outset by the encounter of the femur, which is put in motion with the corresponding bone of the other side." (Ward's Outlines of Human Anatomy, p. 264.)

If the opposite limb be flexed, however, then adduction can be carried to 45° . Circumduction and rotation are important movements.

The structure of the head and neck is peculiarly adapted to receive force. There are inverted arches converging towards each other and even decussating.

The development of the femur is by (1) one principal ossific centre for the shaft, first appearing about the seventh week, and by one for each of the four epiphyses, in the following order: (2) A single nucleus for the lower epiphysis appears shortly before birth; (3) one for the head in the first year; (4) one for the great trochanter in the fourth year, and (5) one for the small trochanter in the thirteenth or fourteenth year.

The neck is formed by extension of the ossification from the shaft. The small trochanter is united to the shaft by bony union about the seventeenth year, the great trochan-



FIG 7.—PLAN OF THE DEVELOPMENT OF THE FEMUR BY FIVE CENTRES.

ter about the eighteenth, the head from the eighteenth to the nineteenth year, and the lower epiphysis soon after the twentieth. It will be seen, then, that at birth there is only a single epiphysis in which ossification had already begun, viz., the lower epiphysis. The physiological devel-

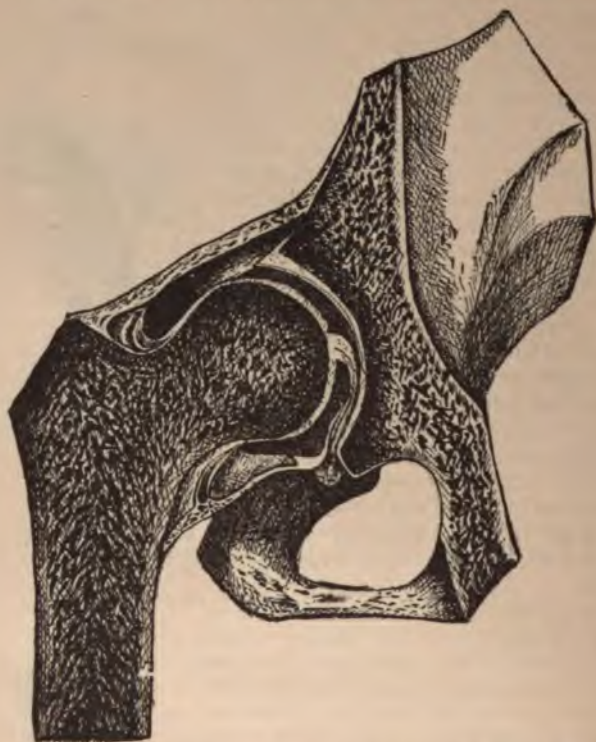


FIG. 8.—VERTICAL SECTION THROUGH HIP-JOINT OF AN ADULT. (AFTER MORRIS.)

opment is very rapid in the upper epiphysis and the numerous large foramina in the neck for blood-vessels shows how rich must be the blood-supply. The accompanying figure (9) represents, very faithfully, a section of a hip in a boy eight years of age. The angle of the neck and shaft is well shown by comparison with the adult femur in Fig. 8. The extent of cartilage tissue between the diaphysis and

the epiphysis is likewise shown by comparison with the adult section.

In fresh specimens taken from young subjects it is interesting to note the physiological hyperæmia. The ossific

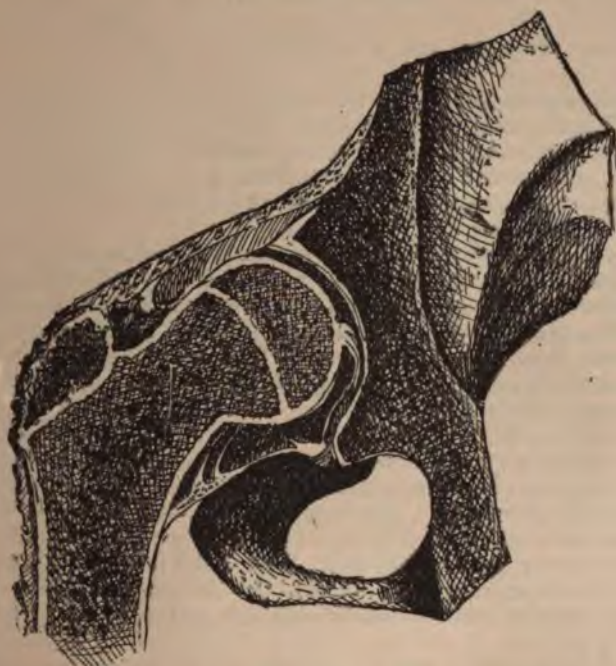


FIG. 9.—VERTICAL SECTION THROUGH HIP-JOINT OF A CHILD. (MODIFIED AFTER MORRIS.)

matter is not so hard, and the intercellular spaces are not so sharply defined. Fig. 9 is modified from Morris' work, the changes being made from a specimen I have in my possession. Fig. 8 is copied from Morris, without change.

CHAPTER III.

SPRAINS AND CONTUSIONS OF THE HIP.

The popular fallacy so prevalent in our own country that hip-disease, as it is called, is caused by a sprain or a contusion, induces me to devote some remarks to these mishaps, great and small, the more especially as my records are pretty well supplied with cases which I propose to use by way of illustration.

By sprain is understood a strain or wrench to some of the joint structures, the ligaments especially. The extreme freedom of movement of an enarthrodial joint, like that of the hip, diminishes the liability to sprains. There are certain sudden movements, however, which strain not only the capsular ligament but the ligamentum teres also, and these do occur at all periods of life. Extreme abduction combined with flexion renders the fibres of the capsular ligament tense, and falls or injuries sustained when such tension is brought to bear, may cause considerable laceration even of these structures. When sudden flexion, combined with adduction and rotation outwards takes place the ligamentum teres is very liable to injury. It is most lax in abduction and hence cannot suffer sprain in the very common position of the limb to which children are exposed while at play.

The ligaments, however, are the least frequently injured in sprains at this articulation so far as my clinical experience teaches. Generally, I find the muscles near or at their points of insertion involved, as shown by manipulation and traction. It requires a very severe wrench to inflict serious injury on the ligaments, so well are they protected by fascia, cellular tissue and muscles. One would naturally suppose that the nerves would participate in the sprain, but it is seldom, in my own practice, that I am able to find any symptoms of nerve lesion. Occasionally I meet with cases, yet they are rare. It is different in contusions. In the case of a boy, aged three years, whom I saw October 1, 1881, the obturator nerve was so involved that temper-

ary paralysis ensued. He fell three days before this date, from a window, a distance of twenty feet, striking on the right side. The parents searched for bruises on the skin and could not find any. He walked a little stiffly the same evening and was fretful during the night. Next day he was unable, or, refused at least, to walk under any circumstances. When he came under my observation, the limb was held in slight flexion at the hip, and on attempting outward rotation, resistance was encountered. Joint tenderness was quite a marked feature, and on rotating the limb I detected a distinct grating, not albuminoid, between the head of the femur and the acetabulum. There was very little muscular resistance, no atrophy, and no shortening of the limb. No paralysis was discovered at this time.

My diagnosis was a contusion of the joint, and the peri-articular tissues seemed to have escaped. The position of the limb was readily explained by reflex muscular action.

A spica bandage with cotton batting underneath was applied and the patient was ordered to bed. On the seventh, a week later, the reflex symptoms had subsided, and the child was able to stand without difficulty. The treatment was continued, and on the eleventh he was walking, but there was a marked limp in the gait and the reflex symptoms had recurred, although they were present only on movement of the joint, as in walking. Six days later I found the boy walking as if the limb were weak and the calf was nearly a half inch smaller than its fellow. The limb tottered as he stepped and there seemed to be paralysis in the muscles supplied by either the obturator or the sacral. Faradism was employed for a few weeks and on the nineteenth of January he was discharged cured. The gait was perfect and there was no joint tenderness. I saw him again on the last day of the month, and there was no relapse.

Now in this case, in the absence of fuller notes on the day I recorded an apparent paralysis, I am unable to decide whether the paralysis, or, paresis, was due reflexly to injury of the articular terminal fibres of the obturator, or branches of the sacral, or directly from contusion of the sciatic as it passes behind the trochanter. The muscular spasm was certainly reflex and a sufficient cause is found therefor if we suppose that the articular nerve-terminals were injured.

The symptoms of sprain depend materially on the tissues injured, and frequently so many are implicated that a clinical picture is difficult to paint. Of course pain immediately, on the receipt of the fall or wrench is to be expected, yet sometimes a day elapses before this symptom arises. The fact that in chronic bone-disease of the hip lameness is often the only sign for several weeks furnishes a strong argument against the traumatic theory in the etiology of the same.

In young children the crying and fretting and disturbed sleep so common within the first twelve hours after a severe fall are too well known and must be construed as indicative of immediate pain. In adults this is distinctly complained of in the beginning. A carpenter, forty-two years of age, in 1881 fell a distance of twelve feet, the upper portion of his left thigh coming in contact with a ladder. He experienced a sharp pain in the hip, and this, with a marked lameness, continued up to the time I saw him, six months afterwards. Indeed, he had a severe contusion of the hip which kept him confined to bed in a hospital a few weeks, and compelled him to resort to crutches after leaving the institution. He was on crutches when I first saw him, and I examined the limb with much care, finding only a half-inch atrophy, no shortening, and a smoothness of joint surfaces. The movements were not resisted unless carried to extremes, and then he winced. My impression was that he had strained some fibres of the capsular ligament, as well as contusing the joint. The one thing he complained of most was the persistent pain and deep soreness in the groin. Under the hot douche by day, and hot fomentations by night, he gave up his crutches at the end of two months and then faradism was employed daily. His improvement has been slow, yet he is now free from pain and moves about very easily without artificial support.

The signs which one finds often correspond closely with those found in the early stage of joint-disease, and a differential diagnosis sometimes becomes very hard to make. If, however, the history of the fall be clear and the symptoms immediately succeeding be unmistakable, the diagnosis is easily made. These are so often imperfectly remembered, and so often become insignificant under a rigid cross-examination that one must rest content with a provisional diagnosis, and keep the case, for a while at least, under close observation.

A boy, five and a half years of age, was brought to the hospital on the eighteenth of July, walking quite lame, with tenderness in the left groin, but not behind the trochanter. The natis was changed a little in contour, and muscular resistance was offered when flexion, extension and rotation both inward and outward, were carried near the full normal limits. In other words, he gave many of the signs, on testing the functions of the limb, that one gets in the first stage of chronic articular ostitis. On inquiry it was learned that the boy was perfectly well and free from lameness on the twelfth, when he had a fall while at play. He walked lame immediately thereafter and complained of pain. In a day or two these symptoms subsided, and he had another fall, spraining the same hip. A sprain was the diagnosis, followed by an interrogation point, and a roller was applied by way of assisting in securing the desirable rest. In four days the pain had disappeared and the contour of the nates was normal. Nearly two years afterwards I traced the case out and found that all symptoms had disappeared shortly after the date of my last note, and that he remained free from pain or lameness for twelve months, when he received a contusion over the same hip, and was lame about three days.

In 1878, the month of October, a little girl, three and a half years of age, a thin, exceedingly cross-looking specimen of humanity, was brought presenting a marked degree of lameness. In fact the child seemed unable to walk except by the aid of a chair. The joint was fairly locked, so great the muscular resistance when movements were attempted in any direction. There was no infiltration or signs of contusion in the soft parts. A week before this she fell from the hand-rail of a staircase, striking on the left side, and no bruises could be found, but she cried a little at the time. That night, and on subsequent nights, the sleep was undisturbed. Putting on shoes and stockings caused no cries or wincing. Only she refused to walk. Rest and a liniment were ordered, a simple sprain having been diagnosed. The patient did not return as directed, and fourteen months afterwards I found her free from lameness and in excellent health. All symptoms had disappeared shortly after the visit to the hospital. These sprains assume vast proportions when the child injured is a few years older than these two, and prospects of damages from a landlord or a wealthy corporation are held out by some hungry member of the

bar. The diagnosis then becomes extremely difficult and prognostications signally fail. Take the following as an instance: In the month of February, 1880, a thirteen-year-old lad, muscular and well developed, came from a neighboring county to the hospital with his parents, plain laboring people of foreign birth. My examination was made with much care. He stood with limbs parallel, the right foot however inclined to inversion, *i.e.*, he would from time to time assume this attitude, and as he walked the foot would be inverted although the lameness was scarcely perceptible. He could stand resting all of his weight on either limb without pain or inconvenience, but when questioned as to the locality of symptoms he would complain of soreness in the right groin and down the outer side of the thigh as far as the lower third. There was no infiltration any where to be found; flexion, extension, abduction, adduction, and rotation were made to the extreme limits, without increase of soreness and without muscular resistance. The limbs were equal in size and length, and I could not by any test elicit joint-tenderness. There was tenderness along the iliac crest, and the superficial inguinal glands were a little enlarged.

The history given was that one day—a month before—while riding in a cart over a rough road, by a sudden jolt he was thrown against an iron bar in the cart, the right hip receiving the shock of the concussion. He walked well on getting out, and did not complain of pain. Next day he complained of pain in the right foot and was unable to wear his boot. There was a certain lameness present, too, with inversion of the foot, and these symptoms not subsiding by the end of a week a physician was consulted, who stated, so the mother says, that the "hip was out of place," and after efforts at reduction claimed to have succeeded. At all events he got relief from pain and lameness from these manipulations. A week elapsing, he had pain referred to the hip and the knee, and the foot again became inverted as he walked. This last is the only constant symptom. Since the accident he has had a little nocturnal enuresis. I confessed my inability to make a diagnosis and as the mother was desirous of getting the boy into the hospital he was admitted. A fly-blister was applied in the inguinal region that night, poultices followed during the next three days, and by the end of February all soreness and inversion of foot had disappeared. He was retained in the hospital

ten days longer, when a careful examination failed to detect any symptoms whatever. On this date he walked about twenty blocks, after which he was lame again, the lameness continuing two weeks, when he was readmitted to hospital in the same condition as before. A liniment and a spica constituted the treatment, and March 29th I made a note that his lameness differed from that on the former occasion in that he walked on the toes and the ball without the inward rotation.

He was to every appearance restored by April 2d, but was under daily observation until the 30th, without a symptom. He was then discharged. It was reported on May 8th that he had been lame for eight days, and in June I found the lameness and eversion still present. I sent him to see Dr. Frank Hamilton, who wrote me "I think the internal rotators are partially paralyzed; he can turn the leg in if he tries." It was about this time we learned that a suit had been instituted against the town corporation for damages sustained by virtue of the road being out of repair. In fact I was asked to appear as witness in the cause. This suit I discouraged by stating I could not testify to any specific lesion, and after a year's delay, I think, the cause was dismissed. During this time, too, under the delays and uncertainties of the law, the lameness gradually disappeared, and to my mind these curious relapses became satisfactorily explained.

It is something remarkable, however, the heights from which a child can sometimes fall without sustaining corresponding injury. Quite a number of such cases have come under my own observation and it has been rare to find any joint disease resulting. Severe contusions of the soft parts, and occasionally of the bone, have been about the only lesions I could detect. A girl, aged three and a half years, was brought to me in July, 1877, with a contusion of the left thigh. It was stated that two days before this she fell from a third-story window of a tenement house into the back yard, probably striking in her descent a clothes line which broke the fall. She was picked up unconscious, though she soon recovered from this state. The forehead had sustained a lacerated wound. No other injuries were found, but the child refused to walk and complained of pain in the left loin. I found the thigh one inch larger than its fellow and a resistance to complete extension at the hip. There was no shortening, no discoloration no fracture.

I did not see her again until the 4th March, 1883, an interval of nearly six years having elapsed, and I found that she had made a speedy and a perfect recovery. No traces of the former injury could be discovered.

In the month of August, 1875, I saw a girl, aged five years, who had fallen a few days before from the fourth-story window into a gutter, striking, as she fell, a shutter on a third-story window. The left limb, when I examined her, was rotated outward, and there was great prominence of the upper third of the femur. I could not detect any crepitus articular or periarticular, and there was no shortening. She walked with a marked limp, yet seemingly without pain. The different diagnoses I succeeded in getting from gentlemen who examined the case with me were: (1) probable fracture of the neck, near trochanter, (2) hip-disease, (3) fracture of the pelvis, and (4) relaxation of the ligaments.

The treatment was purely expectant, and I contented myself with examining the case from time to time and recording my observations. In January, 1876, I recorded the same signs as on the first date, with the exception that her gait had materially improved. Attacks of diphtheria (?) and scarlet fever in the spring of that year were followed by suppurating cervical glands, but the functions of the limb suffered no impairment. In the month of January, 1883, after a lapse of nearly seven years, I made an examination, finding the same prominence of the femur in its upper portion looking very much like the deformity of a dislocation or a diastasis. Yet I could not detect any shortening or any atrophy. The head of the bone was in the acetabulum, and there was normal smoothness of the articular surfaces. The movements were perfect in all directions save in extreme outward rotation. The child was free from pain and walked without any lameness. The diagnosis to which I was led was that she had sustained an incomplete fracture of the thigh in its upper fourth and that a degree of torsion took place at the same time.

I trust that by the narration of these cases the diagnosis has been made sufficiently clear, and I pass now to

TREATMENT, which need not occupy much space. In recent sprains all recognize the value of rest, and Nature herself seems to enforce this great principle. I have been in the habit of using a spica bandage with infrequent changes, and this simple measure assists much in securing the rest desired. I discourage all attempts at walking, and insist on

the child being confined to bed or the nurse's arms until the soreness has been removed. If the soft parts have been contused cold or hot dressings will naturally suggest themselves. A nineteen-month-old child came under treatment November 12th, 1879, with a history of a fall on the 6th, in the doorway, the foot turning under her as she fell. The child had been walking about five weeks only. She cried bitterly for about two hours and then fell asleep. There has been no disposition to use the limb and movements at the hip aggravate the pain. She cries much during sleep and holds the thigh flexed. I found that motion at the hip was free and painless in flexion and rotation, but not so in complete extension. There was no shortening or atrophy or infiltration of the parts about the joint. One year previously a brother four years of age developed chronic articular osteitis of the hip, which was in the suppurative stage.

Notwithstanding this fact, I diagnosticated a sprain, and the mother was enjoined to move the limb as little as possible. A snugly-fitting roller was applied, and was not removed until the 15th, the date of the next visit, when it was noted that the deformity was less marked. I refrained from any manipulations, but reapplied the roller with cotton batting beneath, and directed the same care in handling as before. In four days more the case was considered cured. The motions at hip were perfect and the child stood without any deformity. The roller was to be continued a week longer. There was no further treatment, the case making a good recovery, as proven by examination in January 1880.

The treatment of contusions is practically the same as of sprains. Rest is the *sine qua non*, and the diagnosis once established frequent examinations are to be discouraged.

The necessity for breaking up stiff hip-joints that depend on ligamentous strain and periarticular adhesion, does not often arise, especially in childhood. In other joints, for instance, lying more superficial and limited naturally less in movements than the hip, these adhesions form. It generally happens, however, that stiff hip-joints in children, when broken up by force, done as a rule, under the impression that the lesion is a result of a sprain, do badly and cause the surgeon a deal of regret. He has egregiously erred in diagnosis, and the original lesion has been hastened into an advanced stage.

Not so, however, in adults, who suffer severe sprains at this joint. The reparative process is much slower, and adhesions do somehow form, wherein brilliant results are attained by vigorous passive motion under an anæsthetic.

I think I am stating a rule that every careful surgeon will approve and that every careful surgeon observes when I state that brisement force is seldom or never indicated in the stiff hips seen in early life. If they depend on a sprain, time and locomotion and play will accomplish all that is desired, and a prognosis as to the perfect restoration of function may in nine cases out of ten be safely made. If the limitation of function depend on a peri-arthritis the same natural means will operate to bring about a perfect recovery.

If, however, there be a bone lesion, either central or peripheral, undoubted damage will be done and the future usefulness of the joint jeopardized.

It is better to wait and allow enough time to elapse to settle the question as to diagnosis. In chronic articular ositis, the intervals between the exacerbations are so harmless in their symptoms and the lameness is so persistent that the temptation comes with great force sometimes to attempt relief under an anæsthetic. Cases are sent to me, not infrequently with notes from the attending physician, asking whether it would not be good practice to make an attempt at overcoming this little stiffness left over from an ancient injury. The cases are nearly always in children whose parents have given so clear a history of trauma that the doctor really believes such to be the exciting cause, and invariably I find a chronic bone-disease, at or near the joint, in one of the stages of slow evolution.

CHAPTER IV.

NEUROSES OF THE HIP.

"*Neuroses*, a generic name for diseases supposed to have their seat in the nervous system, and which are indicated by disordered sensation, volition, or mental manifestation: without any evident lesion in the structure of the parts, and without any material agent producing them. Such is the usual definition. Broussais attributes them to a state of irritation of the brain and spinal marrow."—*Dunghison*.

Such is, I am well convinced, the recognized meaning of the term among neurologists, and clinicians generally have found it very useful and a very convenient name to employ. Formerly a neurosis carried with it a pathological significance of some kind not always understood, but latterly it has come to represent a class of functional disturbances of the nervous system, and the definition at the head of the chapter fairly expresses the sense it conveys. In addition to the indications specified in the quotation by which these nervous phenomena are manifested I would add *reflex muscular spasm, chiefly tonic*.

The term associated with the hip is intended to convey to the minds of my readers the fact that there are many pseudarthropathies of the hip wherein the neural element is so prominent that we speak of them as neurotic. There are many cases purely hysterical, and we speak of these as such, and again there are instances in which the symptoms are feigned or counterfeited so closely that we speak of such as cases of neuromimesis. Sir James Paget, in "Clinical Lectures and Essays," published in 1875, employed this latter term and illustrated the subject by some cases quite remarkable. Skey, in a series of lectures published in 1867, called these joint affections hysterical—as did Sir Benjamin Brodie years before. Indeed, Sir Benjamin says: "I do not hesitate to declare that among the higher classes of society at least four-fifths of the female patients who are commonly supposed to labor under disease of the joints, labor under

hysteria and nothing else." Esmarch, whose name is associated with so much that is grand and abiding in surgery, rode at one time the hysterical hobby, and (Dr. Shaffer—Hysterical Elements in Orthopedic Surgery—is my authority for stating this,) fully indorsed this assertion of Brodie. Esmarch, however, adopted to my mind the more comprehensive term—viz., *gelenkneurose*, and his publication at Kiel in 1872 was entitled "Ueber Gelenkneurosen." M. Charcot and S. Weir Mitchell have embellished this subject, and indeed the literature of neurology contains much that relates to the various disturbances in nutrition and sensation. Hysterical contractions are very common in neurological and gynecological medicine. The neurological specialist is too prone, I think, to attribute real arthropathies to neuroses, and the cases of tabes dorsalis with bone and joint lesions so well elaborated by Charcot, certainly furnish strong analogical evidence that some at least of the joint diseases with which the orthopedist comes in contact are neural in origin. The late Dr. Jno. K. Mitchell of Philadelphia and his illustrious son, whose name I have already mentioned, have furnished many illustrations showing the connection between spinal lesions and joint lesions.

The subject is a fascinating one to the orthopedist, and he eagerly grasps at any cause the knowledge of which will help him to so easily solve some of the harassing problems of this particular specialty. In the early part of the last decade I became exceedingly interested in nervous diseases, and I studied many cases that lay on the border-line of neurology and orthopedy. Many instances of apparently formidable joint affections I could trace to a spinal or neural origin, and I obtained speedy cures with this knowledge at hand.

In 1877 I published a paper that I had presented to the American Neurological Association on the subject with which I am now dealing, and in it gave my conclusions based on a study of some forty cases of true and false arthropathies. The subject was brought prominently before the members of my own specialty at that time. In 1879 Dr. Shaffer collected his own cases, read a paper on "Hysterical Joint Affections," before the New York Neurological Society, and brought it out in the shape of a monograph in 1880.

From a reported case or two in the volume one can infer that the author appreciated the danger of being carried

away by enthusiasm. My own enthusiasm when at work over my cases a few years before this period led me subsequently into occasional error, and I am now very sceptical about the causative relationship between neuroses and true bony lesions of the hip joint; so that my present chapter on this subject will deal purely with the false arthropathies of neural origin.

Dr. Shaffer has placed on record some valuable cases, which I shall take the liberty of using in connection with my own. It is difficult to discuss the pathological phases of this subject, for the reasons already given, and I propose now to illustrate the clinical history by means of cases. The following appeared in my paper in 1877, and was that of a boy aged eleven years, who was brought to the outdoor department of the hospital in March, 1877, for suspected hip-disease. A hasty examination was made, and a day set for his admission as an in-patient. The mother was assured that the lesion was spinal, and a fair prognosis was given. No history was recorded at the time, but this was deferred until his admission. The next day, however, by the unsought advice of a kindly disposed aunt, the child was taken to an orthopedic expert, a consultation was held, and double hip-disease was diagnosticated. (This was volunteered testimony on the part of the mother and the aforesaid aunt.) I simply make mention to illustrate a difficulty in making a differential diagnosis.

On the 27th March, admitted to the hospital, when it was learned that the father, after a long illness had died of phthisis, and that two other children in the family had died of some acute intracranial disease—in fact, no better strumous history could have been obtained. The patient has ever been healthy, prior to the middle of the preceding month. Then, without any known exciting cause, he complained of pain in the right knee; shortly afterward of pain in both knees, and in back. To-day, as he walked, one limb for a while was favored, then the other. His chest was found somewhat rachitic, auscultation furnished negative results. At one time he stands so that a marked left skoliosis presents itself, at another *vice versa*. In other words, one position quickly fatigues. Tenderness on pressure over spinous processes of sixth, seventh, and eighth dorsal vertebræ, more marked as that of the ninth is reached, becoming excessively so over those of the lumbar. Pressure over trochanters, lateral ligaments, and malleoli

of both lower extremities, gives pain. Flexion, ab- and adduction of either thigh, is resisted by muscular spasm. Hyperæsthesia is a prominent symptom. No swelling or effusion of any kind is found, periartritic, and when the limb is grasped firmly and motion made, no pain in any joint is perceived. There is no arthropathy, and the former diagnosis stands unamended. An emplastrum cantharidis to the spinal tenderness is all that is prescribed.

Four days later very little tenderness remained. On the 7th of April it was recorded that he walks with perfect ease, no limp being discoverable. No spinal tenderness at any point; no tenderness anywhere. On the 16th he was cured and on the 17th discharged.

The recurrence of symptoms after long remissions is not uncommon, and occasionally we have an opportunity of observing the case through two or more exacerbations. A boy, for instance, aged four and a half years, came under my care in the spring of 1876, presenting a stiffness in the lumbar spine, without tenderness or deformity. There was a moderate contraction of the psoas, left side. The boy had been resting poorly at night, and walking with a limp for three months. A history was given of a stepladder falling across his back a month before the symptoms appeared. A diagnosis was made of spinal caries and a brace was applied. Ten days later there was scarcely any resistance on the part of the psoas, yet the spinal stiffness remained the same.

Three years after the above note was made, the boy came under treatment again for a recurrence of the same symptoms identically that had presented at first, and they were now of four days standing.

The mother was quite sure that the boy had been pronounced cured shortly after the removal of the brace in 1876. Now there could not be found any evidences that spinal caries had existed and the case was pronounced one of neurosis of the hip. A blister to the lumbar spine was ordered, and in addition to this, the fluid extract of ergot in drachm doses three times a day. The ergot was prescribed a week later, the blister not having been followed by prompt relief. Three days after the ergot treatment had been instituted, the symptoms subsided, the limb was straight and he was discharged cured.

In March, 1883—just four years having elapsed—he appeared again, complaining of the same group of symptoms.

The limb was advanced, natis flattened a little, the ilio-femoral crease lower, while the resistance to movement existed only in the thigh flexors.

The symptoms promptly subsided under blistering, and the boy was soon discharged again.

At no time was there any atrophy of the limb, and at no time were there any signs about the hip save a lameness and spasm of the ilio-psoas. There was no evidence that this boy aimed at any mimicry, and the lesion, if any existed, was, I think, a meningeal hyperæmia caused in the first instance by the direct blow, and the meninges being rendered thus vulnerable were easily excited to similar conditions. The theory I favored in my communication to the Neurological Association was the hyperæmic rather than the anæmic one, but I had no pathological facts at that time, nor have I any now.

The hysterical element is well illustrated in this case reported by Dr. Shaffer. It was that of a girl aged ten, coming under his observation in September, 1876. She suffered from all the important and many of the urgent symptoms of disease in the left hip. The family history was unsatisfactorily given. The symptoms had come on very insidiously, the limp coming before the pain, though the interval was very short. Deformity and sleepless nights had followed, and when Dr. S. saw her she was on crutches. The symptoms, I had almost forgotten to mention, followed closely upon a fall. The doctor had great difficulty in securing an examination, and it was only after many suggestions that "the patient was finally placed in the supine position, the mother in the meantime making what seemed to be manual traction with a degree of force that indicated long practice. The patient all this time was shrieking with pain and grasping the furniture near at hand, apparently as a means of counter-traction. I imagined that the case was one of chronic osteitis of the hip-joint in the stage of exacerbation. After much persuasion, I at last induced the mother to permit me to make the traction and control the limb. I then commenced to gently test the condition of the joint, as regards motion. While manipulating in the mildest way I was startled by an urgent cry from the patient and imperative command, 'Hold it tighter,' two or three times repeated. I was already making all the traction possible, and naturally asked an explanation. The mother hurriedly said, 'You don't squeeze tightly enough.' This

threw a new light on the symptoms. Desisting wholly from all efforts at traction, I merely compressed the ankle-joint with all my power. While doing this I could place the thigh in any position, and could even press the articular surfaces together without resistance or complaint.

"Still 'squeezing the ankle,' I was able to get the patient in the upright position with little or no trouble. Without any support but that afforded by her crutches, the thigh became flexed and adducted. The whole limb was visibly, though not markedly, atrophied. There were various hyperæsthetic areas on the affected limb—principally on the inner aspect of the thigh—and over the crest of the ilium. Pain was produced by pressure through the trochanters, by crowding the sacro-iliac surfaces together, and by digital compression in the inguinal region. The patient stated absolutely that she could not walk without support. There was normal faradic contractility of the leg and thigh muscles."

The doctor informed the mother that the child did not have hip-disease, but his opinion was not well received. Some time later he saw the patient in his wards at St. Luke's, still on crutches, and still with "hip-disease." The mother had sought other advice and the case pronounced one of "hip-disease." Under treatment for the neurosis she soon recovered and left the hospital.

A letter to Dr. Shaffer from Dr. G. A. Spaulding, is so interesting a sequel to the case that I shall make no apology for quoting it.

"On February 19, 1879, about two months after her discharge, her mother again presented the patient for admission to the hospital, giving the following history: A few weeks previous she had been seized with convulsions. These convulsions, the mother stated, were becoming more and more frequent and alarming—as many as three or four occurring in twenty-four hours. As the mother gave this history, she was occupied in unrolling a large bundle, which proved to be a blanket. This she spread carefully upon the floor, remarking that the hour for one of these attacks had arrived, and that it was her custom to put the blanket down as a protection. Precisely at 11 o'clock A.M. the patient composed herself carefully upon the blanket, and passed into one of the most characteristic hysterical convulsions I have ever witnessed. The subsequent history is very brief and most satisfactory. The usual remedies lessened the

frequency and shortened the duration of the attacks. But an absolute cure was not effected until later. I chanced to be in the ward one day at the time the patient was seized with a convulsion, and happening to see a siphon of carbonic acid water, I picked it up and holding the young girl firmly by the back hair, I discharged the contents of the syphon down her throat. Her convulsive movements were instantly checked, and she promised to avoid all such conduct in the future. She kept her word, and in a few weeks was discharged from the hospital. During all this time the patient had no recurrence of the hip-joint manifestations."

It has been my experience, as it has been also that of other observers, to find genuine cases of bone disease of the hip with hysterical or neurotic symptoms complicating. These would be the cases where one finds much difficulty in differentiating one affection from the other. There are indeed, very many old cases of ankylosis of the hip from suppurative and non-suppurative disease, presenting most marked neurotic phenomena. In August, 1877, a girl twelve years of age came under treatment, presenting a marked deformity of the left hip—two inches shortening, two inches atrophy of the thigh, one of calf, a sesile fluctuating tumor about the trochanter without tenderness or extra heat thereover, muscular resistance to abduction and extension, while flexion was easily made. Her dorso-lumbar spine was excessively tender. Three years antedating this observation she began to walk lame and had pain three months afterwards. With the invasion of pain she soon was unable to walk, and for four months her sufferings and constitutional symptoms, from the history given, were very great. A peculiar neurosis would manifest itself during the remissions of pain about the hip, viz., a sensation about head and right ear as if water were dripping. Eight months after her first symptoms of joint disease she took to crutches, and on these she has walked for over two years. In the family there is a distinct neurotic and a tuberculous history. A blister to the tender spine was ordered, and after a "terrible drawing" on the part of the aforesaid blister, she reported much improvement two weeks later. A high shoe which she had been wearing was discarded now, as the limb seemed to be longer, and the crutches were likewise of no further use.

Belladonna in gradually increasing doses was ordered. The patient continued to improve, and one morning about

four months after her first visit, and after a so-called malarial attack, my attention was called to a hyperæsthetic area on the sole of the foot. For this the hot-water douche was advised, and relief promptly followed, soon after which she passed from under observation. Curious to learn the outcome, I traced out the case, and found March 16, 1883, that in the five years no neurotic symptoms had been present, that the fluctuating tumor had disappeared, that the disease about the hip had been free of any exacerbations, and that the result under expectant treatment was certainly very good.

One of the most difficult problems is the differentiation of neuralgiæ in and about the hip from true disease of the joint. In these cases we seldom have any reflex contractions about the joint. There is the lameness, the pains over bony prominences, the insidious invasion, the exacerbations, and the atrophy. It is safe, I think, then, to exclude joint disease if the absence of reflex symptoms persist, and if the family history be predominantly neurotic. Many and many a case have I seen wherein the family history alone was sufficiently neurotic to enable me to reach a conclusion.

One of the most interesting cases—in view of its neurotic phases—that I have had the opportunity of observing, was in the person of a girl aged twelve, who came to me in 1876. A younger sister had died of tubercular meningitis, a brother aged nine subsequently came under treatment for talipes equinus depending on infantile paralysis, and an elder sister I have likewise had under treatment for lateral curvature associated with an anterior crural neuralgia.

The girl herself came with a history of lameness "off and on" for two years, and unassociated, so far as I could learn, with any fall or injury. She simply began to feel tired and to favor the right limb. The natis on this side was flattened, the crease was shortened, there was one inch atrophy of the thigh, and three-quarters of the calf. The joint-movements were absolutely faultless. A diagnosis, however, was made of "morbus coxæ," and she was admitted to hospital.

Under expectant treatment she was soon so far relieved that she was discharged. The pain and lameness had entirely disappeared. The symptoms returned in a month, and a blister was ordered. Very soon afterwards—ten days—she was entirely relieved. The subsequent notes are full of relapses, and finally a chorea developed in 1880, yielding

to arsenical treatment in about three weeks. In January, 1881, she developed an acute articular rheumatism affecting both knees and the left ankle. This took the usual course. Chorea minor developed a year afterwards. Last summer—1882—she had a sciatica. She frequently has precordial pains without any heart lesion. Her general health is apparently good all the while. The lameness has not recurred, and yet the thigh is two inches smaller than its fellow. The temptation to regard these phenomena malarial by reason of the fact that certain heart symptoms yield frequently to quinine, has led me to employ that drug from time to time in toxic doses without material benefit. At present the actual cautery is being employed.

The diagnosis furthermore is obscured by certain inflammatory signs seen in the distribution of nerves about the gluteal region, and really it is very difficult to avoid committing an error. In some instances there is distinct swelling about the hip, and this, associated with the characteristic deformity and muscular contraction causes one to hesitate long before making a diagnosis. This became necessary in the following case, which has been reported to me during the past year, as continuing well and free from lameness. The girl, a strumous-looking child, aged ten years, was admitted to hospital in April, 1876. The family history is imperfectly obtained, as no other members are present at date of admission, the child coming from an orphan asylum. A history of the exanthemata is obtained, however, and of a fall from a bed six or eight weeks prior to this date, and the appearance of signs pointing to some lesion about the hip two weeks thereafter. This, taken in connection with her general appearance, a marked lameness typical of chronic bone-disease of the hip, the position of the right limb in standing, viz.: semiflexion, eversion, and rotation outward; a flattening of the nates, tenderness on pressure thereabout amounting to a hyperæsthesia; resistance to flexion beyond 90° , to extension beyond 160° ; a swelling near the crest of the ilium; an absence of real shortening, while there is an apparent shortening—the above history, I say, taken in connection with all these signs, positive and negative, leads to a diagnosis of "hip-disease" second stage; though, on reflection, it occurs to us that such an amount of hyperæsthesia cannot be due to disease in the hip-joint, and that such deformity has come on too soon for true bone disease, and

hence we placed an interrogation point after the diagnosis already recorded. The treatment is expectant.

On the 9th May a distinct and well-marked fulness over crest of right ilium was observed, extending from the anterior superior spinous process to the sacro-iliac junction, quite tender to pressure. The hip-joint seems free of any disease.

The fulness slowly increasing, a fly blister is applied the evening of the twelfth, the usual poulticing to follow.

Abed the forenoon of the 16th, but in the afternoon she moves about the ward with great difficulty by aid of a chair, the foot being raised some two inches from the floor. The symptoms gradually subsided, and with the exception of a pain in the lumbar region at times, nothing occurred until the middle of August, when the fulness seemed to have shifted from the ilium to the thigh, and the upper fourth of this member measured one inch more in circumference than the left. There were also heat tenderness and constitutional disturbance generally. A cathartic, evaporating lotion, and rest seemed to afford relief in a fortnight, though the fulness remained. With a few intervening notes of minor importance, it is noted a month later that the child stands with both limbs parallel, and scarcely a limp can be detected in her gait. The changes subsequent to this depended on the amount of exercise, and the treatment was purely expectant. At times, she was in great pain, unable to leave her bed, and the parts around the hip would become exquisitely sensitive, then relief would come and she would get almost well.

In one of these attacks, in May, 1877, there was discovered marked tenderness over and to either side of the spinous processes from the fifth dorsal vertebra to the sacrum. The spine was thoroughly blistered and poulticed, with decided benefit. Subsequently, ergot was administered, and by July 20th there was no pain or lameness or other sign of disease. She was kept under daily observation until October 5th, up to which time not an untoward symptom had recurred, and she was discharged cured; no muscular rigidity, no tenderness—spinal or femoral—and no lameness whatever existing.

To sum up, then, the points in diagnosis:

There will in nearly every instance be a neurotic element in the family history. The history is all important, and in certain cases may furnish evidence which will be pathognomic.

In neuromimesis certain tricks will sooner or later be discovered on examination, which, it is needless to say, should in all cases be most thoroughly made. The psychical element will predominate in this as in the hysterical joints. The absence of atrophy both in neuromimesis and hysteria, with electrical reactions to faradism preserved, the hyperæsthetic areas and occasionally paræsthetic areas will contribute largely to the exclusion of joint-disease. There is a peculiarity of the gait that is indicative of pain or fear, and that is otherwise difficult to describe. If contractions exist other signs that will invalidate them as signs in joint-disease will surely be present and their significance will be manifest.

Again, the age will, as a rule, be between ten and twenty. Many of the phenomena are absent about the beginning of menstruation. In neuralgia as before mentioned the history will help one to estimate the value of the atrophy, and the freedom from muscular resistance is significant.

Spinal tenderness, though not invariably present, is a very strong diagnostic point and this will be worthy of study.

The *treatment* is simple in those cases of muscular contraction, especially if the tender spine be present. Counter-irritation in the form of blistering, the actual cautery, or simpler means, such as liniments, and the administration of ergot or belladonna.

In cases of hysterical contraction or of neuromimesis the treatment by fly-blisters in connection with moral suasion secures good results. The great benefit, in many instances, is in the revulsive effect of the blister, while in some cases the subsequent poulticing gives to the blister a derivative effect. Prompt relief very often follows and the recurrences are as promptly relieved. Take the following as illustrative of the relief afforded by blistering.

A girl, aged nineteen, was admitted to the hospital in June, 1880. She came from one of the towns on the Hudson, and was on crutches when she appeared for treatment. The family history could not be obtained; the patient reported that as a child she was delicate, but had been in fair health up to January, 1880, when she had a fall, which was soon followed by great pain in the knee. This shifted to the hip two weeks later, and she walked lame, suffering much from fatigue. For the past six weeks she has not been able to walk unless with crutches. She has been very restless nights, and has lost flesh.

She stands resting all of her weight on the right limb the left foot not even touching the floor. The left limb is advanced and rotated outward, while the pelvis is tilted to this side. No infiltration about the joint; thighs equal in size. The pain is referred to the left loin, the spine, and anterior surface of the knee. Absence of joint-tenderness, but muscular tenderness, with pain on pressure along sciatic nerve. The thigh can be almost completely flexed without pain or resistance. Indeed all the movements are normal, save extension, which aggravates the pain. There is for-mication about the sole and ankle and a moderate degree of dorso-lumbar tenderness.

Joint-disease was excluded in the diagnosis, and a fly-blister was applied to the spine the same night. There was a little relief after two or three days, but nothing very marked until the morning of July the 2d—ten days after admission—when she got up from a rolling-chair and walked across the floor with very little lameness and very little exertion. The pain had completely subsided and the deformity no longer existed. She was then put upon cod-liver-oil and an iron mixture.

By the 1st of August all signs of disease had disappeared, and a month later she was discharged. No signs present, and general health excellent. She continued free from lameness or any symptoms until about two or three months ago. She had become a little anæmic, and complained of pain about her hip again. She came to the hospital, had similar treatment, and returned to her home in two or three weeks fully restored. She had, in fact, no joint-symptoms at this last visit.

And again, the following case, in a girl aged nine and a half, a robust, hearty-looking, child, who was admitted in the spring of 1877. Until eighteen months before, her health had been excellent, and the family histories on both sides represented as good, although during the past year a sister has been under treatment for infantile paralysis. The patient however, after a fall, one and a half years since, experienced a sense of weakness in right lower extremity, with pain in knee. This continued for three or four months, uncomplicated with any other functional disturbance. She has walked lame, and during the past three months the symptoms have been increasing in severity. On admission, a thorough examination detects only a marked halt in her gait, a lengthening of the right natal fold, slight infiltration

of the right inguinal ganglia, a furuncle in acumination, below the right patella (sufficient to account for condition of the inguinal ganglia), and a slight, though decided tenderness on pressure over the spinous processes of the eighth, ninth, and tenth dorsal vertebræ. The negative points were all noted in the case-book, and transcription here is unnecessary.

A blister was applied to spine, and next day, poultices to the vesicated surface, while at the same time the furuncle was subjected to appropriate treatment.

Ten days after admission, there was no spinal tenderness; inguinal enlargement was scarcely perceptible; furuncle has disappeared.

Five days later she was discharged, cured, and returned to her home.

Recent opportunity has presented for learning the final result in this case, and I find that she has never had any relapse.

The belladonna treatment, in my opinion, is certainly to be recommended as I have witnessed some remarkably good results from its administration. Ergot holds a place thereapeutically of somewhat questionable value and may serve a good end in properly selected cases. Above all, attention to the minor details of general health, cathartics judiciously employed, tonics and nutrients, changes of living, and rest are agents that the successful practitioner cannot afford to overlook. Concerning electricity I have had no experience, and *a priori* should consider it contra-indicated except in the neuralgia which comes under this classification.

It is my conviction that many of these neuroses depend on meningeal hyperæmia induced by malarial poisoning. I have a patient at present, a patient whom I see once in two or three months: he lives beyond the Harlem River, in a district notoriously malarial. Is ten years of age, a male, and is of a neurotic diathesis. I first saw him March 11th, 1882. He had been screaming at night for a long time; had been favoring the right hip in walking for six or eight months, yet the limp was not constant; and he complained of pain in the course of the anterior crural. The night screamings, I learned, on further investigation, were what the mother called "night terrors," and he had been subject to these phenomena for many years. He did not have the ostitic cry. The anterior crural pain was not constant, was not periodical, sometimes it was present in the

morning, sometimes in the evening. They were uninfluenced by change in the weather. I searched diligently for the usual symptoms of malarial poisoning with negative results. During the last summer he had a diarrhœa the course of which was marked by intermission. He now suffered from constipation. I could not detect any atrophy of the limb, and did not encounter any muscular resistance in testing the functions of the joint. There was no joint-tenderness.

On general principles I ordered five grains of quinine twice a day, and on the twentieth, nine days elapsing, he called to report. The report was that his pain and lameness disappeared within a day or two, and that he had been entirely well until the nineteenth, when, after a considerable running at play, he came in very lame and had much pain in the outer side of the thigh. His sleep during the night, however, was undisturbed, and in the morning he was "all right again." I still found the joint functions normal. The mother, in response to inquiries, admitted that a sewer-pipe near her house was open. The quinine was continued in the same doses, and on April 26th I examined the boy again, to find nothing whatever in the way of sign or symptoms. The quinine had been continued two weeks after the date of the last visit, and there being no further indications for its use the mother had discontinued it of her own accord.

The patient was conditionally discharged, and on May 9th he called again complaining of a sharp attack of pain the day before, during damp weather. There was also this morning a little stiffness at the joint, as he had considerable difficulty in getting the stocking on. Still no joint resistance. The quinine was ordered again, and the mother was instructed to renew it on the recurrence of symptoms. From this time to February 20, 1883, he had one light attack of pain, which soon passed off.

Then, again, there are cases of neuralgia, wherein both hips seem weak and the limbs unsteady. The first symptoms here, perhaps, begin years before in the wake of an intermittent fever. A condition of chronic malarial poisoning is present, and quinine will not meet the case. Arsenic in some of its preparations better fulfills the requirements.

I have seen speedy relief follow the use of the cautery in contractions of the ham-string muscles. For instance, I have applied it in light strokes to the lumbar spine in a

case where the contraction had existed for six weeks, to find entire relief the following day.

The prognosis is good in the contractions accompanied by spinal tenderness. This predicate I employ, however, when the nature of the affection is fully appreciated. The proneness to recur under like causal conditions is certainly well established. In the neuromimetic forms the prognosis is not so good. The symptoms may continue indefinitely. Sooner or later, however, some one makes a correct diagnosis and the case speedily terminates in recovery, or in other neuroses. The same difficulty is met with in the hysterical cases; and in the neuralgic symptoms may come and go for years.

CHAPTER V.

I. RHEUMATISM OF THE HIP.—II. RHEUMATIC ARTHRITIS IN THE ADULT [MALUM COXÆ SENILE].

I.

One of the most common errors with which the general practitioner is charged is that of calling hip-disease (chronic ostitis of the hip) "rheumatism." Scarcely a week passes but that a patient suffering from the disease well advanced is brought to the dispensary, the parents asserting, "my doctor said it was 'rheumatism.'" It is seldom that a case of disease at the hip is reported in extenso, without this testimony of the friends is inserted. I have always taken the evidence with much allowance, and in many instances I have felt no disposition to censure the gentleman who has made such a diagnosis. The invasion of this dreaded disease is often very like that of acute monarticular rheumatism, and for several days and weeks even the symptoms run along almost parallel one with the other. I have very little doubt but that the surgeon who prides himself on his diagnostic skill occasionally commits just as great an error (considered as an error) in calling cases of rheumatism "hip-disease." I have now the history of a case spread out upon my books, in a male child two years of age, whose symptoms began with sharp pain in the left thigh one night at eleven o'clock, causing loud cries, and next day there was decided redness with a little swelling on the upper third of the leg, same side. This child was treated, so I am credibly informed, with weight and pully for "hip-disease." When I saw the patient one month after the invasion of the disease there was effusion in with extra heat and tenderness about both ankles and the left knee. The symptoms were subacute in character. The mother was herself typically rheumatic. Under soda salicylate, vigorously employed, the symptoms soon subsided, and in a week he was walking quite easily. A few days latter I succeeded, for the first time, in making a thorough examination of the

hip, finding absolutely no impairment of function and no tenderness whatever. Even after all these changes for the better, the physician first in charge, the father reported, called in, examined again, and was willing to make affidavit that the case was one of "hip-disease."

We have been educated up to a positive fear of making a diagnosis of rheumatism, especially muscular rheumatism. One dreads criticism, as do some malariaphobists. In some localities it requires much nerve to call a disease malaria. Those wiseacres who love to talk learnedly about subacute gastritis, perisplenitis, etc., lie in wait for the malarial man. Now I am pretty firmly convinced that many cases are correctly diagnosed rheumatism outside of the large cities, and that good results follow. It has been my privilege as a specialist to come in contact with many rheumatic cases, and I have recorded a few that I shall refer to in this chapter.

The term rheumatism, as applied to the muscles, is deprecated by some authorities. They prefer to speak of myalgia. Myalgia simply means pain in a muscle, and nothing more. Rheumatism carries with it not only pain, but pain on movement, tenderness, and a rise of temperature, frequently associated with other constitutional disturbances. It does not necessarily mean a palpable myositis, as some clinicians would seem to intimate.

Dr. Garrod, in Reynolds' System of Medicine, defines muscular rheumatism as "an affection of the voluntary muscles, of an inflammatory nature (?), but unaccompanied with swelling, heat, redness, or febrile disturbance."

On October 11, 1878, a medical friend asked me to see his little daughter, two years of age, in whom the mother had observed, on the 2nd, a manifest indisposition. The rectal temperature was 103° . The day previous the child had eaten grapes and had swallowed the pits. A cathartic was administered immediately thereafter, and the pits were passed, per rectum, the next evening (the 2nd). All day the little patient complained of pain about the shoulder and in the arm, was restless the next night, her temperature that day ranging from 102° to 103° . On the 4th the symptoms had subsided, and she was well on the 5th. There was no lameness of any kind.

On the morning of the 6th, while the mother was dressing the child it complained of pain in the left thigh and in the left foot, crying if handled much, and was noticed walking a

little lame—just a mere halt it was. This lameness continued without change one way or the other during the 7th, the 8th, and the 9th, and during the night any turning in the crib would be accompanied by moaning and crying aloud. There was no pain at this time in the arm or shoulder. Whenever any one grasps the hip in lifting her an outcry is made. The father I knew to be a sufferer from occasional attacks of muscular rheumatism, and he regarded himself as a typical rheumatic. On my examination I found the child walking with a decided limp, more correctly described as a halt. She stood on the limb without any evident tenderness, and there was nothing abnormal in the position. The nates were unchanged, and there was no muscular spasm or resistance of any kind when I executed with the thigh the various movements of the hip. The joint was not tender by any test employed; there was no atrophy, no swelling or induration at any point, and no spinal sign or symptoms could be discovered.

Four days later, in the evening, I made an examination with the same care, and the lameness, as on the first examination, was absolutely the only sign I could discover. It occurred to me at this date that this lameness partook more of the nature of that due to paresis of the anterior tibials, yet I could not appreciate any atrophy. I learn that in the morning when the child is set upon the chamber-pot it complains of pain in the left hip, and raises this side of the nates from the vessel. I had scarcely ventured on a diagnosis up to this time, but was gradually eliminating bone or joint disease. A day or so later I employed the faradic current diagnostically and the result was negative. The lameness and morning tenderness continued, gradually growing less, however, until the 28th, when all disappeared, and the case was discharged cured. There has been no recurrence of symptoms, however light, up to the present date.

It will be seen then that the occurrence of pain in a fleshy part preceding lameness, tenderness, or pressure over the muscles, constitutional disturbance more or less marked, and a family history in which rheumatism is present, constitute the chief symptoms by which one is to be guided. Then the perfect freedom of joint movements, together with a limp which is suggestive of loss of power rather than the stiffish limp of chronic ostitis, known to all orthopedists as the "hip-limp," these two signs are quite significant. A

curious case, which puzzled not only myself but several other gentlemen to whose diagnostic skill I always pay humble tribute, came under my observation in 1875, and I was unable to venture a diagnosis even until 1878, in October, when an attack came on which acted so much like an acute or subacute muscular rheumatism. The case in 1875 was this:

A female child, two and one third years of age, living in a malarial locality, and the daughter of a gentleman who combines the rheumatic and the strumous diatheses, with the rheumatic notably preponderating, was taken in October of that year with pain near the left hip, chiefly confined to the gluteal region. Lameness came on simultaneously. There was no evidence of any traumatism in the case. At times there was stiffness of the lower portion of the spine and tenderness about the crest of the ilium, suggesting to one expert a low vertebral osteitis. Another inclined to osteitis of the hip, although neither he nor any one of us could find any muscular resistance about this joint. The child was lame, however, for nearly five months, some days less, some days more, some days not at all. There was no screaming or restlessness during sleep, and, indeed, there never was any pain that could be regarded as at all significant. The hip was blistered, moderate rest was maintained, and finally, just as I was coming to believe in an iliac periostitis, all symptoms subsided and the child was well.

It so continued until the second attack, which I studied more closely, and which was easier of diagnosis.

In October, 1878, on the morning of the 17th, without any premonitory symptoms, the child cried on getting out of bed and could with difficulty be dressed, so great was the hyperæsthesia about the hips. She was unable to walk, and was carefully carried down stairs. Remained sitting all day, unless she wanted anything not within reach; then she would hobble along by the aid of a cane, the left thigh being held all the while in flexion, so that the foot would touch the floor only by the ball and toes. If any one moved her she cried. The weather on the 16th—the day preceding the attack—changed from warm to cold, and it rained that night.

On the evening of the 17th she seemed better, but was unable to walk upstairs, and cried this night five or six times while asleep. There was nothing to indicate to the father any febrile condition. She had to be carried down

stairs on the morning of the 18th, and used the walking-stick in going about the floor. About the middle of the afternoon of this day I called to examine the patient and learned that she was playing in the yard. I could find only a trace of lameness, no swelling about the joint, no rise of temperature, and no resistance to any of the movements of the hip carried to the normal extent. She had not taken any medicine. Next day she went to school, and has remained well and free from lameness to the 1st of July, 1883, when she came in from school crying and complaining of pain in the left knee. In an hour all pain had subsided.

Again, on the evening of the 12th of August she was quite lame and suffered much from pain about the same knee. She could not get up stairs without assistance. All day long she played without any lameness or pain and seemed to be in excellent health. There was no restlessness or disturbance of any kind during the night, and by the morning all signs and symptoms had vanished.

Now whether the attack in 1875 was one of subacute muscular rheumatism, or not, I am not in a position to decide, yet my belief in that theory is very strong. The strumous diathesis which in her case was, and is now, so well marked, stands in the way of my accepting any theory as to bone or joint-disease undergoing resolution. The parts must be without swelling, and yet the swelling may not be present when the examination is made. But for a clear history of this sign, and an uncertain history of a blow, I might have diagnosed rheumatism in a boy aged nine, who came under observation in April, 1881. The family history was exceptionally good, and he had been complaining only eleven days when he entered the hospital. The first symptom was pain referred to the left gluteal region, and this was on the 9th. It followed a kick on the hip by a playfellow, the boy reported. His sleep was disturbed by pain the same night, but he did not walk lame until the 11th, when he had a chill, which was followed immediately by fever, and the next day there was swelling over the hip. He was treated, as report went, for rheumatic fever, being confined to his bed because of his inability to walk. Finally he was sent to the hospital for supposed "hip-disease." On examination he was totally unable to walk, and it required considerable effort on his part to stand. The spine was normal, and there was no infiltration or swelling about the hip. Flexion and extension, when carried to extremes,

gave him pain. The left natis was flattened and the gluteal crease obliterated. As he lay, in the dorsal decubitus the thigh was flexed and adducted to a slight degree. Under expectant treatment he soon recovered, and was ready for discharge six weeks after admission. The slight resistance to movements, the position of the limb, the chill and fever followed so closely by the swelling, which the parents remembered and described so well, and the present recovery, pointed to a traumatic cellulitis, which underwent resolution.

To diagnosticate, then, a muscular rheumatism in the vicinity of the hip, the following points are necessary if it occurs in a young child :

1. A rheumatic history in one or the other of the parents.
2. A sudden invasion, the first symptom being pain.
3. Muscular hyperæsthesia more or less pronounced.
4. Absence of deformity.
5. Absence of resistance to normal joint movements.

In older children it seldom occurs, and in adults it sometimes occurs, but then it is more apt to be confounded with sciatica and to be associated with a lumbago. Difficulties in diagnosis will therefore seldom occur in adult life.

In the rheumatism which affects the immediate periarticular structures it so seldom affects this joint alone that one will have little or no occasion for differential diagnosis.

In youth, however, and in adult life we occasionally have articular rheumatism, affecting this joint, and the symptoms differ little from those of ordinary polyarticular rheumatism. In the subacute and chronic forms, it becomes difficult in certain stages of the disease to distinguish between this and serofulous arthritis.

In May, 1880, I saw, with Dr. M. T. Scott, in Lexington, Ky., a case of joint disease in a girl fifteen years of age. There was the shortening, and the atrophy, and the deformity characteristic of strumous disease. Yet the amount of motion and the exceptionally clear history Dr. Scott gave me rendered the diagnosis comparatively easy. The deformity was of two years' standing, and there was phthisis in both father and mother. This strumous diathesis, I judge, served to retard recovery, even in the case so clearly rheumatic. I neglected to add to the above report that I found joint roughening in the knee, and in the shoulder, the elbow, and the wrist. A year later the right hip became

similarly affected but a rest for a week or two and anti-rheumatic remedies served to avert any of the subsequent results to which its fellow was subjected.

When the rheumatic inflammation is limited chiefly to the periosteal tissues in close proximity to the capsular ligament, signs may present that will render diagnosis exceedingly difficult. I have only within a few days satisfactorily accounted for some signs that I found in the fall of 1880 which led me to record as belonging to neuromimesis and some very positive signs in the winter of the same year which led me to diagnosticate a chronic articular ostitis peripheral and periarticular in origin. The case has been very puzzling for the past two and a half years and I am just now firmly convinced that I have unconsciously had under observation all the while a very interesting form of chronic periarticular rheumatism of the hip. The case will certainly bear a detailed history.

A boy eight years of age was transferred from the Home for the Friendless to the hospital in the latter part of September, 1881, without a reliable history. It was reported that the father was intemperate and worthless, and that the mother was dead; cause not known. Six or seven weeks prior to admission, he was observed to walk as if something ailed his ankles. The gait was unsteady, he complained at the beginning of pain about these joints, yet had no febrile reaction, did not take his bed, and in fact was not regarded as a sick boy. These symptoms were followed within two or three weeks by pain and stiffness at the wrist joints.

On examination nothing in the way of physical signs could be discovered save some rachitic changes the sternum, in the sterno-clavicular articulations and at the knees. While the gait was a little unsteady there was no lameness, and no spinal tenderness could be elicited. There was no heart murmur that I could discover. When asked to locate the pain he pointed to the knuckles and to the tibio-tarsal joints. It was supposed that the boy was anæmic, and nothing more.

After a month's observation the case was still enveloped in obscurity, the gait was evidently that of an ankle-limp, and yet I could not detect any other signs of articular or periarticular disease. The whole limb was hyperæsthetic, the dorsal spine was quite tender, and the foot had been frequently seen hanging in equino-varus. It seemed as if

there was after all a neurosis of spinal origin—possibly only a neuromimesis. Topical treatment was directed to the spinal area of tenderness, and there was a decided improvement noted in less than a fortnight. The gait did not become perfect, however, and in the latter part of December I subjected him to a careful examination of the hip, especially as I fancied he was slowly acquiring the hip-limp. I selected a hard table, removed all the clothing and found the following signs: Rotation inward with the leg fully extended could not be made to the same extent as could the fellow limb under the same circumstances, the limitation of motion was very marked; the thigh could be flexed and extended and abducted over as complete arcs as could corresponding movements be made in the other limb. Negatively, there was no atrophy, no infiltration, no signs in ilio-costal space or iliac-fossa. The diagnosis on the strength of the persistent lameness (so light that it could with difficulty at times be recognized) and this resistance to perfect rotation was recorded as chronic ostitis, probably central, in the neighborhood of the hip-joint. By the middle of July, 1881, the lameness was more marked and was regarded as characteristic, yet the signs at the hip had not increased. After an intermittent form of dysentery in in the autumn his lameness became still more marked, and in December he complained of pain, referring it to a small area just below the trochanter major. In the spring it became less marked, and the signs seemed so insignificant, that in July even expectant treatment was suspended. He enjoyed perfect (?) immunity from symptoms and signs until the following September when the lameness returned. He complained much of pain in the hip, and there was found marked joint tenderness. A fly-blister was ordered, the symptoms subsided soon afterward, and in November, another was applied. He was worse the last week of December. Without any special treatment he recovered from this exacerbation, and has continued well to date. Still, holding on to the diagnosis of bone disease, I wondered why the evolution was so slow, and on the last day of July I submitted him to a final examination, finding no lameness, no deformity, no shortening, no resistance to rotation or any of the joint movements. In fact, all that I did find was a little muscular atrophy back of the trochanter and a half inch atrophy of the thigh in its upper portion. While as above noted there is no lameness there is a certain

peculiarity in his gait difficult to describe. He has now a well-marked mitral regurgitant murmur.

At all events, my final diagnosis, of his case is this: A chronic rheumatic arthritis at first poly-articular, finally monarticular, the lesions in the last joint being periarticular with exacerbations, the joint becoming involved by contiguity at these times, giving rise to temporary synovitis.

Now I am prepared to state that the diagnosis of a lesion like the one in the case I have just reported ought to be easy, *i.e.*, with a knowledge of all the facts I had in my possession. The muscular element was not a part of this case, except in so far as the nerves affected the muscles. The same law holds good in chronic rheumatism, that holds good in other chronic diseases, *viz.*, the law of exacerbation, and with this before our minds, the peculiar phenomena of this case are readily explained. At first we had the ankles affected, then the wrists, both perhaps in separate exacerbations. A little later came the hip symptoms, and these continued with long remission for two and one half years. The spinal tenderness and hyperæsthesia may have been due to a hyperæmia of the meninges and may thus have affected the nerves. With his heart lesion now fully developed, the final outcome of the case is a question of much interest.

The disposition of a rheumatic peri-arthritis to invade after long intervals the joint is well known in the history of this disease. We have at present a boy, nine years of age, in the hospital, who came several years ago under treatment for chronic articular ostitis of the knee. There were all the signs, including the deformity, that go to make up the features of such a case, and under the usual treatment a surprisingly good result was had within a few months. It seemed very odd that this boy, in the same ward with other boys who were even less deformed than he, should so far outstrip them in the race for health and soundness of limb, yet such was the fact, and I was compelled to think of his case as an anomalous one. After a year or two he was readmitted with similar symptoms, greater deformity, and in addition a marked distension of the synovial sac. Merely an unusually acute exacerbation, thought I, and sure enough it subsided promptly under rest and extension apparatus. Up to this time, bear in mind, he had not exhibited any signs in any of the other joints—but a few months later the other knee, after a con-

tusion of the shin, took on inflammatory action, and the synovial sac soon filled. A double osteitis now, it seemed to me, only in this instance the synovial membrane became quite early involved. The prognosis was gloomy and the case caused me considerable anxiety. However, these symptoms subsided, contrary to expectations, and the deformity of both limbs was overcome. Later still, he began to complain of pain at his left tibio-tarsal joint, and in a few days redness and swelling followed. Then it dawned upon me that this was a case of chronic rheumatism, beginning as a monarticular variety, and subsequently involving other joints. Occasionally a case presents with an unmistakable rheumatic history, joint swellings, etc., and subsequently develops true bone disease. One is inclined to believe that even bone signs are but rheumatic signs until an abscess forms.

I well remember in all the details, a case that came under my care in 1881. It was in a stout, robust-looking girl, eleven years of age, who came into the hospital on August 26th, and a history was given which ran about as follows: In October, 1880, she began one day, without provocation, so far as the family could learn, to complain of pain in the right groin, and was feverish; two days later her ankles swelled, the febrile symptoms continuing, and among these symptoms profuse perspiration. In a week the wrists were puffy and painful. This attack kept her in bed for three months, and for two months longer she was unable to walk. Since March, however, she had been getting about, after a fashion, on crutches.

I found on examination that she stood with her weight on the left limb, the right nearly parallel with this, but rotated outward over a small arc. She was not able to walk without crutches. The right natis was very broad and quite prominent, the crease lowered. This fulness at the nates extended along the thigh in its upper third. Resistance was offered to extension of the limb beyond 165° , flexion was very nearly perfect; on rotation, which was limited to a small arc, a distinct roughening could be felt within the joint. There was no joint tenderness elicited by examination. I could get no articular roughening at the knee, but at the ankle-joint the roughening was present and the movements were limited to very small arcs. The left ankle-joint presented limited movements, but it was not so with the knee and the hip of this side. There

was very little atrophy, and while the limb was really an inch shorter, as measured from the anterior superior spinous process the pelvic accommodation was such that there was no practical shortening. There was no heart murmur. After two and a half months an abscess developed on the outer side of the thigh in the middle third, and there was extensive infiltration of the inguinal glands. A month later she passed from under my observation. I found before she left that the thigh could not be flexed beyond 90° or extended beyond 150° . The abscess had not opened. Now, one would naturally expect from this girl's history and from the signs recognized within the joint, that her hip lesion was rheumatic, and yet the suppuration coming on later would dispel this opinion, and the natural inference would be that the bone disease, or, suppurative periarticular disease was coincidental. The roughening within the joint was exactly like that found in the ankle-joints. It is not so very rare to find periosteal suppuration about other joints that are rheumatic. I think, though, that if a careful examination be made, with the proper interpretation of symptoms and signs, it will not be impossible to separate the one from the other.

Now, a case like that of a boy whom I saw in the spring of 1881 is not so misleading. He came under treatment for chorea minor of seven weeks' standing. On the subsidence of this disease he developed a subacute polyarticular rheumatism. This was two months after he had come under treatment, and among the first symptoms were pains in the knee and thigh of the right side. About the same time he walked lame, favoring this side. It was not a characteristic hip-limp, yet my suspicions were aroused and I gave him a pretty thorough examination, getting negative results, with this exception; I could not make normal abduction. Under salicylate of soda he walked perfectly well in less than a week. But during this week the other hip presented the same sign. I saw him a month afterward and he had no relapse. Of course, with the absence of deformity at the hip and the puffiness at the ankle, one could not well arrive at any other diagnosis than that of subacute rheumatism.

Having illustrated the different phases of rheumatism as it affects the hip, both as an extra-articular and an intra-articular lesion, I feel that one who understands the symptomatology of rheumatism in its different forms, and

examines the case with the fulness of detail that an obscure case should always demand—I feel, I say, quite sure that no flagrant error will be committed in diagnosis. The prognosis is nearly always good, both as to life and as to perfect restoration of function. If death ever does occur, it occurs from the heart complication. If deformity persists it grows less marked in time, and the ultimate result may be complete cure. The myalgic affections are very favorable as to prognosis. Even if recurrence of symptoms come on the tendency is not, like bone-disease, to impair the tissues more and more after successive exacerbation, but to gradually wear itself out. The tendency is always toward recovery.

THE TREATMENT of rheumatism need not occupy our attention long, for this is well considered in all text-books in general medicine. Of course, if one makes the diagnosis of muscular rheumatism in a child there is no special treatment indicated. The treatment on general principles will yield good results. It is the deformity we are called upon to treat, and this sometimes becomes very difficult. The majority of cases of stiff, or partially stiff, rheumatic joints require passive motion under an anæsthetic. This treatment is the orthodox treatment, but many find that poulticing the parts for several weeks and then employing passive motion is very effective. This is the plan essentially of the "bone-setters," and the success with which they meet should induce us to make more frequent use of it. Passive motion without an anæsthetic only induces muscular resistance, and on each attempt the resistance is the greater. I am not speaking now of the plan wherein previous poulticing forms an essential part of the treatment. In studying cases of ankylosis of the hip, in which bone-setters have achieved success, I find that their most brilliant results have been in rheumatic cases.

An important question in therapeutics is this: should the parts be put at rest for a week or two after a brisement forcé under an anæsthetic, or should passive motion be continued daily without the anæsthetic? In other words, how long should one wait to begin such daily motion. There is testimony on both sides, but I am very sure that I have seen the best results in cases where at least a week's rest followed the operation.

I saw a case about a year and a half ago, in a young girl eighteen years of age. Both hips had become horribly

deformed after an acute attack of rheumatism. She was entirely helpless, and the ankylosis seemed almost complete. For months she had not been out of an invalid chair. The patient came, on my recommendation, under the care of Dr. Jno. H. Ripley, in St. Francis Hospital. He employed great force under an anæsthetic in freeing the right hip of its adhesions, and placed it, after a few movements in flexion and extension, at an angle of about 150° and put the parts at rest. He did not repeat the operation for several weeks, and then the force was very slight. Two operations on this limb served to bring it not only in good position, but to bring about a good arc of motion. Later he moved the left hip, and found the adhesions here much greater than those of the right side. The final outcome was a pair of limbs with which she could go about with comparative ease.

Mr. Brodhurst very properly insists on complete flexion in these attempts. Extreme extension should be avoided for fear of surgical fracture.

II.

CHRONIC RHEUMATIC ARTHRITIS (MALUM COXÆ-SENILE).

We find a disease of the hip appearing in the latter part of adult life, described by authors as *malum coxæ senile*, and while there are many cases in which no rheumatic history can be found, the impression prevails, nevertheless, that there is a rheumatic diathesis present, called into action by traumatic influence. I have met with a large number of cases, and I must confess that I fail to find in the majority any characteristic rheumatic element present. The inception is not marked by notable symptoms. Frequently it is not unlike that of a chronic articular ostitis. Bone changes do occur, yet they occur as a result of osteoplastic inflammation, and then we have more properly an arthritis deformans.

The pathological changes are not constant enough to assign to the clinical features of the disease a name based on morbid anatomy. In some cases the structures within and without the joint are implicated to a large extent, and resolution occurs to such a degree that one appreciates on late examination nothing more than the characteristic intra-articular grating of chronic rheumatism. In some cases, again, the tissues immediately involving the joint, such as the ligaments and periosteum, seem to be the

only structures involved, and the resistance to movement in the convalescent period depends on periarticular adhesions. While in another and a more formidable class, bony changes take the form of osteophytes, or stalactites, locking in a measure the articulation. If one looks over the pathological specimens in the different museums a feeling of therapeutical despair comes over him as he examines the old rheumatoid hips. The head of the bone has assumed all manner of shapes; osteophytes and stalactites encircle the rim in irregular arrangement, the cartilage has disappeared, and one really wonders how any measures looking toward the restoration of the joint functions could have ever been successful.

It is a clinical fact, notwithstanding these cabinet curiosities, that much in the way of relief, either through time or therapeutics, is accomplished. It is also a clinical fact that the ankylosis is in many cases far from complete, and that a patient with a limited amount of motion, and with the limb not deformed to any exaggerated degree, gets about quite comfortably.

Before proceeding to the clinical history of these chronic forms of rheumatism occurring in persons beyond the age of forty or fifty, I shall refer, at least, by way of illustration, to certain forms that begin as acute, or subacute inflammations, and are found in adult life prior to the age of forty.

A very good case for study came under my observation in 1879, in the person of a vigorous looking man twenty-five years of age. His vocation for several years had exposed him much to cold and wet weather, and in the winter of 1876-77 he had an attack of what was called lumbago, from which, however, he recovered in two or three months. In the spring of 1877 he was thrown violently from a sleigh, striking upon the left hip, but was not bruised in the external parts so far as he could determine. Yet he was stiff and lame for a week or two thereafter and suffered a moderate amount of pain at the hip. Within two weeks the symptoms subsided and he was quite well again.

A week later, after unusual exposure to wet weather, he "took cold," and this "seemed to settle in his joints." The hip, knee and ankle-joints were affected. The two last named were much swelled, very painful, and very tender. He suffered also from shooting pains in the thigh and groin, yet he did not give up work for a month. The symptoms and the signs became so severe that he finally had to de-

sist, and for a couple of months he was barely able to hobble about on crutches. Then the knee and the ankle symptoms subsided, while the hip was subjected to treatment by weight and pulley and a hip-splint for a year. At one time in the early part of the extension treatment there was very annoying reflex muscular spasm about this joint. On examination I find four inches atrophy of the thigh; resistance to flexion beyond an angle of 135° , to extension beyond 165° , to complete abduction, and to both adduction and rotation even to a limited degree. Pain is felt in the joint and in the distribution of the sciatic nerve on concussion and on pressure over the trochanter. The inguinal glands are large, and the natis is flattened. There is moderate lordosis. Under ether the thigh was moved over a large arc, and adhesions apparently within the joint were pretty thoroughly broken up, but no bony grating could be recognized. The muscular resistance which before was so marked had now disappeared. There was some muscular resistance, however, to complete extension. I could not detect any real shortening of the limb, but there was an apparent shortening of a half inch. The circumference of the thigh measured four inches less than that of the right, and the calf measured one inch less. No rheumatic signs could be discovered at the knee or at the ankle. On coming out from the anæsthetic the movements could be made quite as easily, though the muscles were so deficient in tone that he could not voluntarily flex and extend. In other words, there was found the remains of an arthritis and a marked loss of power in the periarticular muscles. The faradic reactions were good, thus eliminating a true paralysis.

Now, while the man presented a case of true joint-disease, with the characteristic muscular atrophy, the process had been unusually acute, and yet I can not help believing that the same tissues were involved as are involved in older persons. Senile changes in tissues we know proportionately modify the inflammation. That this was a case of monarticular rheumatism, although apparently excited by trauma, I think there is abundant evidence.

I had an opportunity of seeing a case in the active stage. The patient was a commercial traveler, and he was thirty-nine years of age. He was very helpless, and any attempt at passive movement of the right hip caused great pain. The whole groin and gluteal region were infiltrated to a

marked degree; the limb was lying nearly parallel with its fellow, but was in outward rotation. There was no real shortening, the position of the pelvis giving a shortened appearance to the limb.

The parts about the knee were the seat of pain and swelling. He had been suffering very acutely for two weeks or more and was much exhausted. Hence my examination was not very satisfactory.

The first symptoms were a heavy dragging feeling and pain in the right thigh, three months before. He had been much exposed to damp weather while travelling in the West. The symptoms were aggravated by walking; in fact, it was not more than a week before he was confined to bed with the usual constitutional disturbance of an inflammatory disease. The inguinal glands soon became infiltrated, and the physician in attendance found suppuration. After a six days' exacerbation, he had a remission lasting two or three weeks. The symptoms subsided, but the lameness and stiffness of the hip continued without abatement. A relapse followed.

I saw him January 23d, and employed hot fomentations. He was able to get about on crutches by the first of February. Anti-rheumatics were administered, massage employed and later the faradic current was used daily for a couple of weeks. By April 1st he was walking without any assistance, the limb presented very little deformity, and he went "on the road" again, pursuing his vocation. He made a very fair recovery.

The case illustrates a clinical fact recognized throughout the whole range of medicine, viz., that acute diseases resolve with infinitely less impairment of function than those that are essentially chronic in nature. My prognosis in this instance had been gloomy enough.

In the early part of the present year, a man fifty years of age, came under my care for a peripheral paralysis, and I saw in him a peculiar limp that led me to examine the hip, which was found ankylosed in the straight position. He claimed to have been perfectly well two years ago, and to have come of a family free from any rheumatic disease. Never in all his life had any other joints been affected. In 1869, a man gave him a kick in the groin, and the superficial parts suffered contusion, which was followed by pain and lameness for six months. He did not give up work and had no special line of treatment, but gradually got better,

and within less than a year the functions of joint were regarded as normal.

There was no return of symptoms or signs until the beginning of 1881, when his attention was drawn to the limb again by a peculiar cramp-like feeling in the groin immediately before or after a storm. He found, too, that the joint this year was not so useful. He favored it at first and finally a well-marked limp was manifest. At no time has he been compelled to give up work, and at no time has he had any very acute exacerbation. The case, it would seem from the history, had progressed slowly and almost without an incident. What connection the lesion fourteen years ago has with present one it is hard to determine. That the case at present is one of senile joint-disease I am well satisfied.

I knew a man fifty eight years of age who attributed a similar condition of the hip to the wearing of a truss, and a surgeon of world-wide reputation, after examining him on two different occasions, wrote me that he looked upon the truss as the cause of the chronic rheumatic arthritis! The hernia first appeared at the age of fifty-five. A year later, he began to walk lame, and during the next twelve months the following signs slowly developed: limitation in the arc of motion, morning stiffness, pain in hip after a storm, rotation outward, and apparent shortening. I could not elicit any facts pointing to a rheumatic element either in himself or in any member of the family. He walked when I first saw him (which was two years after the first symptom) with a very marked limp and was compelled to use a cane. From both the umbilicus and the anterior superior spine I made out an inch and a half shortening of the limb. The natis was very broad and while the trochanter stood out very conspicuously from the pelvis, it did not appear above Nélaton's line. The position was slight flexion, and abduction. The limit to extension was 160° , to flexion 135° , and the arc of rotation was very small. Abduction was resisted the moment the act was attempted. I could not recognize any joint grating, but there was a peculiar crackling sensation imparted to my hand as I moved the hip. This I found was in the periarticular tissue. The thigh was three inches smaller than its fellow, and the knee and the calf one inch respectively.

Now the two cases I have just narrated show quite clearly the clinical history, and from these and others we can learn that:

1. The invasion is not marked by any distinct train of symptoms.
2. The progress is exceedingly slow, and marked by long remissions and short exacerbations.
3. The signs are, first, stiffness; second, change in position of limb; third, shortening.
4. That a clear rheumatic history is absent in the majority of cases.

Exceptionally, however, we do get a well-marked rheumatic history. My attention was called to a case while writing this chapter in which a chronic polyarticular rheumatism began first in the right hip, slowly invading the right knee, then the left hip and the left knee. On examination I find the left hip strongly adducted and the foot everted, while the other signs are further characteristic of joint-disease. The right is limited as to movement, and the knees on movement impart to one's hand the distinct rice-body sensation.

The diagnosis is not always unattended with difficulty. I have seen cases of sciatica with the peculiar deformity, pain on movement, and periarticular infiltration that belong to rheumatic hips.

As a rule, the neural symptoms are sufficiently well marked to enable one to decide the question in a differential diagnosis. Anterior crural neuralgia gives more of the neural signs that belong to rheumatic arthritis of the hip than does sciatica.

A good point in differential diagnosis between sciatica and joint-disease is this: place the thumb of your hand corresponding to the hip involved over the tuber ischii, the middle finger over the trochanter, and the tip of the index finger fully extended, will fall over that part of the gluteal region along which the great sciatic passes.

Pressure now with the index-finger will elicit pain in the terminal branches of the nerve. If painful sensations do not follow this procedure, take the other hand and place thumb and tip of middle finger over trochanter and tuber ischii as above. The tip of the index-finger will fall over the capsular ligament, and deep pressure here will produce pain in the joint. This simple test I have found very serviceable in practice.

Fracture of the neck of the femur presents many signs in common with senile arthritis, and the differential diagnosis becomes very awkward if the fractures have been im-

pacted. The solution of the question will rest largely on the history of the invasion. If one learns that the patient within the first week following the injury was confined to bed, or was unable to walk, and that several weeks elapsed before the ability to walk was regained, presumptive evidence is furnished in favor of a fracture. And a fair amount of cross-examination in a patient, however stupid he may be, will enable one to judge whether the disease began insidiously or not. The greatest obstacle in the way of making a diagnosis is incomplete examination. The ease with which one can glance at a hip, estimate measurements by the eye, and take for granted certain probabilities as facts, will always be a stumbling block in the way of correct diagnosis.

THE TREATMENT of chronic rheumatic arthritis of the hip is not so simple as one would imagine. It is not as easy to secure rest in the adult as it is in the child. Time is of more value to one than it is to the other. Naturally it would seem that counter-irritation in a disease so sluggish is a very important factor in therapeutics. It is exceedingly hard, though, to carry out a thorough course of counter-irritation outside the wards of a hospital. The disease, too, will have made considerable progress before medical or surgical advice is sought. The family physician, it may be, is asked in a casual way about this peculiar stiffness, or this pain after exercise. A liniment may be ordered and directions given the patient to "call in some time soon" and submit to a thorough examination. Temporary relief may follow the application of the liniment; the case goes into a remission, and the thorough examination is not made. It is so easy, too, to tell the patient that this is simply a neuralgia, or a cold, or a strain, or an infirmity of age. Finally when the stage of shortening and deformity appears, the examination is made for the first time. So that treatment rarely begins until this period is reached. My own experience in the use of the iodides and of the salicylates does not enable me to speak with any confidence as to the value of these remedies. If fibrous ankylosis exists, I favor breaking up the adhesions under an anæsthetic and the subsequent employment of faradism and massage to the muscles that have been so long in disuse. I have seen some decidedly good results follow this plan of treatment. I have already reported a case on page 87, in which the result was very gratifying.

Dr. H. P. Geib, of Stamford, asked me to see a case with him last spring, and as the clinical history is not only well illustrated, but also the value of the treatment I have just advised, I propose giving some of the more important details. The patient was a gardener of robust frame, forty-seven years of age, and had always been in good health prior to the beginning of his present infirmity. About a year ago, while much exposed to wet weather, he first experienced a dull pain in the vicinity of the hip and at the knee. It did not cause him much annoyance until lameness came on a few weeks afterward. No interest was aroused in his case because he rarely made any complaint. Exacerbations of pain and stiffness were induced, he thought, by weather changes. Still he became more lame, the lameness increasing very slowly, yet even this did not occasion any alarm. I found him standing with the right limb advanced, in slight flexion and outward rotation. He walked exactly like one who had made an unsatisfactory recovery from a fracture of the neck of the femur. There was a half-inch real, and an inch and a half practical, shortening of the limb, one inch atrophy of the thigh and no atrophy of the calf. The thigh was fixed on the pelvis at an angle of 165° ; though if a little force were employed a small arc of motion was secured, and at the same time a crackling sensation was felt, as if adhesions in the joint were giving way. The changes in the appearance of nates were very marked and very characteristic.

What pain he had was referred to the trochanter and in the course of the anterior crural. I could not get any evidences of rheumatism in the history, or any account of a fall or injury as exciting cause. Blisters and anti-rheumatics did not effect any good, and two months afterward, assisted by Drs. Geib and Hungerford, I broke up the adhesions very easily under ether. He was kept at rest in bed two weeks and the operation was repeated. Finally it could be done without an anæsthetic; the parts were soon quite free of any resisting bands and under friction and rubbing the recovery was nearly complete when I last heard from the patient.

When the exacerbations are present symptoms are to be treated, and for the pain hot fomentations yield the best results. Stimulating liniments naturally suggest themselves, and pain disappears after a few applications. Anti-rheumatics internally certainly modify the duration, and whichever drug the practitioner is best pleased with is the drug to employ.

CHAPTER VI.

COXO-FEMORAL PERIARTHRITIS.

The abundance of cellular tissue about the hip, the extent of the fascia superficial and deep, and the exposure of the parts to traumatism, render this region peculiarly liable to inflammatory conditions, usually acute in character.

The lesion, as a rule, is confined to the soft parts, and the inflammatory products are bound down by the dense fascia and the muscles thus restricting the joint movements to small arcs. In rheumatism the seat of the disease is in the fibrous tissues, the joint, the aponeuroses, the sheaths of the tendons, the neurilemma, the periosteum or the muscles and tendons. Hence, with so many tissues involved we can not with propriety speak of rheumatism as a periarthritis. The term is preferable, I think, to extra-capsular abscess because it does not commit us to a suppurative form of inflammation.

It is often phlegmonous; and when it involves the gluteal region we speak of it simply as a phlegmon.

The exciting causes are varied, contusion and sprain being the most frequent. Some cases follow in the wake of an exanthem. A few are glandular and are decidedly scrofulous.

The pathology of periarthritis in adults differs from that in children. The term was first employed by M. Duplay to represent a condition about the scapulo-humeral articulation that had been long recognized, viz., a chronic or subacute inflammation of the fibrous structure immediately surrounding the joint, and dependent on trauma. M. Gosselin described cases in which the tibio-femoral articulation was involved. The reason these authors gave for excluding rheumatism was that the lesions were monarticular and were free from rheumatic history. The behavior is practically the same. Exacerbations are followed by adhesions limiting the joint functions and inducing recurring attacks of an arthritis by contiguity. I do not know of

any post-mortem observation demonstrating a similar lesion at the hip. I have not had an opportunity of verifying my own diagnosis in such cases. In a few I have reached the diagnosis by exclusion, and I should like to place them on record, but, then, on reflection I do not see what service they can render to pathology. I have had under observation for seven or eight years, a girl now aged fifteen, and I am unable to decide upon anything further than a chronic fibrous peri-arthritis. I think a strong case could be made out but I shall await further developments.

When one remembers how well protected the hip-joint is against injuries of the fibrous tissues, the infrequency of such lesion is readily explained.

As I have nothing clinical to offer bearing upon these chronic ligamentous forms of inflammation, I have limited myself to the acute and chronic cellular peri-arthritis.

The youngest patient I have had was a female aged five weeks, the cellulitis beginning when three weeks of age and terminating in resolution at the end of three weeks. In an analysis of forty-seven cases of peri-arthritis of the different joints made a few years ago, I found twenty for the hip, sixteen for the knee, six for the ankle, three for the sacro-iliac junction, and two for the spine.

The symptoms vary according to the regions implicated. The invasion is nearly always acute, the patient experiences sharp pain, increased heat of the skin and induration with fluctuation if suppuration follows. As a rule, this is an acute disease and exceptions are rare. A case I have already placed on record in the *American Journal of the Medical Sciences* forms a notable exception and is as follows:

A female, aged three years, to all appearances well nourished, was admitted to the hospital the middle of December, 1875. The father and mother had good family histories, while the child herself was reported as having enjoyed peculiar immunity from the diseases of infancy. Began to walk lame one year prior to admission, and no cause could be assigned. This was the only sign observed, until within the last few weeks, when pain was complained of in the back, and this pain was increased by any jar or turning. The child was restless and wakeful at night. About one month ago a plaster of Paris jacket was applied by a physician for suspected spinal disease. This proved very uncomfortable, and, failing to give support to which the child could accustom itself, was removed by the mother, without

consulting the physician, at the end of two weeks, when a swelling was observed over the left hip.

This morning the child stands with left limb advanced, toes slightly inverted, and walks quite lame. The spinal column presents no deviation laterally or antero-posteriorly, and no tenderness on pressure, percussion, or concussion. The left natis is broader than its fellow, fold elongated. Above the trochanter, and extending from the same to the crest of the ilium, is a circumscribed fulness, elastic to the touch, non-fluctuating, and painless on pressure. Thigh can be flexed to an angle of 90° without pain, and can be completely extended, though there is muscular resistance to complete abduction. There is no shortening, no atrophy of the limb, and no tenderness can be elicited at the sacro-iliac junction. The diagnosis is not positive, although hip-disease suspected. Treatment expectant, a compress with the roller being applied over the tumor for the present.

On the 25th of January the gluteal tumor is perceptibly smaller, and the child walks with more ease.

A few days later the nurse reports that the patient complains of pain along the spine, but a thorough examination is attended with negative results.

By the last of March the tumor had extended below the gluteal fold; general health very good.

Immediately to the left of the sacro-iliac synchondrosis is a hardish movable tumor, the size of a half-walnut; over the upper extremity of the thigh on a line with the fold of nates is a tumor larger in size, fluctuating, and painless. This note was made on the 16th of April.

Both tumors increased in size, the veins thereover became very prominent, and an incision was made in June, at the most dependent portion, giving exit to about one pint of pus, of fair consistence.

Constitutional disturbance did not follow until ten days later, when the patient became very feeble and indisposed to eat or make any exertion. The discharge was very profuse and offensive. Brandy and tonics were given freely, while the usual disinfecting injections were employed. The notes from this time forward show a steady decline; emaciation became extreme, and all efforts, nutrient and stimulant, proved unavailing. Finally an exhaustive diarrhœa set in; this was followed by a dysentery, and in August, five days after the diarrhœa began, the patient died by asthenia.

An examination, post-mortem, revealed the sac of an abscess about eight inches long by four wide, lying beneath the gluteal muscles, and a careful search failed most signally to detect any connection with diseased bone. The hip-joint, the sacro-iliac joint, and the dorso-lumbar vertebræ were carefully examined and found to be absolutely free from disease.

Ordinarily, cases progress differently from the above and the explanation of this one must be found in the low vitality of the child. Take, on the contrary, the case of a boy aged nine, who was admitted to the hospital the first week in September, 1877, with a history of lameness dating from the 19th of August, he having fallen through a cellar doorway the day before. He had been resting poorly for the past two nights. On admission, tongue is coated, pulse is 120 temperature 101.5° , and the boy is fairly nourished. He stands with the right thigh advanced, knee semiflexed, and foot slightly everted; he walks decidedly lame, favoring the right side. The natis is enlarged, and presents to the touch an elastic feel just about the trochanter, where there is also considerable tenderness. The surface temperature is 2° lower over this region of fulness than at the corresponding point over the right hip. There is one inch increase in circumference; tenderness in the groin, but none in the hip, as tested by pressure over the trochanter in the line of the neck of the thigh-bone, and by pressing on the knee (flexed) and on the foot (leg extended) in the axis of the limb. The movements are limited in all directions—in flexion to 90° , and in extension to 150° . There is no spinal tenderness, no ilio-costal fulness, no tenderness or induration in the iliac fossa. On the following evening a fly-blister was applied, and the usual after-treatment with poultices was adhered to; yet, by the middle of September, the infiltration had increased to such an extent that the boy could scarcely be moved, so extremely tender were the parts about the hip; the circumference had increased three inches. From this time forth it became evident that supuration would supervene, and the parts soon became greatly distended, the thigh assumed a degree of flexion amounting to about 90° , and on the 1st of October there was seven inches difference between the two thighs at the upper third. The boy had become greatly reduced. Abscess opened by incision, and two pints of pus evacuated. Tonics and stimulants were administered quite freely. The

case, without further detail, progressed to a cure by the 10th of November, the opening of the abscess having closed two weeks after the incision. The boy was discharged in December completely restored; no lameness, no deformity, in good health. In January, 1880, I sought him out, and made an examination of the limb, finding a joint absolutely perfect, so far as signs go. There was no atrophy of the limb, no loss of muscular power. The only sign of former disease was a cicatrix on the posterior surface of the thigh in the upper third.

Such extensive suppuration with so perfect a recovery is somewhat remarkable, did we not remember how capacious is the cellular tissue under the fascia of the thigh. The muscles are generally well protected against injury and one often finds in bone disease, for instance, these immense accumulations of pus with very little impairment of muscular tissue. A not uncommon mode of termination, especially in cases of mild type, is by resolution.

A girl, aged eight years, presented on admission a well-marked swelling in the gluteal region, right side, with much pain, extra heat and tenderness. Her axillary temperature was 102.6° . She could with difficulty walk, and the joint, while not tender, was limited in its movements by periarticular infiltration.

The adductors were likewise tense. Her symptoms followed a fall against the round of a chair fourteen days previously, the pain coming on the same night. Her nights became restless, and the case was regarded, so the father reported, as one of hip-disease. The pain was chiefly referred to the knee, and this, with the signs, made the diagnosis an extremely plausible one. The direct contusion, the speedy development of acute inflammation, the infiltration, and the absence of any joint-tenderness enabled me to diagnose a peri-arthritis. Hot fomentations were employed, and on the 26th of October, one month after admission, resolution was progressing rapidly. On the 10th of December there was no lameness, no infiltration, no atrophy—no pain. The patient was discharged, and two years afterwards I examined her again without finding a symptom or sign of disease.

Glandular suppuration in the inguinal region is of longer duration than when it involves the cellular tissue, but the symptoms otherwise differ only in severity. A girl, aged five years, was admitted in July, 1876. There was entire ab-

sence of any cause, predisposing or exciting, in the history. The first sign, a swelling, appeared in the left groin four months before her admission. Lameness was first observed about the same time.

The patient on admission was quite anæmic. She stood with left limb a little advanced, and walked favoring this limb. When the child was placed in the dorsal decubitus so that the spinous processes were on the same horizontal planes, the distance between popliteal space and floor was three inches; flexion could be made over the normal arc, and abduction and adduction were easily accomplished. The thigh was one half inch smaller than its fellow in the left groin, about midway of Poupart's ligament was an indolent ulcer three quarters of an inch long by one inch wide, edges smooth; one inch below this lay a smaller ulcer in the bottom of which was a little pus. Suppurative lymphadenitis was diagnosed, and the treatment consisted of simple dressings and an alterative tonic with cod-liver oil. These ulcers proved very obstinate, and did not thoroughly heal until March of the following year. She did not gain sufficient strength, however, to warrant her removal from treatment; but on April 27th, five weeks after the closing of the ulcers, the child was discharged cured, there being no halt whatever in her gait.

DIAGNOSIS.—To differentiate this from ostitis or from synovial diseases we must remember that bone-disease especially, if it be tuberculous, is essentially chronic, and that the pain and lameness always precede the infiltrations of the soft parts. In this connection we recognize the importance of a clear history, for on this the facility of diagnosis depends. The deformity and the locality of the abscess furnish no diagnostic signs of importance. In this, as in many other joint-diseases, it is extremely difficult to diagnose the case at a single examination.

A female child, aged six months, was brought to the dispensary department in June, 1881. There was a large amount of infiltration in the left groin and this extended round the upper third of the thigh, the limb being rotated outward. I had difficulty in getting any motion at the joint by reason of the apparent mechanical obstruction. After a little coaxing I did get smooth motion over limited arcs and succeeded in eliminating from my mind the question of a diastasis. True, I had not elicited any history of a fall or injury of any kind, yet the position of the limb, the

absence of redness of the integument naturally suggested such an accident. The symptoms were of three weeks' duration, and the family history was aught but reassuring. The mother was one of twenty-one children, five of whom only were living. I could not find any condylomata, but my suspicions of syphilis were so strong that I made a diagnosis of hereditary syphilitic peri-arthritis and ordered one twelfth of a grain of calomel three times a day.

Seven days later the infiltration was much more circumscribed, and fluctuation was discovered. Four days afterwards I made an incision, giving exit to a few ounces of pus, and the case progressed uninterruptedly to a good recovery. Within a fortnight the functions of the joint were normal, the deformity had disappeared, and a cure was recorded. I took the precaution to examine the parts a month later and found no relaxation of the capsular ligament and no impairment whatever to the joint.

When there is an absence of infiltration, and when one gets a history of a strain or over-exertion and an insidious lameness, the diagnosis is much more difficult. In July, 1880, Dr. Ripley asked me to see with him a boy aged six years, who, three weeks before our visit, had an acute suppurative disease of the middle ear, with perforation of the drum. From this he had made a good temporary recovery. One week after the beginning of his ear-disease on a damp, disagreeable day, he had been taken for a sail on the East river, and on his return that night he cried frequently during sleep. In the morning there was febrile movement, with a disposition to flex the left thigh on pelvis. Any attempt to move the limb was attended with sharp cries and the mother fancied that the knee was swelled, but Dr. Ripley, who saw this case next day, could not find any swelling. He did find a temperature of 104.5° , and a corresponding degree of constitutional disturbance. The thigh could be extended quite easily, but there was resistance to abduction. The movements became less free in a few days, and we found the limb extended, while the right was flexed and adducted, so that the sole of the foot pressed firmly against the dorsum of the other foot, as if assisting in maintaining extension. There was a distinct area of induration in the iliac fossa glandular, perhaps, and pressure elicited tenderness. The thigh could be easily extended, but flexion beyond 90° met with resistance and caused pain. Abduction and rotation were likewise resisted, while there was entire

absence of joint tenderness. The fold of the nates was a little lower on this side. Yet the gluteal region was free from any infiltration. It was difficult to decide between a periarthrosis, and an acute bone lesion. Yet the history and the appreciable infiltration so speedily developed, pointed to the former, and this diagnosis was recorded. Counter-irritation was advised, and on my next examination, eleven days afterwards, the signs were less marked and the diagnosis was in a measure confirmed.

Dr. Ripley informs me that the case terminated in a cure.

Pelvic cellulitis in a child is not of common occurrence, yet when it does occur the symptoms and signs, too, are those of a periarthrosis; indeed, it is a periarthrosis. The iliac fossa is the point of departure, and the ilio-psoas muscle is in spasm by reason of the infiltration thereabout.

About the middle of September, 1882, a little girl, two and a half years of age, was brought to me for a hip lesion of two weeks' standing. The process began acutely, and on the day I examined the case the right hip was held in sharp flexion, and there was a perceptible amount of infiltration in the groin and extra heat and tenderness along the inner side of the thigh. I made out a periarthrosis, the lesion being chiefly confined to the internal iliac fossa, and the case subsequently came under the care of Dr. Shaffer, who confirmed the diagnosis I had made. The case went on to suppuration, and on the disappearance of the infiltration the deformity disappeared, and soon the patient was discharged cured.

On the right side one naturally thinks of a perityphlitis, and the signs of an idiopathic perityphlitis are not unlike those of a pure periarthrosis wherein the psoas group is chiefly involved.

A periarthrosis occurring in a neurotic subject is not always easily diagnosticated. The neuroses obscure symptoms, and we can rely only on signs. And thus, too, if malarial symptoms enter as a complication the difficulty in arriving at a correct diagnosis is certainly very great. I am reminded now of a case that puzzled me for two or three weeks, and it is only on a careful review of the symptoms that I can find any consolation in having erred so egregiously. The patient was a sickly, cadaveric-looking girl nine years of age from Westchester county, and came under my observation in the latter part of March, 1881. She

had always been the delicate one of a phthisical family. In the preceding year she had suffered much from malarial fever. Two weeks prior to my first record of her case, the girl had a chill one night, and this was followed by fever. Next day she favored the left hip in walking, and the lameness continued without abatement; indeed, it had been steadily increasing. There was also much pain in the outer side of the thigh, and in the vicinity of the hip. The child was worse by night and comparatively well by day, and febrile movement had been quite marked at irregular intervals. When I made my examination I found that I could not abduct the right hip to my satisfaction, and that rotation caused a little pain. Other movements were perfect. The same signs, identically, were found on testing the functions of the left hip, and in addition there was marked tenderness and a shade of fulness behind the trochanter. The spinous processes were very tender, and in fact the whole body was markedly hyperæsthetic. The pain was referred to the left lower extremity a few days later, and a thorough examination could not be had on account of the extreme tenderness. I was at a loss to make a diagnosis, but felt quite sure that a malarial element was present and that this might account for the spinal neuroses.

Quinine was pushed to physiological effects, and within a week all spinal tenderness had disappeared. The tenderness about the hip remained, however. Then I left off the quinine for a week and the neuroses returned. On resuming the quinine the complications gave place to the real hip symptoms, and by this time, twenty days after admission, there was an unmistakable area of fluctuation over and above the trochanter. In less than a fortnight an immense abscess, involving the whole of the upper two thirds of the thigh was opened and the flow of pus was quite remarkable.

It was not until the end of August that the case was pronounced cured. The neuroses by this time had long since ceased to annoy, the functions of the hip were perfect, and the girl had grown plump and hearty. Recently, two years from that date, I have seen my old patient, and have failed to find any traces, save the superficial cicatrices, of the former disease. It all seems clear to me now, and my only wonder is that I did not make out a pure neurosis of the hip.

There was, then, the case as it stood, viz.: a periarticular cellulitis occurring in a neurotic subject in whom malarial

poisoning was present. Let one remember, then, in making a differential diagnosis, that the following points are to be considered:

1. There may be simply a sprain or contusion.
2. There may be a bursitis simply, and a knowledge of the locality of the bursa will assist materially in arriving at a conclusion.
3. An exacerbation in a very slow and scarcely appreciable case of chronic osteitis may closely resemble a periarthrosis.
4. A neurosis from any cause, with muscular contraction, may be taken into consideration.
5. A residual abscess from lumbar Pott's disease may present beneath the fascia. The spine should always be examined.
6. An acute epiphysitis may give rise to signs that will be very confusing.

The diagnosis, as above remarked, becomes comparatively easy when one takes into account the behavior of acute and chronic inflammation.

The prognosis is good, that is, a cure can be predicted in from three weeks to six months. The deep abscess of the thigh, however, is a more serious affection, and it is in such that a fatal issue is sometimes to be expected. It is extremely rare that joint-disease follows such an inflammation, and hence one can safely assure the patient that no injury to the articulation will ensue. I deem it my duty, however, to place on record this exceptional case.

The patient was a boy aged three and a half years when I first saw him in March, 1882. He came with a history of a fall from a high chair six months previously, getting a sharp contusion over the upper and outer aspect of the right thigh. He suffered much the same night, and was confined to bed by order of the physician who had been called, for three weeks, the contusion slowly giving way to a circumscribed swelling. This soon terminated in abscess, which was opened and the discharge therefrom continued in varying degree up to the date of his appearance at the hospital. The lameness was very slight, in fact it was with difficulty recognized; the limbs were parallel; there was no atrophy, no shortening. The joint surfaces were smooth and free from tenderness, and the movements were very slightly if at all limited in any direction. The sinus communicated with a sac lying beneath the fascia lata, but no

bone could be discovered by careful probing. A diagnosis of peri-arthritis was made, and the case continued under the care of Dr. Mayer, with whom I had simply consulted.

Everything progressed to a wish until the latter end of December, same year. The doctor gave most encouraging reports of the case; the lameness was for months not perceptible, but the sac, which had been well cleansed from time to time, would occasionally refill, and on these occasions the child would favor the limb. Finally Dr. Mayer lost sight of the case. The parents moved to another part of the city, the patient suffered from unavoidable neglect, and when I saw him again in February of this year the signs pointed to a well-marked case of chronic periosteo-ostitis of the hip. Deformity had already become a prominent sign, and at the mother's request he was admitted to the hospital. Under a better hygiene and a modified rest he soon showed decided improvement, but the separation was so poorly borne by the mother that she insisted on removing him a few days after admission.

Dr. Cheever, of Boston, in a very interesting paper in the *Boston Medical and Surgical Journal* for April 12, 1883, gives some cases in his own experience wherein inflammation beneath the deep fascia of the thigh led to unpleasant consequences. I have myself seen cases of deep subfascial abscess both in front of and behind the hip, running an extremely tedious course and leading one to suspect bone disease as the initial lesion. Careful exploration, however, fails to detect any necrotic bone. It is certainly the experience of many surgeons, whose field is large, to find burrowing pus sacs with fungous lining membranes, to thoroughly open the same and to find no diseased bone.

A well-developed lad, thirteen years of age, came under treatment in March, 1882, for what I regarded with some reservation a strain of the right hip. The only signs I could find on a pretty thorough examination were a little resistance on abduction, and when the thigh was forced in this direction, pain was complained of in the capsule (?) of the joint. After a long run on the first day of December, 1881, he felt stiff next morning, and walked lame. Pain at this time was referred to the groin, and gluteal region. These symptoms continued a fortnight, and after ten days of complete remission returned and were pretty constant up to the date he presented for treatment. Ten days after his first visit in March I found decided tenderness over

the posterior superior spinous process of the ileum, and ordered a blister.

Fourteen months elapsed before I had an opportunity of seeing the case again. This was in May of the present year, and in March an abscess had appeared spontaneously near the right sacro-iliac junction. An immense sac lying under the gluteal muscles, and filling about all of the external iliac fossa, was explored with much care, and I could not find any evidences of diseased bone.

There was no tenderness at either sacro-iliac or hip joint, the lameness was so slight as to be scarcely appreciable. The inguinal glands were enlarged, and there was additional fullness in this locality without any fluctuation.

The sac had been washed out daily, and the discharge had varied in quantity. The fullness in groin has increased, and has caused considerable uneasiness. In August I find a little fluctuation in Scarpa's space, with one or two points of redness and induration. The gluteal sac is discharging very little. Dr. Wm. T. Bull saw the case, explored the sac and failed to find diseased bone; yet he is quite confident that such exists. There is very little doubt that the pus is burrowing down into Scarpa's space, and appropriate surgical measures have already been urged.*

This case furnishes not only many points of interest to the diagnostician, but, illustrates the importance of prompt surgical interference. This immense sac, in such close proximity to the joint, is certainly a dangerous neighbor, and the sooner it can be removed the better it will be for the joint; the better it will be for the health of the patient. I have grown extremely restive under chronic abscesses arising in tissues around the joint. It is dangerous conservatism to let them alone.

It is regarded by some of the more conspicuously conservative dangerous to probe sinuses or explore sacs. I am convinced by overwhelming evidence that is better to make a diagnosis, even at the expense of injuring soft parts. Wounds will heal if properly treated, and they will heal if not treated, but sinuses will not heal where they must serve as tracks for the passage of pus that is being continually

* As these sheets are going to press Dr. Bull writes me that he has this day, August 31st, at St. Luke's, made free incisions antiseptically to find a sequestrum of bone in the crest of the ilium near posterior superior spinous process. His prognosis is good.

manufactured by a pyogenic membrane. The well is being fed all the while, and it must have an outlet.

The following simple case taught me, as a sad experience will always teach, the value of exploring sacs, and of omitting no recognized tests in arriving at a diagnosis.

In the early spring of 1875, a female child, aged one and a half years, was brought into the office of the Out-patient Department, and the examination, which was very superficial, resulted in a diagnosis of caries at the sacro-iliac junction. The child was feeble, and was with difficulty handled, on account of tenderness; the soft parts about the sacrum were extensively infiltrated, two or three ill-conditioned ulcers were present, and the skin around these was bluish, the veins were prominent, and there was a sero-purulent discharge which was rather abundant. I did not explore the ulcers and sinuses with a probe, nor did I go through with any of the recognized tests for the presence of disease at the sacro-iliac synchondrosis. I learned from the mother that this condition of the soft parts had existed for six weeks, and that the first sign she observed was a small point of redness and swelling, like an ordinary boil. She knew of no cause. I did not ask her anything about previous treatment—was hurried, and, as before stated, did not examine very closely into the case. It seemed clear enough to me at that time, for I thought sacro-iliac disease of common occurrence. I had not seen any cases about which I had felt sure as to diagnosis, yet I attributed this to my ill-luck. Simple dressings, with tonics and occasionally stimulants, made up the treatment for the next six months. I did not see the child often, yet there seemed to be no marked change in the signs presenting from time to time, and while the health was improving a little I felt no great uneasiness about the ultimate result. In September she suffered considerable pain, and there were four sinuses, with large openings, amounting to ulcers. The mother calls September 18th with the child, and brings in her hand a piece of muslin, one inch square, which she found yesterday protruding from one of the ulcers. The muslin was far on the way to decay, and, on questioning the mother, she remembered well that, in the early part of February, seven months before, the doctor who opened the "boil" inserted a piece of muslin to keep the wound open. She did not see the doctor any more, and had forgotten all about the tent. All the sinuses closed within a week,

and the child soon recovered. I did not see the case any more, but found the child in January, 1880, and made a careful examination. I did not find any impairment of the functions at either hip or sacro-iliac joint. There was no atrophy, save about the cicatrices which covered the sacral region. The mother reported that no relapse had ever occurred.

With the cases I have recorded in connection with that part of my subject which treats of the pathology and clinical history, the transition to treatment is very easy.

TREATMENT.—In no one of the inflammatory lesions in and about the hip is there greater call for the employment of correct surgical principles. We seldom have a cold abscess in peri-arthritis, and hence the inflammatory products can be treated without delay. In severe contusions rest and hot or cold applications are called for, as the physician's choice may be. My own preference is for hot fomentations, and by hot fomentations I do not mean the application of a bit of flannel wrung out of hot water: I mean more than this. The ordinary toweling or spread cloth used for counterpanes, should be folded into several thicknesses, saturated with water heated to the boiling point, and deprived of its superfluous water by wringing. Then apply immediately the cloth thus prepared; quickly cover this with oil-silk or oil-muslin, and over all apply a bandage of dry cloth. Cloths, when properly applied, (and it will require several applications for one to get familiar with all the details), will keep the parts hot for at least twelve hours. This repeated, then, in twelve or twenty-four hours, serves to allay the pain very often in a remarkably short space of time. If abscess form, the pus should be promptly evacuated. I well remember a case in which this was delayed, until the sac grew to immense size. It was in a poorly nourished girl, four years of age, whom I saw first in August, 1881. She had never been in good health, having suffered not only from many of the exanthemata, but from many of their sequelæ. A week prior to this visit, the mother heard her complaining of the back. On examination, I found the little patient unable to walk without a stiffness of gait. The right natis was a little flattened, and deep beneath the gluteal muscles could be felt a tumor filling the external iliac fossa, tender and semi-elastic. In the dorsal decubitus, the left thigh could be extended completely, but abduction was resisted and painful. Rotation was perfect, and the

existence of any joint-tenderness was extremely doubtful. There was no tenderness at the sacro-iliac junction.

I made a diagnosis of periarthrititis and advised an incision. The advice was not accepted by the attending surgeon. Two and a half months later I saw the case again, and at that time the abscess extended throughout the whole of the gluteal region. It opened spontaneously; extensive sloughing followed, and the patient finally, in an extreme degree of emaciation, found a home in one of the sea-side sanitariums. She died of exhaustion a year after the first appearance of the disease. I am quite sure that no signs of disease in spine, sacrum or hip ever developed during the whole course of the illness.

A case in an adult excited considerable interest in one or two hospitals in the winter of 1881.

A woman, twenty-five years of age, came to me in September of that year, and presented a glandular enlargement in the inguinal region, left side, and a small soft tumor near the sacro-iliac synchondrosis, same side. There were also associated with this condition occasional neuralgic pains. The first symptoms began three years before this period as she was convalescing from a difficult labor. A fall nearly a year subsequently seemed to aggravate the symptoms. In other words, the whole history pointed toward a chronic cellulitis in the left side of the pelvis, and she had come to the hospital on account of some impairment to the functions of the hip. It did not require an extended examination to exclude disease at this articulation, and I referred her to a general hospital. She was admitted and examined by the visiting physician, who referred her back to me for a truss. I certainly made out a tumor in Scarpa's space, and got an impulse, but it was the impulse of fluid, and I declined to apply a truss. The case was referred then to Dr. Ripley, who agreed with me in diagnosing a pelvic abscess. Pressure on the sacral tumor would impart an impulse in the tumor in Scarpa's space. Under expectant treatment both of them increased rather rapidly in size, and Dr. Ripley admitted her into St. Francis Hospital in the early part of June, 1881, for operation. The aspirator was first employed, and shortly afterwards small ulcers formed. Then a free incision was made and the upper tumor collapsed. Through drainage was established and repair promptly followed. At no time was there any eroded bone found, and it was the general opinion that the

abscess did not depend on caries, or in fact on any bone lesion.

When the periarthrititis is glandular the surgical principles apply here as well as in other tissues. Glandular abscesses, however, as a rule give very little cause for anxiety. The great danger in allowing any inflammatory tissues to remain long in contiguity to so important an articulation must be quite apparent. Orthopedic appliances are very seldom called for, and one need not attach any importance to the deformities which often arise during the progress of the disease. In closing this chapter I can name nothing **more important in the treatment than a correct diagnosis.**

CHAPTER VII.

BURSITIS OF THE HIP.

From the anatomy of the hip one will learn that several bursæ exist about this joint and contribute largely to the smoothness with which the muscles, in their action, pass over bony prominences. Their functions have already been discussed in the chapter on anatomy, and now we discuss them in a state of inflammation. Many believe that one of the modes of origin of hip-joint disease is through injury and consequent disease of the bursæ, and a tumor presenting in the gluteal region, for instance, in the second stage of a chronic articular ostitis is often pointed out as simply a bursitis. Now this is very confusing, and in my own experience I have really come in contact with very few cases of unmistakable primary bursitis in connection with the hip-joint, and in the text-books I do not find any cases recorded with a generosity that will enable one to make the diagnosis for himself. The general practitioner, it would seem, is in a position to recognize these lesions in the early stage by very simple methods, and this being done, many cases may not only be saved from joint-disease, but from the prolonged treatment for a joint disease which has no existence in fact.

Those most commonly the seat of inflammation are; the bursa under the glutei lying over the pyriformis, the bursa in front of the gluteus maximus, and between it and the vastus externus, and the large bursa between the ilio-psoas and the capsule of the joint (see Figs. 1 and 2). Others may, and I presume do, become inflamed under the influence of pressure or blows, and yet they are so intimately associated with neighboring tissues that the recognition of them as individual pathological entities is next to impossible, and to define them as such would subject one to the charge of striving after "pathological refinements." The *cause* is manifold. Bursitis frequently follows very closely a fall or a strain, is often induced by exposure to cold, and occa-

sionally we have to admit that it is idiopathic. It matters little, however, what the cause may be. It is sufficient to know that a strumous bursitis is not recognized.

In 1874 there came under my observation a lad, aged fourteen years, with pains about his left hip and tenderness over the upper portion of the shaft. The case puzzled me considerably then, and finally I concluded it must be a peculiar form of "hip-disease." I saw him from time to time, at long intervals, until 1877, when I made a diagnosis of periostitis. At that time he was unable to lie on the left side, and yet I could not detect any lameness or any marked impairment of joint function. He gave the history of exacerbations of pain, confined chiefly to the upper portion of the thigh, and generally relieved by iodine topically employed.

I could not find a record of any notes of his case in 1874, but I remembered him very well, and remembered how barren of any tangible symptoms my observations had been.

On the 5th of March, 1879, I saw him again, after a long absence, and I could detect no real difference between the hip functions at that time and those in 1877. He reported that he had much pain—not enough, however, to prevent him from working—and had not been able to lie on his left side with any comfort for six months. The fulness and tenderness about the trochanter were still present; but it did not occur to me until December 3d of that year (1879) that this must be a case of recurring bursitis, and on examining the parts more carefully, I could make out quite distinctly, by palpation, a small cyst occupying the proper site of the bursa which lies under the gluteus maximus and upon the trochanter (see Fig. 2, C).

On the introduction of the needle of a hypodermic syringe a synovial-like fluid was removed, and the cyst collapsed. The case seemed clear enough then, and the exacerbations of pain and tenderness he had had for the past five or six years were easily explained by the filling and refilling of the bursal sac, consequent on strains or bruises. A few days later my diagnosis was fully confirmed by Dr. J. H. Ripley. The contents were thoroughly removed by a hypodermic syringe, and a compress was applied. This gave temporary relief, and he came under treatment again in March, 1880.

The further progress of the case has been, on the whole,

satisfactory. The removal of the sac by operation was not practicable and was not urged, because of his inability to spare the time, and because blisters would give relief whenever a re-accumulation of serum took place. He has experienced very little inconvenience since the nature of the disease has been recognized. The thigh is an inch smaller in circumference than its fellow, but there is no lameness and no pain. I have recently examined him, and a cure is pretty well established.

Here then, we have no account of any direct blow or strain to induce the bursitis in the first instance, but it does not seem fair to exclude such a cause, inasmuch as no history of the case, in the early part of its course was, if obtained, ever recorded.

This is unlike, in duration at least, the case of a stout, hearty-looking girl, nine years of age, who was admitted to the hospital on the 4th of March, 1880, bearing from the family physician a written diagnosis of hip-disease. We could not detect any flaw in family or personal history, and could not trace her lameness—of four weeks' duration only—to any distinct trauma, although it was presumed that she had strained her hip while at play, as she was very active, and during her waking hours nearly all the time on her feet.

With the lameness there came also an occasional pain in the knee, and an unusual sense of fatigue after playing all day.

On examination I found that she stood squarely on both feet with limbs parallel, and that she walked with great ease, though favoring the right limb perceptibly. I could see a protrusion of the soft parts in the gluteal region, which on palpation could be made out as a cyst-like body about the shape and size of a hen's egg, lying deep under the gluteal muscles, not tender on pretty rough handling, and not giving rise to any glandular enlargement in the inguinal region.

I could not detect any joint tenderness, or bony tenderness, and could not find any resistance whatever to any of the normal joint movements, unless, perhaps, there was slight reflex muscular spasm on extreme abduction. There was no atrophy of the limb, and no tenderness, pain or infiltration in iliac fossa or ilio-costal space.

The diagnosis of bursitis was made without any reservation, and the treatment to be employed was blistering and

poulticing. Three blisters were applied within the next two months, and there was no marked diminution in size of the bursal tumor. In the absence of any acute symptoms the patient was discharged in June and continued under treatment in the out-door department. A compress and the spica bandage were used, and by September 3d it was extremely difficult to detect any fulness whatever in the gluteal region. There were absolutely no hip signs, and the patient was discharged cured.

Occasionally one finds a peculiar "click" on manipulating joints, and the interpretation of this sign is attended with much difficulty. My own impression is that the click is produced by the slipping of a muscle or tendon over a bursa formerly the seat of inflammation and now roughened, more or less, by the resulting diminution in secretion. When it occurs within a joint its significance is easier of explanation. While examining a highly neurotic patient during the past winter, I met with this phenomenon, and it seemed to me that its location was within the pelvic cavity, or, at least, near the pubic rim. The case was one of sciatica, and in the absence of any joint symptoms, I concluded that the bursa under the ilio-psoas was at fault as I invariably got the "click" when that muscle was subjected to traction.

A case of very great interest, diagnostically considered, was brought to me by Dr. Martin, of Boston, a member of my class at the Polyclinic, in April of the present year. It was a lady thirty years of age, who complained of a sense of fatigue and a peculiar "click," which she experienced on walking. It was felt near the insertion of the gluteus maximum, right side, and I tried in vain to get it by passive motion. In the recumbent or upright posture she was unable to produce it, no matter into what position she threw the limb, but let her walk across the floor, and with my hand over the region in question I could appreciate the "click" quite distinctly. There was no arthropathy and no interference whatever with the nutrition of the limb. There was no swelling and no tenderness. Three months before the date of my examination it had appeared quite unaccountably. My opinion, as given the Doctor, was that the bursa over the trochanter had been impaired by inflammatory changes. Dr. Shaffer met with the "click" in a case of true neuromimesis of the knee-joint, which he reports in his monograph, and I infer

that it was periarticular from his explanation, viz.: It was due to "the reduction of a temporarily displaced tendon, or perhaps to the reduction of a slight subluxation; in either event caused by muscular action." The tendon passing over a bony prominence not covered by a bursa whose functions are normal, explains to my own mind this condition of things.

The symptoms, then, seem sufficiently pronounced to give a clinical picture that should enable one to make a diagnosis, and I need not dwell longer on this point than to refer to the difficulty of differentiating this disease from chronic articular ostitis of the hip, or synovitis, if the bursa under the ilio-psoas be the one implicated. The freedom of all the joint movements, save flexion in extremes, and the presence of the inguinal tumor, which increases and subsides under exercise and rest respectively, are the points on which a differential diagnosis can be made. This is more fully illustrated in a case which is reported on page 115.

The TREATMENT will depend, in a measure, on the locality of the bursa inflamed, and upon the severity of the symptoms. Blistering over the gluteal bursæ seems to have given me good result in a single case, and this still is a very popular method. In one case it did no good whatever, and the tumor yielded to a compress and the roller.

The removal of the contents by the hypodermic syringe and the injection of iodine into the sac has been employed with fair result in bursæ in other parts of the body, and I should certainly employ this method in another case.

The rupture of the sac by percussion or direct blow, when the tumor lies over a bony surface, as in the one over the trochanter, would commend itself, but for the danger of exciting inflammation in parts contiguous.

Then this might be brought about by valvular puncture or incision. The fluid would escape into the soft parts and be absorbed. A compress worn subsequent to this procedure over the parts will prevent the reaccumulation, unless this be one of those irritated bursæ, such as the one in my first case proved to be.

I have no experience in the wearing of setons in bursæ of any kind, and on general principles I should hesitate long before recommending this treatment in inflamed bursæ about the hip. A suppuration is induced, and the drainage being poor, the neighboring parts are almost sure to participate. Even this treatment for the prepatellary

bursæ is not looked upon with favor by many good surgeons.

In those sacs which show such a tendency to refill, I should prefer excision. Corresponding last year with Mr. Mitchell Banks of the Liverpool Royal Infirmary, that gentleman very kindly sent me an extract from the Liverpool Medico-Chirurgical Journal entitled, "Notes on the Surgery of Bursæ," published January, 1882, and in these notes I find two cases which he reports as at present in his wards. The disease was confined to the bursa over the most prominent part of the great trochanter. I take pleasure in reproducing them in this connection.

"The first patient, Lydia T., aged 20, told us that some four years ago she was sliding in the street, when she fell and struck her left hip against the wheel of a passing wagon. A lump followed, which burst in about a week. There remained a small sinus, which has continued to discharge slightly ever since, and in the neighborhood of which she has suffered pain at intervals. Some three weeks before admission the parts around the sinus became much swollen and very hard, so that her pain induced her to come to hospital. The only point was whether there was any disease either of the joint or of the femur. All the ordinary tests indicated that the joint was quite sound, while the most careful probing failed to reach bone. Clearly the treatment was simple enough then, namely, to lay the sinus open to its uttermost end. Ether being given, this was done, and then a smooth cavity lined with granulations was reached, which was pretty evidently the sac of the trochanteric bursa reduced to the condition of a very chronic abscess cavity. A free crucial opening into this was made, and it was tightly packed with lint dipped in carbolized oil. It is now growing up to the surface, and in two or three weeks will be quite healed over. Although I was pretty confident that the cavity reached here was the sac of an old inflamed bursa, I could not be absolutely certain, as it was the first case I had seen. But the diagnosis was confirmed by the appearances presented by the case of Mary H., aged 24, who was admitted about a fortnight after the previous case.

Two years ago she fell down stairs, after which she had pain over the outer and upper part of the right thigh, which was followed in the course of a week by a lump about the size of a hen's egg, when first she noticed it. It

has remained pretty stationary ever since; sometimes, she thinks, increasing a little in size, and sometimes diminishing. She had no distinct pain in it, but it made the whole leg ache and feel so weak that she determined to have it removed. Over the trochanter was found a smooth, globular, somewhat elastic tumor, quite free, and moving readily about. The skin over it was unaffected, and there was no pain on handling. Two of my colleagues examining it without knowing the history, pronounced it a fatty tumor. At my first examination I did also; but a day or two after patient's admission her history was carefully taken, and the tumor again examined before operation, chiefly as a part of the ordinary clinical training of the students; and not for my own satisfaction. At this examination, however, the history attracted my attention, and a more careful handling convinced me that the tumor was fluid and not solid. So a fine trochar was brought and thrust into it, and through it came some dark-colored serum. We thereupon all rejoiced at having discovered a second trochanteric bursa, and the subsequent small operation was watched with considerable interest. Under ether I made a free incision through skin and fat into the tumor. Some serum escaped, and then a considerable quantity of stuff which looked like semi-liquefied fat, but which turned out to be lymph floating in the serum. From being worked up and down in the sac, this lymph was evidently acquiring a definite form, and it was pretty clear that after a while it would have broken up into a mass of small bodies, which would in time have acquired the peculiar melon-seed shape, with which one is familiar in diseased synovial bursæ connected with tendons. My first idea was simply to plug the sac, and cause it either to slough out, or granulate up; but it seemed so tough and shining, that I was tempted to dissect it out, and very easily so, the only surface to which it was intimately adherent being the fascia and periosteum over the trochanter. Thus the wound was reduced to a very simple matter, and it will probably heal before that of the first mentioned case."

The cases Mr. Banks first reports are interesting from a therapeutical point. The method of operating employed by this surgeon is to make two incisions, and speaking of the objections to excising bursæ, he makes the following remark:

"In performing an operation which is not necessary for

the saving of life (an operation of complaisance, as the old surgeons would have termed it), one has to balance against the annoyance produced by the complaint, the pain of the operation at the moment of doing it, and the subsequent risk caused by it. With regard to pain, that is a thing of the past, as far as the work of the knife is concerned. As for the subsequent risk, antiseptics have put such an operation as removal of the bursa patellæ almost on a level with the commoner surgical proceedings of paring one's corns and cutting one's nails—operations, by the way, which have both been followed by fatal results, but which, in spite of that, are universally practised."

PROGNOSIS.—If one can recognize a bursa about the hip under a primary inflammatory attack, the prognosis ought to be extremely favorable, not only for speedy recovery but perfect result. If not recognized, however, until the sac has become irritable and thickened, then one cannot predict the time when a spontaneous cure will follow. When the iliopsoas bursa is affected, the prognosis should be given with extreme caution. I am pretty well convinced that grave diseases of the hip-joint arise out of just such conditions.

Take the following, which has been to me a most interesting case, not only of bursitis, but of subsequent joint diseases:

I saw for the first time, in the latter part of April, 1880, a plump, fairly nourished girl, aged eight years, and while there was a tuberculous element in the father's family, the child herself had been in good health all her life. It was reported that two years before this date she had been run over by a wagon and severely bruised. The effects soon passed off, it was believed, and nothing further was observed until she began to complain of pain just above the right knee, in February, 1880. She continued at school, though, and the pain was felt chiefly by night, when the parents would hear cries during her sleep. No other symptoms were discovered until I found a fulness in the right groin, below Poupart's ligament. This fulness did not extend into the iliac-fossa, and I could not find any resistance to the normal movements of the joint. There was a slight limp, right side, but it was not the "hip limp." The natis on this side was broadened a little, and the gluteo-femoral crease was lowered and shortened. The diagnosis lay between a glandular peri-arthritis, and an articular osteitis. Under expectant treatment the lameness

soon grew less marked—scarcely appreciable—but the inguinal fulness remained about in *statu quo ante*. The lameness disappearing, a discharge was granted for the 22nd of June. There was, however, on this, the day of her discharge, a slight yet appreciable resistance to flexion of the thigh beyond 90°. There was no atrophy, and no joint tenderness.

Believing this tumor to be glandular, I employed iodine internally and externally, and occasionally applied a blister over the parts. In August, lameness was induced by going up stairs, and this slight exercise indicated pretty well the locality of the disease. In November she became lame again, though prior to this she had been very active. The inguinal tenderness was very marked, and this tumefaction, or, tumor, still existed.

In January, 1881, I was quite positive in finding an elastic or cystic element in this tumor, and I made a diagnosis of bursitis just beneath the ilio-psoas, and in almost direct contact with the synovial membrane. The tumor was not painful on handling, and was the size of a pullet's egg. There was no lameness whatever, unless a transient lameness after rising from bed in the morning. In March, I was more confident of my diagnosis, and urged the use of the hypodermic as a means of diagnosis at least, but I could not get the consent of the surgeon in charge of the case. Other remedies were employed, liniment, for instance. She became better, and worse again throughout the summer, but always retained that fulness in the groin more or less prominent.

Some days it would be quite large, and her symptoms would be aggravated. Then, again, it would be small, and scarcely any lameness could be detected, and the only sign present was resistance to complete flexion.

In October, 1881, there appeared for the first time real symptoms of joint disease. The hip was nearly locked, and there was much joint tenderness. She was re-admitted, and under expectant treatment grew worse, so that by February she had passed, with a great deal of suffering, too, through the first stage of joint disease, into the second, with impending abscess and great deformity. The father removed her at this time, and placed her under the care of another surgeon. He made out scrofulous ostitis of the hip, implicating the acetabular parts, and has her now

under treatment. An abscess formed, and was aspirated.

Dr. T. M. Taylor, of our staff, very kindly traced the case out in June, and found the girl in a Thomas' splint, limb straight and in good position. The girl had no pain, and was in a fair condition of health. The hip was fixed by the splint, which was not removed; the limb was atrophied nearly two inches in circumference, but seemed equal in length.

Such cases as the one just recorded furnish texts for extended comment. Here was this tumor duly recognized long before any inflammatory mischief had been done the joint, and here was the knowledge of the disastrous effects of disease at this articulation. It would have been better to have removed the offending bursa, taking all the risks of so delicate an operation. In this day of antiseptic surgery, with such facilities for diminishing the danger of inflammatory processes, little fear need be entertained in making an operation wound, however large and however extensive, provided it is demanded by the exigencies of the case. In an acute bursitis rational therapeutics demand rest and expectant measures; but if the lesion gets to be a chronic and a recurring one, then excision of the tumor, or obliteration of it by surgical means is the only rational treatment to be considered.

To recapitulate:

1. The bursæ about the hip are occasionally inflamed as a direct result of strain, contusion, or exposure to cold.

2. Ordinarily they excite a very trifling amount of inflammation in adjacent tissues; occasionally, however, the joint is implicated, especially if the bursa beneath the ilio-psoas be the one diseased.

3. In a certain number of cases of acute bursitis the tendency to recurrence is very great, and this is chiefly true of those wherein a diagnosis has not been made until two or more attacks have already appeared.

4. The diagnosis depends on the history, the knowledge of the anatomical locality of the normal bursæ, the presence of a cystic tumor, and the exploration of the same and the exclusion of synovial, periarticular and bone diseases.

5. The treatment in the first attack should be blistering, if the process be not acute; hot fomentations if acute, rest and compress. If recurrences have already taken place,

and the sac be an irritable or a sero-purulent one, the destruction or the removal of the same is the only treatment that holds out any prospect of a cure.

6. It is dangerous to permit, for a long time, inflammation of a bursa which communicates with the joint, or which lies directly upon the capsular ligament.

CHAPTER VIII.

ACUTE PRIMARY SYNOVITIS.

The serous membrane which lines the capsule and is spread over a large surface of the articulation occasionally becomes the seat of a primary inflammation, marked by acute symptoms and running a comparatively brief course. The age at which children are thus affected is from eight to fifteen years. The invasion is acute and well-defined. The mother will be able to name the day, the hour frequently, when the first pain was experienced, and this is generally preceded a day or two by a little lameness, sometimes merely a sense of fatigue. The joint soon becomes exceedingly tender, and the patient will be unable to walk during the first and second weeks. In chronic ostitis of the hip the inability to walk does not, as a rule, come until several months after the invasion. Lameness, it must be remembered, is the first sign, but this is very slight, and it is a long time before the patient is actually unable to walk. Pain in the branches of the obturator—at the knee, for instance—will follow crowding of the articular surfaces together. The intensity of the pain will, of course, be in proportion to the acuteness of the inflammatory process.

The case of a boy, aged twelve years, who came into the hospital in October, 1879, furnishes a good clinical history of this disease. He came from a country town, and was a muscular-looking lad. There was a history of phthisis in both branches of the family, and the father was reported to be suffering at the time from sciatica. With the exception of a slight attack of what was regarded as malarial fever two years since, the boy himself had been in excellent health until one month before the date of admission, when he was seized with pain on the inner side of the right thigh. He had been in bathing quite frequently during the latter part of the summer—three or four times a day—and it was to exposure or fatigue that his pain was attributed. He

was able to walk the first day, although he was decidedly lame. On the third day he took to bed, so tender had the parts in and about the hip become. There was considerable febrile disturbance, without constipation, and morphia had to be administered every night to allay the pain. The hip and the knee alternately had been the seat of pain, and the limb could with difficulty be moved at all. Recently he had suffered most in the distribution of that branch of the obturator which supplies the knee. He held the thigh acutely flexed while lying in bed.

He was taken from his bed this morning and brought into the hospital. Is able to stand, although the weight is borne on the left limb, while the right is a little advanced, the foot being everted. He remarks that this is the first time he has been able to set his foot squarely upon the floor since the beginning of his illness. As he attempts to turn, he does so by means of the left foot. Can walk only when well supported on each side. He is well-developed, but has a face that is indicative of great suffering. It is a painful expression he has. The thorax and the spinal column are examined, with negative results. There is much width to the nates on the right side, the fold is obliterated; no tenderness over the sacro-iliac junction, and none elicited on crowding the *alæ* of the pelvis together. No infiltration in the groin or in the gluteal region, no tenderness here on handling the parts. The superficial inguinal glands are a little enlarged. Light pressure in the groin or over the trochanter gives rise to no pain; no pain on pressure along the shaft of the femur. If firm pressure be made over the trochanter in the line of the neck of the bone, he winces very decidedly, and refers the pain to the outer aspect of the thigh and about the knee. Concussion of the joint gives rise to much pain.

No dulness or tenderness in either the iliac fossa or the ilio-costal space. The limbs are equal in size, except in their upper thirds, where the right one is one inch larger than the left. This may be the result of two fly-blisters on the inner side of the thigh, cicatrices of which now remain. They were applied by order of the physician at his home.

He cannot be induced to flex the thigh beyond 135° , nor will he permit extension beyond 160° . Abduction, adduction and rotation are quite impossible, so marked is the reflex muscular action when these movements are attempted. The rectal temperature is 102.5° .

A counter-irritant is applied this evening over the trochanteric region.

Two days after admission, he is walking without support, and the improvement is at least fifty per cent. The blistered surface is being poulticed every six hours, although it has healed, and the contour of the nates is nearly restored. He walks with much facility, limping very little. No joint tenderness can be elicited. It is thought necessary, however, to repeat the vesication, and another plaster is applied this evening in the same region.

This last vesicated surface was a long time healing, and there remained early in November many superficial ulcers in its neighborhood. During the last week in October he walked with a mere trace of a limp, and he had no pain until one night, when by accident another patient ran against him the wheel of a rolling chair, striking the gluteal region with considerable force. Consequently he was very lame next morning, and the soft parts, the inguinal glands especially, were extensively infiltrated. No joint tenderness could be found, however, by the different tests, and the pain and tenderness were thus proven to be periarticular. It would seem, then, that the contusion had simply aggravated the periartritic infiltration resulting from the second vesication, without injuring the joint. He went to bed for a few days, and the poultices were renewed.

The ulcers were most obstinate, and the periartthritis of our own making after his admission to the hospital gave him much more trouble than did the synovitis. They (the ulcers) were finally scabbed over, and at the close of the first week in October the boy was submitted to a thorough examination regarding his joint functions, which were found to have been perfectly restored.

Discharged, January 12, 1880. There were no signs of any disease, nor any remnants of disease, with the exception of the roughened skin at the sites of blisters. His general health was excellent.

October 31st, the father writes me, in response to a letter of inquiry, that there has been no sign of any relapse, and that the boy is still free from pain and lameness. Late inquiries have been answered in the same way. It will be seen that febrile disturbance was a marked feature in the early stage.

Effusion into the capsule can generally be recognized when other symptoms are present which go to confirm

its existence. A degree of tension, with increase in size of the nates, can be easily recognized. A boy aged eleven was admitted in August, 1876. A week before his admission, without any known provocation, he suddenly complained of weakness, tenderness and pain, which symptoms have increased in severity. He stood on examination with left thigh advanced semi-flexed and everted, and walked with a decided limp. The left natis was broad, quite tense, and there was marked tenderness on pressure over the trochanter. The superficial inguinal ganglia were enlarged. The thigh could be extended to an angle of 165° without tilting the pelvis. There was limited motion at the joint, but any attempt to flex was opposed by muscular resistance, ad- and abduction being likewise opposed. No shortening, and no atrophy. Pain was complained of when the articular surfaces were approximated. A diagnosis of synovitis was made, and on the day following he was submitted to a more thorough examination. The surface-temperature on left side over the joint was two degrees *lower* than that at same point on right side. Measurement around groin and over trochanter for the right side was fifteen and a half inches, while on the left side it was seventeen and a half; from coccyx to anterior superior spinous process, right side eight inches, left side nine. The usual local treatment was begun without delay.

The blistered surface was poulticed with flaxseed meal on the following morning, and renewed every six hours for three days, then dressed with simple dressings until healed. There was, ten days after admission, one and a half inches difference in the size of the nates, as measured around groin and over trochanter.

The decrease of the swelling continued; the boy was free from pain, and the limb was almost straight at the end of ten days more.

Near the close of the month there was only a very slight limp. No resistance to flexion, extension, ab- or adduction. There was no difference in size or in length of limbs. The measurements over trochanter and around groin on both sides were identical; those from coccyx to anterior superior spine, on both sides, likewise identical. The surface-temperature over the right hip-joint is one half degree higher than that over left. There is still a shade of flattening.

The contour of the nates was to all appearances restored by the 1st of October. There was no pain, no ten-

erness, no limp, and he was discharged cured a few days later.

I saw the boy after a lapse of four years, and no relapse had ever occurred.

There are many good observers, I am well aware, who teach and firmly believe that most of the cases called "hip-disease" begin as a synovial inflammation; and I am quite sure that this impression is often produced by a failure on their part to properly consider the prodromal signs, if I may so call them, that precede the first exacerbation which induced the parents or the friends to seek advice. Unless the surgeon closely cross-examines the patient he will be led to regard this exacerbation as the beginning of the disease. The parents insist on it and then they will say, after a while, apologetically, it would seem, "Yes, he did walk a little lame; but then the lameness was of no account." I have had cases come under observation a second time, after a lapse of many months, and the history of a recent invasion would be given, when I would remember the name, look over my records, and find the same case noted with similar signs. These had subsided to a great degree, and in the interval only an occasional limp after exercise would be apparent. Cases exactly like these I have had under observation in the hospital, and the only signs I could detect, on repeated examinations at long intervals, would be a slight, yet appreciable amount of resistance to flexion when carried beyond eighty degrees, and to rotation or to abduction. A limp *was not always* recognized.

The point, then, I endeavor to make is this: that an acute primary synovitis has a distinct period of invasion, and furnishes a clear and well-defined clinical history.

The following case referred to me for hospital treatment by Dr. Wm. T. Bull, on September 19, 1879, illustrates a not very severe type of the disease. It was that of a girl, aged nine.

With the exception of intemperance in the father, the family history on both sides of the house was good; the hygienic surroundings had been poor, yet the child had been in good health up to the invasion of the present disease, the first symptoms of which appeared on the morning of the 12th, without any assignable cause, unless perhaps exposure to cold may be regarded as a cause. The girl walked a little lame that morning, favoring the left side, and referring the pain to the knee; was not very lame,

and, indeed, rested very well that night; but the next morning, the 13th, she was unable to walk at all, so tender the joint, and so acute the pain. In the afternoon fever came on and persisted throughout the entire night. She suffered very much every day and every night until the day of her admission. While asleep, the limb was flexed at the hip and at the knee. The pain had been paroxysmal, and had been referred always to the groin, the inner side of the thigh, and the knee. The appetite had been good and the bowels regular. The child was carried in with the greatest care, and considerable difficulty was experienced in preparing her for examination.

While the patient was quite anæmic, the muscular system was fairly developed. As she stood, the right limb bore the weight, while the left was slightly flexed at the knee, the foot being everted. She was able to walk a short distance in the room, yet the lameness was very marked. On examination, the heart and lungs were found to be normal. Firm pressure over the trochanter, in the line of the axis of the neck of the bone, caused acute pain, which was referred to the inner side of the thigh and knee. Percussion of the flexed knee, in the axis of the femur, did not produce pain. There was no tenderness on firm pressure in the groin or in the iliac region or in the ilio-costal space. There was no infiltration or swelling in any of the localities just enumerated. The nates on the left side was broadened, though there was no infiltration here. The superficial inguinal glands were slightly enlarged on both sides. The thigh could not be extended beyond 150° without tilting the pelvis; it could be flexed to 90° , though she complained of pain in the groin when it was forced beyond this point. Abduction and adduction could be made over one half the normal arcs. Pulse 160; rectal temperature 101.5° . A blister was applied over the gluteal region the night of her admission, and cod-liver oil and iron mixtures were ordered as routine.

September 28th.—Most decided relief since admission. She is now free from pain, and walks quite easily, only a slight halt being perceptible. No tenderness in or about the joint. Another blister was applied on the evening of the 30th, and on October 17th it was recorded that she had grown comparatively stout, and walked without an appreciable limp. The only change observed in the natis was, that the supra-trochanteric dimple was a little shallower than that on the

right side. The limbs were equal in size, and movements at the joint were perfect and painless. Pressure over the trochanter, in the direction of the joint, gave no pain; concussion gave none. The cure was complete.

October 24th.—Submitted to a thorough examination, and the supra-trochanteric dimple found normal. No sign or symptom of disease. Discharged this date, the parents promising to report on the first sign of any relapse.

The case of a girl, aged six years, who entered the hospital February 19, 1874, differs materially from the one just narrated, and yet the difference is in the acuteness and the severity of the symptoms. In this the invasion was almost instantaneous. When she was brought into the office the pain was so intense that an examination was impracticable, in fact it was deferred until she could be transferred to the ward.

The family was found healthy and free from disease; the girl herself was an only child, and had always been in excellent health. She was considered perfect in health and limb on the evening of the 16th—three days before—went to bed in that condition, and was awakened suddenly during the night by acute pain referred to the right hip-joint. Her screams alarmed the household. Febrile movement was great, and in the morning the child was quite unable to stand on the limb. The pain and tenderness seemed to increase, and the loss of strength from sleeplessness and general constitutional disturbance soon became alarming.

On examination this evening the tongue is coated, the patient cannot be induced to stand alone, much less to take a step, and after much persuasion she allows herself to be held in the standing posture, when the right lower extremity is suddenly adducted, advanced, and semi-flexed; little or no change has taken place in the nates, there is no atrophy of the limb, and no shortening. Any attempt at active or passive motion causes intense pain at the hip, though by grasping the thigh carefully and firmly, making traction the while, the muscles hitherto in tonic rigidity gradually relax, and a great sense of relief is experienced. Acute synovitis of the hip is diagnosed, and a fly blister applied to-night.

March 1st.—Almost entirely free from pain, and condition is much improved.

March 21st.—A second blister applied on recurrence of pain. From this time forward the case progressed as favorably as

could have been desired, and in October it is reported that little or no deformity exists; the child walks with great facility. An examination is made August 4, 1875, no unfavorable symptom having occurred in the mean time, and the result is as follows: general health robust; stands with right limb slightly advanced, walks and runs freely, though favoring this side; contour of hip almost perfectly restored; flexion, extension, ab- and adduction easily accomplished; no pain or tenderness, no shortening or atrophy; with the exception of a mere limp the cure is perfect. This lameness must be due to some loss of substance in the joint structures—a theory very plausible in view of the severity of the primary lesion. The girl was seen by me a year or so later, and this limp could scarcely be detected.

This case began as some bone diseases do begin, viz., as an acute synovitis. The acuteness of the inflammation induced by contiguity a like lesion (though, modified) in the bony tissues.

It is needless to cite further instances. I have cited the above because it is difficult to formulate symptoms—symptoms, I mean, that are pathognomonic. One must examine the case with care, testing the functions and sensitiveness of the joint thoroughly, employing such means as may suggest themselves. He must remember that, if the joint be tender, he should get referred pain in the obturator whenever the joint surfaces are approximated. There should be no infiltration in the periarticular tissues. Sometimes one can perceive an elastic fullness about the trochanter or below the groin, if there be much distension of the capsular ligament. Then, there must be a history of acute pain and great tenderness. The history will be very clear—the mother being able to name the day, and the hour frequently, as I have said before, when the first attack of pain was experienced.

The Diagnosis must depend upon the symptoms and signs already enumerated. There are peculiar cases of bone disease with acute invasions, and with sudden remissions. These are exceptional, however, and I am quite sure that a careful study with opportunities for repeated examinations, will enable one to arrive at a diagnosis.

The Prognosis is good, and the exceptions to a perfect recovery are very few. The case last reported is an exception, and the case of a boy whom I saw several years ago, and placed on record as illustrating an irregular type of

hip-disease, seems now, on retrospection, to have been one wherein repeated attacks terminated in bone disease and abscess. The report is taken from a paper on "The Diagnosis of Hip-Disease," which I published in the American Journal of the Medical Sciences, in October, 1878. Since the publication of that paper, this case has been under the care of an orthopedic surgeon of this city, who assures me that the patient is now in the third stage of "hip-joint disease," and is under the extension treatment. The case is certainly very peculiar, and my history points, as I have intimated, to recurring attacks of synovitis, the final one, as in many instances of recurring disease, not resolving well, and, in addition to this, invading, contiguous tissues. At all events, I shall give it in detail, and at the same time with this regret, viz., that I do not feel that confidence in my notes of 1872-73—the earlier years of my hospital service—that I feel in those of later years. My records were more meagre and hence my "facts" were not well enough fortified against criticism. "No signs of disease" in 1873 does not, for instance, carry with it that conviction that the same expression does in 1877.

In the month of July, 1877, a boy, aged eight years, was brought into the office, and I at once recognized him as an old patient long absent. I of course censured the mother for neglect, but she was positive in asserting that at her last visit three years ago the case was pronounced cured; so on referring to the books I found a record of the diagnosis April 19, 1873, as "hip-disease; end of first stage," and a note July 18th same year "no signs of disease." At this visit his left thigh is flexed on pelvis at an angle of 135° , and is rotated outward; the limb is in fact in the typical position for the second stage of "hip-disease." He is very lame; screams at night, waking, as it were, out of sleep, and in the morning has no recollection of having suffered or screamed during the night. Refers the pain by day to the parts on either side of the patella; there is no swelling or tenderness around hip or knee, both of which seem peculiarly free from disease so far as external appearances or handling are concerned. Flexion and abduction can be made without pain or resistance, but other motions are limited by muscular action; when passive motion is made he complains of pain at the knee. There is no spinal tenderness, no angular deformity, no reliable sign of vertebral disease. The mother declares that the boy was well and active on

the 15th, five days before, not resting well the night of the 9th; that he was out for a long walk on the 12th, slept well that night, and on rising in the morning was lame, but was free from lameness on the 14th and on the 15th; and that all of the present signs date from the 16th. Last winter, she reports, he had very nearly the same train of symptoms one day after a storm, and recovered spontaneously. The attack in 1873 had lasted two or three months prior to his application here for treatment. With the single exception of the transient lameness of last winter, just mentioned, he is reported to have been absolutely free from anything like hip-disease since July, 1873. One year ago he had pertussis without any recognizable sequel.

There are nine children in the family, and this, the seventh, is the only one ever out of health, so claimed. He was always considered a delicate child prior to the spring of 1873. A severe dentition, with an occasional convulsion, a series of convulsions when two years of age, a scarlatina shortly thereafter, and rubeola next in turn, make up his personal history. He is now fairly nourished, though the four lower and the two upper incisors are distinctly notched and irregular, while two molars on the left side have each six distinct processes. The mother is of a temperament markedly nervous, and her appearance forcibly suggests struma, the maternal grandfather died of "rheumatic gout," the grandmother of "apoplexy." The father seems healthy, and gives a good family history. No specific taint is discovered, though strongly suspected in view of the presence of notched teeth in the child. A blister and poultices were ordered to the dorso-lumbar spine.

The deformity is much less July 27th, and the boy feels better. A fourth of a grain of the extract of belladonna three times a day is ordered. The treatment now is directed to the spine more as a solution to the diagnosis than as a therapeutical measure. It will be remembered that I found no spinal tenderness, and hence I had no good reason for considering this, a spinal arthropathy. The mother calls August 3d to report the child free from pain, and the limb perfectly straight, unless after exertion.

On the 11th he is examined; no resistance to normal motion in any direction found, except on complete extension. In view of a possible syphilitic element in the etiology, potass. iodid. gr. iv. three times a day is ordered. There is scarcely any lameness perceptible; stands with limbs par-

allel; contour of nates normal; motion good in every direction, though, when thigh is completely flexed on abdomen, he complains of pain at the knee.

On the 20th of September, flexion and extension could be made to extreme limit; rotation inward to extreme limit causes the boy to wince, though he protests against feeling any pain. The iodide is continued.

On the 17th of October, I found a complete relapse, which the father attributes to a strain the boy received last visit on the way home. The iodide is discontinued, and the belladonna, in fourth-grain doses, ordered again. A liniment for the hip is likewise prescribed.

He was improving again on the 7th of November, at same rate as before.

April 17, 1878.—Is seen to-day, and the limb is found again in the position of second stage. The father reports that in November last he made a good recovery from that attack, and has been straight and active until three weeks ago, when present relapse appeared. There is found also to-day, for the first time, dorsal tenderness.

THE TREATMENT with which I have been most familiar, and to which the symptoms yield with great promptness, is blistering, followed by poulticing. The hospital cases respond well to this method, and hence I can recommend it with much confidence. In addition to the testimony in the cases above mentioned, take the following:

A girl, aged six years, was admitted to hospital September 2d, 1870. The history was that the mother's family was consumptive, but that this child had been in perfect health up to the second week in August, two weeks before her admission, when, without any known cause, unless it may have been a fall three weeks before the first symptom, she began to limp and to complain of pain in right knee and hip. She soon became quite helpless, and suffered excessively at night. The appetite failed, and she lost flesh rapidly. Her exact condition on admission is not recorded, but it is noted that a fly-blister was applied, and that on the 7th, four days later, she was comfortable. On the 8th she is reported as resting well nights, and on the 12th "very little pain" is noted. On the 13th it is stated that she "came in totally unable to walk, but can now walk, even without the aid of chair; right leg semiflexed and everted on standing; right hip broadened; fold of natis much lowered; very little tenderness either behind tro-

chanter or in groin, but considerable on concussion of hip through trochanter; limbs equal in length." On the 29th she is walking with a very slight limp. Two weeks later there is no tenderness anywhere. Is walking without lameness, and is growing fat. And again on November 14th no tenderness could be elicited on pressure over, flexion or concussion of, the joint. She was under observation until the 20th of the following March, and no signs of any disease in or about the hip manifested themselves. I saw her early in November, 1880, nearly ten years later, and could find no evidence, so far as physical signs went, that she had ever had any disease. During all this period she had been free from pain, tenderness, and lameness.

A word regarding blisters. The respected founder of the Hospital for the Ruptured and Crippled, Dr. James Knight, attaches great importance to the poultices which we employ immediately after the blistering, and the mode of procedure is this: A plaster of cantharidal cerate, three inches by four or five, is applied over the trochanteric region at night, and not removed until the following morning, when the blebs are pricked, giving vent to the serum beneath, and a large poultice of flaxseed-meal is applied to this surface, no cloth intervening. The poultice is renewed every six hours for two or three days, when a dressing of simple cerate, or other similar unguent, is employed for a few days longer, the healing process going on the meanwhile.

We do not find it necessary to enjoin any more rest than the patient will necessarily demand, yet I have a friend in Boston, Dr. E. H. Bradford, a recognized authority, who seemingly places much value on absolute rest, citing the following very instructive case in the Boston Medical and Surgical Journal for November 11, 1880:

"A healthy girl, five years old, a patient of Dr. Tarbell's of Boston, was suddenly seized with extreme pain in one limb. There had been no prodromata, except that the child had been noticed to limp a few weeks before. The pain was intense, particularly severe at night, and the patient required opiates. The slightest jar caused violent pain. The pain increased for a week, and began to diminish, but was aggravated by changing the sheets. On examination the child was found lying with both thighs flexed and abducted. The patient could move the toes and

ankles, and such slight motion of the knee (the patient lay with the thighs spread apart and the legs bent at the knee) as did not move the thigh was possible, but any motion disturbing the hip-joints caused intense pain. There was no fever, and none of the other joints were affected, but there was swelling and tenderness over both hip-joints. As the child was absolutely immobilized by the disease, nothing mechanical for the purpose was tried. Extension was not used, as the pain had been decreasing. In a few days this had diminished greatly, and in a short time had disappeared. In a month the patient regained perfect motion at the left hip-joint, but some muscular resistance remained at the right hip, and a light extension by weight and pulley was applied. In three months the child walked about freely, and six months later she was considered perfectly well by her parents. There has up to this time been no relapse."

There came a girl, thirteen years of age, into the hospital in September, 1873, with a history of two months' lameness and pain, which had been most of the time referred to the neighborhood of the patella. She walked with a very marked limp, and the left limb, the lame one, was apparently much elongated. There was much flattening of the nates, and its normal contour was lost. Sudden pressure over the trochanter caused her to start as if electrified. There was no atrophy, and as she stood the limbs were nearly parallel.

Her symptoms pointed to a synovial inflammation, with probably an increased joint secretion. A liniment and a spica bandage constituted the treatment, and rest was not enjoined. In less than six weeks the contour of the hip was restored, all lameness had disappeared, the functions of the joint were perfect, and the patient was discharged cured. A relapse has never occurred, to my knowledge, and I have had an opportunity of seeing the girl from time to time.

The practical deductions from this chapter are that acute primary synovitis is a comparatively rare disease, that it is of easy management, and that the progress is toward recovery. The duration is from two to six or eight months, seldom greater than four months.

In giving a prognosis, it must not be forgotten that bone disease does occasionally arise from extension of the inflammation from the synovial membrane. To demonstrate this

proposition is hardly possible, yet the histories of some cases, especially in children between eight and twelve years of age, furnish strong evidence. We do not know, however, but that the bone lesion may have begun near the periphery and that an exacerbation was early induced. The pathological process is easy of explanation. It is well then, under these circumstances, to be cautious in the prognosis.

CHAPTER IX.

I. ACUTE EPIPHYSITIS OF THE HIP. — II. TRAUMATIC DIASTASIS.

In selecting the term epiphysitis rather than that of diaphyso-epiphysitis, I feel that I shall evoke some criticism, and in advance I wish to state that my reason for so doing is that while the primal lesion is at the diaphyso-epiphysical junction, the ostitis extends the more quickly and the more destructively to the epiphysis, so that a necrotic diastasis soon follows, and the force of the lesion is thus practically spent upon this portion of the femur. The few pathological specimens, to which I have had access, prove to my own mind that even where the diastasis has not ensued, the epiphysis is pretty thoroughly destroyed, and the clinical signs likewise, convince me that such has been the result of the inflammatory process.

A class of cases coming under my observation during the past few years has been peculiarly puzzling, and occasionally a ray of light is shed upon individual cases. Some I have at first diagnosticated—long subsequent, however, to the inflammatory process—congenital unilateral dislocation; some acute suppurative peri-arthritis; some syphilitic arthritis, or epiphysitis, and some were absolute enigmas. To the lectures of a friend in London, Mr. C. Macnamara, I am indebted for my first venture at classification—not that I had not seen the term employed, yet cases were wanting that were sharply defined. Clinical pictures were not readily attainable. They are not abundant, yet I am convinced that many cases of what we are in the habit of calling acute hip-disease, cases which follow closely on distinct traumatism with acute symptoms, should be called acute epiphysitis. Occasionally one with large opportunities for clinical material comes in contact with just such instances of bone lesion, where not only the initial symptoms are acute, but where the whole progress of the disease

is acute up to the point of destruction of the joint. Practically, often the same results are reached, yet they are the more speedily reached, and all the so-called stages of a joint disease pass in rapid review.

My own experience is confined almost exclusively to the disease as it affects young children and infants, but Mr. Macnamara, in the second edition of his lectures on Diseases of the Bones and Joints, states the following:

"Acute epiphysitis, although most frequently met with among young children under two years of age, is not by any means confined to infant life, as we have seen from the cases already detailed." The cases he has recorded, with one exception, however, were those in which other epiphyses than the proximal epiphysis of the femur were involved.

I remember seeing a few years ago a specimen of peculiar interest to the orthopedist. It was shown me by Dr. Judson, and he subsequently presented it to the New York Pathological Society. "The patient was eighteen months old. The symptoms commenced suddenly, and ended in death from exhaustion in seven weeks. The child's foot was everted, but there was an absence of the reflex symptoms usually found in hip-joint disease. An examination showed undue mobility, with crepitation. There was swelling in the iliac fossa, groin, and right labium, and upper part of the thigh. An incision was made over the great trochanter, when about six ounces of pus escaped. The diagnosis made was separation, partial or complete, of the upper epiphysis of the femur. In the specimen the cartilage was found to have disappeared, with the exception of a small scale, which was attached by its outer edge to the neck. This latter was a rounded fragment of cancellated tissue three eighths of an inch in diameter." The extract is taken from an unofficial report of the society's meeting in the New York Medical Journal December, 1878, p. 628. Unfortunately, a complete report has not appeared in the Society's Transactions, as the specimen was presented for a candidate. The specimen appears to me to be one of acute epiphysitis going on to rapid caries necrotica. Dr. Judson tells me that it was to him difficult of explanation. It certainly seems to have been the result of a rapid process, and the clinical history, brief as it is, corresponds closely with one of a case that came under my own observation after the acute symptoms had passed.

It occurred in a female child, who, when eight and a

Half months of age, was taken with a cold and suffered as a consequence apparently from grave constitutional symptoms. The febrile reaction was very great, and the loss of flesh was extreme. The mother got the impression that the child had "the 'harmonia' of the left lung," and at the end of the second or third week, just as a change for the better had been observed, she took it up into her arms one day, when the discovery was made that the hip was very tender, and that swelling in the groin accompanied this tenderness. This fullness of the groin increased for about three weeks; the skin becoming red, while the thigh became more and more flexed. Then a physician was called, and he regarded it as abscess, ordering poultices, which were continued for two or three weeks longer. The abscess soon opened spontaneously, giving exit to about a half teacupful of pus "yellowish" in appearance. The parts soon healed; the infiltration disappeared, and the child began to walk around. It had been walking around the floor by the chairs nearly six weeks when the sickness appeared, and had not shown any lameness. The gait now was marked by a decided lameness, which continued up to the time I first saw the case eight months afterwards—August, 1879.

I found the limb from a half to three quarters of an inch shorter than its fellow, and perceived a distinct bony grating with upward sublaxation. There was rotation outward, and the lameness was such as one would expect from a diastasis. The movements were pretty free and unattended with pain; a cicatrix in the groin remained. The teeth were irregular and decayed, while the incisors were notched, though not in the crescentic manner that Hutchinson describes. I naturally suspected a specific element in the case, and not getting satisfactory evidence in the family history obtained, took the patient to see Dr. R. W. Taylor, who, after a very thorough examination, could not get a history of syphilis in either father or mother (both were submitted to an examination), and no traces of it could be found in other members of the family. The bony grating was fully recognized, and the up-and-down movement he stated quite positively was between the diaphysis and the epiphysis; in other words, his diagnosis was a diastasis due to an epiphysitis caused by cachexia.

The case subsequently came under the care of Dr. Robert

Abbe, who recognized the same condition Dr. Taylor and I had recognized. His treatment consisted of an immovable apparatus to the hip, and cod-liver oil with iron. This grating grew less distinct, Dr. Abbe informs me; but the case passed out of his hands, and neither he nor I have been able to trace it; hence my inability to give final results.

In the cases just narrated, the facts elicited enable one to diagnose epiphysitis, remembering the case of Dr. Judson's. The grating I found in August, eight months after the beginning of the inflammatory process and about six months after the subsidence of the same. I found it again quite readily on two different occasions in November, while, after an attempt at immobilization, it was not so easily recognized—*i.e.*, more pain was induced on employing the movements necessary to its production. The case throws considerable light on some of those reported by Dr. Sayre in the second edition of his Lectures, as traumatic diastasis. For instance, on page 382 he records the case of a little girl (age and date of injury not given), in which he excluded hip-disease, although there was a large abscess in the gluteal region. There was shortening, the trochanter was above Nélaton's line, while "the ordinary symptoms of luxation, inversion of the foot, etc., when the head of the femur is upon the dorsum of the ilium, were absent." The accident, we learn later, had occurred two years before (the date of Dr. S.'s examination), and the *shortening*, he now learned, had followed *immediately*. "The abscess [when it came and how long it lasted we are not informed] was caused by inflammation of the bursa over the great trochanter." On page 384 another case is recorded, the data of which are more exact. The child was three years old when Prof. Sayre saw it, and had been treated, we are informed, for eighteen months with soap liniment and a bandage for "a simple sprain, then six months in St. Luke's, with weight and pulley, for hip-disease, no improvement occurring in his hip." At the end of these two years the little patient came to Bellevue, and about eight months afterwards Dr. S. obtained the following history: "When three months old the child rolled out of the cradle, and the mother, catching it by the leg while falling, felt something snap. Nothing particular was noticed until *about* a week afterwards, when, the mother states the hip looked *somewhat swollen*." (The italics are my own.) Whether this swollen condition ever termi-

nated in suppuration, or whether a cicatrix was sought when the patient entered Bellevue, we do not know.

I do not make this remark to be hypercritical, but I make it because, in my own case, a surgeon of fine diagnostic ability had overlooked the cicatrix in the groin, had discounted the mother's clear testimony about the swelling and the suppuration, and had made out *traumatic* "diastasis of the head of the femur, unquestionably," an error he subsequently very frankly admitted. The result of treatment in the two cases I have taken from Dr. Sayre is not given. "It was the same as if he had hip-disease" in the second; not given in the first.

The third case the doctor reports is on pages 385 *et seq.* This was in a girl, aged four, seen January 5, 1873, and the history he obtained was that on Christmas, 1870, the child, already six months walking, was left by the mother for about two hours in charge of the nurse, and on the mother's return the little one was found lame in the left leg, which was shortened and slightly turned out. From that fatal hour to the fifth of January, 1873, the child was not "able to walk upon it or touch the floor." "The nurse insisted, with great positiveness, that she had received no fall or other accident during the mother's absence, and that she had not been out of her sight a single moment." In view of the mother's clear recollection of the signs of a diastasis (after the lapse of two years), the recorder of the history could make no other comment on the nurse's statement than he did, viz., "The child being too young to contradict this statement, it has to be received for what it is worth." This patient was then living in London, and had the benefit of the advice of the surgeons connected with the different hospitals. All of the surgeons who examined the patient pronounced the case one of hip-disease, and advised leeching, blistering and rest. "The limb gradually contracted; adducted and rotated, until in the course of the year it assumed its present condition," which is shown by a photograph, and the deformity in flexion seems to be rectangular, with rotation outward over a quadrant. Indeed, such is the description on page 387. This progressive deformity is certainly inconsistent with "straight limb," "spine vertical," signs given as diagnostic of diastasis, on page 382. A false ankylosis had resulted, too, for "under chloroform, and with some force, limited movements were obtained."

In this case, we are informed, there had been "no suppur-

ation about the joint, abscesses, or other evidences of carious disease of this articulation." The result of the treatment (division of muscles and tendons aiming at correction of deformity under chloroform, and subsequent use of apparatus) is such as one would expect in a case of caries sicca of the hip; and hence I, for one, am not convinced that this was even a case of diastasis, either from trauma or acute epiphysitis.

It is far from my intention to deny the existence of a traumatic diastasis, or to detract in the least from the honor due the distinguished Bellevue Professor in bringing this subject so prominently forward in surgical science. It leaves, as he claims, one of the deformities to be differentiated from that of chronic ostitis of the hip. Only, my own studies lead me to regard it as an extremely rare accident in early childhood, and as resulting, when it does result, from morbid processes going on at the diaphyso-epiphysial junction.

There is a very interesting case, with a pathological specimen, on pages 389 and 390, valuable not so much on account of the specimen, which might be found in connection with a chronic ostitis wherein repair had taken place, but on account of the testimony of the physician who gave Dr. Sayre so clear a history of the case seen the day following the accident. There was something here that seemed tangible—the shortening, the adduction, and the outward rotation. Yet the physician diagnosing diastasis at this time should, it seems to me, have made some mention, positive or negative, of crepitus, either bony or cartilaginous.

Occasionally one meets with a case many months after the subsidence of all inflammatory signs, and fails to find any grating. This can be easily explained by the repair which takes place, leaving the remnant of the epiphysis covered with a smooth cartilaginous capsule moving in a new cavity, such as Dr. Sayre's specimen showed. The presence or absence of roughening will depend, of course, on the kind of repair that has taken place.

In the early summer of 1878, a male child ten months of age came under my care for a cellulitis of the upper fourth of the left thigh. The infiltration was a notable feature of the case, the skin being quite tense, yet presenting no acumination. There was much febrile reaction and considerable anorexia. The child would make no attempt to creep, and would lie only on the right side. Four weeks previously the mother had observed one morning a sudden "loss of power" in the limb, and could not recall any in-

jury direct or indirect. Next day the fever appeared and with it a "little swelling" about the thigh. This continued without abatement to the date when I first saw the case.

I ordered an anodyne and poultices. Four days later I saw the child and found its condition about the same. Seven days after this visit I found the infiltration, which had involved only one side of the thigh, filling both sides, and extending up to the crest of the ilium, the thigh circumference being thirteen and a half inches against eight for corresponding portion of the other limb. The superficial veins were large and tortuous, and I detected a small area of deep fluctuation. Fearing either a malignant or a syphilitic disease I refrained from incising. The anodyne no longer gave relief, and I resorted to stimulants, as they seemed to be indicated, and concluded to wait a little longer.

I did not have an opportunity of seeing the little patient again until the last of July, five weeks having intervened. In this interval another physician had been consulted, and he opened the abscess, for such it proved clearly to be, in a week or two after I had last seen the case, giving exit, the mother states, to four glassfuls of pus. This gave the needed relief, and the child was now free of pain, although there was some tenderness on moving the hip. There was still a certain amount of infiltration. A tonic was ordered, and nine days later I found the inguinal glands much enlarged, the infiltration above mentioned presenting a boggy feel, while the motion at the hip was smooth. A firm roller was applied, and as the patient was greatly emaciated I urged that it be taken out on the water frequently. I was much surprised to find a month afterwards one inch shortening of the limb, and signs of a pathological dislocation. The case soon passed from under observation, and at the end of a year I succeeded in tracing it out, to find the limb everted to a slight degree, the trochanter on a higher plane than that of the opposite side—one inch above Nélaton's line—and nearer the anterior superior spine of the ilium, no rounded body like that of the head of the bone lying on the dorsum, and no bony grating on active or passive motion, both of which could be made. There were three quarters of an inch shortening which could be easily overcome by traction. This speedily recurred on desisting from the traction. There was only a half inch atrophy of the limb, and the infiltration was no longer present. The

mother had been dead six months, dying from consumption of two years' duration. The father did not care for any further treatment, and hence none was ordered. I examined the case purely scientifically a year afterwards, to find this time one inch shortening and one inch atrophy. The gait and deformity were the same on the occasion of my last examination, fourteen months having elapsed. The shortening was one and a quarter inches, *and not overcome by traction.*

It will be seen, then, that a year elapsed between the suppurative period and my next observation. Whether there ever existed any bony grating I did not know, yet the presumption is that such was present before the reparative process was fully established. If there is one thing more clearly demonstrated than another in bone diseases it is the wonderful success Nature meets with in reproducing osseous and cartilaginous material. Many of Dr. Sayre's cases of excision have demonstrated this most conclusively. In the frontispiece of his last edition is a specimen most remarkable in this respect.

The diagnosis, then, of acute epiphysitis rests chiefly upon the following points: The age of the patient, viz., under two years of age. (This is not absolute, only my own experience induces me to name this period. Other observers have met with this lesion in older children.) The acuteness of the attack, coming on rather suddenly, and ushered in by marked constitutional disturbance. The history of exposure to cold or of a traumatism. The gravity of the symptoms during the first fortnight. The early signs of suppuration. The loss of function of the limb almost from the first symptom, with extreme tenderness of the joint and periarticular tissues. The resulting deformity, viz., that of a diastasis with grating felt in connection with the femur itself. This grating is not a constant sign, especially if repair has begun before examination is made. The lesion is to be differentiated from syphilitic periostitis of the epiphysis and diaphysis, from traumatic diastasis, from acute periarthrititis, from acute synovitis, and from chronic articular ostitis with acute exacerbation.

In syphilitic disease there is always the history, which, by the way, is not always easily obtained. The symptoms of hereditary syphilis are so changeable and so uncertain that one cannot always decide the question. One group of symptoms will satisfy one authority in syphilography and

not satisfy another. The mere notching of the teeth is far from conclusive as a sign. There must be a regularly crescentic notching for the Hutchinson teeth, and then even with this clean-cut sign some are unwilling to accept it as evidence unless the wedge-shaped teeth be present.

The following case well illustrates the difficulty of a differential diagnosis:

Dr. S. Hemingway referred to me in October, 1879, a female child, aged eighteen months, with marked infiltration throughout the whole extent of the right thigh, the circumference being ten inches against seven and a half for the opposite side. The limb was held flexed without any rotation either way, and on employing passive motion at the hip, a distinct bony grating could be felt in the joint. The upper incisors were notched, and seemed to me sufficiently crescentic in the notching; the post-cervical glands were enlarged symmetrically, and the rectal temperature was 103° . I could not find any condylomata, but there was an eczema over the lobe of the left ear. The child was very thin, and poorly nourished. I learned that one month previously the little girl was running about quite actively, and that within three weeks a lameness had appeared. Whether the lameness was sudden or was preceded or accompanied by pain I did not learn. At all events, the child now would not make any attempt to walk.

Without making any attempt to get a specific history in the parents, I referred the case back to Dr. Hemingway, advising an antisyphilitic treatment. Eleven days later Dr. H. sent the child to me again, with a note stating that the patient failed to improve under the mixed treatment, and that then he had applied poultices to the parts with decided benefit. He further wrote that he could not get any specific history.

I somehow felt that there must be such an element in the case, and made an appointment to meet the Doctor with Dr. R. W. Taylor. At this visit the grating was distinct, and twelve days afterward I could not detect it. Emaciation had now become extreme, and there was a wrinkled, aged appearance of the face. The infiltration had not developed into abscess, but nevertheless seemed to have increased in extent.

Next day we met Dr. Taylor in consultation, the parents being also present, and he failed, after a most exhaustive examination, to get any evidence of syphilis in either pa-

rent, or in any of the other children. On the strength of this negative testimony he excluded syphilis, and made the lesion out a purely strumuous periarticular ostitis. The grating was not present at this examination, and hence his exclusion of joint lesion. Under syrup of the iodide of iron and cod-liver oil the patient improved so much that, at the end of six weeks the infiltration had almost completely disappeared.

Two months prior to this examination the right thigh was five and a quarter inches larger in circumference than the left. Now it was only one inch larger. The limbs now were equal in length, and the child was walking. In February, 1880, I saw the patient again and detected a limp not unlike that of chronic joint disease. While all movements were painless and unresisted, I felt the grating within the joint quite distinctly. The capsular ligament seemed abnormally lax, and the great trochanter was more prominent than its fellow. A few days later I found a half-inch shortening, while the limbs were equal in size.

I did not see the case again until October, 1882, when I found a practical dislocation of the hip with one inch atrophy of the thigh, one and a half inches shortening, and the grating still present on passive motion. Then again, in 1883, March 8th, I examined the limbs, finding them parallel as the child lay on the table, but the left one was rotated outward over at least a quadrant. The tip of the trochanter was an inch above Nélaton's line, and was on a plane nearer the abdominal walls than its fellow. The motions were still good, save that of abduction. External and internal rotation were preternaturally free. The shortening was one and a quarter inches, and only a quarter of an inch could be gained by traction. What seemed to be the remains of the head of the bone (the body was small and irregular in shape) could be felt on the dorsum and without the acetabulum, though if sharp flexion were made this body seemed to slip into the acetabulum with a roughened thud-like sensation. No abscess has ever appeared.

I have detailed this case at considerable length, indeed all I have repeated have been thus extensively narrated in order that deductions as to the diagnosis and prognosis might be drawn. In this particular case, however, without a history even of syphilis, I am still strongly inclined to the belief that the lesion was syphilitic. It will be seen,

though, that the presence of a clear history is necessary to the differentiation of epiphysitis from syphilitic diseases of the bone.

In diastasis of traumatic origin the history is also the one point on which a diagnosis can be based. There must be sudden lameness and deformity immediately following the injury, and if these follow any acutely inflammatory symptoms attended with suppuration, leading questions in securing the history should be avoided. In diastasis the grating should also be recognized early, and of course, must not be expected after the lapse of many weeks.

In acute peri-arthritis the infiltration can be recognized, and the joint is free from tenderness. The joint should be tested as to its functions from time to time. I am fully aware that a satisfactory test of the joint or its functions, if an acute peri-arthritis be present, is exceedingly difficult, and as the treatment is practically the same in either event, a differential diagnosis can be deferred until the subsidence of the acute symptoms.

From the acute exacerbation of a chronic articular ostitis the history will be all important, and in the absence of this the age of the child, the character of the infiltration, and the temperature will serve in all likelihood to effect the differentiation.

Then there are iliac abscesses and perinephritic inflammations that may harass one, yet these have signs quite distinctive, and scarcely need be mentioned in this connection.

The prognosis depends largely upon the cachexia of the child, and upon the gravity of the lesion. In a violently active inflammation, like that in the case of Dr. Judson's patient, the chances of life are small. Yet, in the majority of instances death does not ensue. The deformity which results is pretty uniform, and one must expect from a half-inch to an inch shortening. The extension to the surrounding bones does not often occur, yet the diaphysis and the whole shaft may become involved in an osteo-myelitis, the prognosis of which is grave enough. A progressive deformity, such as one would expect in chronic ostitis of the hip, is not to be expected.

The treatment naturally divides itself into measures for controlling the inflammation of the early stage, and means for preventing deformity and correcting the same.

The nature of the disease (to use an expression which can never become too hackneyed), once being recognized, the limb should be placed at rest in the position which will secure the most comfort, and hot or cold applications employed, according to the taste of the practitioner. As I have before remarked, when speaking of acute inflammations my own preference is for hot fomentations. If abscess forms, it should be opened early and destruction to the periarticular structures thus avoided. Undoubtedly much valuable information can be gained by exploring with one's finger, the abscess sacs thus opened. Rest should still be continued, let the joint be well protected during Nature's efforts at repair, and by no means allow the patient to walk upon the limb, unless this precaution have been secured. I am not giving the treatment as I practiced it, but I am giving such as my cases teach should be employed. They did not have any protection to the joint except in one instance, and that seemed to do well. Though, in a case reported by Mr. Macnamara on page 79 of his work, to which reference has been made, all the precautions were taken, drainage tubes were inserted about the joint, and the limb was fixed to a Thomas' splint with subsequent extension from the foot of the bed. The final report records shortening, and such other conditions as my own cases show.

A plaster-of-Paris dressing or a well-moulded leather splint could be easily managed, I should think, in a child so young.

These need to be worn, too, for many months at least, and then should not be removed until the joint is carefully examined as to the repairs that have taken place.

II.

DIASTASIS OF THE HEAD OF THE FEMUR.

Diastasis is an anglicized Greek term, and means simply a separation, in connection with the proximal end of the femur. It means a separation of the epiphysis from the diaphysis, and corresponds closely enough for the practical purpose of a definition with an intracapsular fracture which occurs in the adult. It will be remembered that ossification between the diaphysis and epiphysis is not complete before the twentieth year of life. By reference to Fig. 7 on page 47 the line of cartilaginous union is seen.

Dr. Hamilton classifies epiphysial separation with fractures, and states, in speaking of them as applied to all the long bones, that they rarely occur after the twentieth year of life; and in speaking of this particular separation, on page 374 of "Fractures and Dislocations," he states that the four cases he has collected, viz.; one reported by Mr South in 1837, in a boy ten years of age; one by Dr. Willard Parker in 1850, diagnosed seven years after its occurrence, in a girl eighteen years of age; one by Dr. Alfred C. Post in 1840, in a girl sixteen years old, and one by himself in a boy fifteen years old, "constitute the only examples of this accident which I find reported, or of which I have any knowledge, and although there may be much reason to suppose that the diagnosis may be correct in each instance, I can not regard them as actually proven." And he further remarks, "nor can I admit the accident as fairly established, or the diagnostic signs as being properly made out until these important points have received the confirmation of at least one dissection."

The signs given by Bauer are: eversion of the limb and shortening, yet the limb will be straight; a loose articulation, a straight pelvis, and crepitus in the early stage; the spine will be vertical, shoulders square, and the apex of the great trochanter above Nélaton's line. The deformity must also be produced suddenly. If one confines himself to these signs the diagnosis should be easily made, and no two observers should disagree. For at least ten years I have been looking for a case of unmistakable diastasis, the direct result of trauma, and I must confess that I have met with only a single case that does not admit of doubt. This was in a boy eight years of age, whom I saw for the first time the 30th of August, 1881. He was able to walk, though he was quite lame, and the act gave much pain referred to the left hip. There was an inch shortening, and this yielded three quarters of an inch on strong traction, a marked *bony crepitation* accompanying this manœuvre. There was a distinct up-and-down movement. The limb as he stood was very nearly on a line with the axis of the body, but was rotated outward over an arc of about 20° , the foot being in marked eversion. Most of the weight was thrown upon the right limb. The movements were very good. He complained, the father said, much of pain during the night. There did not seem to be any atrophy, though comparative measurements were omitted.

The history as given by both the patient and the father was that three weeks before this date, while in perfect health and sound in limb, he fell a distance of fifteen feet, striking directly upon the left hip. His lameness and apparent shortening followed immediately. My diagnosis was diastasis of traumatic origin, and the case was referred to Bellevue Hospital for treatment. Dr. L. E. Holt, who was house-surgeon to the fourth surgical division, reported to me that my diagnosis was confirmed at the hospital, that the deformity was reduced, and that the plaster-of-Paris dressing had been employed.

He remained under treatment from September 1st to November 2d, when he was discharged cured. I traced the case, and examined again on the 10th of March, 1883, finding a little broadening of the hip, about the trochanter, on the left, the affected side, perfect motion in all directions, a half-inch shortening as measured from both trochanter and umbilicus, a half-inch atrophy of the thigh, a quarter-inch of the calf, and a gait in which one could on close inspection detect a slight limp. There was no grating or roughening of any kind within the joint. The recovery may be said to have been perfect.

In Mr. South's case, as quoted by Dr. Hamilton, the limb, when first seen after the accident was slightly turned out, but scarcely at all shortened. If the thigh were flexed and rotated outward a distinct "dummy" sensation was felt, as if one articular surface had slipped off another. By way of treatment the patient was placed on a double inclined plane, but so little inconvenience was experienced that he would frequently leave the bed and walk about. The further progress of the case has not been recorded. Dr. Parker, at his clinic, made out a case in a girl who had had abscess and fistulous discharge. The history of the fall on the curbstone several years before, although in time followed by suppuration, shortening and eversion, and the fact that flexion and rotation could be made without inconvenience seemed to have convinced Dr. Parker of the correctness of his diagnosis. There are so many cases of undoubted bone disease at the hip in which ankylosis is not present and in which flexion and rotation cause no inconvenience, that Dr. Hamilton was fully justified in not accepting this clinic case as one of diastasis.

Dr. Post's case presented the signs the day following the injury, and Dr. Hamilton's case was equally well ob-

served. Still, the dissection was wanting, and hence the diagnosis has not been verified.

It is very curious how much difficulty in diagnosis arises. Indeed it is no easy lesion to make out, and the following case illustrates very well the point I now maintain.

On the 4th of December, 1880, a German lad, sixteen years of age, presented at my clinic, and there was found a peculiar deformity about the hip, which he said had immediately followed a fall nine months before. The history was confusing a little and I saw the father a week later, who assured me that one day in March last the boy was walking rapidly along the sidewalk, when he slipped and fell, making strong effort to save himself. On coming into the house the boy found himself hurt so severely that he took to his bed, and was unable to walk for six weeks. During this period he was treated with a plaster-of-Paris dressing for a "fracture of the hip." On coming out of this treatment at the end of the six weeks, he hobbled about on a cane for a few weeks longer. He had been slowly gaining from that time, and on examination there was found an inch and a half atrophy of the thigh, undue prominence of the trochanter, a moderate amount of limitation in all the joint movements, and at least an inch shortening of the limb. The limb was very nearly parallel with its fellow, and there was no in or eversion. I did not get enough facts for a diagnosis, and I thought it a subluxation, a diastasis, or an arthritis. The case was sent to Dr. Frank H. Hamilton, who wrote me that he thought it a "fracture of the neck, *probably* a separation of the epiphysis." Dr. Holt, who was house-surgeon at Bellevue at the time, reported to me on the evening of the 8th of December that Dr. Hamilton examined the case more carefully that day in the hospital, in the presence of Dr. Yale and Dr. L. H. Sayre, all three of whom pronounced it an intracapsular fracture. Dr. Holt went over the case again and felt convinced that such was the lesion.

A fortnight later Dr. Hamilton told me that he had changed his diagnosis and in the absence of a more satisfactory history could not believe it other than a "genuine case of hip disease."

Now, I have given the above details in order to show how uncertain one can be on this subject, and how obscure signs may be after the lapse of a few months.

Histories are very uncertain bits of literature, and the

facility with which a history to suit a case can be obtained is a well-established fact in medicine.

Two years ago I had a friendly correspondence with Dr. Sayre, about a patient he sent me for mechanical support. The patient was a girl fourteen years of age who brought a card from the Doctor, saying this was a very interesting case of dislocation of the hip of long standing. I naturally felt curious to "look it over," and found her walking quite easily, though limping. The heel of the left foot lacked an inch of reaching the floor, and the foot was a little everted. The limb was very nearly parallel with its fellow; the trochanter could be felt at a point a little below the crest of the ilium, and near the anterior superior spinous process. Taking this as a bearing, I ran my finger over it and encountered a globular body lying on the dorsum ilii. On rotating the limb, this body rolled under my finger. In the dorsal decubitus, the shortening by careful measurement was a little less than one and a half inches, and on firm traction downward this shortening was completely overcome; the globular body above mentioned slipping over an irregular surface, where a distinct grating could be recognized. Abduction of the limb was impossible, as the member lay in its acquired position. As she stood, there was no deviation in the spinal column to the right or to the left. I could not find any cicatrices, and could get no history of suppuration. The girl told me that she had always walked lame, and furthermore that she hurt her hip when four years of age. Both father and mother had been dead several years, and I had no other one from whom information could be obtained.

I made out a congenital dislocation of the hip and explained the roughened sensation on the theory of an irregular cleft in the upper rim of the acetabulum. A note was sent Dr. Sayre asking whether he meant by "dislocation of long standing" a congenital dislocation; and I received a reply in which he stated "It is not a congenital dislocation, as she was perfectly well until she was *four* years old, when she had a fall down stairs out of a girl's arms, and probably had a diastasis at the neck of the femur, although it may possibly have been a luxation; but my impression is, it was a diastasis."

The crepitus, if crepitus it could be called, on making traction of the limb seemed to me to be the only sign which could be regarded as one of a diastasis, and yet, in

ten years time, crepitation ought certainly to have long since disappeared. Dr. Sayre relied on the history he got from the girl and I did not. It will be seen that it is very easy to err in diagnosis. I was not convinced by a careful examination that this was a diastasis, and even the weight of so great an authority as that of Dr. Sayre did not convince me. I have met with quite a number of cases of double congenital dislocation in which a roughening on passive motion can be easily recognized. In a recent number of the Philadelphia Medical Times is a report of a case of epiphysial separation by Dr. J. M. Barton of Philadelphia. The patient was a boy aged fifteen years, who, a few days before Dr. B. saw him, had received an injury to his hip in the following way: while crossing the yard bearing a large bundle, a companion pushed against him so that he let the bundle fall to the ground and rested his hands upon it to save himself from falling. While in this position, a second push turned him over and he came to the ground seated, supporting his weight by the hands. An inch shortening was found on examination, and the foot was everted, though not as fully as it is in senile intracapsular fracture. The popliteal space and lumbar spine were in contact with the bed at the same time. The periarticular muscles were free from spasm, the fascia-lata was relaxed. The trochanter was higher, more prominent, and nearer the anterior superior spinous process than its fellow.

Under ether the limb was fully rotated and the trochanter described a large arc of a small circle, *i.e.*, it rotated on its own centre and did not increase its distance from the median line of the body. Traction reduced all deformity but shortening and prominence of trochanter returned immediately on suspending this act. Crepitation of an unusual kind was felt, during these manipulations, as if large surfaces of diseased bone were rubbed together.

The patient was placed in bed with extension and the hip was additionally supported. At the end of five weeks there was less than a half inch of shortening and on removing the extension the original deformity returned, although under portable extension treatment for a year the shortening had increased to one and a half inches.

Diastasis is to be differentiated from:

1. An unusual form of traumatic dislocation.
2. Congenital dislocation.
3. Pathological separation in acute epiphysitis.

4. Pathological separation in chronic articular osteitis.

The treatment is simple and any one recognizing the lesion early would naturally resort to such means as would reduce the deformity and hold the fractured parts in apposition. It is very important to fix the hip securely and maintain the immovable dressings for at least two months. The parts will readily enough unite after a fashion, but the hyperæmia induced in neighboring parts is apt, it seems to me, to set up bone disease, especially if the child be permitted to use the limb while the neck of the femur is unprotected.

In those cases wherein deformity has already resulted, and the malposition of the limb is such as to occasion much impairment to locomotion, the treatment will be the same that is employed in the correction of the deformity from chronic bone disease of the hip.

Reported cases are indeed very scarce wherein perfect recovery has been obtained. The results seem to be no better, in fact, than those wheret he diaphyso-epiphysial lesion is an inflammatory process.

The conclusions, then, to which my studies have led me are:

1. Diastasis of the head of the femur of traumatic production is an exceedingly rare accident.

2. The diagnosis at the time of the injury even is much more difficult than one would infer from the signs given in the text-books.

3. The diagnosis years after the occurrence of the deformity depends altogether on the history, and as histories are so frequently biased by preconceived ideas as to the nature of the lesion, this is a very uncertain basis for an opinion.

4. Practically it makes no difference whether one at this advanced stage diagnosticates traumatic or pathological diastasis, as the treatment for the two is identically the same.

5. The results with or without treatment, as far as one can judge from published reports of cases, are the same as are obtained in chronic articular osteitis of the hip.

The treatment must extend over a longer period than is required for fractures, in view of the nature of the bone in contiguity to the line of separation.

CHAPTER X.

I. PERIOSTITIS OF THE HIP. — II. MALIGNANT DISEASE OF THE HIP.

By the terms periostitis of the hip I would call attention to a class of cases coming frequently under observation and distinctly traceable to a specific cause, viz., traumatism in some one of its varied forms. It is the periosteum about the trochanter which is most frequently implicated, but sometimes pelvic bones are involved, and we have the same lesion to contend with. The shaft of the femur, when the subject of periostitis, does not occasion the anxiety that the extremities of the bone do when affected.

With acute diffuse periostitis I am not personally familiar, and I have no clinical experience, consequently, to record. To dissociate it from acute osteitis or acute osteomyelitis is hardly practicable, however desirable. Such cases are fully detailed in works on surgery, and come more frequently under the eye of the general surgeon.

The acute localized periostitis from trauma and the sub-acute and chronic forms occurring in the vicinity of joints are not usually recognized in works on surgery, except in their relationship to the etiology or pathology of arthropathies.

Periostitis, secondary to an ostitis, is not an uncommon lesion, and then really it is not entitled to a distinct place in the nomenclature of joint diseases. To recognize the primary localized periostitis is certainly very important, while it matters little whether the secondary form is recognized or not. In one, a joint may be saved by prompt and judicious surgery; in the other, the same surgery would be meddlesome. In no department is an early diagnosis so valuable as in the disease of which this chapter treats.

Among the causes, a contusion is the more frequent. Exposure to cold, strains, and the like often act as direct exciting causes.

The symptoms resemble closely those of chronic artic-

ular ostitis, and very often the progress of the case is such as to puzzle one in defining the characteristics of the two. There will be the direct cause, in close proximity to the date of the swelling, or, periosteal enlargement, and hence the necessity of becoming familiar with the touch of all the structures one can reach about a joint. These pains at times will be most acute, depending largely upon the severity of the inflammation. Take, as instance, the following case, which will furnish likewise some useful points in diagnosis:

On the 23d of October, 1877, there hobbled into the Outdoor Department, on crutches, a man aged twenty-two, of fair build, yet not well nourished; and his sufferings were so great, he said, that he had lost much flesh during the past fortnight. His lameness was of only four weeks' standing, and, in fact, none of his symptoms dated further back. He was a porter in a mercantile house, and fancied that he had strained himself while lifting. It seemed a plausible etiology, too, for his pain and soreness about the right hip began the day after a severe effort at lifting a case of goods. Swelling soon followed, and prior to the date of his visit to the hospital a blister had been applied. It was difficult to secure an examination at all satisfactory; yet there was found a marked degree of infiltration diffusely scattered throughout the gluteal and upper femoral regions, with tenderness on handling, and on attempted movements at the hip. A diagnosis was provisionally made of hip-disease in its acute stage, and further vesication was ordered. October 27th.—Is able to walk now, and feels very much better. November 5th.—Walks with a very slight limp, has no pain, the infiltration is much less, and the patient wants to return to work. After a week or two he ceased coming, and returned to his vocation, although the movements at the joint were not quite restored. He was able, however, to do only very light work, and then suffered much pain after exertion.

March 20th, 1878.—Returns with a relapse—*i. e.*, swelling, pain, and tenderness about the trochanter major of two weeks' standing. The infiltration this time is phlegmonous in appearance, and the movements of the joints are very little, if at all impaired. He was blistered again, and iodide of potassium was administered. This treatment was continued with temporary benefit, then acute symptoms recurred, and finally, on May 4th, an abscess on the upper third

of the thigh, outer aspect, was opened. May 21st.—A small spicula of bone from the shaft of the femur exfoliated through the abscess opening. After this the discharge ceased, and the opening soon closed. June 5th.—Discharged cured: no lameness; no pain; no infiltration. Nothing further occurred until January 22, 1879, when he returned with a swelling and tenderness over the spine of the tibia on the same side, of ten days' standing. The circumference is one inch greater than that of the fellow limb at the corresponding point. Periostitis of the tibia is diagnosed, and iodide of potassium, gr. x., t. i. d., ordered. An incision was made to the bone on the 13th of February, and more blood than pus evacuated. After a few days there was an increased flow of pus, and a few days later the wound closed. He was discharged cured on the 21st of February. Seen December 13th as a conductor on the Fourth Avenue Railroad, and declares that he has not suffered the slightest inconvenience since last spring. Considers himself perfectly restored.

Within the past year I have seen the subject of the above history, and he has never had any return of symptoms.

In some instances, especially in young children, the case becomes exceedingly chronic, and the abscesses open and discharge to close again, year in and year out. A bright girl, eleven years of age, was admitted to hospital in the spring of 1881. She seemed to be in excellent health, but was quite lame, and presented a marked degree of deformity at the right hip. The movements were limited to a small arc, although the joint-surfaces were smooth. Below, and in front of the trochanter, a sinus existed, while on the outer surface of the thigh were four cicatrices. There was an inch and a half shortening. A little over two years before her admission she had fallen, striking the hip; pains about the thigh and knee speedily followed, and on the thigh a periosteal(?) swelling appeared. This developed into an abscess and was soon opened. A high shoe was worn on the foot of the sound limb—the child going about on crutches. Extension by weight and pulley was not tolerated well, and she seemed to derive the greatest relief from the crutches and high shoe. For four years these sinuses would open and close, giving rise to deformity which would subside as the inflammation subsided. Finally, she recovered with an inch shortening, with scarcely an appreciable lameness, and with perfect motion at the joint.

The fact that many of these patients suffer from the most intense pain is due to the locality of the inflammatory process. The formation of pus sacs in contiguity with nerve-bundles of course induces pain. I have seen instances where the periosteum covering the pubis was inflamed and the symptoms were referable to this region. The iliac-fossa and the crest are occasionally injured, and the nates are altered, the inguinal glands are enlarged as the lesion extends, and the joint movements are more or less restricted. A boy, aged four and a half years, came under my observation October 5th, of last year, with a hardish swelling under the gluteal muscles in close proximity to the sacro-iliac junction, right side. He fell in July, striking against the rocker of a chair. The signs came on very slowly, and the thickening of the periosteum had only recently been observed. No sacro-iliac tenderness, and no hip-joint tenderness could be discovered. The subsequent progress of the case fully confirmed the diagnosis made, the neighboring joints remaining free.

The diagnosis is made on the history and on the presence of a periosteal thickening, if the case comes under observation early, and if later, then the extent of the sinuses and the absence of joint lesion. These are the chief points on which one can base an opinion, but all surgeons know that in very few instances can they get sufficient data for a sharply defined anatomical diagnosis. Between an osteitis and a periostitis there exist many symptoms in common. I remember a boy, aged ten years, who was admitted to hospital January 26, 1876, and in the absence of a history I made a diagnosis of "hip-disease" second stage, employing the term to indicate an articular osteitis. I found him with the limb advanced and foot everted, walking with a slight limp. The natis was much broadened, fold lowered, and while I could elicit no joint tenderness, the limit to extension was 150° , to flexion 130° , and there was a little atrophy. Under a liniment, and hospital régime all symptoms and signs disappeared by the following March. The functions of the joint being found normal, he was discharged cured, to be readmitted, however, on the 11th of the following August. I found then a circumscribed induration on the inner side of the thigh, without any fluctuation discoverable. The skin was pinkish in hue and deprived of its epidermis. No muscular spasm of a reflex nature existed about the hip, and no other evidence of a joint disease

could be found. My diagnosis was at this time a simple cellulitis. This area broke down into ulcers, and sinuses followed, which discharged more or less during the next two or three months. In December these closed, while a similar condition of degeneration presented itself on the outer side of the thigh. Repeated exacerbations with a mild grade of constitutional symptoms supervened, and in March the inner side of the thigh, in the old locality, began to behave badly again. Abscess formed here, and in May, a spicula of bone was exfoliated. This completed the cure, and I had myself to censure for taking fifteen months to recognize the true nature of the disease. But for the clinical features in the case it would be humiliating to place it on record. It teaches the value of the probe, if that lesson were necessary in this enlightened age of surgical science. I have seen far more abuse from neglect of this simple aid to diagnosis than damage done to healthy or diseased parts by its employment in the hands of the most reckless. I am aware that some honest surgeons of large experience condemn its use because of supposed injuries done. Had I resorted to it in this case I should surely have been spared the error of diagnosing a cellulitis on the boy's readmission. Remembering the influence of cold as a cause of periosteal inflammations, I had no difficulty in forming a correct opinion in the following case. This one is so interesting from a therapeutical point of view that I find it very serviceable at this juncture because I can illustrate what further remarks I have to make on diagnosis, passing at the same time to the treatment.

A lad, aged fifteen, was referred to me for "hip disease" by a medical friend, who had made only a cursory examination, during the latter part of 1881. Two months before his appearance at the hospital he had taken a surf bath one cool day in August, and the next day without any chill preceding he had a slight febrile exacerbation attended with headache. The next ten days found him confined to bed, complaining much of pain in the upper portion of the left thigh and in the hip. There was no pain referable to the knee or its coverings. In the upper third of the thigh was considerable tenderness. At the end of the ten days on getting out of bed he was able to walk only with the aid of two canes. The patient walked with a cane into my examining room; he was anæmic; the limb was flexed at the hip and rotated inward; the deformity was not marked,

yet suggestive. I could not discover any joint tenderness—but on measurement found the circumference of the thigh in its upper third one and a half inches greater than that of its fellow; the whole limb was apparently an inch longer than the right; really there was no difference. The induration was confined to the outer aspect of the limb, and to my touch seemed unmistakably periosteal. There was no fluctuation, but there was extra heat and tenderness. I did not thoroughly test the joint movements, but found the articular surfaces quite smooth on moving the limb over small arcs. The diagnosis was made unhesitatingly of periostitis of the shaft in its upper portion, and I ordered a high shoe for the sound limb and a pair of crutches to correspond. An iodine liniment, cotton batting, cod-liver oil, and a tonic completed the order.

This was followed faithfully, and the boy did well for a month, in so far as freedom from pain and comfort were concerned. Then the area of induration became more circumscribed, and while I could get no fluctuation I felt quite sure that the disease was not receding. Hot fomentations were substituted for the cotton-batting, and when I saw the patient again—a week later—a spontaneous opening had occurred, and a sero-purulent discharge issued therefrom. Carbolic acid, in weak solution, was employed as an injection, and at his next visit he brought me two spiculæ of bone, less than a half-inch in length, which he had removed himself from the sinus the day before. By exploring freely I could not detect any more. The sinus was kept open, however, and within the next fortnight two more spiculæ were exfoliated.

In April he fell down a half-dozen steps, striking on the trochanter, and the sinus bled a little. A week's rest and a sojourn in the country proved highly beneficial. In October a good-sized shell of bone was removed from the sinus, and this proved to be the last exfoliations of any significance. The sinuses closed, the joint movements became more free, and the crutches were discontinued. He had no lameness, no shortening of the limb, and he was regarded as cured, until six months later, when the sac filled again, and quite an insignificant piece of bone was thrown off. He soon recovered, and has been on the convalescent list now for a year, with instructions to call only on the recurrence of any symptoms.

There came into my examining-room one morning in

December, 1881, a boy, aged eight, whose case I looked upon as an excellent result from an old periostitis, with necrosis and exfoliation of bone. He had no atrophy of the thigh, only a half-inch of the calf, and no shortening of the limb. The joint-surfaces were smooth, and the functions normal. An old cicatrix existed about the trochanter, and he reported that spiculæ of bone had been exfoliated through an abscess in this locality.

I learned that he had been a patient of Dr. Schoeneman's, of this city, and at my request the Doctor very kindly furnished me a copy of his notes of the case, an abstract of which I here present. He had first seen the boy in February, 1881, and had obtained a strumous history. The boy had a fever of some kind in the November preceding, and on convalescing, a few weeks later, complained of pain in the right hip, occasionally in the knee of the same side. There was some fulness around the hip-joint, and the only point of tenderness was below and anterior to the great trochanter. Movement in every direction was easy and normal in extent, though the boy complained a little when ab- and adduction were carried to extremes. The treatment to be employed was a long splint; but nothing was done prior to July 9th, when it was recorded that he was not able to walk, and suffered from pain in hip, thigh and knee. The gluteal region presented much fulness, the fold was obliterated, and motion was limited and painful in every direction. On the outer side of the thigh, at its middle third, was a fluctuating tumor. The splint had been applied on July 14th, but very little extension was made. Warm fomentations were employed. The splint soon gave relief, and on July 28th the abscess opened spontaneously. A probe reached bare bone over the trochanter. Carbolic acid injections of the usual strength were ordered as a wash three times a day. A small piece of bone (size of a pea) was exfoliated on August 6th. The deformity of the limb had by this time disappeared. Later, abscesses forming about the sinus were opened and thoroughly cleansed with carbolic acid solution. The discharge continued, more and less profusely, until November, when the sinuses closed. The splint was then removed, and the boy began to walk without assistance.

The case which I had under my own observation had about the same history, progress, etc., as Dr. Schoeneman's had. The one was treated by the method known as that of "physiological rest," the other by the long splint. Both.

made excellent recoveries, and the time required was about the same. The principles, then, which these cases teach are: the maintainance of good position of the limb, a certain degree of rest to the parts, and general constitutional measures.

Mr. C. Macnamara, of the Westminster Hospital, London, thinks very highly of the extract of belladonna, freely applied, over the inflamed area, in conjunction with perfect rest to the parts, and his reported results are most excellent. He introduces a grooved needle when pus is suspected, presses the fluid contents out along the needle, and then places a firm compress over the parts. In view of one or two cases that have gone on to fatal results, I am convinced that early incisions, or needling, such as Mr. Macnamara practices, should command more attention. I have in mind now a case seen many years ago, where a sharply-defined diagnosis was made of subacute periostitis about the trochanter, where the progress of the case fully confirmed the diagnosis made, where constitutional treatment was alone employed, where abscess after abscess gradually invaded the joint, where amyloid degeneration supervened, and where death by exhaustion has recently occurred.

In chronic tibial periostitis, as well as in the acute form I have had, as have others, most gratifying results from free incisions down through the inflamed periosteum to the bone, even when pus was not even expected. Such treatment in the neighborhood of the hip must become popular when we begin to distinguish with tolerable accuracy between the various diseases prevalent about this articulation. The prevention of necrosis and osteitis by contiguity is especially to be considered, and the protection to the joint structures aids materially in limiting the inflammatory process.

There are other remedies which are sometimes resorted to with good result, such as blistering and other means of counter-irritation. Fomentations likewise are called for in the relief of pain when the knife is not employed.

As regards medication the iodides are in good repute, but I doubt very much their great value unless a syphilitic element prevail. I should rather rely on tonics, cod-liver oil and a good hygiene. The last we cannot always command. Indeed, the art of medicine is truly an art when it works good against all such obstacles.

The prognosis is good if a correct diagnosis can be made

and if treatment can be carried out on strict surgical principles. A case of trochanteric periostitis, or iliac periostitis if allowed to pursue its own course, will do one of two things. If mild in type resolution will in all probability take place within a few weeks; if it be of a more severe type and occur in an individual of cachectic habit, the march will be slow, yet undeviating, to a bony joint disease, the final outcome of which no man can predict. That many cases of so-called hip-joint disease originate in this way I have long since been convinced. Dangerous expectancy it is to overlook these periosteal contusions. In infants the enforced rest soon brings about a cure if inherited syphilis be not an etiological factor.

The prognosis of acute diffuse periostitis involving the shaft of the bone is grave enough, though prompt therapeutics have deprived this of much of its terror since the memoirs of Chassaignac in 1854, and the paper of Dr. Demme, of Berne, in 1862. The incisions that they recommended, and which were followed by such disastrous results, made now under antiseptic precautions, would seem to overcome the objections urged then against the procedure. Their cases, however, were those of osteo-myelitis, in which, of course, a suppurative periostitis existed.

II.

MALIGNANT DISEASE OF THE HIP.

Intimately associated with periostitis is a class of diseases whose beginning is obscure, whose termination is fatal, and whose early diagnosis is next to impossible. The most prevalent of the malignant diseases are the sarcomas, and Bilroth believes that their subdivisions, made according to histological peculiarities, are of no great value during life. Dr. S. W. Gross believes differently, and in a paper showing careful elaboration, makes a very interesting study of sarcoma of the long bones, based upon an analysis of one hundred and sixty-five cases. He found that the most frequent were sarcoma. Osteomas, chondromas, osteoid chondromas, fibromas and myxomas prevail next in frequency in the order named. His paper has been published in the American Journal of the Medical Sciences for July and October, 1879.

Tumors of the long bones begin either in the periosteum

or in the medulla. Thus we have central sarcoma and periosteal sarcoma. The term osteo-sarcoma is an unfortunate one, as Dr. Gross has pointed out. It means one of two things: either a sarcoma in or on a bone, or a sarcoma in the soft parts containing osseous matter. Wilks and other English writers have designated the periosteal osteoids osteo-sarcomas, and some German pathologists apply this name to the myeloid tumors only. These are the giant-celled tumors, and are always central. The central tumors are as a rule enclosed in a bony capsule, *i.e.*, the major portion is bony, while other portions may be membranous. The peripheral or periosteal sarcomas are covered by the outer fibrous layer of the periosteum, and if this tissue participates in the cell proliferation the capsule is composed of connective tissue. Osseous tissue is never found in the investing membrane.

The periosteal are the malignant tumors one finds most frequently in the neighborhood of the hip, and are the growths that present for differential diagnosis.

In Dr. Gross's tables, including all the bones involved, the femur was the seat of disease in sixty-seven cases out of the hundred and sixty-five. The central giant-celled tumors are not met with during childhood, so that in differentiating neoplasia in children we can eliminate this class. Even in adult life the upper epiphysis is seldom implicated. Thus, in seventy cases of the giant-celled variety the upper epiphysis was the seat of disease in only two instances, while the lower epiphysis was affected seventeen times.

The round-celled sarcomas, which are periosteal, are the tumors which are the more apt to present in early life, and even these were found to occur not earlier than the seventh year in the tables above mentioned. Naturally, in the large clinical field to which I have had access I should find this disease in early life, if at all, and in the many hundred cases of disease in and about the hip, I have notes of only three or four. I seldom meet with cases where even the diagnosis seems at all probable.

The clinical history is very important, and I gladly place on record the following, which will serve me as a text for remarks on pathology, diagnosis and therapeutics.

On the 20th of July, 1881, I saw a boy aged three years, and diagnosed chronic periostitis of the middle third of the right femur on the strength of pains in this vicinity and a slight bony enlargement, which was quite smooth.

He had been complaining of vague pains in the limb for several months, and had not rested well at night. There was no lameness and no impairment of joint function.

He was in fine physical condition and the fulness had been observed only a few days. The swelling, or, enlargement completely encircled the bone, yet there was no tenderness whatever. I could not learn any cause either predisposing or exciting. The symptoms yielded to lotions, etc., and it was not until September that my fears were aroused. I found then that the size of the limb had been rapidly increasing, and on measurement the thigh in its upper third was two inches larger than its fellow, in its middle third it was three and a quarter inches larger, and in its lower third one inch. In one or two points I got deep fluctuation, yet there was a bony hardness generally over the mass, and the boy was suffering much at night. The superficial veins were growing prominent. I now gave up the idea of a periostitis and felt quite sure that the growth was malignant. The shape was ovoid, the skin was unaffected and the tenderness was not marked. Dr. Weir saw the case in consultation, agreed with me that it was one of sarcoma of the femur and advised amputation. Dr. Ripley, after a microscopical examination of a bloody fluid removed from one of these fluctuating areas arrived, at the same diagnosis. He agreed with Dr. Frank Hamilton, who made the same diagnosis, in advising against operation. By the latter part of September there were four inches difference in the size of the two limbs and yet the boy was walking with very little inconvenience, and had not lost flesh.

The parents would not consent to any operative procedure and I had the melancholy privilege of following the case to the end. Through the month of October the increase in size went on without marked deterioration of health. The growth extended from condyle to condyle by the latter part of November and the veins had become large and tortuous. Rest was obtained only under the influence of morphia. The circumference was seventeen and a half inches against eight and a half for the other limb. The lymphatic glands were not involved, the skin was normal and the joints of the hip and knee were smooth and as yet unaffected.

In December emaciation was first apparent and he was unable longer to go about. Though January and February

he dragged along, eking out a suffering existence, the limb looking like a vast appendage to a small body. In the early part of March a superficial vein on the anterior surface of the tumor ruptured and the boy lost considerable hæmorrhage before assistance was rendered. The appearance of the parts on the 1st of April is well represented by the accompanying sketch made for me by Dr. Crook.

The skin did not slough, and there was no hæmorrhage of any significance, but the boy became œdematous and gradually sank April 4th, dying by exhaustion. Permission was given to remove the tumor, and with the assistance of Dr. G. W. Ryan I made a dissection of the parts involved. The thigh was disarticulated at knee and hip, the former joint with the superficial parts of the lower epiphysis being found absolutely normal. The latter joint was filled with a gelatinous-looking fluid, although the acetabulum was smooth and the head of the femur seemed



FIG. 10.—ROUND-CELLED PERIOSTEAL SARCOMA.

normal. The greater portion of the thigh, inclusive of muscles and bone, was replaced by the neoplasm. The mass, deprived of the integument, weighed ten pounds, and the jelly-like appearance on longitudinal section of blanc-mange; no muscular tissue could be found. Here and there were a few cysts of varying size. The periosteum could be distinctly traced out in the mass, it being separated from the bone in a crescentic manner, the greatest distance of separation being one inch.

Dr. William H. Welch made a microscopic examination and reported that "the tumor is composed of a mass of cells with little intercellular substance, and is quite rich in blood-vessels. The cells are for the most part small round

cells, but there are some larger round, as well as irregular cells. Here and there are a few giant-cells. There is no alveolar or other regular arrangement of the elements. To the naked eye it is clear that the tumor originated in the periosteum. Diagnosis: Round-celled sarcoma of the periosteum." The earliest period of life at which the disease showed itself in the eleven cases analysed by Dr. Gross was seven years. In the case I have just reported the first symptoms appeared before the boy was three years of age. I saw a case last fall in a boy aged four and a half years wherein the disease had lasted for nearly three years. In this boy the pelvic bones were involved and the tumor filled the whole of the external iliac fossa, including the hip. The inguinal glands were much enlarged, but whether from irritation or disease I could not tell. The first symptoms were noticed when he began to walk. The case was seen also by Dr. Yale, who felt no hesitancy in pronouncing it a sarcoma. This was much slower in its growth than the other case.

Pain, in the case I have detailed at length, was a most persistent feature, especially after the tumor reached such dimension. There was never any pulsation, and fracture did not occur. Dr. L. E. Holt related to me, at the time I was so much interested in the above cases, the history of another that had come under his observation, and it was as follows: In the summer of 1881, he saw, with Dr. Denning, of Webster, New York, a girl nine and a half years of age, who had for a long time been suffering from what was regarded as chronic hip-joint disease. The family history was good, and the patient's own health had been good. When five years of age she had for several days sharp neuralgic pains in the right knee without preceding lameness. The pains passed away, without treatment, and a year later returned with greater severity, lasting several weeks, and during this time she walked very lame. She soon got relief spontaneously, but for a few months only, as the pain, lameness and deformity returned and continued with very little remission. The girl attended school quite regularly, until nine years of age. About this time the parts took an increased enlargement and pain at times became excruciating. Her screams were sometimes heard a quarter of a mile distant. For three months prior to the date of Dr. Holt's examination opiates were used daily. Profuse night-sweats, without any chills, had of late appeared. He found the

patient thin, but not emaciated; a pulse of 150, and a temperature of 102.5° . The right thigh was flexed at 90° and adducted. The pelvis moved with every attempt at passive motion of the limb. An immense tumor occupied the region of the hip, extending vertically from the crest of the ilium to the middle third of the thigh, and transversely from the gluteal cleft to the labium majus. In the groin it extended above Poupart's ligament, but followed its direction. In this locality the surface was a little irregular, but everywhere else it was smooth and uniform. The skin was tense and glistening and over the nates a little discolored; the superficial veins were prominent.

There was no tenderness on palpation, but there was a sense of deep fluctuation. Moderate concussion of the joint surfaces elicited no tenderness, but any efforts at passive motion excited great pain, especially if rotation were attempted. The circumference of the limb over groin and trochanter was twenty inches against eleven for the opposite side. From the anterior superior spinous process to the gluteal cleft the measurement was eleven and a half inches, that between same points on left side six and a half. There was apparently no shortening of the limb. The rapid enlargement, the loss of flesh, and the hectic with the appearance of the skin led the Doctor to believe that he had to deal with a deep-seated collection of pus. The patient was accordingly anæsthetized and a four-inch aspirator needle was introduced to the full length in several directions, and in every instance only a few drops of blood were obtained. It was very evident that no abscess was present.

While the girl was under ether a little motion was obtained over an arc of about twenty degrees. She grew steadily worse and in a few months died of exhaustion. An autopsy could not be secured.

The character of these tumors in general appearance deceives many. When fluctuation is discovered no ill results can follow the introduction of a hypodermic needle. The appearance of blood when one explores for pus is always of the gravest significance.

Little need be said upon the subject of treatment. Opinions are about evenly divided on the question of operation or palliation.

Dr. Gross collected thirteen cases of periosteal rounded sarcoma, and all were subjected to operation save one.

This one he could not compare with the remaining twelve because of the incompleteness of the history. Of the twelve that he analyzed ten underwent amputation and two excision. The two that were excised involved the shoulder joint and in both cases the disease returned. There were four of the twelve that did not have a perfect history, so that in estimating the prognosis as regards duration of life he was confined to eight. The time from the first observation of the disease to the close of life varied from two months and a half to five years and one third. The average was eighteen months. "Of the eight cases in two death was due directly to surgical measures; one recovered, but died from metastatic deposits at the expiration of thirty-two months; three recovered, but died subsequently from supposed systemic infection respectively at seven, eight, and nine months; one was alive with local recurrence at the end of three weeks; and one remained well for forty months." In the case I have reported on page 162, it was the mother's regret that she had not consented to the operation. My own conviction, from my knowledge of the life the little sufferer led, is that operation should be done even if there is not a single chance of recovery. We know, however, that life can be prolonged, and we know, furthermore, that suffering can be ameliorated by such procedure. I saw that child from time to time, and saw him in pain and in distress; saw that ponderous mass threatening hæmorrhage and sudden destruction to life; saw the emaciated body fading into insignificance beside the tumor, and saw the mother worn down by care and apprehension. I was convinced, I say, by all these circumstances, that amputation could have done nothing worse, and may have done much better.

An early diagnosis is all-important, and the points in differentiation from periostitis are the following:

1. In periostitis the area of thickening is more circumscribed and more irregular in outline.

In periosteal sarcoma the thickening soon embraces the whole circumference of the bone.

2. In periostitis the superficial parts present more signs of an acute inflammation.

In sarcoma the superficial parts present little in the way of extra heat or other inflammatory signs.

3. The pain in periostitis diminishes in direct ratio with the growth of the tumor.

In sarcoma the pain increases with the growth of the tumor.

4. Suppuration is the rule in periostitis; the exception in sarcoma.

The diagnosis in the advanced stages is not difficult. Of course the joint may be so enveloped, and the functions of the same may be thereby so much impaired, that chronic articular ostitis may be diagnosticated.

In the early stage of central ostitis very few signs present that are in any way similar to those of a sarcoma. A differential diagnosis here is rarely called for; but there are certain points in common between the two, where the diseases are more advanced. For instance, I saw a boy, four years of age, last spring, with a bony enlargement of the femur, and I am not yet fully decided as to whether it is a periosteal sarcoma, a chronic osteo-myelitis, or a chronic articular ostitis in the second stage. When I first saw the case there was uniform thickening of periosteum, it seemed, in the whole circumference of femur in its middle and upper thirds. The trochanter was very prominent, yet the joint surfaces were smooth and in normal apposition. When I saw the case again, three months afterwards, the bony enlargement was the same, yet there was a large, fluctuating, movable tumor on the posterior surface of the thigh. I did not have an opportunity of exploring the tumor.*

1. In the second stage of a chronic articular ostitis, the tumor is either circumscribed or distinctly fluctuating over a large area.

In a periosteal sarcoma the tumor, as a rule, takes in the whole circumference of the bone, and if fluctuation be present, it will be over a very limited area, and more than one of these areas will be found.

2. The superficial veins in the one are not prominent; in the other they get to be enormously distended.

3. As the tumor increases in the one, the general health does not suffer; as it increases in the other, cachexia and emaciation become the more marked.

4. In abscess from bone disease the pain is at no time very severe, and when it does occur it occurs during exacerbations. In sarcoma the pain is progressive, and, as a rule, constant and severe.

* Dr. John A. Wyeth informs me that the abscess has been opened, and that the case now presents the features of a general ostitis of the shaft.

5. The hypodermic needle, or the needle of the aspirator, will enable one to make a differential diagnosis when other means fail.

To quote Dr. Gross: "Finally, a rapidly-increasing, painful, lobulated, soft, elastic, non-pulsating, pyriform or fusiform tumor, especially if seated on the shaft of a long bone, occurring at about the twenty-third year, and unaccompanied by fracture, but marked by discoloration of the skin, enlargement of the subcutaneous veins, involvement of the lymphatic glands, and elevation of temperature, may be safely ranked among the periosteal round-celled sarcomas."

CHAPTER XI.

CHRONIC ARTICULAR OSTITIS OF THE HIP.

(SYNONYMS: MORBUS COXARIUS; MORBUS COXÆ; HIP-JOINT DISEASE; HIP DISEASE; TUBERCULOUS DISEASE OF THE HIP; CHRONIC EPIPHYSITIS OF THE HIP; MEDULLO-ARTHRITIS; COXALGIA; COXITIS).

PATHOLOGY.

Whatever name surgeons employ to represent the disease in question, all recognize the fact that its essential feature sooner or later is a destruction by inflammatory process of the bones entering into the articulation. Its nature, at least in the advanced stages, is too well recognized to admit of any argument at this late day.

I employ the term chronic articular ostitis, because I believe it better represents the pathology.

The time has come when Science demands a definition of the terms we employ. Hip-disease has too vague a meaning. Too many distinct diseases are included in this term. Men talk glibly about curing hip-disease, and we find that they can give no clear idea of just what they mean.

So of morbus coxarius, and morbus coxæ—the Latin equivalents merely. All are objectionable, although popular. Coxalgia means pain at the coxo-femoral articulation; coxitis, inflammation without regard to the tissues primarily involved; chronic ephysitis answers very well if we can always rest satisfied that the epiphysis is the only bone involved in the initial lesion. We know too well that the diaphysis and the acetabulum are often simultaneously implicated. Hence my objection to the use of the term. Tuberculous disease of the hip is formidable enough, and may convey the proper idea; but on this side the Atlantic we are unprepared as yet to accept the conclusions in full of our German co-workers in this field of pathology. Some of us may believe, and with good reason, too that all osseous lesions in the neighborhood of this joint are not tuberculous. The name I have chosen will, I think, more clearly accord

with accepted views, and will not commit us absolutely to one form of inflammation. The time has also come, I think, when a careful examination, with a full understanding of a history, of signs, and of symptoms, will enable us to recognize the disease in its early stage, despite the objections of the general surgeon. Errors will, of course, arise, yet they will be highly instructive to him who strives to make this branch of surgical science an art in the fullest sense of the term.

When, then, I use the term chronic articular ostitis of the hip, I want my readers to understand that I mean a bony lesion to begin with, and a chronic process; hence an insidious disease and one difficult with which to grapple. I mean, too, to convey the idea that no one bone is always the seat of the initial lesion.

To the pathology of this disease, then, I propose to devote a few pages, and I make no claim to any originality. To name the different views of writers would be tedious and unnecessary. The text-books on general surgery supply this want, and every student is supposed to leave college with an understanding that there are two theories prevalent; one, that this disease begins as a simple inflammation in the soft parts, the ligamentum teres or capsular ligament preferably, or in the synovial membrane or cartilage, induced by a sprain, or wrench, or contusion, however slight; the other, that it begins as a chronic ostitis of a strumous nature in one or more of the centres of ossification in the immediate neighborhood of the articulation. It may be caused by sprain or concussion, but frequently arises without these factors, and is aggravated after the full development of the disease by trauma. For an excellent resumé of the views held and facts furnished by different authors, see a paper by Dr. Judson, in *New York Medical Journal and Obstetrical Review*, for July, 1882, entitled, "Some Practical Inferences from the Pathology of Hip Disease."

The arguments employed in favor of an inflammation in the soft tissues of the joint being primary, and inducing, either by interference with the blood supply or by contiguity, a chronic ostitis in the acetabulum or head, have never been convincing to my mind, and hence this theory has not been accepted in my pathology. Pathological specimens, I am well aware, are adduced to prove that the initial lesion was in the round ligament. These instances are, with a single exception, in specimens where section of the bone

has not been made. The exception is in the case of Dr. Willard's. I shall present his conclusions, with comments, however, a little later.

An epiphysitis, and especially a chronic epiphysitis, wherein the inflammatory exudations encroach upon the blood-vessels, must, of necessity, produce a hyperæmia of the ligamentum teres, which carries the blood in a great measure to said epiphysis, and this hyperæmia cannot long remain without the usual inflammatory changes.

In his work on Diseases of the Joints, Mr. Barwell states emphatically: "In no case of ostitis about the epiphysis have I ever found the round ligament other than entirely absorbed, thinned and inflamed, or ulcerated and hanging in shreds;" and to this view he is my authority for stating that Mr. Aston Key gave the weight of his authority.

Without entering into an elaborate argument, I think that thoughtful and practical surgeons, the world over, will agree with me when I assert that the injuries done this ligament in cases where a clear and unmistakable diagnosis can be made at the time of, or very soon after the occurrence of the injury, in children at least, terminate in resolution, with or without the "absolute rest" so zealously insisted upon by the orthopedist. On the other hand, all men know that there are cases of disease at the hip-joint that do not make a perfect recovery, even if the most successful orthopedist gets them under treatment the moment the first white blood-corpucle wanders from its channel to light up disease.

That disease may begin in the synovial membrane and extend by contiguity to the bone I am as well convinced as symptomatology and clinical facts can convince one, but I am unable in my study of pathology to adduce a single case either from my own records or from literature that will prove beyond a doubt that such a process takes place. Still, it is my belief, based on clinical records and comparative pathology, that many of the bone diseases about the hip occurring in children over eight years of age are induced by synovitis or periostitis. Some I find myself that seem clear, and yet I cannot feel absolutely certain. An acute epiphysitis may in these very cases be the original disease, and the synovitic symptoms may be such as we find developing in the course of a chronic epiphysitis.

Take the following case, in a boy ten years of age, in whom I diagnosed, with a precautionary interrogation-mark

however, acute primary synovitis. He was admitted to the hospital in February, 1881, and was so excessively tender about his hip that it required the greatest amount of care to get him into the ward without pitiful shrieks. After much coaxing he was induced to stand. The left limb was rotated outward over a small arc, and the foot was everted. It was slightly flexed, and by reason of the pelvic accommodation was apparently one and a half inches longer than its fellow, while careful measurements from the anterior superior spine revealed nearly a half inch shortening. There was no atrophy, and while there was unmistakable joint tenderness, most of the soreness on moving the limb was periarticular. Along Poupart's ligament the glands were infiltrated quite distinctly, and along the inner side of the thigh the parts were apparently swelled, yet measurements failed to verify. The gluteal, the iliac, and the ilio-costal regions were free from any infiltration. While all movements were resisted, any attempt at passive motion excited pain which was referred to the distribution of the anterior crural and the obturator nerves. The adductors stood out prominently tense. There was some febrile reaction but it was not measured.

One month previously, while apparently in good health, and without any provocation, he complained one morning of pain in his knee, but walked to school as usual though limping. The lameness and the pain increased during the day and next day, so that on the third day he was quite unable to walk. His sleep was not disturbed unless he moved in the bed. The symptoms, according to the father, had been growing steadily worse. With this history, then, with the liabilities to cold at that season of the year (Christmas time), and with those symptoms many of which were those of synovitis, I felt reasonably sure that here I had a genuine case of primary synovitis, and I made a favorable prognosis.

The treatment adopted was such as I had used with success in others, viz., blistering, poulticing, and rest. He grew rapidly worse, and within a month the infiltration had extended throughout the upper portion of the thigh. By the last of May an immense abscess had formed and opened near the junction of the upper with the middle thirds of the thigh. The pus was brownish in color and had a fecal odor. The deformity had increased and the hip was practically locked against any motion, active or passive.

The boy was taken away, and I have heard that he died shortly after removal. I have reported already in the chapter on bursitis, page 115, a case wherein the disease of a bursa underlying the ilio-psoas was the cause, in my opinion, of the joint disease, the final results of which have not been reached.

Under seven or eight years of age the vast majority of cases of so-called hip-disease begin as an ostitis. Beyond that age a certain proportion, not large as I have already stated, begins as a bursitis, a synovitis or a periostitis, while still a large number begin as a central bone disease. At all events, be the starting point what it may, the peculiar richness of the blood supply in the cancellous structure of the bone, the temporary hyperæmias in and about the centres of ossification, induced by over-use or external violence, and the recognized existence of a diathesis, make the transition from health to disease at times extremely easy.

The experiments of M. Ollier, in Number X, of the *Revue de Chirurgie*, 1881, showed how easily disturbing forces could affect the epiphysis, *i.e.*, could induce hyperæmia—the initial stage of inflammatory changes. Dr. Jno. Jas. Berry, formerly associated with me in hospital work has written during the past year in the *New England Medical Monthly* a very instructive paper entitled, "Juxta Epiphysal Congestion in its relations to Hip-Disease." He makes use of the following remark, which I can in a great measure confirm:

"We must remember that, whereas, in adults, the ligaments and cartilage suffer from the shock of injuries, in children, concussion affects the weakest portion of the articulation, which is the epiphysis. Added to such injury there is crushing of the dense enclosing layer and effusions of blood into the medullary spaces." The promptness of such injuries to resolve, I think, is well demonstrated, and when they do not thus terminate one naturally assumes a constitutional diathesis. It does not always result in carious deposits even in strumous children, for there are various degrees of resistance. Hereditary qualities and conditions of health, hygienic surroundings and peculiar conditions of the atmosphere make the individual, and this tissue in particular, a fit receptacle for the lodgment of the bacillus which is found in strumous matter.

Then, again, certain acute diseases increase this vascu-

larity in structures wherein rapid developmental changes occur and bring about practically the same result as do concussions and other injuries.

This is well illustrated in a case reported by Dr. Willard of Philadelphia, in the *Boston Medical and Surgical Journal*, 1880, and in which the microscopical work was done by Dr. Shakespeare of the same city. The article was entitled "Hip-Joint Disease: Death in Early Stage from Tubercular Meningitis." The child was five years of age, and phthisis and bad hygiene were found in the history. Lameness and other signs of joint disease began one year prior to Dr. Willard's observations in the case. From his examination he concluded that there was "presumptive evidence that the round ligament is the centre of the disease." The



FIG. 10.—ACETABULUM AND HEAD OF FEMUR, SHOWING DISCOLORED SPOT ON LATTER.

patient was confined to bed with weight and pully, and every facility utilized for securing good hygiene. Two months later tubercular meningitis developed, and after a very acute attack, lasting six days, the patient died. The specimen is of such great interest that I have reproduced it in its gross appearances.

"There was not more than ten drops of effusion, but the synovial membrane was everywhere congested and softened, and at the acetabular attachment of the ligamentum teres were decided evidences of inflammation and softening of tissues. Upon the head of the femur, on its posterior upper surface, was a discolored patch (Fig. 10) possibly

caused by post-mortem contact against the acetabulum, although there was no corresponding spot in that cavity, and it had more the appearance of redness situated beneath the articular cartilage. The capsule was perfect, the round ligament intact, and while the membrane covering it was more reddened and softened than at any other part, yet there were no positive signs of ulceration to the naked eye." "After decalcification of the hard parts and hardening of the soft tissues," Dr. Shakespeare made a section of the acetabulum and head, at the same time cutting longitudinally the ligamentum teres.

The epiphysis did not contain to the naked eye any caseous or other nodules, the cartilage was entire, there was nothing macroscopical in any of the tissues suggestive of miliary or confluent tubercles.

Among the conclusions arrived at from microscopical examinations of this specimen was that the bony structure of the neck of the femur, although hyperæmic, was but slightly diseased and not tuberculous, and that a few caseous foci were found in the ligamentum teres, but these were not tuberculous. Indeed, about the only condition actually found was a somewhat exaggerated hyperæmia throughout all the tissues. Pathologically, it was negative.

Now, while the conclusions arrived at by the two gentlemen reporting the case are perfectly legitimate, I am constrained to regard it as one in which the pathological processes that existed early in the disease (this had begun already a year before coming under Dr. W.'s treatment) were in that slow, inactive state, and under the favorable hygiene latterly provided, had undergone a certain degree of resolution, all to be disturbed again and provoked to renewed activity by the invasion of the acute tubercular meningitis. This disease, it will be seen, proved fatal in one week, and hence time had not been sufficient for any extensive lesions from original foci of the chronic disease.

The centres of ossification are fertile soil for the development of strumous (tuberculous) processes. The resemblance of this cancellous texture to the parenchyma of lung is very striking, and the clinical characters of tubercle in the two localities have been brought in close comparison within the past year by Mr. Scovell Savory, one of the surgeons to St. Bartholomew's Hospital. He published his notes on page 737 of volume II. of the *Lancet* for 1882. The structure of the two tissues is sponge-like, yet the resem-

blance becomes, the stronger when a mass of yellow tuberculous-looking matter occupies the substance.

Mr. Savory speaks further of the halo of inflammation or increased vascularity by which each is surrounded, varying in width. I have myself seen this so often in bone with caries and rarifying ostitis. This is very difficult to show without colored lithographs, and hence the ordinary plates seem tame and inconclusive. The author from whom I have just quoted goes still further in his comparison: "Just as pleurisy is so often set up by the disturbance of tubercle in the lung, so synovitis is often provoked by the disturbance of tubercle in adjacent bone; and just as empyema is sometimes produced by the perforation of the lung-wall and the escape of matter into the pleural cavity, so suppuration in a joint which is too often destructive is due to the perforation of the articular wall of bone and the escape of matter into the synovial cavity."

The researches of Volkmann establish, so far as specimens from the joint and the bones entering into the formation of the joint removed by excision at all stages of the disease can establish, the truth of the theory that the great proportion of all cases begin by small localized centres of disease at or near the centre of ossification. The nature of these, histologically, is tuberculous.

My own studies lead me to the conclusion that the centres of disease are nearer the diaphyso-epiphysial line. In a case that I had for a time under observation with Dr. C. T. Poore of this city, and subsequently published by that gentleman in the Medical Record, this localized centre of disease is shown in the accompanying figure No. 11.

The patient was a girl aged five years, and began to complain of pain in her *right* lower limb in the early part of December, 1878. The family history was poor, and the hygiene had been wretched. There was no existing cause, so far as could be ascertained. The pain and lameness were synchronous, and the stiffness was especially marked in the morning. When I saw her first it was on the 14th of December, and I found both lower limbs very hyperæsthetic, the right the more notably so. I saw her again nearly one month later. She seemed very helpless, and the report from the mother, who was herself exceedingly hysterical, was that the child had been screaming while asleep, and even waking out of sleep crying, as if suffering terribly, every night since I had seen her last; that the lameness had

increased, and that she was losing flesh. I saw that she was much thinner than when I had examined her before. The left thigh now was advanced a little and the foot everted. Extension to the normal limit was resisted, other movements were not. Two days later there was dulness in the left ilio-costal span, but in the absence of other signs was not significant. The lameness and pain on walking, and the morning stiffness were still present. Pain and resistance were encountered when the left thigh was rotated. Two days elapsed again and the right thigh was adducted,



FIG. II.—SPECIMEN OF DIAPHYSO-EPIPHYSITIS FROM CASE REPORTED ON PAGE 177.

the foot was inverted, and there was marked resistance to flexion beyond 90° . The same resistance was present on the *left* side. As she stood, both limbs were in moderate genu-vulgum, and the right natis was flattened and crease lowered, while the lameness was marked in the left limb. Tenderness at either hip or at either sacro-iliac synchondrosis was absent by any test employed. Indeed, there was no sign present on one side that was not present on the other, and this circumstance was duly recorded.

In a couple of days she was again submitted to a thorough examination, and the greatest tenderness elicited was over the left sacro-iliac junction. Motion at the left hip caused no pain. Even the severe test of putting on and off the

stocking caused no pain, and forcibly percussing the heel with limb extended induced laughter. On attempting to stoop, pain was complained of at the left knee, and as she stood this limb was apparently longer. Next day Dr. Poore saw the case with me, and he noted that "nothing wrong could be detected about either hip-joint; motion free and painless in all directions, except that she complained of some pain in the knee when the left thigh was strongly flexed. When the left joint was moved patient made no complaint, but when the left ilium was pressed inward she cried out from pain. There was no swelling about the right or left hip-joint; no change in the crease of the natis. The right hip-joint seemed perfectly healthy. There was pain on pressing the crest of the ilium on the left side inward, referred to the left knee, or upon attempting to communicate motion to the sacro-iliac joint on that side. There was tenderness, or at least the patient complained, on pressure being made over the sacro-iliac synchondrosis of the left side, and there appeared to be some dulness on percussion over that joint; none on the right. In walking or standing she favored the left limb, but there was nothing characteristic in her attitude."

On the 24th of February I saw her with Dr. P., and noted that motion at hip (left) was limited in flexion and extension to smaller arcs than normal, and in abduction and adduction to scarcely appreciable arcs; that with the exception of the tenseness of the adductors, the same signs were found at the right hip. I could not discover any atrophy or shortening. The joint surfaces on both sides were smooth, however, in the limited arcs of motion.

During the latter half of March there was much pain about the right knee, and the limb was held flexed as the child lay in bed. Adduction became a strongly-marked sign on each side.

I assisted, one day early in April, the Doctor in making a pretty thorough examination under ether. The adductor contraction yielded with very little force, but in our manipulations the right hip was subluxated. While there was entire absence of articular roughening at either joint, this giving way of the ligamentum teres was the only sign we could discover. The urine, a few days subsequently, was observed to be dark and smoky. The patient died on the 16th, and after twenty hours post mortem, we found the limbs perfectly straight and equal in length. The parts on section

down to the capsule, right side, were normal in appearance. The head could be easily slipped out of the socket, and as easily returned. The capsular ligament itself was intact, but on being opened was found to contain about two drachms of thick, inodorous pus. The ligamentum teres was softened, pretty thoroughly disorganized, and about two lines of it was attached to the head, while the proximal portion lay spread out on the floor of the acetabulum. On passing the finger over this portion of the acetabulum an area of bare, roughened bone, a half-inch in diameter, could be felt, and one blade of a small pair of forceps passed readily through without force, the point of the blade being felt by a finger inserted through the sacral foramen. The cartilage covering the head was yellowish but nowhere eroded. Section of the head and neck was made, and nothing abnormal to the naked eye was observed.

The left hip-joint was exposed, and its capsule was found normal in every respect. No fluid escaped when it was opened, and the head could only be turned out of the socket with considerable force and with the characteristic suction sound. Its complete dislocation was impossible, without dividing the ligamentum teres. This ligament was pale red in appearance on section, and seemed normal in size, strength and attachments. The articular cartilages were pearly white, and apparently normal. The same means with the finger and forceps were made to detect erosion or disease in the acetabulum, as were made on the right side, with absolutely negative results.

On removing the capsular ligament at its femoral attachment, a worm-eaten hole was discovered on the upper border of the neck just at its junction with the head, and into this hole the point of a lead pencil could be inserted without force. On section of bone, a yellowish (caseous [?]) patch was seen involving the upper portion of the diaphysis, encroaching upon the diaphyso-epiphysial cartilage and even above this line within the medulla of the epiphysis there was a similar patch, the two only separated by the cartilage. This diaphysial patch communicated with the joint by means of the small hole above mentioned. There was no pus. A vascular areola existed about this patch, shading off into the normal bony tissue. (See Fig. 11.) On opening the abdominal cavity, the bladder was seen above the pubis but not distended. Pressure upon this viscus was immediately followed by a discharge

of at least a half ounce of whitish very fetid pus from the vagina. The bladder contained about an ounce of clear normal-looking urine, and its walls appeared normal. A pus-sac was found between the bladder and the vaginal wall opening into the latter. This sac had been cut away by the dissection, and its direct connection with the perforated acetabulum could not be made. The whole inner surface of the pelvis was carefully exposed and no evidence of disease about the ramus of the pubis, the symphysis, or either sacro-iliac junction could be discovered. My own explanation of the source of the abscess is that the pus burrowed behind the obturator muscle, as it sometimes does. (See Fig. 6, arrow C), and found its way into the ischio-rectal fascia. In the female the vagina perforates the rectovesical fascia and receives a prolongation from it. It would be just as easy, then, for the pus-sac to open into the vagina as in the rectum, between which there is no fascial layer.

I have been thus particular in detailing this case, making it even fuller in some respects than it was when first published, because I find it so very instructive and so illustrative of the pathological processes that take place. In the first place the subject would pass anywhere for a strumous child, and yet no exciting cause could be found.

Again, the ostitis developed in the acetabulum of one side, and in the diaphysis of the other side, very nearly about the same time. In other words, there was a multiple lesion, and the foci of disease were in close proximity to centres of ossification. From the acetabulum there were quite early, though not appreciated, signs of synovitis. Indeed, the process here was more acute than in the femur, and the inflammatory processes extended the more rapidly to neighboring parts, involving the synovial membrane on the one hand and the pelvic fascia on the other; a little later, the ligamentum teres. It will be observed, too—and this fact I want to stand out in bold relief—that although *the ligamentum teres was thoroughly diseased and disorganized, the nutrition of the epiphysis suffered no appreciable change.* The acetabulum was not the tissue to suffer from disease of this ligament, and yet it was perforated.

The process going on in the left femur was much slower, and was what some might describe as a caries sicca. But how do we know that this would have been so had the process in the right acetabulum been less acute?

It is seldom that the ostitis pursues so rapid a course

as it did in this particular case, yet cases have their counterpart in pulmonary tissues. Often the lesion seems arrested, and cases with long intermissions are not at all uncommon. Cases like the following come under observation, and during the interval between exacerbations a cure is often pronounced. The boy was four years of age at the time of admission to the hospital in March, 1871. It is recorded that he had a brother suffering from caries of the hip, well advanced into the destructive stage. They report that a year prior to admission our patient fell from a velocipede about one year prior to admission, and a few months later complained of pain in the right knee. This became severe, and was referred to the hip, causing the usual night screams, the morning stiffness, etc.

Condition on entrance to hospital as follows: plump, and well nourished; boy standing with the right lower extremity semiflexed, everted, and resting on the toes, and walking with a very marked limp; nates on right side broadened, natural depressions effaced, crease raised, and cleft inclined to the left; thigh flexed on pelvis at an angle of 150° , and held here by muscular action, though flexion can be carried to 90° without causing much pain. The diagnosis is made without reservation, and, under the usual treatment of the hospital, the case made good progress; though in the month of May there occurs without known cause a suppurative middle-ear disease, left side.

At the close of the first week in September it is noted that his condition is such as to justify his discharge, and a month later his general health seems excellent; he stands squarely on both feet, and walks without a trace of lameness; no atrophy exists, no tenderness or pain on complete flexion or extension, or on concussion of trochanter—in fact, no sign of disease in or about the hip can be detected. His friends had deserted him, and no home could be found; hence, he remained in the hospital, different persons promising to adopt him, until the beginning of 1875. During that period never a sign of disease was observed, and the cure was regarded as well established. The ear disease continued, however, after the usual manner.

On the first day of January, 1875, note is made of an enlargement of cervical glands right side three months' standing, coming on without any known cause, and steadily gaining ground despite all treatment. Hip still free from any sign of disease.

Next day, after perfect immunity for three years and three months, the hip is the seat of great pain, and the boy is abed with a high temperature, and crying if any motion at the joint be attempted.

The acute symptoms were relieved by the middle of the month, and the boy was walking around the ward, though joint still tender and glandular infiltration increasing. A general glandular enlargement, or, adenia, set in, the boy became emaciated to a skeleton, and death by asthenia occurred the last day of February.

Autopsy twenty-four hours later, conducted by Dr. Ed-



FIG. 22.—VERTICAL SECTION OF PROXIMAL END OF NORMAL FEMUR IN CASE ON PAGE 184.

ward G. Janeway. Body greatly emaciated, and skin jaundiced about eyes, scrotum and right lower extremity; both lower limbs lie in complete extension, and motion at joints is free.

Right lung slightly œdematous, otherwise normal, and old pleuritic adhesions are extensive; left lung and pleura normal, as also the heart. Peritoneal cavity contains about a pint of a yellowish jelly-like material; liver is one fourth larger than normal, and on the surface as well as on section there is a mottled appearance.

In the gastro-hepatic omentum a gland the size of a walnut presses against the ductus-communis choledochus,

the pyloric orifice of the stomach and the receptaculum chyli. The microscopic appearances of this gland are normal. Mesenteric glands enlarged, as likewise the cervical, from the mastoid process to the clavicle, varying in size from a hazel-nut to a walnut. A deeper gland separates the deep jugular from the carotid, a space of one inch, and presses against the pneumogastric. Pus is found in the right middle ear, extending into the mastoid cells.

The right hip-joint being opened, the capsular ligament is found intact; there is no fluid within the cavity, and suction force is normal, while the ligamentum teres is easily detached. Head of bone presents a dirty yellowish aspect, with a groove extending from ligamentum teres towards



FIG. 13.—VERTICAL SECTION SHOWING FOCI OF DISEASE IN CASE ON PAGE 184.

trochanter minor, intersecting a similar groove about the insertion of capsular ligament. In this groove is new connective tissue. At one point the cartilage is completely eroded; head flattened. On vertical section there appear three yellowish spots, two above and one below the line of epiphysial union, which line of union is carried up one inch; cartilage is one half the normal thickness, and this, as well as the bone underlying, is, in the field of the microscope, seen to be in the process of fatty degeneration. The head and neck of the sound femur are also removed

and the above description is comparative. Blood examined microscopically and found normal. The accompanying cuts show very strikingly the pathological changes, with the exception of the coloring. The whitish spots in the head and neck of Fig. 13 in the original sketch, as made by the artist at the post-mortem, are yellowish, showing the fatty metamorphosis to perfection. Fig. 12 is a section of the sound bone inserted for comparison.

The case of Fricke's, of Hamburg, published in 1833, I take from Dr. Judson's paper, is of value in this connection. The boy was four years of age and had been lame



FIG. 14.—SECTION OF SOUND FEMUR IN FRICKE'S CASE. COMPARE WITH FIG. 15.

FIG. 15.—SECTION OF FEMUR IN FRICKE'S CASE. PAGE 185.

four months, when he died of tubercular meningitis. Longitudinal section was made of each femur and is represented in the copies from colored lithographs. Fig. 14 the sound; Fig. 15 the diseased. He found the synovial membrane everywhere red and congested. The articular cartilage was healthy in all its surfaces, while the spongy tissue of the upper portion of the femur, throughout its whole extent, was much redder and more vascular than that of the sound femur. A firm yellowish or grayish-white mass was seen in the interior of the neck occupying the greater part of the medulla, and taking the place of the spongy tissue.

At its upper portion it was retained in contact with the compact layer of the neck of the femur, but loosely enough for a probe to pass between; the lower portion of this mass was firmly adherent to the spongy tissue. The epiphysial cartilage was greatly reduced in thickness.

M. Lannelongue's case published in 1881, in the Bulletin of the Surgical Society of Paris (vol. ii. No. 1. pp. 9-11,) illustrates the close connection between the diaphysial lesion and the fungous localized synovitis. This abstract I also take from Dr. Judson's paper. The patient, a girl, three and a half years of age, had been lame two and a half months and the hip was locked in the flexed and adducted position. Five months after the invasion of the joint disease she died of diphtheria, and the synovial membrane was found, post



FIG. 16.—VOLKMANN'S CASE. PAGE 186.

mortem, reddish, thickened, and fungoid in appearance, in certain places, especially at its lower and posterior portion. The synovial changes appeared to M. Lannelongue to start from the neck of the femur near the head. The ligamentum teres was also red, vascular and slightly fungous. The surfaces of head and acetabulum presented no change, and the articular cartilages retained their normal condition, with the exception of a little thinning on certain portions of the head.

Section of head and neck revealed a marked redness in the centre of ossification of the head and large areolæ in comparison with those of the opposite side. The prominent feature of the specimen was a cavity the size of a small bean lined with thin membrane and filled with a cheesy substance, situated immediately below the epiphysial cartilage. The bony tissue around the cavity presented a red zone. From certain portions of this lining membrane of the cavity fungosities started and reached the surface of the bone, where they became continuous with the thickened synovial membrane.

Volkman has published a case the specimen from which (Fig. 16) is similar to Fricke's. (See p. 1406, Saml. Klin. Vortrag. Nos. 168, 169, 1879.) It is described by the

author as having a cavity in the neck of the femur immediately under the epiphysial cartilage, which cavity is lined with smooth tuberculous membrane and filled with cheesy matter.

The term *ostitis malacissans* is the term Billroth prefers for the early changes, and Volkman employs for the same the term *rarefying ostitis*. The chalky salts quickly disappear from the osseous tissue, and the medullary vessels increase; the medulla, being filled with wandering cells takes the place of the disappearing bony tissue (Billroth). This is directly the opposite of *ostitis osteoplastica*. In the one softening of the bone-substance occurs, and in the other the neoplastic tissue is transferred into compact bone.

The form of inflammation with which we have to deal is not the osteoplastic ostitis, but the ulcerative and the fungous. Caries is only employed to represent the destructive stages of an ostitis. It represents the bony defects caused by the lacunar erosions. Caries begins as an ostitis, and is known as such by some authors, Billroth preferring to abandon the term altogether and modify the term ostitis to express the different kinds one meets both clinically and on the dissecting-table.

If, then, a rarefying ostitis, which produces always a softening of the bone substance, is characterized by proliferating granulations, and does not go on to suppuration, we call this a *caries sicca*, or, an *ostitis fungosa*. If, on the other hand, the rarefying ostitis goes on to suppuration, the neoplastic material disintegrating or undergoing carious metamorphosis—this we call *caries atonica*. Frequently masses of bone become separated, and the process is called *caries necrotica*. Indeed, as repair goes on, and these disintegrated portions are exfoliated we have particles of necrotic bone coming away with the pus; so that a really distinct caries is comparatively rare. Both clinical experience and post-mortem anatomy teach clearly that no one form is always present to the exclusion of the other. The forms of inflammation blend here as in other tissues.

Billroth claims that the non-suppurating caries, the fungous ostitis, is the more common in childhood, while the atonic belongs especially to adult life. My own views are just the reverse of this. He states, argumentatively, "Pathological anatomists, who only see caries on the dissecting-table, rarely know the fungous form accurately, or consider

it the more rare; but when one often examines pieces of carious bone, cut out during life, especially the resected joints of children, where the process is going on actively, he learns to judge differently from what he would in the anatomical museums where macerated bones almost exclusively are preserved" (p. 503, Hackley's Trans.).

I would retort by asserting, with abundance of proof to sustain me in the assertion, that at least three-fourths of the cases of chronic articular osteitis of the hip in children do suppurate, and the reason why the distinguished Vienna surgeon, and other surgeons throughout Germany, do not meet with the atonic form of caries in these resected specimens is, that they, almost with one accord, *operate early*, and rarely wait for the suppurate stage. How can one determine whether the process he sees on resection would have remained as it is, or have gone on to caseous degeneration and the formation of tubercle?

It is simply impossible to say in every given case of chronic bone disease affecting the hip-joint, and I might include the other large joints, that suppuration will not occur. In thirty cases of caries of the ankle in children that I have analyzed, twenty-five suppurated. (Am. Journal of Obstetrics and Diseases of Women and Children, April, 1880.)

The changes that take place in the medullary portions of the bone in the vicinity of the centres of ossification, even in the fungous osteitis, certainly cannot long resist the tendency to suppuration. Indeed, Virchow has shown that the boundary lines between the medullary cells and pus cells cannot be sharply defined. (Cellular Pathology.)

The development from one to the other is, of course, hastened by septicæmic influences. So that I am forced to the conclusion that it is exceedingly difficult to differentiate from clinical evidence between a caries sicca, and a caries atonica. With this chronic disease marked by such slowly developing products in the medulla and at the centres of ossification—a strumous basis—the development of tubercles is an easy and a natural process.

Dr. Henry H. Smith, of Philadelphia, has traced the connection, in a highly instructive paper, presented to the American Association in 1878 (Transactions for that year). He notes the influence of congestion of the medulla on the cell proliferation, and on the increased number of leucocytes; also the defective elaboration of blood as a result of

perverted myeloid cell action : and arrives at the conclusion that struma and tubercle are so closely allied that differences cannot well be demonstrated. Such is now the accepted view of the nature of the strumous ostitis of the spongy portions of bone.

In Germany, I am informed by Dr. Wm. H. Welch, the question is long since regarded as settled, and further investigation is deemed useless.

Given, then, the caseous degeneration, what becomes of the products, and how does the process extend? Abscess forms, the cavity is lined with a membrane in which can be sometimes found tubercles. The caseous matter contains bone debris. Parts fall together, are fused, or still further destroyed.

Barwell's case, in a boy who died of tuberculous meningitis two months after the appearance of the first symptoms of joint disease, is detailed on page 276 of the Wood's Li-



FIG. 17.—SHOWING RAPID DESTRUCTION OF BONE IN BARWELL'S CASE.

brary Edition. The specimen, Fig. 17, is described as follows :

"What remains of the round ligament can barely be seen ; it was very thin, soft, and shreddy ; red, and infiltrated with a blood-stained serum. The epyphysial and diaphysial head of the bone, with a portion of the neck, was, at its lower part, quite carious ; the excavation shown in the figure was, when fresh filled up with thick pus, mingled with bony detritus and soft granulation tissue. The cartilage was intact though thinned, except around the caseous cavity, where it had in great part disappeared. It was detached in great part from the bone for a considerable distance around the margins of that excavation."

Mr. Holmes, in "The Surgical Treatment of Children's Diseases," has a specimen figured which closely resembles Mr. Barwell's. The drawing was made from the bone as removed by excision from a girl eleven years of age who had been lame for two years. Mr. Holmes describes it as a case in which the disease was seated wholly within the neck. I have had the specimen reproduced in Fig. 18.



FIG. 18.—MR. HOLMES' SPECIMEN TO ILLUSTRATE CARIES OF THE NECK. VERTICAL SECTION NOT MADE.

The portion of bone which gave way is well shown, yet I am not convinced that the epiphysis did not contain a focus of caseous osteitis inasmuch as no mention is made of a section. It does not follow that because the "articular surface was quite healthy" a mass of carious bone did not lie beneath it ready to break through during an exacerbation and complete the destruction of the joint. The compact tissue of the neck giving way first, this case goes on record as one of the femoral variety of hip-joint disease. The disease

may be such that the whole articular cartilages may be shed. This occurs, however, in the acute and subacute form of an epiphysitis. Mr. Barwell has figured a fine specimen on page 278 of the American edition of his work. The accompanying figure (19) is from a colored lithograph published by Volkman in his lecture. Dr. Judson has adduced this as an example of the spread of the pathological process from the centre to the periphery rather than the reverse.

The neck and head in their changes are altered materially; the angle the neck makes with the shaft becomes acute sometimes, often it becomes rectangular, and the trochanter is carried above Nélaton's line, giving rise to the appearance of a dislocation. The acetabulum, if not primarily diseased, occasionally becomes involved from contact with the necrotic masses filling its cavity.

Dr. Judson reports (page 7 of his pamphlet): "It is a curious fact, and one which has not received the attention it deserves, that the tables of exsection of the hip for disease contain a large number of cases in which the acetabulum is reported as healthy." In Hodges' table of one hundred

and eleven operations, there were sixteen cases wherein the acetabulum had escaped disease.

In a case the specimen from which is shown in Fig. 20, the acetabulum and remnant of head were fused into one homogeneous mass.

The boy, aged twelve, was admitted to hospital in June, 1875. He had a diathesis typically strumous inherited and acquired, if the latter were necessary to complete the condition. Six or seven years before admission symptoms



FIG. 19.—FROM VOLKMAN'S COLORED LITHOGRAPH, SHOWING EXPOLIATION OF ARTICULAR CARTILAGE.

of bone disease at the hip developed. Abscesses formed, and when I examined him the joint was seemingly ankylosed, the angle of deformity in flexion being about 135° . Several cicatrices existed, and below the trochanter there were two open sinuses. The shortening and atrophy were prominent signs. From the date of his admission to August, 1876, the case ran the usual course. Abscesses would refill, sloughing follow about the gluteal region, and at this time one had opened below the anterior superior

process and above Poupart's ligament. Later, ulcers formed over the coccyx and in the border of the perineum.

Indeed, all the parts about the joint became the seat of ulcers or cicatrices or areas of infiltration. Head symptoms were frequently noted, and during the next two years the notes show many exacerbations, many remissions. Finally, in August, 1878, the area of hepatic dulness increased.

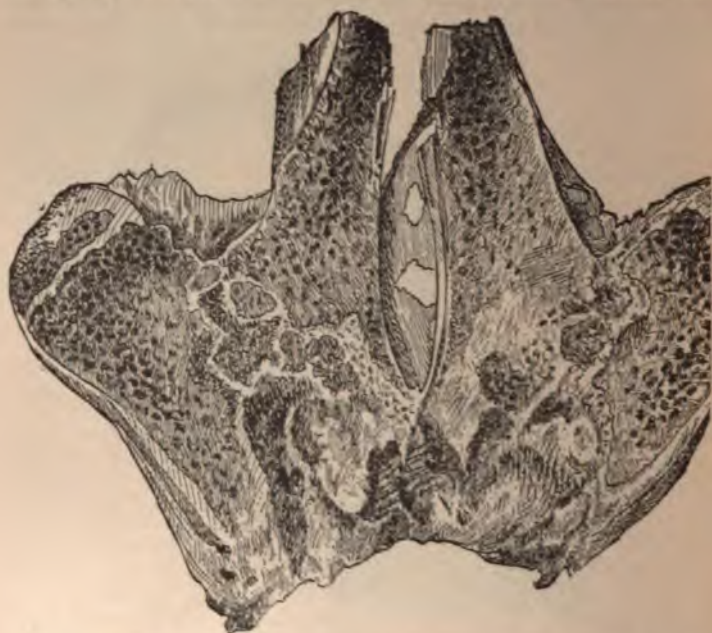


FIG. 20.—CASEOUS OSTITIS. REMNANTS OF HEAD, NECK AND ACETABULUM FUSED TOGETHER IN ATTEMPT AT REPAIR. TROCHANTER DISPLACED UPWARD. COMPARE WITH FIG. 21.

There was much pain in this region, the urine for two or three years of low specific gravity, 1008, now presented epithelium and blood, but no casts. In September he had considerable vomiting and diarrhœa, and in October he slowly sank, dying by asthenia on the 21st. Dr. Janeway assisted me in the autopsy ten hours after death. Drs. Ripley and Putzel were present. The left femur was exposed and an attempt made to tear it from the pelvis, but

it seemed so intimately associated that this portion of the pelvis was removed with the upper portion of the femur. The inner surface of the ilium showed a track of abscess, one end connecting with the perforated acetabulum, the other with an ulcer above Poupart's ligament. The trochanter major was very prominent, and extended one and one half inches above the corresponding point on the right side. The shaft of the bone, even denuded of all the soft tissues, was held firmly in adduction. On longitudinal



FIG. 21.—SECTION OF THE SOUND FEMUR IN CASE ON PAGE 193, TO COMPARE WITH FIG. 20.

section through shaft trochanter and portion of pelvis removed, the neck was absent, and only about one half of the head could be seen, and this was fused with the acetabulum, the outlines of which were very indistinct, a yellowish border shading off into red, taking the place of the normal rim. On comparison with a like section of the parts on the sound side the difference between the two hips stood out in fine relief.

The trochanter of the diseased femur seemed to be on the same plane with the head of the sound femur, thus

making a shortening of the limb of between two and three inches. The shaft and the trochanter were perfectly normal macroscopically.

The colored sketch from which the drawing represented in Fig. 20 is taken, shows the osteophytes scattered throughout the caseous mass, and is a fine demonstration of the mode in which destruction and reproduction go on at the same time in even the atonic caries of bone. The stage had been reached in this case when the reproduction was in excess of the destruction. But for the development of amyloid disease the patient would have made a recovery, with a very useful limb.

The spleen was normal in appearance, but the kidneys had adherent capsules, nodular surfaces, and on section a marked waxy appearance was shown in the cortex and pyramids.

The liver filled the greater part of the abdominal cavity, and the right lobe, instead of presenting a very *sharp* border, was markedly *rounded*. (Text-books make this point in differential diagnosis during life between waxy and fatty livers; the border is sharp in waxy, rounded in fatty. The explanation given is that the organ reaches the brim, or fossa of the pelvis, and not being able to get lower, the border is turned, so to speak.) The border of the left lobe was sharp, it not having descended into the pelvis. The weight of the liver was five and a quarter pounds. The upper portion was strongly adherent to the diaphragm. On section amyloid changes were very apparent to the naked eye.

The lungs and pleura were free from miliary tubercles, though in the middle lobe of the right a half-dozen calcified nodules, varying in size from a pin's head to a small marble, could be felt, apparently plugging the bronchi.

The cranial dura was lined by a membrane which could be easily removed, and which, on microscopical examination, was found to consist of fully-organized tissue filled with capillary vessels. No tubercles were anywhere found. The bones were not examined microscopically.*

The destruction of the acetabulum is well shown in the specimens represented in Fig. 22, which I have taken from Barwell.

* This case was reported in the Medical Record for November 3, 1877, as one of "Cure of Tubercular Meningitis by Ergot," and, now, two years later, the post mortem showed that the boy had had, instead, a simple acute internal pachy-meningitis.

The specimen as shown in Fig. 23 represents what few of us have had an opportunity of seeing, viz., a pus sac hanging from the inner wall of the acetabulum.



FIG. 22.—CHANGES IN ACETABULUM IN THE ADVANCED STAGES.

This is also taken from Barwell.

The disease occasionally extends through the neck into the shaft, and Dr. Poore believes that we have an osteo-

myelites more frequently than one would be led to suspect. In a paper on excision of the hip-joint, published in the *New York Medical Journal* for May, 1877, this author reports two or three cases in which a grave osteo-myelitis existed. In one case, while he attempted to throw the head of the bone out of the acetabulum, after the usual incision had been made, the femur was fractured at the junction of the diaphysis with the epiphysis, just above the



FIG. 23.—ABSCESS FROM ACETABULUM.

knee-joint. The whole shaft was removed by drawing it through the original opening. The cut end was soft and discolored. It happened with Dr. Poore, as it has happened with other surgeons whose experience in excisions is large, on making his section, in several cases, to find the medullary canal diseased. Lower sections reveal the same conditions not infrequently.

Mr. Holmes found a femur in a case reported in *St. George's Hospital Reports*, Vol. I., soft and diseased at both ends. Dr. Sayre, in fifty-nine cases of excision, found the shaft diseased in two-fifths of that number.

Dr. Poore significantly remarks, "I know of no means of ascertaining the condition of the shaft before commencing

to operate, except that cases of disorganization of the joint of long standing should be looked upon with suspicion."

It occasionally happens, also, that not only the shaft but the pelvic bones are diseased throughout a greater part of their structure. Mr. Armandale, in a paper on Hip Disease,



FIG. 24.—SECTION OF FEMUR IN CASE REPORTED ON PAGE 198.

states that he has met with two cases in which the whole femur, the ilium, and probably other of the bones were diseased throughout their whole structure.

The nature of the osteitis is usually the same in multiple lesions of the spongy bones, and the accompanying figure, No. 24, shows the lesion in the head of the femur nearer the

periphery than I have usually found the initial process. The boy from whom this specimen was taken had, in addition, a caseous vertebral ostitis, a similar disease of the bones of the foot, and a tubercular meningitis from which he died. He was ten years of age when disease of the foot appeared, and shortly afterwards the spinal symptoms developed. The "knuckle" was not observed until he was twelve. Six or eight months later, signs of chronic articular ostitis of the left hip were recognized. In a few months abscess over the trochanter formed. Later still, cystitis appeared and yielded to treatment. At times the hip and the ankle would be distended with fluid; then, an exit being found, they would seem normal. Reflex symptoms were never a marked feature of the case. From February, 1878, to October, 1879, he led at his home a vegetative existence. Then he developed a tubercular meningitis, and died in November. The wonder was with his prolonged emaciation, his ulcers in various localities, and his prolonged suppuration, that he did not contract amyloid degeneration. There was no phthisis, however, in the family history, so far as could be learned.

The autopsy was conducted with much thoroughness, yet the full notes are unnecessary here, and a bare mention of the lesions in certain organs will suffice. The brain, for instance, contained the lesion both macrospical and microscopical of tubercular meningitis.

True miliary tubercles were found in the pulmonary pleura.

The bodies of three or four of the middle and lower dorsal vertebræ were broken down and generally disorganized, and a caseous cyst connected therewith was in close proximity. Over the liver were small granular bodies pronounced by Dr. Janeway, to whom I referred all the specimens, miliary tubercles.

The femur, left side, was denuded of periosteum at its middle third for a couple of inches, and this area connected with a fistulous tract opening on the outer side of the thigh. On careful dissection, the capsular ligament was found intact; but just above its insertion, and above the upper margin of the acetabulum, was an opening through the ilium, into the floor of the acetabulum, through which the eroded head of the femur could be distinctly seen, and through which I put my finger, and felt this carious body move as I rotated the shaft.

Areas of denuded bone were seen all along the external iliac fossa, and even up to the sacro-iliac synchondrosis.

No trace of the ligamentum teres could be found. Lying loose in the acetabulum were several small pieces of necrotic bone belonging apparently to the head. On cleansing the cavity of these fragments no erosion of the acetabular cartilage could be discovered save in the upper portion above mentioned. In the triangular space, however, for three quarters of an inch in diameter, there was complete loss of bone substance, but no opening into the pelvis. The internal periosteum was quite thick at this point. There was no pus or other fluid in the joint cavity.

On vertical section of femur, a soft pulpy material filled the centre of the trochanter, and a similar mass occupied the upper end of the shaft at the centre of ossification.

In the remnant of the diaphyso-epiphysial head was a yellowish pulp with reddish areolæ in both epiphysis and diaphysis, the cartilage separating the two being irregular. The angle of the neck with shaft, was apparently unchanged. In this section one could easily see the different stages of a rarefying ostitis. A portion of this pulp microscopically presented medulla cells, granular and fatty, with an occasional giant cell, but no nucleated blood corpuscles.

The tibio-tarsal joint was intact; the medio-tarsal thoroughly disorganized; articular cartilages destroyed. The greater portion of the scaphoid remained, while the cuneiform bones were reduced to one half the normal size. These fragments were loose and easily picked out. The cuboid and the proximal ends of all the metatarsal bones, for at least one fourth of their length, were eroded, and lying in thick fetid pus.

The internal malleolus was enlarged, but not eroded, while on section all the cancellous tissue was replaced by pus, pulpy matter, and the debris of carius necrotica. There was no opening through the shell of compact tissue.

It seems fair to assume that central ostitis developed in the tarsal and metatarsal bones, and in the bodies of the vertebræ about the same time. The inflammation in the bones of the foot extended by contiguity to the tibio-tarsal synovial membrane, inducing a simple synovitis, which resolved like any other simple inflammation. The facts I have recorded in my complete notes. The opening stook place into the medio-tarsal joint, producing here a puru-

lent synovitis with destruction of the joint. Pus likewise escaped into the periarticular tissues, and we had chronic abscess. The malleolar osteitis, while going on to caseous degeneration, did not perforate the outer shell.

The femoral diaphyso-epiphysitis and the iliac osteitis, seem to me to have been undoubtedly primary lesions occurring, however, two or three years subsequent to the foot and spinal diseases. The synovitis here was, I think, secondary, and was undoubtedly purulent. The boy had certainly enough caseous foci for the development of tubercle and the fatal tubercular meningitis, although no such diathesis was traceable in the family.

The further destructive changes secondary to these bone lesions are direct and indirect. The anæmia is one of the direct, and many of the patients who die of this disease, die by asthenia after prolonged suppuration.

Among the more prominent modes of termination are exhaustion, tubercular meningitis, amyloid degeneration, phthisis. In one hundred and fourteen deaths I have succeeded in tracing, my notes show that fifty patients died from pure exhaustion after long suppuration, the osteitis never having fully subsided. Twenty-six died from tubercular meningitis, and generally before destructive changes had taken place in the joint. Eighteen died of amyloid degeneration of the larger viscera, induced by prolonged suppuration. Thirteen died of intercurrent ailments not classified, and seven died of phthisis. Connection between tuberculous osteitis, and tuberculous meningitis, and between prolonged suppuration and amyloid degeneration I have attempted to give in a theoretical way in the chapter on Etiology. As a rule, amyloid changes are late in developing, yet cases are on record in which they may appear in a few months. M. V. Odenius, in a Sweedish periodical, the *Nordist Med. Arkiv*. Bd. XI. No. 25, reports the following:

"A case of traumatic lesion of the knee-joint in a man, twenty-one years of age, who had always before been healthy; the injury was complicated by considerable loss of blood and perforation of the synovial sack.

"After having been treated for some time at his native place, and not in the most rational manner, he was admitted in the hospital at Lund. He was excessively emaciated, and on the inner side of the right knee existed a wound of some size, which communicated with the articulation, and in the latter was a large abscess filled with foul

pus; he died soon after; about two months after receipt of the injury.

"AUTOPSY.—Advanced destruction of the articular cartilages, caries of the bones and a large abscess along the femur and tibia; in the kidneys, amyloid degeneration of a portion of the corpora malpighiana and their vasa afferentia. Traces of the same degeneration were likewise found in the capillaries of the spleen and their immediate vicinity. The other organs exhibited no similar changes, so that it is to be assumed that the degeneration mentioned was directly dependent upon the osseous lesion, as in Cohnheim's celebrated case. The conclusion at which we arrive is that this degeneration can develop itself within a period of two months."

It is not very uncommon to find tuberculous degeneration and amyloid degeneration exist in the same subject. The so-called amyloid, or lardacine is closely allied to albumen, differing from this substance in its insolubility in acids containing pepsine (Billroth and Kuhne).

When death does not ensue by any of these processes repair takes place by the elimination of the fluid contents of these caseous patches, by reproduction of bone in the form of osteophytes, by condensation of periarticular tissues ligaments and periosteum, and by the fusing together of the neoplasia, forming a synostosis, or, what is more common, a joint practically ankylosed by fibrous tissues.

The conclusions to which I have arrived are:

1. The large majority of cases of chronic articular ostitis occur in childhood prior to the eighth year.
2. In these the initial lesion is an ostitis interna, the focus of disease being in, or in close connection with, the centres of ossification.
3. The head and neck of the femur are more often involved than the acetabulum.
4. It is rare for a single centre of ossification to be involved, but usually two or more are implicated at very nearly the same time.
5. The ostitis is a rarifying ostitis, and may terminate in a caries atonica or a caries sicca, the former being the more frequent.
6. Synovitis is secondary, and if developed by contiguity is simple, and if by the perforation of the cartilage or compact layer, is purulent.

7. In children beyond the age of eight years the initial lesion is about equally divided among a central osteomyelitis, a chondritis and a synovitis.

8. The process, whether central or otherwise, is exceedingly slow, and proceeds to the destruction of the joint and displacement of remaining portions of bone.

9. If the patient inherits a tubercular diathesis he is in danger of tubercular meningitis prior to the occurrence of suppuration and to amyloid degeneration subsequent to this stage.

CHAPTER XII.

THE ETIOLOGY OF CHRONIC ARTICULAR OSTITIS.

The causation of chronic joint disease in childhood will always occupy an attitude of great importance in orthopedic surgery. Whether there exists in all cases, or in the great majority of cases, a diathesis known as strumous or scrofulous, which acts as a predisposing cause; or whether this has no connection save an incidental one—this is the question that meets one at every turn in connection with these maladies. That there must be an exciting cause few will deny. That the exciting cause is always trauma, and that a predisposing cause, even with this as a factor, is unnecessary, few there be rash enough to assert such a proposition. There has been and there continues to be much useless controversy in relation to this subject. One class arrays itself on the side of traumatism, the other on the side of scrofula. The lines are not sharply defined—one does not know exactly how the other defines his terms. When the traumatist says that the majority of joint diseases come from a fall or an injury, the impression is given that a strumous habit or a constitution otherwise vitiated has nothing specially to do in their development.

When the adherent to the scrofulous origin of joint diseases presents his views the impression is given that all spring from hereditary predisposition.

It is curious to note the differences of opinion on this very subject, and I am quite sure that these differences spring from an imperfect understanding of the terms. The terms strumous and scrofulous are considered to hold a certain relationship to tuberculosis, and the relationship is by no means clearly understood. This subject has been handled in a masterly way by Mr. Frederick Treves, of London, in a work published in this series. From his work one gets, I think, a clear idea of what "tubercle" is, what is meant by "tuberculous," and what relationship "scrofula" holds to this condition. I shall therefore, without going into the details

of the discussion, simply give the histology of tubercle, and then the conclusions reached by his investigations.

Tubercle "is composed of a mass having a finely rounded outline, and made up principally of cells. These cells are so arranged as to form in typical specimens three zones. The central part is occupied by one or more giant-cells, round this is a zone of many so-called epithelial cells, and beyond this is a third zone of simple embryonic cells or leucocytes. All these cell elements are supported by a fine reticulum, which is generally concentrically arranged at the periphery, and towards the centre is observed to be continuous with the processes that commonly come off from the giant-cells. The affected district is non-vascular. Such is a typical tubercle." And yet, from the modifications in this structure and from the fact that giant-cells may be met with under the most varied circumstances and conditions where we can in no way term them tubercular, the conclusion is reached that tubercle presents no distinctive specific anatomical element.

The conformation of the mass, the grouping of its parts and its history, its tendency and evolutions—all these and more determine its individuality.

To construct a brief definition of scrofula, or, as I prefer to call it, struma, is exceedingly difficult. I believe I am safe in stating that all authors, with one or two exceptions, regard as synonymous the adjectives strumous and scrofulous. *Æsthetically*, I prefer the former, and shall consequently use the term scrofulous as infrequently as possible. To understand what the term means is not difficult. We recognize it as a tendency, a diathesis, and when one speaks of a strumous diathesis we understand him as speaking of struma, which I shall proceed to define.

Struma, then, is a diathesis in an individual either hereditary or acquired, which renders its subject, especially in childhood, peculiarly vulnerable in certain tissues, viz., the mucous membrane, the skin, the lymphatic system, and the bones, and the inflammation which is so easily induced in the tissues named, is remarkable for its great pertinacity and for products which are notably cellular in character, which present certain peculiar properties when inoculated on animals, and which, instead of terminating in resolution or suppuration, extend locally and infect adjacent parts, developing either into tubercles or degenerating into caseation.

Call this diathesis a tendency if you will; it can scarcely be called a disease. That it is recognized by certain characteristics all must admit. It is impossible for a physician to be long connected with a dispensary or hospital in a large city without coming to the conclusion that some vice, either hereditary or acquired, must underlie the constitutions of the vast majority of the poor who seek medical assistance. In one instance, the shape and configuration of the head attract your attention; in another, the peculiar expression of the eye, the hue of the face, the irregularity of the teeth; in another instance, the contour of the chest, the general carriage, etc., etc. It is difficult, in fact, to predicate strumous of one particular type of expression. Some children who are undoubted subjects of this diathesis have light hair, and some have dark hair; the skin in some is almost transparently light, in others it is very dark.

The experimental inoculation of tubercular and strumous products have been conducted by such men as Villemin, Burdon Sanderson, Wilson Fox, Klein, Cohnheim, Hueter Schüller, Klebs and Deutschman, and the results, so far as they affect the relationship of the two conditions, may be summed up (to quote from Mr. Treves) as follows:

"1. That tubercular matter, when introduced into the bodies of certain animals, can produce at first a local disease not distinguishable from scrofula."

M. Kiener, in "L'Union Médicale" for 1881, p. 316, has shown that the injection of tubercular matter into the testis can induce caseous inflammation of that body, and into the knee joint, a chronic joint disease that fully accords with the common notions of white swellings. Cohnheim's experiments have all the same bearing, although these observers may refrain from applying the term scrofulous to the results produced.

"2. That scrofulous matter when used as a vehicle for inoculation can produce general tuberculosis.

"3. That tubercular matter acts more vigorously in these experiments than does strictly scrofulous matter.

"From these results it may be gathered that experimental inoculation maintains the identity of scrofula with tuberculosis, and at the most can only show that the two conditions differ somewhat in intensity and degree."

If we conclude, then, as many observers seem to have established, that struma is the soil, tubercle the seed (and it is especially, many think, exclusively, upon the soil of

struma that the infective tubercle can take root and develop), we must accept the conclusions Mr. Treves draws as to the relationship, viz :

" 1. The manifestations of scrofula are commonly associated with the appearance of tubercle ; or, if no fully formed tubercle be met with, a condition of tissue obtains that is recognized as being preliminary to tubercle. *Anatomically*, therefore, scrofula may be regarded as a tuberculous, or tubercle-forming process.

" 2. The form of tubercle met with in scrofulous diseases is usually of an elementary and often of an immature character, whereas in disease called tuberculous in a strict clinical sense, a more perfect form of tubercle is met with in the form of the gray granulation, or adult tubercle (Grancher).

" 3. Scrofula therefore indicates a milder form or stage of tuberculosis, and the two processes are simply separated from one another by degree."

There is no pathological outrage, then, in speaking of chronic hip-disease as tuberculous; and one cannot but admire the courage with which Dr. Gross adheres to his convictions on this subject. All men know that what this great surgical clinician has studied has been well studied.

In 1877 I presented to the County Medical Society of New York, a paper, based on the analysis of 860 cases of joint disease, and the part that the strumous element plays in the etiology of these diseases was the chief point my investigations aimed to determine. Much of that paper I shall reproduce in this connection.

Dr. L. E. Holt, of this city, has since been associated with me in the hospital, and from an inaugural thesis he prepared in 1880 I have additional statistical data.

The sexes in bone lesions of the hip are about equally represented. In 1818 cases I have analyzed, I found 909 males and 909 females. Dr. Holt, in 2307 cases collected at a later date from the same hospital records, found 1178 males and 1129 females. Those, then, who argue that boys suffer more frequently than girls and that evidence in favor of traumatism is therefore furnished, can find little to encourage them in the statistics I have adduced.

A word or two in reference to falls and the influence they have on the minds of both laymen and professional men, may not be amiss in this connection. About the first question propounded by the anxious parent when a

child with suspected joint-disease is brought to a physician is, "Doctor, do you think it came from a fall?" That question seems paramount to all others. I have often wondered why the maternal instinct did not suggest the all-important question as to what will cure the child. Generally, by the time a physician has been consulted, the history as to traumatism has been thoroughly investigated—the child has been induced, either by fear or by love, to admit the possibility of some fall on the sidewalk, on the ice, or down a flight of stairs. If the unfortunate victim cannot remember such an occurrence, some Argus-eyed neighbor calls in to volunteer testimony on the subject, so that there can be no excuse for a doctor omitting this item in getting a history. I think it will be fair to state that most of the histories, the data from which form the basis of this chapter, have been taken by men who have graduated from colleges thoroughly imbued with the idea that traumatism produced a very large proportion of all the chronic arthropathies.

I have seen a great many paralytic children, have examined them with much care at various stages of the paralysis, and many have been under my observation for several years. I have seen them fall often, and frequently get severe bruises; and I have seen the injuries neglected time and again. No class of children, I presume, fall and tumble about more than these unfortunates. To see an arthropathy and an infantile paralysis associated in the same patient is with me a rarity; and, where such have been noted, I have been particular to make special record of the case. This point is so interesting, that I have collected a few figures which enable me to speak with some degree of confidence. In the paper, as read, I had 1440 cases, embracing a period of fourteen years; but, as I am not familiar with those recorded prior to 1871, I have concluded to refer only to those I have had an opportunity of myself observing. During six years (1871–1877), 845 cases of spinal paralysis in children under fourteen years of age have been examined at the hospital, and of that number I am able to find four complicated with joint-disease. In three the joint-disease followed the paralysis, in one it preceded the paralytic attack. This one I have already reported in the Philadelphia Medical Times, for December, 1876.

Age is a predisposing cause—that is, the disease occurs

more frequently at certain periods of life—and from this fact, arguments are constructed to militate against a strumous diathesis in the etiology. In 560 cases of chronic ostitis of the hip analyzed in 1880, it was learned that the disease began before the fifth year in 352, or sixty-three per cent; 290, a little over fifty per cent of all, began between the third and fifth years of life; only 39 developed after the tenth year, and only five after the thirtieth, three being at the fourteenth, and one each at the fifteenth and the seventeenth years. Among the cases collected were a number over ten years, in which the primary diagnosis made was chronic articular ostitis, while the progress and result of many thus diagnosed revealed an error, nearly all proving to be peri-arthritis, mon-articular rheumatism, a neurosis, or a simple synovitis. The development of this disease after the fourteenth year of life, I feel fully justified, then, in declaring to be exceedingly rare. Sixty-one, of the 560 analyzed, commenced before the second year. It is most commonly developed, one can safely say, between the third and the fifth years. The disease is known to begin as early as the eighth month; but statistics here are unreliable, for many bone diseases at this period are unquestionably syphilitic.

In an address delivered by Dr. S. D. Gross, before the American Medical Association in 1874, he says, "It must be within the recollection of every one of the older members of this association, that many of the diseases formerly designated as scrofulous have, (thanks to the researches of modern laborers), been proved beyond the possibility of doubt or cavil to be of a syphilitic nature." The differential diagnosis, however, between syphilitic bone diseases and strumous bone diseases has been ably set forth by recent authors, notably Dr. R. W. Taylor, of this city. A study of bone syphilis in young children would be barren indeed without an intimate knowledge of Dr. Taylor's work—"Syphilitic Lesions of the Osseous System in Infants and Young Children." With the facts then concerning the early age at which the upper epiphysis is attacked by strumous inflammation, it becomes pertinent to ask why children in general are more frequently diseased than adults.

For some valuable information on this point I am indebted to Dr. Jacobi, who entered into the discussion which followed the reading of my paper. He raised this very question, and proceeded to apply the fact, that every-

thing which had a rapid physiological development was apt to become pathological, to bone and joint diseases especially, claiming that those parts of a bone which had a rapid circulation of blood were the most frequently diseased. The upper portion of the femur was better supplied with blood-vessels than the lower portion, and it was a fact that, when we had to deal with disease of the bone in young children, the epiphysis was almost always the seat of the inflammation. He referred to the anatomical fact, also, that when man was born there was only a single epiphysis in which there was a single point of ossification, and that was the lower epiphysis of the os femoris—all the others being soft tissues. In the same degree that the epiphysis ossified, the doctor continued, the tendency to inflammation and suppuration of the bone generally would be diminished. The remarks of both Dr. Hamilton and Dr. Jacobi on the different periods of life at which struma manifests itself, the different tissues affected, etc., were very interesting and highly instructive. As I have not space to incorporate the discussion fully in this chapter, I shall refer my readers to a *verbatim* report of the same to be found in the Medical Record for April 28, 1877.

Without entering into the old discussions of heredity or transmission of disease from generation to generation, I wish to affirm my belief in the theory that a disease or diathesis in the parent may be transmitted to the child, if not through the same tissue and by the same manifestations, at least through different tissues, preserving the factors, chronicity and pertinacity.

Let me illustrate. Much has been said about spinal caries being essentially a tubercular disease, and men whose experience and judgment must be profoundly respected hold now tenaciously to this theory. They find often a tubercular family history, probably running through two or three generations; and where they do not find this history, they conclude that such a diathesis must exist and has escaped their search. The opponents of this theory claim that no tubercular deposit has been found in the vertebræ thus carious, and furthermore, in many instances no tubercular deposits can be found in the lungs or other organs, and on these negative facts they stoutly deny any tubercular element in the etiology. Now, it seems to me that no question in general pathology rests on a firmer basis than this: that a tubercular diathesis, or

any diathesis, in the parent, may be and is transmitted to the child, manifesting itself not in the organs through which the diathesis manifests itself in the parent, but through other organs and tissues. The type of the lesion may change in many particulars. The diathesis may be masked, and good hygiene and a prophylactic course of treatment may prevent its development in any tangible form, yet there remains the vulnerability. Those who have had occasion to study the alcoholic diathesis find transmitted lesions in the nervous system. How frequently are we baffled in our efforts to relieve a seemingly trifling disease in a child, and how zealously do we resort to drug after drug, when, finally, our attention is called to a suspicion of a syphilitic diathesis in the parents, we begin our anti-syphilitic medication, and a cure speedily follows! In one of the cases included in my analysis this fact is strikingly illustrated:

A little girl, aged seven years, was brought to the outdoor department for a synovitis of the right knee. There were found the usual symptoms and signs accompanying a subacute arthritis, and, furthermore, the child seemed in an excellent condition of health. The mother had traced the disease to a fall some three months prior to her first visit to the hospital, which was during the early part of 1876. The appearance of the mother, it is true, aroused my suspicion as to the existence of syphilis in herself, yet I could at that time see no connection between her disease and the one for which she brought the child. In fact, I did not pursue an investigation even, but proceeded to treat the child after the usual manner. I made slow progress, and after a few months the mother grew naturally dissatisfied and discontinued her visits.

During the early part of 1877 she returned, after having visited in turn other dispensaries. I found the child still lame, and the knee in about the same condition as when I last saw the case. I instituted the same treatment, and proceeded to keep full notes of the progress of the case. After two months' observation I found no improvement. I then obtained an accurate history of the family, and I found that this child had been born subsequent to the development of syphilis in both father and mother, and I obtained a history of hereditary syphilitic manifestations in the earlier years of the child's life. I discarded all former treatment, and ordered potassium iodide, in ten-

grain doses, thrice daily. Within ten days the improvement was most decided. In less than a month a perfect cure was accomplished, and up to the present time no relapse has occurred.

Dr. Taylor has done more than any author, so far as my knowledge goes, to establish the differential points between syphilitic osseous lesions and strumous osseous lesions. In the closing paragraphs of his excellent work, to which allusion has already been made, he justly deprecates the readiness with which observers, ordinarily extremely careful, attribute certain swellings about the diaphyso-epiphyseal junction of the long bones to syphilis when there is not the slightest evidence of the disease in the ancestors. These lesions differ in many characteristics from those of syphilitic origin. I can not do better than quote the following:

"An important question here arises, namely: Are there any distinguishing characteristics in these osseous lesions which will enable the physician to promptly and correctly diagnosticate them from syphilis? It must be confessed that in the main they resemble in many particulars the lesion of syphilis, still there are certain quite distinct features which are important to know. As a rule the osseous lesions above alluded to [those of acquired struma] are developed rather rapidly, may be complicated early by degeneration, and for the most part, *do not primarily affect the joints* [the italics are my own]. There are usually a smaller number of bones involved than in syphilis, and there is a *greater tendency to unsymmetrical development* [italics again my own]. Pain is generally a constant symptom, [this I do not care to italicize] and, in short, there is usually a much more pronounced condition of inflammation than we find in syphilis. When degeneration occurs there may follow sinuses which have the typical scrofulous appearance [as a matter of course] which we have observed to be not constant in syphilis. Finally, a point of some importance may be determined by the bone or bones involved; thus, in this condition, it is very probable that the cranial bones would be unaffected, [I do not remember ever to have seen a case of strumous osteitis of these bones] and that the lesion would be limited generally to the long bones, or perhaps to the phalanges, whereas, in syphilis we have found that a number of different classes of bones were often coincidentally involved. Still, as I have said in the chapter on diagnosis, the distinction very often

rests upon the history of the case, and upon the coexistence of lesions which are undoubtedly syphilitic. Treatment will not always afford conclusive evidence, but it may sometimes assist in a measure" (pages 173 and 174).

At the time Dr. Taylor wrote he did not believe in the acquired struma, I am led to infer, and yet the etiology of these lesions and the progress correspond identically with those of this diathesis.

I am not, then, prepared with Dr. Gross to assign syphilis so prominent a place in the etiology of a strumous diathesis, nor am I prepared to speak so cautiously of it as does Dr. Taylor. In my studies I find just as much reason for naming this condition struma as I do for naming those conditions struma in which histories of hereditary disease are conspicuous.

I tabulated two hundred and sixty-five cases of chronic ostitis at the hip with reference to an hereditary, and two hundred and seventy-one with reference to an acquired diathesis, including the diseases and conditions which seem to develop struma in a child even when the family record is clear of any transmissible diseases and tendencies. These I have found to be the exanthemata, particularly rubeola, pertussis with tardy convalescence, rachitis, a severe dentition, prolonged cholera infantum, bad hygiene, etc.

Sixty and one-fourth per cent of the number analyzed, from an hereditary point of view, gave unmistakable evidence of a diathesis thus transmissible, and evidences, in other children of the family, of the existence of such diathesis were found in twenty-five per cent of the whole number.

In the two hundred and seventy-one analyzed with reference to an acquired diathesis eighteen per cent had developed the diathesis in this way. Pertussis stood in a causative relationship eight times, in three instances there being no hereditary influences traceable. Scarlatina seemed to cause the disease eight times, there being no evidence in six of the cases analyzed with regard to heredity. In five cases measles were the exciting cause, and in one only (four were analyzed) was there found any evidence of heredity.

Since the publication of that paper, I have pursued my studies in this direction, and am still further convinced that not only do measles (and whooping-cough and scarlatina) often serve to bring out a strumous diathesis in a child by

heredity entitled to the same, but also induce such a diathesis even where the family records are void of any transmissible diseases. Take the following case: A boy, aged three years, the picture of health, and always regarded as exceedingly healthy. The parents, both of whom I have the opportunity of interviewing, present very good histories, both personal and family. The patient, I find, on entering the room, walking about the floor, carrying his head a little stiffly, the shoulders being appreciably raised. He will not turn the head without turning the body at the same time. There is no deformity of spinous processes except a very mild degree of lordosis in mid-dorsal region. Notwithstanding the clear history thus far obtained, I strongly suspect vertebral ostitis, but on pushing my investigation still further I learn that these symptoms have not lasted a week; that, in fact, one week ago he was very active and was jumping from the sofa, when he fell, striking his head directly against the floor—the fall producing a little concussion of the brain, but that he rested well that night and did not manifest any symptoms whatever until the third morning, when he got out of bed holding the head awkwardly, and complaining of pain on moving about. Since that morning he has been resting poorly nights, and his cervical stiffness has rather increased.

In view of this severe fall, then, with the above facts in view, I am on the point of excluding any bone disease in making up my diagnosis, and of attributing the whole difficulty to a muscular or ligamentous strain, relief from which will speedily follow after rest and counter-irritation; but on attempting, by way of routine, to explore the posterior wall of the pharynx with my finger, the little fellow sets up violent resistance, and begins coughing rather spasmodically. The father now informs me that he is just getting over whooping-cough, which has already lasted two months. With this additional fact, I interpret the fall as a concussion of one or more of the vertebral bodies, the nutrition of which has been impaired by the whooping-cough in such a way as to render them peculiarly vulnerable. This was a most unfortunate time for such a traumatism, and I have little hesitancy in predicting, for the little patient a bone disease with destructive changes.

In the *Revue de Chirurgie*, No. 10, 1881, M. Ollier, of Paris, has very clearly shown how such strains or concussions produce cerebral and peripheral bone diseases, in an article

entitled "De l'entorse juxta-épiphysaire, de et ses conséquences immédiates ou éloignées au point de vue de l'inflammation des os."

In 1876 a well-marked case of articular ostitis of the hip, in a boy aged two years came under my observation. He was the second of two children, was nursed by the mother until eighteen months old, she herself having been unwell during this whole period, *i.e.*, had "falling of the womb" and considerable anxiety on that account. She nursed the first child two years; was in excellent health the meanwhile, and the child is reported as being in good health. The maternal grandmother, they say, died of consumption (evidence not very clear) and with this exception the family history is believed to be very good. The subject of this record, to resume, had many signs of rachitis during the first year, and in the beginning of the second had a cholera infantum which "wore him away to a shadow." During this illness, without the probability of any traumatism, the mother found his hip tender one morning while changing the diaper. This was the first of the train of hip symptoms which followed.

Last fall, while seeking diligently in the presence of my class at the Polyclinic for a predisposing cause in a case of ostitis at the hip, I obtained the following history of a robust-looking patient, a boy aged six. He had a family record clear of any diseases to which a diathesis might be attributed, and there was no evidence of any fall or injury of any kind sustained. In the summer of 1881, toward the close of the season, he had, while living in the outskirts of Brooklyn, a six-weeks' attack of typho-malaria fever with a protracted dysentery. The convalescence was exceedingly tedious, and toward the close of this, one morning, without any previous signs, he got out of bed a lame boy, and has been lame ever since. Three months later he had a very acute exacerbation which lasted only a week or two. The mother naturally attributed his lameness to that long illness, and there seems to my mind good reason for her belief.

I could illustrate at great length, did the occasion demand, the influence the exanthemata, and measles especially, have in the production and the evolution of a strumous diathesis. From a still more extended study on this subject, I arrived at the following conclusions:*

**Medical Record*, June 3, 1882, p. 592.

I. Measles is not by any means "a trivial disease."

II. Measles, and indeed any of the exanthemata, with whooping-cough especially included, are to be dreaded in patients suffering from the chronic bone and joint diseases commonly known as scrofulous.

III. Measles and whooping-cough take precedence among all the diseases of infancy and childhood in the evolution of an hereditary strumous diathesis.

IV. A strumous diathesis may be *caused* by an attack of measles or of whooping-cough in a child whose family history, both paternal and maternal, is absolutely free from hereditary diseases.

A word regarding histories for scientific purposes. Not infrequently do I read the notes of a case published in the journals or the text-books with which case I am perfectly familiar. It is reported as having a "good family history," and to my certain knowledge there is enough phthisis and bone disease in the family to convince the most skeptical. It is well enough to omit all reference to a family history in reporting a case, but to report the flippant reply of a parent to the question "Are you healthy?" and "Is there anything of this kind in your family?" as settling a question of fact is a gross insult to Science. If one pretends to get a history, let nothing be set down as fact unless it can be established as fact. Because the mother is robust-looking, it does not follow by any manner of means that her immediate family even, is a healthy one. There should be a careful cross-examination, conducted, however, in a gentlemanly way. If it is incomplete, let the fact be stated in the report. My faith has so often been shaken in family histories that I attach no importance whatever to the terms "good" and "excellent" used in connection with the same. I have many letters on file in my case-books from physicians recommending me cases of joint disease in which they state the family history is good, and in the same letter tell about some other member of the family in the last stage of consumption.

One of the most rebellious cases of disease of the hip I have ever had under my observation, was in a girl aged five years, who came under treatment in 1875. Over the left sterno-mastoid muscle was a cicatrix of old glandular abscess, and there were eczematous excoriations about the *alæ nasi*. She had the typical strumous face, and while under treatment had recurring attacks of naso-facial erysipelas. The history as given was that her family history was good, and

that the two other children were in fine health. Subsequently I learned on a personal examination into the history that the father was consumptive and when young had cervical abscesses; that the mother was regarded as consumptive (since died of this disease), had had several still births, and came herself of a family in which struma and tuberculosis prevailed. She had a brother who had multiple cold abscesses when six years of age, continuing more or less up to the time of his death by consumption, at the age of nineteen years. I learned, furthermore, that the eldest child in the family was delicate as a baby, suffering much from abscesses about the thigh; and that the patient herself had when young chronic eczema-capitis with cervical adenitis.

The proneness in certain individuals to the development of multiple bone lesion in close proximity to articular surfaces is one of the strongest arguments, I think, that can be adduced in favor of a strumous diathesis. I have seen many cases where only one hip was involved develop a similar lesion in the other hip while under treatment; and by treatment I mean both the expectant, so-called, and the best form of mechanical. To find a case of caries of the vertebræ with caseous osteitis of the hip and of the ankle is not an uncommon occurrence.

In 1875 I presented to the New York Pathological Society a specimen of caseous osteitis of the head of the femur where multiple abscess of the lungs had followed. The patient had also caries of the ankle. The boy was seven years of age, was the second of three children, all of whom were in a state of health far below the normal standard. His father died at the age of thirty-six of phthisis pulmonalis, six months after a form of insanity for which he was confined in the Flatbush Asylum. Both the insanity and the phthisis, it is fair to say, were developed two years subsequent to the birth of this child. A paternal aunt died of phthisis. The mother had been choreic from girlhood. His maternal grandfather died in an insane asylum. A maternal aunt was insane at the time I made my report.

With the exception of a slight herpetic eruption about the nasal orifice, the child was considered healthy up to his third summer, when a colliquative diarrhœa set in, and for months following this a peculiar awkwardness in his gait was noticed. Finally he recovered completely, so report went, and during the summer of 1872, when only four years of age, he fell from a railing, and on the *next day*

complained of a pain in the left knee. This pain soon subsided, and nothing save a slight limp on extra exertion was observed for the next six months. Then "the starting pains," the gradual change in the position of the limb, and tenderness, induced the mother to seek medical advice. An abscess formed five months later.

In March, 1874, the right ankle quite suddenly, and without apparent cause, took on severe inflammation. Other abscesses formed, but shortly after the invasion of the ankle, the scarlatina was contracted, and this was followed by œdema of the lower extremities, and chorea followed also in the wake of the scarlatina. For a full report of this case see Trans. Path. Soc., vol. i., p. 72.

Many instances, I know, can be found where a diathesis seems to be wanting when the case first comes under observation, and I have recorded many myself, but during the progress of the case other manifestations, notably strumous, will appear, and facts in connection with the family history will be brought out that can not be controverted. Time and again I have had this experience, and hence my convictions about the relationship of this diathesis to the bone disease of which I am treating have been forced upon me, *volens volens*.

Traumatism may and often does play an important part as an exciting cause, yet one would marvel why grave lesions do not follow the numerous cases of strains and contusions about the hip—many of them were of the most severe character and many very trival—that appear at the out-door department of the hospital with which I am connected. Let me give an extract from a lecture in Seguin's Clinical Series, 1877, of a gentleman who has had very large experience in these diseases, and one who has the reputation of being a careful observer. Dr. Newton M. Shaffer says:

"Experience proves that traumatism excites acute lesions only, as a rule. In those constitutions strong enough to resist and repair the injury these acute troubles soon subside; under reverse circumstances they are apt to be followed by a chronic form of inflammation which may end in suppuration. . . . Traumatic joint lesions (excluding incised wounds of the capsule) are not very frequently seen, unless we accept sprain and dislocation as being lesions of this character. When, however, these typical traumatic joint lesions occur, they present symptoms that are unmistakable. They no more resemble the ordinary forms of

chronic joint disease in their course and history than a *fracture resembles a chronic osteitis.*"

In this same lecture there occurs a very instructive case in a boy, aged five years, of dislocation of the hip, which was reduced by Dr. Little fourteen days after the accident, and for ten days following this reduction the boy presented symptoms that some regard as diagnostic of chronic joint disease. Dr. Shaffer very clearly set forth the difference, however, and the subsequent history of the case was a gradual subsidence of all symptoms and a complete recovery. The patient had a typical strumous history too, and was five years of age, so that here there was sufficient trauma of not only the ligamentum teres, but the capsular also, to induce a chronic "hip disease."

I have myself placed on record in the American Journal of the Medical Sciences, 1869, a case of traumatic dislocation in a child, aged four years, in which I reduced the dislocation at the end of six weeks. There was perfect restoration. The efforts at reduction were very great, as will be seen by the subjoined notes.

One evening of June, 1878, I had my friend, Dr. Ripley, see the patient with me. He fully confirmed the diagnosis I had already made, and we proceeded at once to reduce the dislocation. Chloroform was administered and when anæsthesia was complete the limb was rotated, while the thumb and fingers grasped the head of the thigh bone, which could be felt to roll distinctly. The Doctor made out the same shortening that I had made out some days previously. With the aid of a towel one held the pelvis quite securely, while the other manipulated the limb. We flexed the thigh acutely on abdomen, rotated inward, then extended. This was no avail. We then flexed and abducted and extended, and the deformity remained the same. Every possible manœuvre was resorted to, and for fully one hour we worked without any success whatever. Finally, after a strong adduction and careful extension, the bone could be felt under one's fingers to slip into place. There was no noise made, and we were only assured of our final success by finding the limbs parallel, equal in length, and the movements at the joint normal. A double spica bandage was applied, the limbs bandaged together, straight splints having been bound in popliteal space, and a pad having been placed between the knees. An opiate was ordered for the night.

On the second day I find child free from pain, and the mother reports that after the first night he rested very well. The bandages are removed to-day and the limbs remain quite straight; passive motion made with comparative ease and the dressings re-applied. An enema is ordered.

Five days later the mother brings the child to the dispensary and reports that he has rested well and been free from pain since I saw him last. The limbs are of equal length, and both lie straight and parallel, one with the other. There is a moderate degree of resistance to complete extension, flexion, and adduction, though the thigh can be moved in flexion over an arc of about 90° with ease, and rotation can be made with the same degree of facility. Only a spica is worn at present.

He continued to improve, occasionally having a "catching pain" as he walked.

Three weeks after the reduction flexion could be made over the normal arc; rotation not quite perfect, and a very slight halt was observable.

At the end of a month he walked and ran quite freely, and I could not detect any halt in his gait. The mother said she could not tell by his walking which was the lame limb. Flexion and extension perfect and painless; rotation nearly so; a scarcely appreciable change in the nates; no atrophy; no shortening; general health good.

In tracing out some cases in January, 1879, I called at the residence of this patient and found that he had been free from any pain or lameness since the date of his last visit. I had him stripped, and on a thorough examination I could find no symptom or sign of disease about the joint. His rotation was perfect.

If this injury were not severe enough to induce an arthritis, then it is useless to talk of falls as "causing hip disease." It is fair to assume that the ligamentum teres was either torn across or severely stretched, and we must admit a certain amount of injury done the capsular ligament. Then, too, the bruising and pulling and torsion that were incidental to the efforts at reduction were certainly sufficient to cause disease in the joint, even if it had already escaped permanent injury. Dr. Sayre, on page 237 of his Lectures, says:

"A pinch of the skin, producing a 'blood blister,' or slight extravasation of blood within the cellular tissue, is of common occurrence, and is of no great importance. If let alone it will soon be absorbed; or at most if you let the

fluid out and do not irritate the wound, it will soon get well. But suppose, even in this most trifling injury, that instead of giving it rest and time to heal you constantly scratch it with a rusty nail ; you will produce a sore that will last as long as the irritation is continued. [My patient walked around six weeks irritating those joint structures, and they got no rest.] This is a parallel case with a joint that is exercised after concussion, or a blow or wrench that has produced an extravasation of blood from tufts of blood-vessels already referred to."

Dr. Shaffer, in his lecture, says : "If we take, for example, a case of chronic joint disease at the earliest manifestations of the local symptoms, and treat it *locally*, as we would a fracture or a dislocation, can we assure ourselves that we will arrest the disease? Can we feel certain that pus will not form? I do not mean to disparage local treatment in joint disease when I say that we cannot."

This leads to the question:

Can Joint-Disease occur in a Non-strumous Child?—At the meeting of the New York County Medical Society, in March, 1877, in the discussion which followed the reading of my paper, Dr. Sayre propounded the above question, or what I take to be its equivalent, viz.: "Can Pott's disease of the spine, or hip-joint disease, develop from an injury in a child in perfect health and absolutely free from any hereditary diathesis?" The question was propounded for Dr. Frank Hamilton, who had just spoken, or myself, to answer. Dr. Hamilton answered in the affirmative. A remark of no less a distinguished surgeon than Prof. S. D. Gross was given by Dr. Sayre, which was that hip-joint disease could not occur in any man, woman, or child, unless a tuberculous diathesis be present. Such a statement, I confess, caused some surprise, and induced me to conduct a more thorough analysis of such cases as I had hastily recorded in my paper, then incomplete, wherein "nothing found" was specified.

Of 596 cases analyzed with reference to hereditary, and 614 with reference to an acquired, diathesis, I have succeeded in finding only *one* case of which it can be surely said there was no struma complicating. The three cases of spinal disease which I had reported in my paper may be classed by some as non-strumous, but I feel sure others will differ in their opinion.

I think I am prepared to answer the question now, as

propounded by Dr. Sayre. Whatever other observers may have experienced, I feel warranted in stating, from a careful study of the cases whose analysis is here recorded, that true chronic joint-disease *cannot* occur in a non-strumous child. I believe that a *slight* injury often develops or acts as exciting cause, but never induces the disease unless a *predisposing cause* be present. I am not prepared with Prof. Gross, to admit that that predisposing cause is always a transmitted tubercular diathesis; but I am firmly convinced that it lies in a morbid condition, which is either hereditary and permanent, or acquired, whether temporary or permanent.

Are Chronic Joint-Diseases ever the Cause of the Strumous Diathesis?—Mr. T. Holmes, in his "Surgical Treatment of Children's Diseases," on pages 337, 338, after speaking of the causes of struma, makes the following observation:

"I believe, also, that protracted suppuration is an efficient cause of tuberculosis, and that many of the exhausting joint-diseases which prove fatal ultimately by phthisis, and are therefore set down as strumous, were really themselves the cause, and not the effect, of the tuberculous diathesis." From a careful reading of Mr. Holmes's remarks on struma, I came to the conclusion that he made only a *difference in degree* between the strumous and the tuberculous diathesis.

That a joint-disease long continuing does sometimes develop struma in a child already predisposed, I have not the slightest doubt; but that it *causes* the diathesis *de novo*, as scarlatina causes it, or as rubeola or pertussis causes it, I entertain grave doubts. As bearing on the question, I have selected such cases as have been under observation during a period varying between six months and six years, and have analyzed them closely, including in my table those wherein amyloid degeneration developed, wherein adenia, tuberculous meningitis, recurring naso-facial erysipelas, chronic recurring phlyctenular conjunctivitis, diseases of other joints and of the bones, and several types of vaccinia occurred.

Three hundred and twenty cases were found for observation, and of this number two hundred and thirty-six gave no evidence of strumous disease in any other locality. Manifestations undoubtedly strumous were observed in eighty-two, while in fifty-two of the two hundred and thirty-six there was exhaustion in its various degrees. Before giving the different types of struma as developed

while the patients were under observation, I propose to show what number of those wherein exhaustion was a prominent feature actually developed any strumous signs in localities or tissues other than the joints; also to show whether such developments were due to the exhaustion, or to other well-known causes or conditions, which were present, and which were noted in the histories.

Those fifty-two cases, I may as well state, were cases in which long-continued suppuration existed, and in which exhaustion pure and simple was the only sign noticed. Seventeen of these were in the hospital from six to twelve months, and fifteen I saw twice a day during the whole of their hospital sojourn; twenty-one were in the hospital from one to two years, and all of them, likewise, I saw twice a day. Eight were under the same daily observation for periods ranging between two and three years. The remaining six were under observation from four to five years, one as an out-patient, the others as in-patients. I am thus specific lest some one may say that strumous manifestations may have appeared, and soon disappeared, no note having been made. I have kept faithful records of the cases, and such can be found at any time on the hospital case-books. Furthermore, twenty-three of the fifty-two died from exhaustion induced by the long suppuration, and no struma in other localities occurred. I can with assurance, then, state that in fifty-two cases of suppurating joint-disease this diathesis was not manifest extrarthritic.

A further analysis of the fifty-two cases of exhaustion gives the following result: In sixteen no attempt was made by the historian to trace any hereditary diseases in either member of the family, or the connection of any of the diseases of infancy with the joint disease; in thirty-six, a predisposing cause was found either in a transmitted or an acquired diathesis, or in both. Twenty-seven gave hereditary diseases in the parents, and evidence of acquired struma was found in twenty-five. The hereditary diseases were found more frequently in the father than in the mother in the proportion of about two to one. Evidences of strumous disease were found in other members of the family in fourteen instances. In every case, then, exclusive of the sixteen in which no attempt was made to ascertain the existence of a possible predisposition, a cause, in a greater or less degree adequate, was found for the severity of the disease; in other words, a strumous diathesis, either

hereditary or acquired, could with reasonableness be predicted of every case.

Of the eighteen cases affected with strumous disease of the lymphatic ganglia, such as I have classed as adenia, only one suffered from any exhaustion consequent on suppuration prior to the glandular infiltration. In the thirteen cases with recurring nasal and fascial erysipelas as the exponent of the strumous diathesis, there was no suppuration in nine; the suppuration was very slight and not at all exhaustive in two, while in two there was prolonged suppuration antedating the first appearance of the lesion under consideration, and in both of these two the family histories were sufficiently poor to account for a transmitted tubercular diathesis. Consumption was found on both sides, and an exanthem as an exciting cause of the joint disease in one; while in the other the mother's family was decidedly consumptive, and an acute necrosis in three or four different localities was the exciting cause of the joint disease.

There was no suppuration in five cases dying of tubercular meningitis, but there was some excitement from the pain incident to the disease of the joint in four of this number, while in one there was no severe pain at any time. In five, long-continued suppuration produced exhaustion, which was thought to have been the cause of the meningeal disease; but in one of the five pertussis, severe in character, occurred just prior to the prodromal period of the fatal tubercular meningitis, and could with propriety have been considered the cause.

Among the cases in which strumous disease developed as chronic and recurring phlyctenular conjunctivitis, four occurred prior to any suppuration, and in three there was no suppuration while under observation. Of the three who suffered from an unnecessarily severe and chronic vaccinia, two had been the subjects of suppurative disease of the joints, while one of these even bore marks of struma about the cervical region and in the eyes, reported to have antedated the suppuration, and in the other consumption was found on the mother's side, rheumatism (chronic articular) on the father's.

Of the whole number of the cases of amyloid degeneration twenty-two suffered a more or less degree of exhaustion from prolonged suppuration.

To resume, then. Of the number analyzed with reference to the question of exhaustion from prolonged suppur-

ation causing the strumous diathesis, eighty-four were found to have been the subjects of exhaustion in various degrees of severity. In fifty-two no strumous manifestations in other portions of the body than the joint thus affected occurred during the period of observation; in nine there was strumous disease elsewhere manifest, but the facts go to show that the predisposition existed prior to the suppuration and exhaustion, and had actually shown itself in some instances, hence the disease, or diathesis, was simply *developed*, and not caused *de novo*, by the exhaustion.

In the twenty-two cases of amyloid degeneration of the liver and kidneys, exhaustion was the exciting cause in every one; but from the table it will be seen that in nineteen out of the twenty-two an efficient predisposing cause was found, while in the remaining three no such predisposing cause was sought. If amyloid disease be strumous, it may be interesting to know why this peculiar type of struma should occur—what factors are necessary to its production. I have often wondered why some cases of joint-disease could suppurate profusely for months, and for years even, and no amyloid changes in liver and kidneys occur. We have only twenty-two of the eighty-four cases of exhaustion, or about twenty-seven per cent, terminating in this lesion; and the suppuration in the twenty-two was not greater, and did not extend over a longer period, than that of the fifty-two of uncomplicated exhaustion.

It is a significant fact, that in every case of amyloid disease where a family history was sought—twelve in number—an hereditary disease was found; and this hereditary disease—a fact still more significant—was found to be pulmonary consumption in ten out of the twelve. The consumption was in the father in five instances, in the mother in six, being found in both father and mother once. One history of the two remaining gave chronic rheumatism in the father and in the mother, while strumous diseases were found in other members of the family; the other gave habitual drunkenness in the father, and probable consumption in the mother, a wretched hygiene being found as an element of no little importance. In seven no family history was obtained, but the personal history gave an exanthem as causing or developing a strumous diathesis, associated with a bad hygiene in two, unassociated with a bad hygiene in one. Bad hygiene was found to have existed in a highly probable causative rela-

tionship to the joint-disease, and its severity, in five cases, one of which was furnished with additional evidence of struma, by the existence of such diseases in other members of the family. In no one of these cases was even a personal history obtained. Hence the data, for conclusions are very imperfect so far as the last five are concerned, in fact, the whole ten, where no family history was obtained, are valuable only so far as their harmlessness to a theory is concerned. Amyloid changes have been observed in the glandular tissues almost exclusively. The theory to which I have referred is, "The lymphatic diathesis is in most cases congenital, and transmitted from generation to generation."

I believe that, if Billroth had asserted that such was the fact in *every case*, his assertion could not have been disproved.

The question, then, raised at the beginning of this branch of my subject, "Are chronic joint-diseases ever the cause of the strumous diathesis?" cannot be answered *affirmatively* by the history of any one of the three hundred and twenty cases I have had under observation. That chronic joint-diseases sometimes develop strumous disease in other localities in an individual in whom a predisposition already exists, twenty-two of my cases abundantly prove. Yet, as my analysis furnishes proof incontestable that the joint-disease itself is strumous, it remains for other investigators to prove that chronic joint-diseases, by any amount of supuration, ever *develop* even, a strumous diathesis. *I cannot prove the assertion.*

The conclusions, then, to be drawn from these extended remarks and statistics are that:

1. A strumous diathesis, either hereditary or acquired, is the great predisposing cause of all chronic inflammatory bone lesions of the hip.

2. That the disease may be excited by a fall or strain or wrench, exposure to cold, or by an acute disease, an exanthem, for instance, with a prolonged convalescence.

3. That in many cases no exciting cause can be found.

All this question of etiology, then, must have some practical bearing. The successful treatment of these maladies, attended with so much suffering, productive of so much deformity, much of which is often irremediable, and the mortality—a lingering mortality, too—of which is between ten and twelve per cent—the successful treatment, I say, is

the prize to the attainment of which all our labors should tend. That many diseases essentially constitutional demand local treatment, no sane man will deny; and, with a proper understanding of the constitutional vice on which the local lesion depends for its existence, no sane man will assert that local treatment alone will meet all the indications.

CHAPTER XIII.

CHRONIC ARTICULAR OSTITIS OF THE HIP.

CLINICAL HISTORY AND COMPLICATIONS.

The nature of diseases that are chronic and marked by exacerbations is usually not duly appreciated, and this lack of appreciation renders both therapeutics and prognosis inexact and unreliable.

In lecturing on this disease I have heard it reported that an old professor, a pioneer in orthopedic surgery, was wont to say, that any one could get a reputation in the treatment of hip-disease provided the case was secured near the close of an exacerbation. He advised then that the patient be dismissed as soon as the temporary relief followed.

To estimate the value of any plan of treatment in any given disease one must know the natural history of the disease itself.

The division of this malady into stages, while it may express an incorrect idea of the pathology, is very desirable; I shall hence retain the old nomenclature. By the first is meant the early stage, and it means to my mind the stage of ostitis. The symptoms are not always the same, yet the signs are quite uniform. When a case presents a lameness which points to a saving of the hip, however slight, a flattening of the nates and a resistance to passive movements, with the minimum amount of deformity, we call this the first stage, *i.e.*, so far as signs go. The symptoms may be only an occasional pain when active or passive motion is made, or the most violent pain even when the limb is at rest. Again, there may not be a symptom present and the deformity may be scarcely appreciable. If we limit, then, this stage to the period between the initial lameness and the establishment of deformity irrespective of the length of the interval, one can understand always what we mean when speaking of the early, or, first stage.

It will fairly indicate, too, the first stage in the patho-

logical process. Marked deformity rarely accompanies a pure osteitis of the diaphyso-epiphysial centres of development. So long as the inflammatory process does not extend by contiguity or by actual rupture into the synovial cavity, the symptoms and the signs are not apt to be other than reflex. These may continue for months, scarcely appreciable. At present we have in the hospital two cases of chronic bone disease in the neighborhood of the articular surfaces of the knee-joint, and the present theory as to the pathogeny of chronic epiphysitis is most beautifully demonstrated. At times the patients walk with a limp that can be detected only by the most careful observer, and the functions of the joints seem perfect when the knee is flexed; the contour of the parts notably differs from the normal, and yet while extended the difference cannot be readily appreciated. On palpation the extra heat, and the bony enlargement can be easily recognized.

Then, again, acute symptoms suddenly appear on trivial provocations, lameness is extreme, and the signs of a distended synovial sac are very marked, palpation detecting the fluid without any doubt. A few days' rest seem to allay these acute symptoms, and the parts relapse again to the nearly normal condition. Such has been the course of events in these two cases for nearly a year, and the explanation is this: the inflammation extends occasionally to the articular surface, rapidly spreading to the whole synovial membrane and a serous synovitis results. This soon subsides, there being no purulent element, and the bone lesion slowly progresses, as before.

Now, nothing seems clearer to my mind than the identity between these processes and those going on in the vicinity of the hip.

It is a significant clinical fact that tissues once inflamed are rendered the more vulnerable, and recurring attacks making successive inroads finally induce destructive changes.

The main point, however, I am endeavoring to make is this, viz., that the first stage of chronic articular osteitis has a symptomatology that is, like the pathological process, subject to changes. When a synovitis by contiguity makes its appearance, the symptoms and signs become those of a synovitis, and one examining the hip at this juncture would find the sign of the second stage. So long as the synovitis is not fungous or purulent, resolution takes place and then we have the clinical features of the first stage.

Take a case, for instance, in a female child three and a half years of age I saw in March, 1879. The child had for one year been limping a little, occasionally complaining of a little pain at the knee, and crying out sometimes during sleep. The mother had traced out a fall on the floor which occurred three weeks before the first sign, as a cause. This first sign was a mere awkwardness in gait, the right limb being favored. A few days later there was ephemeral pain. These were all the symptoms noted, and they would become so insignificant that advice was not sought until the date above mentioned. I had some difficulty myself in recognizing the limp, could not discern any tenderness in or about the joint, and did not encounter any resistance in making passive motion except in flexion beyond ninety degrees and in abduction. There was no pain, and yet on the two signs obtained, and the history, I recorded a diagnosis of suspected bone-disease in the neighborhood of the hip. A few days later I was unable to arrive at anything more satisfactory, but determined to keep the case under observation. I did not have an opportunity of making another examination until the beginning of October, and the reason the mother gave for not reporting sooner was that the child got "perfectly well" very soon after the first visit in March, and continued "well" until September, when she began to walk lame again and to rest poorly at night. She knew no existing cause for this apparent relapse. I found exactly the same signs I found in March; nothing more. Ten days later the diagnosis was unquestionable.

Now, this case illustrates the slow evolution not only of the pathological process, but of the symptoms.

Take another. A girl, eight years of age, whose father had died of rheumatism, and mother of consumption, came under observation in May, 1880, with the history of a slight lameness extending over a period of two months. It was reported that there had been also a little pain about hip and knee. She cried aloud, too, at times, during sleep. The limbs were parallel, the ilio-femoral crease was shortened, there was limited rotation, a little fulness apparently about the trochanter, and she walked without lameness. This was the middle of the month, and a fortnight later there was an exacerbation, marked by great pain, great tenderness, inability to walk, or even to get into any position at all comfortable. This subsided under rest and anodynes, and by midsummer the hip and limb were appa-

rently normal. On testing the functions, however, there was found moderate yet marked resistance in all directions, accompanied by pain, and one-inch atrophy of the thigh by measurement. The atrophy did not exist in May prior to the exacerbation. This condition of apparent restoration continued until the latter part of September, when she was decidedly lame, and complained of pain on the inner side of the knee. The day before she was trying to execute a fancy dance. Rest was enjoined, and in October, one, to see the girl walk and dance, would never suspect the slightest impediment; yet, on critical examination, would detect the muscular resistance as above recorded. Four months now elapsed before another sign developed, and this was a circumscribed fulness below the trochanter, attended with a little pain. The query as to abscess was noted on the records, and these signs continued for a couple of months without becoming any more marked. In a note two months later, I made mention of the insignificance of apparent and the significance of real signs. Quite an active summer was passed, the completeness of her recovery being a subject of frequent remark.

The family, however, noted the slight lameness after much walking. In the latter part of August I found, on examination, a little more resistance to movement than I had encountered in July. The atrophy remained as before.

From this time to August, 1882, a period of eleven months, I saw her frequently and could not get any joint tenderness, or anything more than the slight, yet, to my mind, important signs on testing the joint functions. There was no exacerbation whatever during this period. The lameness, however, had become gradually more marked. One day in the latter half of August she suddenly became very lame, and complained of pain in the hip and at the knee, all without known provocation. The symptoms grew gradually worse, and within a week the limb had assumed the characteristic deformity of the second stage. The most violently acute pains supervened, the fulness which had long since disappeared reappeared in May, 1883, and to-day she has the shortening, the deformity and the residual abscess of the third stage. Furthermore, the abscess has opened, hectic has appeared, and emaciation is a prominent sign.

The number of cases similar to this is not small; and there occur many examples of dissatisfaction on the part of

friends with any kind of treatment. Every year a few are brought to me by the parents recommended frequently by the family physician for diagnosis. The cases are already under orthopedic treatment; but because of the slow evolution of the disease and the remissions, it is believed that the specialist is prompted purely by mercenary motives. It is very seldom, too, that on examination I find any ground for doubting the diagnosis already made, and for questioning the necessity of maintaining the same careful observation that has been begun.

In my search last winter for old patients that had ceased to attend, I chanced to find in the fourth ward of the city a little fellow whose history, apart from the amusement it afforded, was very instructive.

The case was in a boy aged four years, whom I saw first in the latter part of February, 1881. The office record showed that we had found him limping, favoring the left hip, and resisting flexion of the thigh beyond ninety degrees, as also abduction and rotation, while the adduction stood out in marked reflex contraction. Extension was perfect, and there was no atrophy. It was difficult to learn whether he had any pain or not. He had been lame for one week only, and no exciting cause for this lameness could be found. The diagnosis of articular ostitis at the hip was recorded without even the mental reservation of an interrogation point, and by way of treatment rest was ordered. When he returned eight days later for observation it was learned that he had been complaining of pain about the hip. The muscular resistance to movements was still more marked, and hyperextension showed a beginning resistance to this function. There was also an appreciable (?) amount of atrophy of the thigh and calf. The diagnosis was confirmed, and the mother so informed. This was the last opportunity I had for examining him until the last day of February, 1883, two years having elapsed.

On entering the room, the mother seemed greatly surprised, and to my inquiries concerning her boy, replied: "Why, he's well this eighteen months. You'll excuse me, Doctor, but I'm a religious woman, and when you gave me so unfavorable opinion about the little fellow, I sought the aid of the parish priest, who offered six or eight prayers over him, and then he was soon well!"

I commended her for her faith, and asked the privilege of examining my former patient, whom I saw crouched in

a corner of the room. She consented rather grudgingly, and on getting all the clothing removed, I had him walk across the floor while Dr. George W. Ryan and I watched closely for any defect in gait. We both detected a slight degree of lameness, or rather a yielding merely to that side as he quickened his pace. The ilio-femoral crease was shorter on this side than on the left, and in the groin was a little fulness not marked, yet clearly recognizable on comparison. Flexion was not as complete in the hip formerly affected as in the other; but comparison was necessary to elicit any resistance. Abduction could be made to the normal extent without pain or resistance. The same was true of inward and outward rotation. Abduction was not so easily executed on this side as on the other. There was no atrophy in any part of the limb and no shortening. The mother averred that he had not had any pain since the latter part of the spring of 1881.

Here, now, was a good reason for maintaining one of two propositions: 1. That there had been an error in diagnosis. 2. That the case had been cured by miraculous intervention. In the first place, I am quite sure that the case is not an absolute cure, but that the boy is enjoying a long remission and will yet come to the exacerbation. It is quite rational, however, to suppose that the disease is arrested in this the first stage, and that the signs, as at present existing, are the result of a periarticular lesion of an obscure nature, and will ultimately disappear. In the second place, I do not believe that any power superhuman will bring about any such result in a future exacerbation. It will be observed that the atrophy followed in the case just preceding this one closely on the second exacerbation, and that its maximum was reached within a short time. In the last case cited no atrophy has taken place.

I measured a six-year old boy in December, 1880, in whose case there were signs of disease at the hip, the signs admitting of no doubt whatever. His disease began rather acutely, *i.e.*, the lameness was accompanied from the beginning with pain and the ostitic cry. There was not any atrophy. I measured the same limb one year later, just after a second exacerbation (neither of which was very acute), and found no atrophy whatever, yet he had favored the limb all the while, and it seemed a little longer, but in reality was not. The family history contained a specific taint.

It would seem that the atrophy was in direct ratio with the acuteness of the exacerbation, and depended on this element in the disease. Occasionally one meets with a case, however, that would seem to disprove this theory. Take the following, in a girl six years of age, who was admitted to the hospital in August, 1878, with a history of symptoms dating from April, 1877. It was stated that she had sharp pain in the knee during the first few weeks after the invasion, and then this subsiding she went until December, only walking a little lame, when a severe attack of pain came on, rendering her quite helpless for several months. In looking over my out-door records, I found the same patient entered under date of May 12, 1877, there being at that time an appreciable degree of atrophy and a history of *one* year's lameness! The symptoms had been very insignificant; yet this atrophy had supervened. To estimate the importance of atrophy in diagnosis is very difficult. That it does exist clinically all admit. Indeed, it is one of the most common, if not the most common, of the signs in chronic articular ostitis. Dr. Shaffer believes that the atrophied muscles exhibit marked diminution in faradic contractility, and published in 1877 a paper in demonstration of this position. None, I believe, deny the diminished faradic contractility of atrophied muscles, and hence few orthopedic surgeons have availed themselves of this faradic test in arriving at a diagnosis.

Dr. John J. Berry, while an interne of the Hospital for the Ruptured and Crippled, analyzed thirty cases of articular ostitis of the knee, and many more with other affections of the knee with reference to this very point, and published his conclusions in the Medical Record. "The result of these examinations has been to impair our confidence as to its claims; for in those presenting all the other signs of ostitic disease, which was often far advanced, the contractility was diminished about in proportion to the muscular atrophy, the responses being equally good in those cases presenting the same condition of the muscles from other causes." This so well expresses my own impression that I have given the extract as above.

Now, how shall we explain the existence of the atrophy? Sir James Paget, in his "Clinical Lectures and Essays," calls it reflex atrophy; and according to this author it is "due to the disturbance of some nutritive nerve-centre irritated by the painful state of the sensitive nerve-fibre." I agree fully

with Dr. Shaffer in regarding the "state" as an inflamed one rather than a painful one.

The lameness that shows itself as the earliest sign is the lameness peculiar to bone lesion. One soon recognizes the difference between this and the lameness of a paralysis, partial or complete. There is something about it that is often pathognomonic. In my notes I have come to speak of it as the "hip-limp." Throughout all the stages when the patient does walk the element of stiffness is present. True, the degree varies. At first, and often for a long time, only those immediately concerned can detect any favoring of the limb at all. At times it is a mere awkwardness; the child does not raise the foot so high as the other is raised, the step is shorter, and all the time the little one shows a degree of care that excites in the parent some apprehension. Weeks may elapse, and sometimes months, before any change is observed. During this period falls are more common, and after one of these accidents a well-marked limp is developed. Very frequently, in seeking the history of a case, have I found this peculiarity of gait antedating the fall, to which the disease is attributed, and often it is that a watchful mother, in looking back over the case, volunteers this testimony. Indeed, with the pathology of the disease in mind, one can readily see how the central otitis, while limited to a single small focus, would produce a sign so apparently insignificant. Later, the gait develops into an unmistakable limp, the body, as the step is taken, being thrown cautiously to the side on which the disease exists. There is not that confidence in the limb that shows itself in the other. The lameness, too, is more marked after sleep. The muscles seem stiff, and after a little while this wears off in a measure. Exceptionally, it is more exaggerated toward the close of the day, if the child have been at all active. From the inception, then, to the close, it may be laid down as a constant sign. And those remarks and statements about the child walking "perfectly well," and entirely free from lameness are to be taken with due allowance for the inexactness of speech and the natural lack of close observation in the laity. Few of such reports will bear the test of rigid cross-examination. I speak now advisedly, for my observation on this point has been very close.

Pain of a reflex nature is the earliest symptom, and this is more frequently referred to the knee. The richness of the nerve-supply in and about the articular structure ren-

ders the parts near and remote peculiarly susceptible to pain. The grosser lesions, however, do not cause so much pain of a neuralgic character as the more obscure lesions. One often wonders why it is that a child with only the most obscure signs about the hip has so much pain, and *vice versa*.

I have often found that children whose parents were neurotic suffered themselves from neuralgic pains on apparently slight provocation.

Some writers on this subject maintain stoutly, and it seems to be done in order to establish a theory in pathology, that the reflex pains in the knee-branches of the obturator are present only in the early stage—the stage, according to their views, of synovitis. If there is one symptom more than another that will be present in paroxysms throughout every stage it is this distressing knee pain. Time and again I find it here in the hospital wards in cases far advanced in the ulcerative and destructive stages. It is not uncommon to see an emaciated boy, with the hip in extreme deformity and the thigh covered with ulcers, grasping the knee with both hands, conscious by long experience that pressure will relieve pain.

The obturator, the anterior crural, and the sciatic are often irritated, and give the symptoms of the same in their remote distribution. Of one thing I am convinced, viz., the unreliability of patients in their statements concerning the dates and localities of pain. In the last case to which I have made reference, the history as obtained in August, 1878, was that the disease first made itself manifest in April, 1877, by slight pain at the knee, which gradually increased, etc. Then I find on my books, under May 12, 1877, that she had been walking lame for a year, and had suffered occasionally from pain in the knee and foot. In this history, taken so shortly after April, 1877, there is no mention made of the gradually increasing pain, which is reported a year later to have been present at this time. The only sign found, on testing the movements in 1877 was a little resistance to extreme flexion. My attention is just called, too, as I am writing this, to some inconsistencies in the history of another case, and I make mention of them as illustrative of this very point.

On our Case Books, there occurs, under date of May 18, 1870, the history of a boy eight years of age. It is stated, by the way, that there is no scrofulous taint discoverable.

It is also recorded that when four years of age he fell from his uncle's arms upon the ice, and that his "knee was impaired;" that the knee was the seat of pain for some time; that all symptoms then subsided, and two years elapsed before another exacerbation appeared.

In another history of the case as published, this fall on the ice occurred when he was eight years of age—the very time when he entered the hospital well advanced into the second stage. This fall, too, at the age of eight, was "immediately followed by pain about the hip." On the 25th of March, 1883, I learned the following facts from the mother: 1, That this patient died about two years ago; cause given, consumption and Bright's disease; 2, he has a brother with double hip disease, now in the Home for Incurables on Randall's Island; 3, he has a cousin (whom I saw), a daughter of the mother's sister, hideously deformed from carious disease at both hip-joints; 4, the father and all his family—mother, brothers and sisters—died consumptive at comparatively early ages.

It may be safely asserted that pain is present in every case, especially during and immediately following the exacerbation. It is generally regarded as a clinical fact, however, that, exceptionally, a case may go through the first stage, and even the second, without pain at hip, knee or ankle, but I am an unbeliever. I do believe that the pain is often of little consequence and insufficient to excite any apprehension. Indeed, I have seen hips with cicatrices about them and with shortening of the limb wherein the pain and inconvenience have been so slight that a physician had not even been called.

The reflex muscular contractions make their appearance very early, frequently within the first week, and continue with remissions through all the stages. It requires close examination often to recognize them, and a comparative test of all the muscles is necessary. The same cause that induces the atrophy and the pain seems to operate in bringing about the muscular spasm. Resistance is offered when flexion is made beyond eighty degrees, when abduction is attempted and when external rotation is carried over a small arc. This is early shown by the efforts the patient makes to get the shoe and stocking on. Indeed, it is difficult to find a severer test to a hip than this one shoe-and-stockings test.

In some instances the flexors and extensors are not af-

fect. A boy seven years of age was admitted to the hospital in October, 1881, with a history of the ostitic cry and of lameness lasting four or five months. There was nothing in his posture to excite any suspicion, yet the natis was broadened a little and the crease was shortened. Flexion was made to the full normal limit without the slightest resistance, and both extension and hyperextension were made with equal facility. No resistance was offered when adduction was attempted, but when abduction was made to extreme limits a perceptible amount of resistance was recognized, and this became more marked when rotation was attempted.

The thigh was one and a half inches smaller than its fellow, the calf a half inch, and yet there was not the least tenderness discoverable at the joint or in any of the tissues thereabout. It was difficult to account for so much atrophy and so little muscular resistance, and I went over the case again with much care, only to find the same signs. I had no hesitancy, however, in making a diagnosis of articular ostitis, and I kept him under daily observation for six months. I tested the hip from time to time, and the freedom of flexion and of extension continued intact. The limb gained nearly three quarters of an inch in girth, and the lameness diminished perceptibly. While I did not consider the disease fully arrested, I yielded to the parents' request for his discharge, and recorded all the points in the examination the day of his departure. The limbs were parallel and he walked with barely a trace of lameness. The thigh could be flexed acutely on the abdomen without any tilting of the pelvis, and abduction could be made without any resistance.

To hyperextension and to outward rotation there was slight yet unmistakable resistance. There was no joint tenderness, no infiltration, and no bony enlargement. "Indeed, it is difficult to detect any bone lesion, yet there is strong suspicion that he has it and that this may some day explode."

The mother brought him to me one month from the date of discharge with the report that he had fallen on the sidewalk the day before, straining his hip. He rested poorly that night. I found considerable joint tenderness but no periarticular infiltration. A counter-irritant was ordered and directions were given to keep the boy in bed for a few days. He was better in a week, and in June I found the

movements in flexion and extension unresisted. Those in abduction and rotation were resisted more than at date of his discharge. Besides, the trochanter major was enlarged and reached a plane farther from the body than did its fellow.

The same signs prevailed in July, but shortening began then, and in August there was fully a half inch difference in the length of the limbs. The same freedom of extension and flexion was found in October after an examination, while abduction and rotation were resisted more markedly than before.

In some cases abduction can be made with perfect ease while flexion is limited, but as a general rule all the arcs of motion are limited, and it is very often the case that the joint movements are completely locked and the muscular spasm can be easily proven by an anæsthetic. Under ether the spasm yields and no resistance is encountered since adhesions within or immediately surrounding the joint have not formed. One of the most characteristic signs found on grasping a thigh in a case of bone disease at the hip, is the apparent ankylosis of the hip. In whatever direction the thigh is moved, resistance is encountered and the pelvis moves with the limb. This is often the deciding point in making a diagnosis.

The change one finds in the contour of the nates, is a flattening not due entirely to muscular atrophy. The muscles are simply in a state of rest, the weight of the body is thrown on the other limb, and this limb falls naturally at rest. This is one of the oldest signs, and is relied on with much faith at present by a class of men who deprecate passive movements, holding, as they do, the theory that the disease begins in the soft structure within the joint. With the pathological views I hold, however, I have come to place very little reliance in the gluteal appearances. These muscles do not participate in the reflex contraction so peculiar to the adductors and the ilio-psoas. They are influenced more by the periarticular infiltration and by the position of the trochanter. At a later period, broadening takes place and the parts have such an appearance as one would expect to find when the acetabulum is filled by a foreign substance at the expense of the head. In the early stages, too, one sometimes finds a fullness in the gluteal region, imparted to it either by the extension of the inflammatory lesion to the bursa in the vicinity, or by the

appearance of an abscess springing from the digital fossa. This sign means, of course, a very acute exacerbation, or an acute synovitis going on to suppuration. The latter, however, is very improbable.

The length, shape, and position of the ilio-femoral crease depends much on the nature of the disease. Whether it be raised or shortened or lowered, it makes little difference as a clinical sign. In the first few weeks of a chronic ostitis, there is scarcely any change; possibly the crease will be shortened.

The ostitic cry comes a little later than the lameness or the changes in the nates. It is usually present when there is pain in the knee by day. The child will be sleeping very quietly and the parents will be startled by a shriek or a cry; go to the crib and find the patient still asleep. The nerves are irritated by the inflammatory process, reflex contractions of the muscles take place, distorting the limb and perhaps crowding together parts of the articular surface that are hyperæmic, the cry is uttered unconsciously and all is quiet again. Where the limb is held by extension apparatus or compressing appliances, so that the muscular contraction cannot take place, these cries are not made. A frequent repetition, however, of these nerve irritations finally awaken the child, and then there is continuous crying. These paroxysms continue generally every night for a week or two, when they spontaneously subside, or, rather they continue during the exacerbation. Many cases I have been on the point of blistering when I would be informed that the child had rested well during the past night or two. Many I have seen yield very promptly to a fly-blister, but, again, it is my observation that the cries do not cease until two or three nights after the blister has been applied. They cease very promptly, too, on the application of extension. Indeed it is one of the most common observations of surgeons to find a child sleeping quietly almost immediately after traction on the limb has been made by the hand.

One of the strongest arguments for traction is found in this very relief so instantaneously given. All men bear testimony to it. Traction with the hand necessarily implies an amount of fixation so that the good result may come, as Dr. Judson claims, from its fixative power.

To enumerate, then, the symptoms of the first stage: Pain on rising in the morning, referred generally to the knee, but often to other points in the distribution of the

obturator, the anterior crural and the sciatic nerves, screaming during sleep, and crying aloud, even after waking out of sleep. There is also associated with these pains a hyperæsthesia of other nerves in the neighborhood, and we have a tender spine, and many of the neuroses belonging to a spinal irritation, or a genital irritation.

These symptoms are of an irregularly intermittent character, coming as the exacerbations come, and going as they go. This is the rub; but the ostitic cries may be present without any day pain or any apparent tenderness.

The signs are in the order of their appearance; awkwardness in gait; lameness characterized by a certain degree of stiffness at the hip; this lameness persisting, differing, however at times in degree; loss in contour of nates; reflex spasm of the adductors the rotators and the flexors aggravated by attempts at passive motion, and atrophy of the thigh muscles, frequently also of the calf group. Such are the usual and most common signs and symptoms in the early stage, and they may cover a space of time varying between one month and three or four years. Be it remembered that the intervals of apparent cure or arrest of the disease are longer far than the exacerbations, and that the intervals grow less frequent and shorter in proportion to the frequency and the acuteness of the exacerbations.

There are irregular types presenting from time to time, and they seem to present phases not found in the regular types. My own impression is that the early stage of this affection, given a correct diagnosis, presents a train of symptoms and signs that are pretty uniform. We are often intentionally or unintentionally deceived as to the symptoms, by the parents or friends bringing the patient, and we just as often fail to elicit all the signs actually present by hasty or imperfect examinations. Symptoms may differ in the degree of severity, and signs may be more or less marked—and while, for instance, it may be honestly reported that a child, after going through one or two unmistakable exacerbations, does not walk the least lame for many months, and while in a *very few* cases this may be a fact, my convictions are that there is lameness all the while, however masked it may be by the fond wishes of a parent or the eagerness on the part of the medical attendant to record the fulfillment of a prediction. Statistics are not necessary to the maintenance of the proposition just set forth; I speak after having made statistics,

and I am quite sure many of the careful observers who practice the same specialty I do will bear me out with their testimony.

So much for the first stage, and now a few remarks on the second. By the second I mean the stage that corresponds to the stage of pathological perforation either into the capsular ligament or the periarticular structures. It is quite true that often in an acute serous synovitis of the hip we have the same signs that accompany a purulent synovitis. The signs of an acute synovitis, however, soon subside, and if bone disease be the cause leaves us the signs of the first, or, stage of ostitis. The most natural outlet for the pus within the diaphysis epiphysis or acetabulum, is into the capsular ligament; and the specimens, nearly all, show that such has been the case. Yet there are instances where the pus has found exit without the capsule, and the burrowing about the muscles has given rise to deformity such as we find in the second stage. The perforation, too, of the acetabulum may take place where the greater portion of the caseous ostitis is concentrated, and the outlet for matter here is either into the obturator muscle, appearing on the nates as it comes through the small sciatic notch, behind the muscle, the pus appearing near the perineum in the rectum or in the vaginal walls, or in front of the muscle, the abscess presenting above Poupart's ligament. (See Fig. 6, page 45.) The symptoms and signs under the above circumstance must differ according to the groups of muscles involved. The suppurative arthritis that most commonly arises in the progress of this disease has certain distinctive signs at its inception which mark the beginning of the second stage, clinically speaking.

It begins in an exacerbation, and the reflex pains, the muscular spasm and the atrophy that comes on at this juncture, differ, as above mentioned, very little from the synovitis by contiguity. The persistence of the signs, however, and the appearance of new signs more marked render the clinical group complete. The gradual passage from the first into the second stage may be illustrated by the case of a boy, aged five years, whom I saw in May, 1872. The strumous diathesis was very well marked, and he had begun, without any known cause, to complain of pain in the hip and the knee, having walked lame a few days before the beginning of these acute symptoms. This pain was attended with very great tenderness in and about the hip, an increasing

lameness, the ostitic cry, etc. The limbs were parallel as he stood, and at this date the limp was very slight. The natis was broadened and the crease lowered. No tenderness on concussion or percussion could be elicited at the joint. Muscular resistance was offered to flexion beyond eighty degrees, but none to abduction or adduction over normal arcs. There had not as yet been any atrophy. In accordance with the stereotyped hospital treatment he was blistered and poulticed, and being anxious myself at that time to test the efficacy of this method, in a case, too, of so recent date, had all the details of the subsequent poulticing carried out to the letter. The blister, it was recorded, fourteen days after its application, had afforded temporary relief, and a second was applied.

He did well, *i.e.*, had no acute symptoms until the first week in September, when tenderness again became manifest, the gait was more awkward, and his sleep was disturbed again. The second exacerbation was approaching, and being fully developed by the 14th, he was blistered a third time. Within ten days the acute symptoms began to subside, and by November he was in a comparatively good condition. In January he was still going around quite actively and was free from pain. In February the inguinal glands were observed to be a little enlarged, and during the first two weeks of the month he grew lamer, the glands increasing in size. The muscular resistance became more marked, deformity now began to show itself, and this glandular infiltration, proved to be only a part of a more extensive infiltration, which by the 1st April had developed into an immense abscess. There was nothing more than the deformity to mark the difference between the stages; he went about the ward, and by the middle of May the abscess had reached huge proportions, hanging between the thighs like a large scrotal hernia. It opened spontaneously, and on the third day he was confined to bed with hectic fever. Next day, however, he was up, and toward the last of June it was recorded that not an untoward symptom had occurred since that one day's hectic. The abscess had resulted in a draining sinus and the deformity had become less marked. In July it was apparent that another abscess was slowly seeking an exit on the outer aspect of the thigh in its upper third. It increased to a great size without special inconvenienc, certainly without constitutional disturbance, until the third week of De-

ember, when it opened. This was not followed by hectic, and in July, 1874, another abscess opened, apparently springing from the thyroid foramen. In October still another, and by this time the deformity was very great. The position of the limb was that of sharp flexion and rotation outward. The subsequent history is not pertinent to this chapter, and will be continued in another for the final result.

It will be seen that this case began with an exacerbation which subsided really within a week, for when the boy was admitted he had no symptoms, only a few signs by which a diagnosis could be made. A three months interval followed, when acute symptoms and an accentuation of the signs marked the progress of the case. Within a fortnight he was better again, and five months now elapsed before the third exacerbation came on. This was less acute, indeed, than the other two, but marked the close of the first stage, and the subsequent history of the case demonstrated quite clearly that this had been the beginning of the second, or, extra-osseous abscess, stage.

The case of a boy aged six years who entered hospital September 21st, 1878, was extremely instructive from the interrupted progress to the second stage. Four weeks prior to his admission, while at play he stepped into a hole in the floor and is thought to have wrenched the hip, but he was well in less than a week. A week subsequent to this apparent recovery he was quite lame, and the mother detected a difference in the nates. Symptoms developed, such as pain, restless nights, loss of appetite, and loss of flesh. When I examined him, the right limb as he stood was abducted a little and advanced, while the foot was inverted; lameness was very marked. The thigh was flexed at an angle of 150° , and extension beyond this angle, as well as abduction, were much resisted. Flexion was resisted beyond ninety degrees. Indeed, all the signs went to show that this was a case in an acute exacerbation. A liniment and a roller were applied, and by the 2d of October the relief was so great that serious doubts were recorded as to its being a case of articular ostitis. Improvement was uninterrupted, and on November 9th he was removed. It required a very thorough examination then to convince me that there was a chronic ostitis still present.

He returned in the following March, and while the limp and the other signs pointed unmistakably to the disease

originally diagnosticated, there were no symptoms. The little fellow had just passed through an exacerbation at home. During the first week of April he began to complain of pain, to walk lamer, and to rest poorly at night. A blister was applied the evening of the 7th, and on the 10th it is recorded that he had derived no benefit therefrom. This, in fact, was the beginning of the second stage, and instead of gaining, as he had done on former occasions, he grew rapidly worse. A day or two later it was observed that he lay abed on the left side with the right thigh flexed and at an angle of ninety degrees, and he cried aloud if the least movement was attempted. In a few days he was induced to occupy a rolling chair, and it was noted, near the close of September, as he stood by a chair, that the limb was everted rotated outward, and flexed at an angle of about ninety degrees. The superficial and deep inguinal glands were infiltrated, and for the first time now could any atrophy of the thigh be detected.

It not infrequently happens that a case is doing remarkably well and indications seem to point strongly to an arrest of the disease in the first stage when a fall or injury will be speedily followed by the most acute symptoms ushering in the second stage. I well remember the congratulations with which I was indulging myself on the rapid strides toward recovery of a boy who was in the hospital in 1873. He was only six years of age, and had been admitted in the beginning of the year with pretty well marked signs and a few subacute symptoms of disease at the hip. A few reflex symptoms not in the nature of an exacerbation were present at odd intervals during the first six months of his stay, and in June he was the most active boy on the ward. On superficial observation no disease could be recognized. In the early part of July some carpenters were at work and this boy climbed the scaffolding one day and fell a distance of six or eight feet, his hip coming in contact with the hard floor. On getting up he could scarcely walk and there was much extra heat in the soft parts. He was kept in bed with cold-water dressings, but at the end of a week the symptoms were more acute, deformity had followed quite rapidly, and despite repeated blisterings the case went on to abscess. The final result, with sketch of patient, can be seen on page 335 I had under observation in 1877 a case with many obscure neuroses in a boy ten years of age. He had been complaining of pains in

his right thigh for a year when I first saw him in June, 1877, and had been limping for six months. I could get only spinal symptoms, and directed my treatment to that region, thinking it might be a neurosis of the hip. It was fully two months before I could get any signs, save the lameness, of disease at the hip. He continued under treatment in the out-door department until April, 1878, attending very regularly and exciting a vast amount of interest by reason of the shifting of the symptoms from spine to hip, and *vice versa*. My notes show a pretty clear history, though, of progressive chronic ostitis confined more exclusively to the diaphysis.

He came into the hospital the middle of April, and the case was still very obscure. I had from the beginning placed myself on record as diagnosing bone disease, and although the signs were few they were sufficiently well marked to be diagnostic. A month subsequently it is recorded that three or four days ago he received a kick from a playfellow just below the knee while sitting in a chair, and since that accident he has been crying out during sleep, and even awaking out of sleep, crying out with pain in hip and knee. At this time he was scarcely able to walk and he moved about in a rolling chair. No contusion can be found superficially, and the hip joint must have suffered a concussion resulting in rupture of the cartilage of incrustation at some point permitting escape of pus into the articular cavity. Possibly this, and possibly only a serous synovitis by contiguity. At all events, acute symptoms remitted in a few days only to appear again shortly afterwards, and his limb from this time forward gradually assumed the flexed position, while the pelvis assumed a higher plane. The trochanter became more prominent and the joint movements were to all intents locked.

I could not help but regard this as a rather extraordinary case in the lateness of the development of the bone disease and in its exceedingly slow evolution; for it will be remembered that the boy was fully eight years of age when the first symptoms, such as pain and hyperæsthesia, appeared. Then a period of six months elapsed before the mother recognized any lameness. Still more curiously, for two or three months after coming under my own observation, no resistance to movements in any direction or to any normal extent could be detected. Yet he had the undoubted hip-limp, and on this I based my diagnosis. The mode of passing into the second

stage was very nearly according to rule. It is seldom that a genuine central osteitis, unless acute in character, goes rapidly into the second stage. I have searched my notes rather diligently and I am able to find only a few. Be it understood, however, that I am not referring to cases occurring in children beyond the tenth year, when the probabilities are that the disease began either as a synovitis or as a periostitis.

Most cases pass almost insidiously from the first into the second stage, and the line cannot be drawn. In out-patients one can very often see them at one date presenting the signs peculiar to the first stage, and at the next visit signs of the second stage will be present. In hospital, however, where you see cases day after day, you can only record in the vast majority "gradually passing into the second stage."

A little girl five years of age was admitted to the hospital in the early part of 1873, and the family history was decidedly strumous. The child, two years prior to date of admission, had begun to walk lame and to complain of pain in the knee, then in the hip. Although she had passed through at least two exacerbations, one of which was unusually acute, she still presented the signs of the first stage, without any atrophy even. The lameness and the reflex spasm, on movement, were very characteristic. During the months of March, May and June I had nothing to record in the way of change except an occasional sign of pain, which would pass away as it came. The deformity imperceptibly increased all the while, and the spasm grew more marked. By November the second stage signs were well established, and these continued with progressive steps until an attack of pertussis, six months later, reduced her to such a degree that the displacements of the third stage began to make their appearance.

The progress in another girl, a year or two older, who was in the hospital from April to the following September, was very similar to that in the one just narrated. She had a slight exacerbation very soon after her first signs, six months before her admission, and was fairly established in a second exacerbation at the time she came into the hospital. She seemed to rally from this with very little difficulty, but it was only a faint remission. The symptoms resumed their severity, and in June a fulness appeared—the first sign of abscess—and the deformity slowly increased, so that in August the case was well advanced into the second stage.

The duration of this stage is variable, yet, as a rule, not so long as the first. The disease may be arrested before the third is reached, but this is not, as some would imagine, a termination. Treatment may and often does render such protection to the joint that the processes of repair begin before any bony displacements take place. It is very safe, however, to predict that a limb will shorten from bony changes at the upper end, in a case where the weight of the body is constantly brought to bear upon the repairing process at so great a disadvantage as takes place in a limping patient. The angle at which the neck meets the shaft will most assuredly change, and the trochanter will rise above Nélaton's line, even though the articular extremity remains undestroyed.

It is my custom to designate that as the second stage when the limb presents a well-marked though not exaggerated deformity, with either apparent lengthening or apparent shortening of the limb. The patient usually bears the entire weight on the sound limb standing, while the limb of the diseased side hangs in flexion and outward rotation. Some authors regard this position of the limb as caused by distention of the capsular ligament. So far as my own observations go, and so far as my study of the arguments *pro* and *con* go, I must dissent from this as the cause. In many cases where one can detect by palpation the abscess as it springs from the digital fossa, the limb is not in this position. The amount of rotation varies, and the amount of flexion varies. Often the limb is not rotated either way, but is held rigidly in flexion. The nerve-supply to the joint is in intimate connection with all the periarticular muscles, and especially those concerned in adduction and flexion. The ilio-psoas is an outward rotator, as well as a flexor, and it is an anatomical fact that the muscles concerned in the different angular movements act as outward rotators. Thus we have the chief flexors—the ilio-psoas, all the adductors, the two chief adductors, and the great extensor [Morris]. It is not rational to suppose that the whole cavity is filled with pus as soon as the perforation takes place into the joint, either through the cartilage of the head or the cartilage of the acetabulum. Even if it did, the muscles would not yield so promptly to the efforts of the limb to assume the position it would naturally assume when divested of these surrounding structures. By the time, too, that this stage in the pathological process is reached inflammatory pro-

cesses have extended to the intra- and extra-articular tissues, thus limiting the movements as well by inflammatory neoplasia as by additional irritation of nerve-filaments traversing these products.

To be more explicit, then. The clinical second stage of a chronic articular osteitis of the hip begins with the establishment of permanent deformity, due to muscular contraction, and ends with the establishment of the deformity dependent upon bony changes and displacements. There is no shortening in this stage, although it may be apparent; there is no lengthening, although this is called the stage of elongation. Not that any orthopedists or any general surgeons really believe that there is any elongation; but theories have declared such to be the case, and for this reason the name is sometimes retained. The tilting of the pelvis, and not the capsular distension, is now generally recognized as the cause of the apparent lengthening. The tilting upward of the affected side of the pelvis not infrequently occurs, and then we have apparent shortening, although the capsular ligament may be fully as much distended.

The escape of the pus into the periarticular structures occurs first during the second stage, and the suppurative process becomes fully established; so that one naturally begins to look for abscess, and if the symptoms are unusually acute and unusually persistent, the anxiety is all the greater. I would not for an instant be understood as saying that the approach of abscess is always accompanied by acute or especially painful symptoms. Far from it; for these pus sacs present, very often without any premonitory symptoms, if we can rely on histories; but I am prepared to state from my daily hospital experience that there are premonitory symptoms in nearly every case. I think if I were to search my records closely I should be at a loss to find a single case in which the abscess was not preceded by several weeks, it may be, by certain vague pains about knee or hip called neuralgia, a certain amount of restlessness at night, attributed to indigestion or constipation.

I have in mind now the case of a little girl who came under observation in July, 1878. She was at that time four years of age, and the initial lameness began nearly a year previously in the wake of an intermittent fever. The second stage was ushered in by a very severe exacerbation a few months before admission. She entered, therefore, with deformity, and the angle at which the limb was held was

120°. There was no shortening, but three-quarters of an inch atrophy of thigh. This child had also what is quite common in this stage, as well as in the third, viz., a compensating lordosis in the lumbar region.

On admission, she was in the midst of an exacerbation of a mild type, and counter-irritation was followed by relief. Nothing further occurred worthy of any note until the latter part of March, 1879, when she had a recurrence of some malarial symptoms, which continued with remissions for a couple of months. No other note occurs again until August, 1880, when it was simply recorded that the deformity without any pains or other symptoms had reached ninety degrees. Her case was considered a cure in the second stage, and it was thought also that it furnished a fine example of a *caries sicca*. Circumstances were such that she remained in the hospital, and she has been as closely observed as if she were a patient. Her gait has been remarkably good, and even graceful withal.

One day in April of the present year the nurse called my attention to a soft tumor at the junction of the upper with the middle thirds of the thigh, outer aspect. I said, here is a case in which the abscess appeared without premonition of any kind. I remembered, however, that she had been complaining during the past winter at odd intervals, and on reverting to my notes found that in March, 1882, she had an exacerbation lasting a few days and subsiding spontaneously. Similar attacks occurred in October and November, and she was blistered once or twice.

The locality of abscess is most frequently under the tensor vaginæ femoris, or in this immediate neighborhood. Another favorite site is on the outer side of the thigh near the junction of the upper with the middle thirds, and from this, as a starting-point, the pus dissects up the fascia, and we find not infrequently an abscess extending from trochanter to condyle.

It must not be forgotten that this stage, like the first, is marked by exacerbations. At times when acute symptoms prevail the deformity may be very great, and the reflex contractions may arrest any movement, however slight. A little later, in the intervals, one may find smooth motion over an arc of seventy or eighty degrees.

The changes in the nates are even more exaggerated than in the first stage. We find a very broad natis, and if abscess underlies, the contour differs still more markedly

from the normal. The spine begins to adapt itself to the joint deformity, and the lumbar region presents an antero-lateral curve, the convexity forward and to the side opposite the bone diseased. This is purely compensatory, and changes as the angle of flexion at the hip changes. (See Figs. 25, 26 and 27.) By suspending the patient or by having him sit upon a level surface the curve will disappear. So likewise this can be accomplished by lying on the back with the limb held in its abnormal position.

The third stage presents clinical signs in accordance with the bone changes. The steps from the second to the third are sometimes as gradual as those from the first to the second; sometimes they are very abrupt. This stage may be defined in clinical terms as the stage wherein real shortening of the limb makes its appearance—pathological shortening—and wherein the deformity is dependent mainly on the bone changes, the limb assuming positions consonant with the portions of head, neck or acetabulum destroyed.

For instance, if the upper rim of the acetabulum is carious, and hence insubstantial as a border against which the head rests, the limb would naturally be adducted and rotated either inwards or outwards. Inwards, if the anterior part of the head had broken down first; outwards, if the posterior portion had been the first to give way. There are cases where the limbs preserve their parallelism, and the deformity is most marked in the gluteal region when the projecting trochanter gives the appearance of a dorsal dislocation. When the lower portion of the acetabulum has been the seat of disease, and the limb during the second stage has been in flexion and outward rotation, fusion is apt to take place between the necrotic head and the carious acetabulum. Then the deformity differs very little from that of the second stage. The most common position for the limb to assume, however, in this stage is flexion, rotation inwards and adduction. In this position most of the limbs can be found, and in this position most of the limbs are left after expectant treatment.

We have now in hospital a boy who was admitted early in 1881. He was then seven years of age and had begun to favor the limb in walking three weeks before his admission. He did not complain of any pain, and his lameness was the only evidence that there was any tenderness about the joint. In fact, I saw him when he had been limping only a

week, and could not elicit any tenderness by a pretty careful examination. The maternal history was tuberculous.

On the day of his admission I found it quite easy to flex the left thigh—the one he favored—to an acute angle. By comparison the angle was equal with that on right side; but when the extreme limit was reached the boy winced. I could extend the thigh to the normal degree without any tenderness. Abduction was very nearly perfect and quite painless, adduction perfect, though causing a little pain. Rotation inward and outward was not only resisted a trifle, but caused pain. He referred what pain he had experienced to the trochanter and to the front of the right knee. There was a little change in the contour of the natis, and the ilio-femoral crease was a shade shorter than that of the opposite side. Atrophy, shortening, and tenderness at the articular surfaces had not yet presented. The treatment employed was purely expectant, in accordance with the hospital rules; and while his lameness progressively advanced, there was no symptom until the beginning of February, when the parts about the hip seemed unusually tender and were subjected to the usual local treatment, during which he was not allowed to walk about the ward. This exacerbation ran its course in a week, and he then moved around very easily until the third week in April, when he had pain, and was able no longer to walk. Furthermore, he cried out during sleep, notwithstanding the details of treatment had been fully carried out, and by the last of the month his symptoms and signs were those of the second stage.

About the middle of May the inguinal glands were infiltrated and the gluteal region presented, on palpation, a similar condition. He became anæmic, and one month later I discovered a small fluctuating tumor on the anterior and outer aspect of the thigh lying beneath the tensor vaginæ femoris. Within ten days this tumor had become quite distinct to the eye, and above the trochanter springing apparently from the digital fossa another tumor was recognized, cystic in nature. At this time he was not suffering to any great extent from pain, but was comparatively comfortable. From this date to the beginning of July, 1882, the case progressed slowly without notable changes. The gluteal tumor had by this time become a large, fluctuating mass without acute symptoms. The deformity of the thigh was in flexion at about 135° , and rotation outward over a small arc. Late in September this abscess opened spontaneously, and in ten days he was suf-

fering from hectic, was losing ground, and he had a laryngeal cough. These symptoms did not continue long, and the next note I have, records extensive ulceration of the skin around the opening. This was in January of the present year. In February another abscess appeared on the inner side of the thigh near the perineum, and in a few weeks this opened, the skin sloughing. During this period he rested well nights and was comparatively free from pain. The rotation outward became less marked, and by the first of June there was a slight amount of inward rotation. About this time he began to suffer from great pain about the knee, and it yielded very imperfectly to anodynes. At present his gluteal region presents one boggy mass of inflammatory products, and the thigh is pretty well covered with ulcers and necrotic bits of integument. He is thin even to emaciation, yet goes about on crutches with more ease than one would imagine. The hip is practically locked against any movement, and his shortening is about an inch and a half.

This history I have narrated without abridgment. It records a bad case and gives the steps from the first to the second stage, and then from the second to the third. I have not had occasion to suspect any amyloid changes as yet. I should not give vent to any words of surprise did these changes manifest themselves before the close of the present year. The family history predisposes to this complication, and yet I have the records of many who have passed through just such stages, and have suppurated as freely, emerging from it all with bony ankylosis, and with useful limbs. We have at present in the female wards a child now ten years of age, the skin and soft parts over whose hip and thigh present one net work of cicatricial tissue, whose angle of deformity is 135° and whose shortening is two inches. She has a very useful limb and yet her face indicates the highest type of the strumous diathesis.

It is difficult to find patients, especially in the early years of life, wherein such extensive ulceration occurs. In those cases where the bone lesion seems to start from the periphery, the passage from the second to the third stage is more acute—the abscesses when they do present are more numerous and the sloughing is more extensive. A good many run a course like that in a hearty-looking girl aged seven years, who came into the hospital early in the autumn of 1880. The family had observed her limping about six

weeks before she presented for admission. The lameness had been very slight and unchanging; there had not been a twinge of pain in any part of the limb, and never any night screams. She could walk long distances without tiring. As the patient stood for examination the right limb was a little everted. The usual changes in the contour of the nates existed, and on passive motion some resistance was encountered at 150° in extension, and 135° in flexion. The other movements, viz., abduction, adduction, and rotation, were limited to very small arcs. I failed on several tests, concussion especially, to elicit any tenderness in or about the joint. The atrophy of the thigh was three quarters of an inch, and that of the calf a half inch. The diagnosis was made without any hesitation and the lesion was located in the upper epiphysis of the femur. During the first week of November she became very lame and began to cry out at night without waking. The symptoms did not yield to the treatment employed, and a month afterwards a little thickening about the trochanter was observed, while the limb was assuming a degree of permanent flexion. In other words, this case was passing into the second stage at the close of what seemed to be the first exacerbation. This is contrary to rule.

This thickening around the trochanter proved to be the early appearance of an abscess which was quite large in February, and which increased to a great size by the latter part of May, when it opened spontaneously.

The opening of the abscess was not followed by any constitutional reaction, and it soon closed down to an inoffensive sinus, which itself closed in the early part of August, to reopen again, however, at the end of a week. The general health continued good all the while, and the joint surfaces prior to this time had not suffered from the disease. There was a certain outward rotation combined with the flexion, giving to the case the clinical features of the second stage. The subsequent changes were slow in evolution. The sinus continued to discharge, and in November, a year having now elapsed since the first signs of abscess, there were two openings, and the child was suffering more or less from pain in the knee. These keen pains were the first she had ever had, and they were peculiarly distressing and did not subside until the first week in December.

In the following spring, an improvement was apparent, the sinus closed, and when she was discharged the right

limb was flexed at an angle of about 140° and rotated inward over a small arc. There were two inches shortening and the limb bore the weight of the body without evidence of tenderness.

It has been asserted with considerable emphasis by some writers that the knee pain is not present in this stage of the disease. My own experience flatly contradicts the statement. I have at this writing under treatment one of the most obstinate cases of ill-defined neuralgia in a young lady, the subject of disease at the hip many years ago, that I have ever encountered. The deformity is characteristic, and the shortening is about three inches, yet she walks with great ease when in the intervals of the paroxysms. The ankylosis seems bony, and there are no acute symptoms at any time save these frightful neuralgias. This, however, is an exceptional case as regards the acuteness of the pain. Many patients who go for years with profuse suppuration, have much pain on the appearance of a new abscess.

The text-books illustrate very accurately the condition of these sufferers in this stage, and the graphic accounts of excision from time to time picture but too faithfully the patient prior to the operation. Figures Nos. 25, 26, and 27, represent the resulting deformity in a certain type of cases.

This boy, from whom the photographs were taken, I saw first in May, 1873. He was at that time five years of age, and the disease had already advanced into the second stage. Ten years elapsed before I saw him again. Abscess had formed in 1874, but had not caused much annoyance. A draining sinus a few months, a gradual change in the position of the limb, and an occasional pain were all the data I could get out of his history. For eight years he had been on his feet every day, it was stated to me, and he only thought of seeking advice now because of pain about his hip sufficiently sharp to keep him awake at night. His position in standing can well be seen in Fig. 25. While the gait is aught but graceful, it is an easy one. The shortening as measured from the anterior superior process is only three quarters of an inch, from the umbilicus it is three and a quarter inches, while there is none as measured from the tip of the trochanter to the external malleolus. That is to say, the shaft of the bone has kept pace in growth with that of its fellow. The thigh in circumference is three inches less than the right, the knee only a half inch, and the calf an inch. The lordosis is well

shown in Figs. 25 and 26, and the angle of deformity, in flexion at least, in Fig. 27. I cannot get any motion at the hip. The photographs were taken in April, and in May the cicatrix on the outer side of the thigh broke down in the centre, and a discharge therefrom continued until the latter part of July. At present writing the sinus has closed. In a large number of cases the ankylosis is not bony, and in time there is indeed an astonishing degree of motion. One finds at an early examination the hip to all appearance firmly ankylosed, and at a subsequent examination, especially if several years have elapsed, an arc of motion that is surprising. I have had such experience time and again, and I have knowledge of like experience with other surgeons.

To recount, then, the clinical feature of the third stage. One patient will pass almost imper-



FIG. 25.—THE USUAL DEFORMITY OF THE THIRD STAGE.
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FIG. 26.—THE COMPENSATORY LORDOSIS OF THE THIRD STAGE. SAME PATIENT REPRESENTED IN FIGS. 25 AND 27.



FIG. 27.—THE REAL DEFORMITY IN THE CASE OF SPONTANEOUS CURE IN THIRD STAGE AS CONTRASTED WITH APPARENT DEFORMITY OF SAME CASE IN FIGS. 25 AND 26.

ceptibly from the second to the third, and the exacerbations will be infrequent and far from severe. Abscess may form, and in some instances it will not open, but the sac will collapse, the fluid contents disappear, and the caseous detritus remain an encapsulated and an inoffensive product.

This case is one of many whose details are not only familiar to me, but whose notes are in my possession. A little girl six years of age was admitted to hospital about Christmas, 1875; her sign of disease appeared five months before, and she had passed through one or two exacerbations. The case was slowly passing from the first into the second stage. A few pains at odd intervals were all the symptoms noted between her admission and the middle of October, 1876, when record is made of a diffuse swelling in the upper third of the thigh, outer aspect. Her lameness was much more marked. The fulness did not develop into a well-defined tumor with marked fluctuation until the latter part of May, 1877. It did not go on to suppuration, but remained *in statu quo* for about a year, and then began to disappear. In July, 1879, the remark was made on the records that there had been for many months no changes worthy of note. The tumor had collapsed, the lordosis was very marked, the trochanter was prominent, the thigh was limited in extension to 140° , and was rotated *outward* over a small arc. There was motion over an arc of twenty degrees, and while moving the thigh a grating sensation in the joint was imparted to my hand as it rested over the hip. Abduction and rotation were not permitted, and the limb was shortened one inch really, one and a half inches practically. In other words, the abscess sac had formed and had disappeared without external opening, and the limb was shortened by bony changes, and was rotated outwards. She had long since been discharged from the hospital, as she walked very easily and was free from pain.

In August, 1881, she had an exacerbation lasting about two weeks, but the abscess sac did not refill. I traced out the case in March of present year, and found the signs as follows: the angle of flexion was 120° , and the limb was rotated inward a little; the real shortening was the same, while the practical was two and a half inches greater (four inches now); the arc of motion was scarcely appreciable, but the lumbar spine was very flexible, and hence her facility in getting about; the sac was still in a state of collapse, and it had never refilled.

It need not be a necessary part of the clinical history to have external suppuration, even if a residual abscess do appear.

There is another patient whose hip suppurates freely, hectic comes on from time to time, regulated very accurately by the invasion of pus tracks into fresh tissues, the health fails rapidly, and locomotion is impossible. By day the sufferer sits in a chair with the diseased limb swinging scissors-like over the other, ready with the hand to steady the member when it is necessary to move about or to grasp it on the recurrence of any pain. The knowledge has come by experience that fixation of the hip or pressure over the neuralgic areas will relieve pain. Day in and day out the child will sit in this position nursing the limb, and yet showing a patience that would bring the blush to a martyr. In bed the dorsal decubitus is assumed for a while with both thighs flexed; the sound one at a right angle acting as a frame for the bed-clothing, the diseased one at an acute angle and generally rotated inward, the hands clasping the thigh or the leg, zealously guarding the crippled member. Frequently a pillow will have been placed between the knees, so that when the weary one dozes off to sleep fear of a fall need not be entertained. The hands relax their grasp then, and the pillow suffices. A little later he manages to get over on the sound side, while the diseased limb rests in flexion and inward rotation on a pillow or an air-cushion which lies upon the fellow-limb. Ulcers are raw, surrounding parts are tense and painful, the sleep is broken often through the night, and the morning comes with a sense of relief; and so it goes through one exacerbation and then the interval of comparative comfort. It is true here, as in the other stages, that every exacerbation leaves the patient a little worse. Finally, these run one into the other as the end draws nigh, the emaciation reaches its limit, so that one can truthfully say there's nothing here but skin and bones and impending death.

Some, as I had occasion to remark in another part of this chapter, get well after such suffering and such profuse suppuration.

The duration of the third stage varies between a few months and a number of years. The majority of cases terminating in a useful limb will average about three years, *i.e.*, the sinuses close, the exacerbations seem to be at an end, and the patient is able to walk without support. I would

have it understood that I am not speaking now from statistics. This is not a statistical chapter. The proneness of sinuses to reopen, the difficulty attending the elimination of necrotic pieces of bone, and the interference with repairing bone tissue by attempts at walking, render statistics of cured cases very difficult to obtain.

Concerning the duration of the third stage, we can draw conclusions that merely approximate the reliable, from patients that are still living. In looking over the names of patients whose cases I analyzed for publication in 1878, I find that some have relapsed, others I have not seen. One relapsed after ten years' immunity from abscesses or inconvenience of any kind. He is now in feeble health and has one or two open sinuses, with pains in the thigh and at the knee.

One frequently takes it for granted that, because a patient does not return for treatment, he has continued well. Patients with chronic disease as a rule do not remain long under the same surgeon. It matters little how much they may be impressed with the skill of their medical attendant, they are easily induced by friends to seek other advice.

I have, therefore, in the present volume, been unable to secure reliable data of a sufficiently large number of cases to make statistics on this head of any positive value. I have learned that it is very unsafe to prognosticate that there will be no recurrence of symptoms, no re-opening of sinuses, no future abscess in cases that seem to be examples even, of a *caries sicca*.

This is true, however, that in many instances the late exacerbations are induced by some traumatic influence and pertain purely to the periarticular structures. They are necessarily mild, subside without treatment, and often do not come under medical or surgical inspection. I have seen very frequently such cases come under a surgeon's care and be subject to all the paraphernalia of joint therapeutics that a case in the early stages would demand. Treatment seems to begin really at this late day, and then the patient must go through the stereotyped course, the early subsidence of symptoms being attributed to the measures employed.

COMPLICATIONS.—Among the direct complications in the early stage is a dorsal dislocation. This is not of common occurrence. I have seen two cases, and have placed one on

record in the American Journal of the Medical Sciences. It was in a girl who began to walk lame in the spring of 1877. Her lameness was followed within a month by the first exacerbation of pain. This subsided spontaneously, and the relief was so complete that in October of the same year not even a limp could be detected. The signs in the interval between August and October had been unequivocal. In the beginning of the next February she had scarlatina, followed by enlargement of the cervical glands, and in March a second exacerbation of hip symptoms appeared. These were so acute that the signs at the close of the second week in March were those of the second stage. The thigh was held flexed at 90° , and in marked outward rotation. The promptness with which relief followed made it clear that the second stage had not been reached. The signs in the next fortnight became those of the first stage, and while this remission was of longer duration than the preceding it was not so complete; for the resistance to flexion persisted, and the child was never without a trace, at least, of lameness.

In March of the following year (1879), she, with her playfellows, caught the "walking fever" (it was very prevalent at this time), and after one of these feets she grew suddenly very lame, and the third exacerbation, milder in type than the second, declared itself; but the symptoms disappeared under rest within a week. From general appearances in May, two months subsequently, one would declare that she had no disease, so actively did she move about. One day during the last week of this month a member of the staff observed a shortening of the limb, and a refusal on the part of the child to walk. Dr. Knight's attention was called to the case, and an examination revealed an unmistakable dislocation on the dorsum ilii. The limb was shortened one inch, was apparently much shorter than this, the thigh was semi-flexed, rotated inward, and adducted. A few days before this the limbs were of equal length, and were free from any deformity. The child reported that she fell out of her bed a night or two previously, but on a careful investigation, this was found improbable: the beds in the dormitory are so close one to the other, that a child could not fall between them. Furthermore, on questioning both the day nurse and the night nurse, as well as the children who sleep contiguous, no one saw her fall from the bed, and all are positive that she did not.

I was in the country at this time, and as I was expected

home every day the reduction was postponed until my return.

Chloroform was administered four days after the accident and the diagnosis was fully confirmed. After a few minutes manipulation, the head of the femur slipped into place without any "click." Measurement was made, and limbs found equal in length. While applying a roller about the hips, the head of the bone slipped again but was easily replaced. No grating could be felt. Extension by weight was made, and during the day she suffered considerable pain in paroxysms.

The limb remained in position next day, though the child required an opiate to secure rest through the night.

Extension was removed two days later and a firm spica was applied with a pad above the trochanter, and child was carefully placed in a rolling chair.

The following record was made two weeks after the reduction of the deformity: Since date of last note the case has progressed as well as we could expect. The dressings have been carefully removed and reapplied every other day to avoid excoriations. Any movements at the joint have caused the child to scream aloud. This noon while passing through the ward, I observed the limb sharply flexed, adducted, and rotated inward, along with a marked degree of shortening. An anæsthetic was administered, and I could feel the head of the bone distinctly on the dorsum, and made out one and a half inches shortening. It was easily reduced and child placed in bed with usual precautions.

Next morning the hip was dislocated again. Dr. Ap. M. Vance, a member of the staff, made a splint of Manilla paper and glue in the same manner as he makes his spinal jackets. He procured his cast from a boy whose limb was equal in length and size to our patient's, and the whole dressing dried and was ready for application next day.

After reduction had been made it grasped the pelvis in a broad band, and completely encased thigh and knee and was held securely by a lacing in front throughout the whole length.

We had no difficulty with the limb after the paper splint was applied. The child moved about now quite freely by aid of a chair.

A month elapsed and it was noted that the limb was equal in length with its fellow. No deformity, child free from pain, and case in every way doing well.

In August a leather splint was substituted for the paper, and on testing the joint as to motion, muscular resistance was offered at every turn. The disease was slowly passing into the second stage without the pretext of an exacerbation. In December I was sanguine enough to hope that the removal of the splint and the employment of passive motion would restore the joint functions. The pelvis was raised on the left, the diseased side, and comparative measurements from the anterior superior spinous process to the lower border of the internal malleolus showed there was no real shortening, while from the umbilicus to the malleoli they showed a practical shortening of one inch. The thigh in its upper third was one and a half inches smaller than its fellow, and the calf three quarters of an inch smaller than the right. It was difficult to satisfy myself that any motion at the joint existed.

I soon had to abandon the idea that this was an ordinary dislocation, and to accept the situation, viz., that I had a well-marked case of progressive chronic articular osteitis to deal with, and that the dislocation was but an incident in its march, permitted by a ligamentum teres that had suffered in nutrition from a caseous osteitis in close proximity to one or the other extremity. I could not get any passive motion, and soon desisted. The atrophy reached two inches in thigh circumference by the following April, and since then has remained *in statu quo*. The real shortening at this time was a half-inch, and was three quarters of an inch a year later. In April, and in November, 1882, it was one inch, while the practical shortening was two inches. There was an abscess of three or four weeks' standing on the anterior surface of the thigh outer aspect. In December she was scarcely able to walk. Quite recently I have found the patient walking very fairly. The shortening has increased, and the abscess sac has collapsed.

Mr. Hilton (*Lancet* vol. ii, 1868, p. 2) reports a case wherein the dislocation occurred just as the patient was falling asleep; and, commenting on this, he says ("Lectures on Rest and Pain"): "Here I think it worthy of a passing consideration to inquire why it is that these dislocations almost always occur just as the patient is falling off to sleep. It is then that volition has withdrawn its influence from the nervous system generally, and the excito-motor function of the spinal cord seems to obtain an exclusive authority over

the limbs, and produces the involuntary spasmodic condition of the muscles which causes these displacements."

In the spring of 1879 I found, on examining a child with chronic osteitis of the acetabulum, that the head of the bone slipped out of the cavity very readily, and the nurse, a few days previously, in dressing the patient one morning, felt a peculiar slipping at the joint, and feared that the hip had become dislocated. The autopsy, a few weeks later, revealed a carious condition of the floor of the acetabulum and the destruction of the ligamentum teres. The infrequency of such dislocations in the early stage, taken in connection with the frequency of examinations, with and without anæsthetic, furnishes, to my mind, strong evidence against the pathology as taught by Dr. Sayre and his followers.

In the third stage dislocations are occasionally found, but they do not occur with nearly the frequency they were supposed to occur prior to 1853, when Dr. March presented a paper before the American Medical Association, protesting against calling such those cases in which pathological changes had taken place between the diaphysis and the epiphysis, or in which the head and neck were destroyed, while the trochanter occupied a position above Nélaton's line.

The frequency with which tubercular meningitis develops in the early stages of this disease suggests at times a possible connection as a complication, yet it is only necessary to mention the fact that it does occur, and the relationship I have regarded as more of the nature of cause and effect. That is to say, I am of the opinion (the opinion is not fortified, however, by strong evidence) that the meningitis is caused by either the irritation induced by the frequently-recurring paroxysms of pain, or by the suppurating foci in the well-known manner. It must be understood, though, that I am speaking now of exciting causes, and that an hereditary tuberculous diathesis must be present. And I do not wish to go on record as asserting that tubercular meningitis occurs only in the early stage of chronic articular osteitis. It does arise in the advanced stages; but my own observation leads me to infer that it is a more frequent accompaniment of the early stage.

The displacements that occur in the third stage are varied. The disintegration of the head and the fusion of the eroded proximal end of the femur with a carious rim of the

acetabulum serve to perpetuate a very awkward deformity unless corrected by surgical means.

Dislocation on the dorsum is seldom a dislocation with the head and neck intact. There is nearly always change in the angle with which the neck is joined to the shaft, and in proportion to the amount of bone left in the epiphysis, so much the greater will be the deformity. Last spring, while tracing out cases of interest, I found a boy in the fourth ward, seventeen years of age, with a most ungainly deformity of the hip. The angle at which the thigh was held flexed was 110° , the adduction was very sharp, and the trochanter stood out on a plane of two inches, at least, from the plane of the body. At the same time an irregular bony mass could be felt lying above the acetabulum or in close proximity with its rim, and connected with the shaft below the trochanter. Abduction and outward rotation were quite impossible. There were two and a half inches real shortening and three inches practical. It was very evident from the condition of the cicatrices and from the absence of inflammatory products in the soft parts, that the disease was fully arrested. He had motion over an arc of ten or fifteen degrees, the lumbar spine was exceeding flexible, and his gait, though awkward, was really a good one. The abdomen was not enlarged, and the boy seemed to be in good health. The limb was not œdematous.

When I had last seen him it was in October, 1878. He had then a moderate hydro-peritoneum and œdema of the scrotum; the urine contained granular, fat and hyaline casts, its specific gravity was 1012, and it contained about twenty per cent of albumen. There was extensive ulceration about the hip, and the prognosis, as given then, was very grave, especially as the last abscess opened in the perineum. There was no dislocation at this time. In this long interval he had not received any treatment, but had simply led a vegetative kind of existence in the upper rooms of a huge tenement-house, and Nature had succeeded in effecting a recovery by thus removing the head from the acetabulum. That this portion of the pelvis had been perforated the perineal abscess attested; and the evidences, although I could not make out an enlarged liver in 1878, were strongly in favor of lardaceous degeneration having already begun.

With such extensive suppuration as one often encounters, it would naturally be supposed that ulceration of the walls

of arteries in the vicinity of the hip would often occur. Such cases are on record, but this complication is of very infrequent occurrence. I find only one case among my notes, and this was in a boy who contracted disease at his hip when three years of age. He was five when the second stage was reached, and six when signs of the third were recognized. The suppuration in the early part of the third stage was very profuse, and he made a narrow escape with his life. After a year or two he was in such condition that a good limb was prognosticated. Three years then elapsed, in which interval he was regarded as cured. The deformity was very objectionable, however, and finally means were employed to reduce this to the minimum. He wore apparatus six months, when an exacerbation came on, the old abscess sac refilled, other abscesses followed, and suppuration continued uninterruptedly for sixteen months, when he died of exhaustion. Five days before death, violent arterial hæmorrhage from the bottom of a deep ulcer on the inner side of the thigh came on suddenly one evening, and it was necessary to apply a tourniquet to control it. The vessel from whence the blood came was a branch of the profunda artery, and on the following day a second hæmorrhage occurred, more difficult to control. Two hours later a third, which ceased on the application of a compress.

One of the most formidable complications, or rather sequels, is lardaceous degeneration. The first symptom of this is pain in the right hypogastrium. The seat of pain is presumably the liver; and this is a very constant symptom. Whenever I find a child with a suppurating bone-disease locating the pain under the border of the free-ribs, I forthwith examine the urine and find invariably a low specific gravity and a pale color. Albumen may not appear for several months.

In the case of a boy, who died in April last, I began examining his urine in October, 1881, finding the specific gravity at that time 1004, and not finding a trace of albumen. In November of the same year it was 1003. In May, 1882, it was 1007, and although the liver dulness extended full five fingers' breadth below the free-ribs, there was no albumen. It was not until the month of July, two months later, that I succeeded in getting the first trace of albumen. It will thus be seen that fully seven months elapsed between the first symptoms of lardaceous disease and the presence of albumen in the urine.

I have long since reached the conclusion that lardaceous disease need not be feared in children whose family histories are free of tuberculosis. I am unwilling, as yet, to change my views on this subject, inasmuch as in several of my cases I have not been able to get any data in connection with the family history. Dr. Poore (*Medical Record*, vol. xv., p. 101) has reached, practically, the same conclusion. The last case but two that I have reported furnishes testimony to a very interesting point in connection with this subject, viz., the curability of this constitutional disease. This is the first case I have found in my clinical researches wherein lardaceous disease has presumptively undergone resolution without surgical interference with the bone-disease. I know as a fact that it does subside in a few cases in which removal of the diseased bone has been effected.

From the beginning of these changes to the final termination in death, the time varies remarkably—often it extends over a number of years. I saw, only this last spring, a boy die from lardaceous disease who had been a victim, to my positive knowledge, for ten years. Year after year I have treated him in exacerbation, of chronic nephritis during that whole period.

The course of this disease, like that of the disease which it follows, is marked by exacerbations. The deformities of the spine are generally compensatory, and I do not attach much importance to the lumbar lordosis. I do not recall any case of permanent lateral curvature or any rotary curvature developing out of this compensatory curve. The pelvic deformities are the more annoying when they do occur, and the interference with sexual relations becomes a serious complication, which calls the more strenuously for measures preventive of such deformity. I have seen a case in a woman with the deformity of the thigh so strongly adducted that laparotomy was performed to effect delivery of a fetus.

The influence of the exanthemata in this disease is well recognized, and I have already dwelt upon these sufficiently long in Chapter IX.

CHAPTER XIV.

CHRONIC ARTICULAR OSTITIS OF THE HIP.

DIAGNOSIS.

PART I.—THE FIRST STAGE.

There is a large class of men both in the profession and out of the profession that cares little, as a rule, for the diagnosis of disease. Such men are saying all the while, "Tell us how to cure diseases; we don't care any thing about diagnosis." In the ordinary ills of life, especially those whose course is rapid, it sometimes does seem that diagnosis is of no value. And even in chronic diseases it seems sometimes that treatment is the only thing worth knowing.

It has been my pleasure during the past decade to note the interest nearly all men take in the diagnosis of diseases in the neighborhood of the hip. The first thing, as a rule, the parent wants to know about a limping child is whether it has "the hip-disease" or not, and it is seldom that the parent will rest satisfied with the opinion of a single practitioner. More advice is sought, and this question must be settled. The next question is, What was the cause of it?

Somehow the impression is deeply rooted in the mind of the laity that "hip-disease" and "white-swelling," and "Pott's disease," are practically incurable diseases, and it makes little difference how many flaming circulars are sent about the country by travelling quack combinations, certifying to marvellous cures; how many shrines exist at home and abroad where the magic touch heals by miracle; how many "natural bone-setters," native and foreign, fasten themselves on a community; how many scientific pamphlets setting forth the value of certain splints and modifications of splints are scattered broadcast over the medical world—it matters little, I say, how much of such testimony is furnished in favor of perfect cures, the impression still remains that these diseases rarely leave one perfect in body and limb. The lay mind soon settles down to the acceptance of the inevitable, and it wants to find that treatment which will bring about the best possible results.

Above all things it wants to know what is the matter. Not only does the layman desire this knowledge, but the medical man hungers after diagnosis in diseases about the large joints. To him who "invariably gets good results" diagnosis is the last knowledge that is desirable. He likes such vague terms as "hip-disease," "morbus coxæ," etc. He can call most any lesion in the neighborhood of the hip by those names, and in many cases will get fair results. But to him who signally fails time and again in getting the good results claimed for this treatment and that, who finds some of his cases going on to deformity and shortening, to profuse suppuration and lardaceous degeneration, to that man diagnosis is valuable, and he grows weary of and disgusted with the terms whose import is so vague, and strives after refinements. He is keen to know what tissues are primarily involved; he wants to put his finger on the initial pathological process.

Orthopedic surgery has certainly made rapid strides in therapeutics, and while much of the value of any therapeutical measure depends on the diagnosis made, there is still that uncertainty overhanging this subject that must be removed. The general surgeon who gets the case late gets it when all the tissues, intra- and extra-articular, are involved and places little value on an anatomical diagnosis. He rightly says it makes little difference whether the disease was central or peripheral, whether it was synovial or osseous: the facts as shown under his scalpel are that all the structures are involved. Let him, however, get the case early, when he dares not employ his knife, then he would like to know just what tissues are involved. He doesn't find the whole hip infiltrated and disorganized, but finds the soft parts around the joint free of any inflammatory products. It is certainly valuable to know whether, in a given case, when the signs are yet obscure and of recent date, the lesion is in the centre of the epiphysis, in the acetabulum, in the synovial membrane, in the periosteum, in the periarticular soft structures. Is this knowledge attainable? Has a central osteitis of the proximal end of the femur symptoms and signs peculiar to itself; has an osteitis of the acetabulum its own signs and symptoms; and is the same true of a synovitis?

The importance and the possibility of determining the primary lesion in joint disease are receiving much consideration in England. At the last meeting of the British

Medical Association several valuable papers were presented bearing directly on these points. Mr. George Arthur Wright, in an exceedingly interesting paper, published in the *British Medical Journal* for September 1st, 1883, uses the following language, and I am quite sure it reflects the views of the majority of British and Continental observers:

"I would further suggest that this question of the seat of the primary lesion is not given the prominence it deserves, considering its importance as a guide to treatment. There is, I cannot help thinking, too much tendency to lump diseases together as chronic arthritis of this or that joint."

Frequently I have heard good diagnosticians after analyzing a case, thus express themselves, "This is bone-disease." I do not remember to have heard any one convinced himself as to whether the osteitis is in the epiphysis solely, or in the diaphysis, or in the acetabulum.

The truth is that the centres of ossification in the diaphyso-epiphysal portion of the femur are so intimately associated, anatomically and physiologically, that lesions are very prone to develop in two or more of these centers at very nearly the same time. It is furthermore true that for clinical purposes a differentiation is undesirable.

If one could feel reasonably sure that the inflammatory process extended through the lines of cartilaginous union even, it would be just as easy to reach the parts through the trochanter as if the process were limited to one or the other side of the line. In a chronic osteitis symptoms are very scarce in the early stages. We must rely more on certain signs, which are quite constant. Acute synovitis is marked by acute symptoms almost from the very beginning, such as pain, extreme tenderness and constitutional disturbances generally. The signs, too, accompany the symptoms, and become quite characteristic, provided the lesion be severe.

The symptoms, then, on which one can rely in diagnosing a chronic articular osteitis of the hip make their appearance, as a rule, in the following order: The child will complain of a sense of stiffness on rising from bed in the morning, and will show a tenderness, however slight, in the vicinity of one or the other hip by an awkwardness of gait, a disposition to fall on the most trivial provocation. This condition may last several days or several weeks; but meanwhile, or perhaps following it, there will come a sense of fatigue after play or a short walk. Occasionally, when thus

complaining, the child will refer pain to the region of the hip, and a little later the pain will be referred to the knee, usually just above the patella. This site is not constant, for the sides of the knee and the popliteal space come in for their share quite frequently.

When these shifting pains attract notice an exacerbation is approaching, and the symptoms will soon become more acute. At the same time there will be restlessness during sleeping hours, and screaming while asleep. This latter partakes more of a shriek—one or two—and then an interval, followed by others. It is known as the *ostitic cry*, being regarded by some as peculiar to bone lesions in the vicinity of joints. In seeking for a history of this cry, however, one must not expect to hear that the child invariably cries aloud without waking. It very often happens that two or three long cries in sleep will be followed by a waking and continuous crying. Then the little one will go to sleep again, and the same procedures will recur.

The loss of sleep and the harassing pain by day will naturally, in many children, induce a loss of appetite an impaired digestion and an irritability of temper. These complete the symptoms in the first stage.

The signs furnish, after all, the important points in diagnosis, and for convenience and system I shall arrange them in the order of observation.

INSPECTION.—The lameness is the first sign that attracts one's attention, and this comes as near to being diagnostic as any other sign that presents. As described in the chapter on clinical history the limp is peculiarly a "hip-limp." Every effort the child makes in walking is directed toward the saving of the limb. The periarticular muscles seem to lock the joint, and the motion takes place chiefly at the knee and in the lumbar spine. The step is short, yet firmly taken, and differs materially from the limp of a paretic limb. During the first few days there may be an exception to this, as the foot appears to be unsteadily placed upon the floor, and as the weight is thrown upon it there is a slight swaggering from side to side. This, however, is an exceptional limp, and serves to bring out the rule in stronger relief.

Both in standing and in walking the limb will vary a little between the horizontal line and outward rotation. In standing, furthermore, the limb is advanced a little in order that the bulk of the weight may be thrown upon the

sound limb, and the foot is either on a parallel plane with its fellow, or is a little everted. In my own experience I have seldom found the inversion described as belonging to the first stage. The most common position is a position without inversion or eversion. If, however, the examination be made in the midst of an exacerbation the limb will be well advanced, and the foot in- or everted in accordance with the muscles or tissues about the joint implicated.

The change in the nates next attracts one's attention, and here is found a loss of the normal depressions—the expression, so to speak, is gone. It is like looking at a face in which one side is partially paralyzed, and the difference can only be appreciated by comparison. The ilio-femoral creases are shorter, and are on a lower plane: frequently one only will remain. True, this appearance is present in certain forms of paralysis or in periarthritic lesions, yet the signs are valuable in connection with symptoms and a history. In some cases the creases will be like those on the sound side, but the parts about the crest will be more prominent, and the whole of one side of the nates will seem to be raised, the limbs being parallel. The size of the thigh is less than that of its fellow, and this difference will be early appreciated by comparison. It is a clinical fact—sufficiently elaborated in the preceding chapter, that atrophy begins early in an osteitis affecting the centres of development, and with a knowledge of this fact the observer will look for the signs of the same.

PALPATION.—*The tactus eruditus* does not help one much in the diagnosis of this disease. It is of more value in a negative than in a positive way. If the pathological process have advanced to such a degree that periosteal thickening has been induced, then this can be recognized by palpation; but it must be borne in mind always that every step of the examination should be conducted by comparison. With flabby muscles the size of the trochanter will look and feel larger than normal, provided the other is not grasped at the same time. Pressure over the bony prominence with this periosteal thickening will elicit bone tenderness, which is a sign of questionable value. The inguinal glands may be enlarged, yet it frequently happens that the glands are not enlarged even when the disease is far advanced; so that very little reliance can be placed on the conditions these structures present.

FUNCTIONS OF THE JOINT.—By far the more important aid

to diagnosis is obtained from a test of the joint functions, including not only the condition of the articular surfaces (so far as external examination can determine), but the condition of the surrounding muscles, the extensors and the adductors especially. If one have any fears about employing passive motion, the child can, while balancing on the sound limb, be induced to attempt active motion. On many occasions when I have been debarred the privilege of moving the thigh myself, I have gained much positive knowledge by inducing the patient to execute various movements with the limb. With the present views I hold concerning the lesions in and near the hip-joint, I entertain no fear whatever of doing the least amount of harm to the parts by passive movements, no matter what the lesion may be, *provided* they be made without an anæsthetic. I have never found it necessary to employ an anæsthetic in conducting an examination except on one or two occasions. These exceptions were in a patient with a few female relatives in the room, and I could not execute a single movement without the premonition of a sympathetic shriek. The very signs on which one is to rely in diagnosing an early ostitis are obscured by the anæsthetic.

There is no necessity for being rough or in any way violent in the manipulations. Secure, if possible, a table for this part of the examination, and let it be covered with a blanket or other soft material. Never test the joint function with the patient lying on the bed if it can be helped. Let the patient be divested of *all clothing* below the waist. It is better still to remove every thing, save perhaps, the shirt worn next the skin. Now let the dorsal decubitus be taken on the table thus prepared, and get the child's confidence by manipulating the sound limb. Put the thigh through all the normal movements: flexion, extension, abduction, adduction, inward rotation and outward rotation—all to their extreme limits. This will refresh our knowledge as to the normal movements both in kind and degree, and at the same time the patient will be prepared for an examination of the limb of the side diseased.

As soon as the thigh is grasped with the hand of the examiner the least resistance will be appreciated, and one can often tell in an instant what movements will be limited. Carry, without the employment of force, the thigh over the full extent to which flexion can be made, noting the while any reflex resistance that may present. It will be found

that the resistance point will be between ninety and forty-five degrees. The other thigh can be easily flexed to its limit by way of comparison. For purposes of record the goniometer, as represented in Fig. 28, is a very useful instrument. The one I have represented is taken from Dr. Knight's "Orthopœdia," though modified in the marking. The fixed arm when in use rests with the graduated arc against the side of the body, the joint over the joint whose deformity is to be measured, while the movable arm rests against the limb parallel with its longitudinal axis. The angles can then be read off on the graduated arc. A little practice with the goniometer will enable one to estimate quite closely any given deformity, even without employing the instrument.

All orthopedists insist more or less on the position of

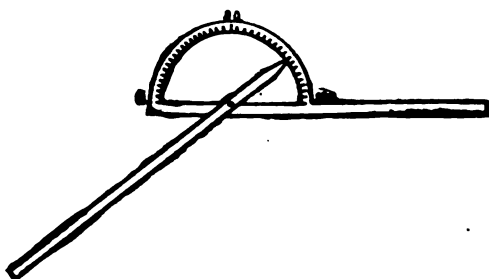


FIG. 28.—A GONIOMETER.

the body and the relationship of the spinal column to the table or bed on which the examination is conducted. All the spinous processes should be in contact with the underlying surface, and in moving the limb this relationship should be maintained. I have been much pleased with the method Mr. Thomas, of Liverpool, adopts for securing this fixation of the body. The accompanying figure (No. 29) well represents the method. The arm of the sound side thus placed in the popliteal space retains the corresponding thigh acutely flexed on the abdomen, thus preventing tilting of the pelvis during movements of the diseased member.

Given now the arc of motion in the different directions, what significance shall we attach to the various degrees of

resistance encountered? If flexion be resisted, however little, even though all the other movements be perfect, we have one of the early signs of a chronic ostitis. If to this be added a limited arc of abduction and of rotation, the signs are thus rendered more significant. As a rule these three signs, viz., resistance to flexion beyond sixty degrees,



FIG. 29.—MR. THOMAS' METHOD OF SECURING FIXATION OF THE BODY WHILE TESTING THE JOINT FUNCTIONS.

to abduction, and to rotation, are among the earliest, if not the earliest, one finds in a thorough examination. Indeed, with these three present a diagnosis can be made. It is very seldom that one of these signs is present without the others. Exceptionally, the flexion sign is the only one that a careful test will discover, but when the adductors

are in reflex contraction there is a limit to full flexion. Exceptionally, too, an articular ostitis may be present and the joint functions in every way perfect, but the exceptions are so rare that the average practitioner will never, in my opinion, have occasion to think of such a contingency during a natural life-time. Very many cases on their first examination give a hip in which all the surrounding muscles are in a state of reflex spasm—no movement whatever is allowed.

SENSITIVENESS OF BONE AND JOINT.—To determine the tenderness of the joint the most common method is to sharply strike the heel or the knee in the direction of the long axis of the limb. This has to me been a very unsatisfactory test. In the first place, the periarticular muscles are in such a state of reflex spasm that the joint is practically immobilized, and thus protected from concussion. In the second place one has to strike with such force to get any response, that not only is there danger of fatal injury to the joint by breaking down the articular cartilage in some weak point, but the impression conveyed to the patient and friends present is one of extreme roughness in examination. At all times and under all circumstances rough methods should be avoided. A plan that I have adopted is free, I think, from this objection, and certainly I can get much more information about the condition of the joint than I can by the concussion method. I make a lever of the patient's thigh, having for the weight or resistance the acetabulum, for the fulcrum the palm of my hand, and for the power the other hand. Bony tenderness if present will generally be found over the trochanter or shaft. As a rule, however, one will rarely find any joint-tenderness in the early stage of this disease, unless perhaps the examination be made in the midst of an exacerbation. The greatest tenderness will be in the fibrous structures enclosing the joint, and these can be the more easily reached just over the digital fossa and in the groin.

While the above examination is conducted, information will be gathered concerning the mode of invasion and the behavior of the patient by day and by night. The family history must be obtained, and it must be remembered that due tact is to be employed in eliciting facts in this connection. The personal history must not be forgotten, for on this the existence frequently of a strumous diathesis depends.

Studying the behavior of the patient at home it will be learned that every care has been made to protect the joint. The first thing the mother will have noticed is the difficulty the child experiences in getting on the shoe and stocking. There is no severer test to the functions of the hip, and all through the course of the disease this serves as a petty annoyance. Mention has already been made of the peculiarity of gait, the restlessness at night, the peevishness, the loss of appetite, etc.

I have endeavoured to give the history, the symptoms, and the signs by which a diagnosis can be easily made in a typical case of chronic articular ostitis of the hip. The first exacerbation is usually delayed some weeks or months, but occasionally it appears very early, and the diagnosis is thus rendered very difficult. In young children, however, I do not believe in very early exacerbations.

Three years ago a little girl of five years was brought to me complaining of pain in thigh and knee, left side. She had been ailing only three days, and there was no signs such as lameness or stiffness or awkwardness in gait even prior to that time. I could get no history of a fall or injury otherwise sustained, and the mother insisted that the family history on both sides was good. I found that the little patient kept her thigh flexed, yet on attempts at passive motion I met with no resistance whatever in making flexion and extension to extreme limits. Rotation, ab- and adduction were limited to a readily perceptible degree. On the strength of these three signs I recorded an interrogated diagnosis of chronic articular ostitis, and reserved a positive diagnosis for a future visit. A week later she was "free from lameness, the thighs equal in size and limbs equal in length, movements perfect, and child rests well nights." A fortnight afterwards I recorded "no resistance at all in movements, child cured and no disease at the hip."

In this case I should not have placed any confidence in the symptoms developing coincidentally with the signs. In another case I saw a few days before this one came under my observation there was a history of symptoms coming on one week after the first sign. The patient was a female, aged eleven months only, and the mother gave a history of a fall six weeks prior to the date of my first examination. The child fell on the hip, and cried a little at the time, but soon became quiet and did not complain any for a week. Then quite suddenly the limb became quite

tender, and the child would cry bitterly if the joint were disturbed. A week afterward extension was applied, but this seemed to add to the discomfort. I could find neither shortening nor atrophy. The adductor muscles were in slight reflex spasm. There was resistance and pain to flexion beyond ninety degrees in the extremes of extension, of rotation, and of adduction an appreciable resistance was encountered. At the end of a week the signs were less marked, yet I felt satisfied that I had here to deal with a case of bone disease. An exacerbation a month later ushered in the second stage, and the diagnosis was settled beyond question.

In differentiating this disease in its early stage the following affections present for consideration:

- I. Contusions and Sprains.
- II. Muscular Rheumatism.
- III. Neuroses of the Hip.
- IV. Infantile Spinal Paralysis (Poliomyelitis).
- V. Periarthritis.
- VI. Bursitis.
- VII. Acute Synovitis.
- VIII. Periostitis of the Hip.
- IX. Ostitis of the Ilium, including Sacro-iliac Disease.
- X. Vertebral Ostitis.

I. CONTUSIONS AND SPRAINS.

The clinical features of these simple lesions have been discussed in Chapter III. The diagnosis is quite readily made when violence has been done to the external parts and when the date of the injury is well known. It becomes more obscure, however, when nothing can be seen externally and when the accident is questionable. We must then make a diagnosis chiefly by exclusion.

Take, for instance, the following case I saw last spring: A well-developed boy, aged five years, had a peculiar gait. It could scarcely be described as a limp, yet he favored the right hip and had been walking this way for eight days. The day before this sign was observed he fell while at play, the limbs being thrown into complete abduction. The mother saw him fall but he got up immediately and ran off to play without showing any evidences of sprain. He passed a good night, and next day toward the evening it was noticed that he favored the right limb a little. From that time he rested

well at night, but was more stiff in the morning than in the latter part of the day. At no time did he complain of pain in any part of the limb. Here, now, was the morning stiffness, the lameness without symptoms, and eight days had passed without improvement. I was prepared to find some resistance on manipulating the thigh, although I could detect no loss in contour of the nates. I did not find any impairment of the joint functions on pretty thorough examination, and recorded as diagnosis a sprain, enjoining rest for a few days. Within a month all this peculiarity of gait disappeared and the boy was perfectly well.

It was not so in the case of a girl aged two years whom I saw last fall. There was a history of a sprain while at play two weeks before she came under observation. A playfellow had pulled the right leg, causing a little pain apparently at the time. She rested well the same night but next morning was stiff and walked lame. The limb, as she stood and walked, was markedly abducted. The lameness persisted and the limb had become quite tender, so that she cried if any one moved it. With a little care, however, the thigh could be moved over normal arcs, the resistance readily giving way. She had begun to cry aloud during sleep and to manifest an amount of tenderness that led me to regard this as an early exacerbation in bone disease. A week later she was walking more easily, but I found for the first time marked resistance to rotation and abduction. The subsequent notes of the case show a gradual progress to the second stage, with abscess, etc.

A girl aged five came under my observation in the early part of August with a lameness of nine days' standing. I found a slight resistance to outward rotation while all the other movements were free and painless. The child had fallen over the railing of a stoop on the day before the lameness came on and had bruised both the shoulder and the hip. Ecchymosis over trochanter remained up to the date of my examination; there were no acute symptoms and there was no sign save the ecchymosis, the lameness and the resistance to outward rotation; hence I made out a contusion of the hip and enjoined rest for a week, when I found the resistance to rotation gone, but the child was lamer. Then I waited a week longer and the mother reported that the lameness was not so marked, yet the child had more difficulty in going up and down stairs. All these signs passed away in the course of two months without any

exacerbation, and six months afterward I examined the case again quite carefully, to find nothing in the way of sign or symptom.

The points in differential diagnosis are:

1. Sprains and contusions are *always* the direct result of trauma.

Chronic articular osteitis is *seldom* the direct result of trauma.

2. Sprains and contusions give signs within twenty-four hours of the accident. Symptoms usually follow immediately.

Chronic articular osteitis may not show any signs until two or three weeks after the accident supposed to have stood in causative relationship. The symptoms will not appear until after the establishment of the signs.

3. In the one there is, as a rule, no resistance to the joint movements. In the other, reflex muscular contractions, causing resistance to passive motion, as a rule, are present within the first fortnight after the initial lameness.

4. In the one the signs are so pronounced that medical advice is sought within the first week. In the other the signs are so obscure that medical advice is rarely sought within a month.

5. Sprains and contusions are more common in adult life, chronic articular osteitis in early life.

6. In doubtful cases time will effect a cure in the former and will have no influence on the latter.

II. MUSCULAR RHEUMATISM OF THE HIP.

Muscular rheumatism, or, myalgia, from cold or exposure, gives certain symptoms that are very like those one finds in the early exacerbation of a chronic bone disease, and the lameness, too, of the former, is sometimes difficult to dissociate from that of the latter. The "growing pains" that children complain of are generally rheumatic, and their relationship to certain signs of articular osteitis are not treated with sufficient consideration, so that in the majority of cases these "growing pains" are but the symptoms of the more formidable disease we are now discussing.

A case in a boy aged twelve years, whom I saw in May, 1879, and one in a boy of the same age, seen first in June, 1879, will illustrate the difficulty in differentiating the two

affections. The first was reported to have been troubled much with "rheumatic" pains for two years, but the family history was free from rheumatism. When he first presented for examination it was for a lameness that had lasted only five days. He had been at school, and had been perfect in limb, so far as I could learn, when one day, without known exciting cause, he was seized with severe pain in the anterior and inner surface of the right thigh. It gradually diminished in severity during the day, and during the following night he had no pain, but next day he was quite lame. On walking the pain was excited again, and it was further called into action by sitting a long while. The same region was always affected and yet he was not troubled any during the night. The natis presented a moderate flattening and the crease was obliterated. Resistance was offered when the limb was completely extended. A counter-irritant was employed and within less than a month all symptoms had disappeared, all signs had disappeared. I saw him several times during the following year and always with negative results on examination.

The other boy was also twelve years of age and had been lame a few weeks three years before. He made a perfect recovery, it seemed from the history, and then, during the early months of 1879, two and a half years later, the lameness, accompanied by pain, returned, affecting the same limb. The pain was so great that he did not leave his bed for two months. Since he left his bed the pain had been very insignificant, unless after much exercise. It seldom caused any loss of sleep. When I examined, three months after his confinement to bed, I could detect no change in the nates except an exaggeration of the dimple above trochanter of the side affected. The limbs were parallel and he could stand on either limb with equal facility. There was, however, a half-inch atrophy of the thigh and of the calf, and a little resistance offered as the extreme limits of abduction and outward rotation were made. The joint was free of tenderness and the thigh could be flexed and extended to extreme limits without the least resistance. This case remained in hospital under daily observation for three weeks and at the end of that time there could not be detected any lameness, while the movements were perfect in kind and degree. Notwithstanding this change, I had some misgivings about discharging the boy, and he was allowed home for a few days. He failed to return, and six months

afterward I learned that he was on crutches, and was in another exacerbation of joint-and-bone disease.

Now, wherein did these two cases differ? Let me state that the first was diagnosticated bone disease and the latter rheumatism. The first proved to have been rheumatism and the second proved to be bone disease. With the history of each before me, and with my mind divested of all bias I can readily note the points of difference. In the first there was a brief lameness, in the second there was a six months' lameness at least; in the first there was a rheumatic history, in the second there was none; in the first the acute period lasted twelve hours, in the second nearly two months; in the first there was no clear history of any preceding lameness, in the second there was such history; in the first there was no pain at night, in the second there was occasional pain at night; in the first there were no signs save resistance to extension, in the second the limb could not be rotated well, or abducted or adducted; in the one there was no atrophy, in the other there was atrophy. Instead of interpreting that confinement to bed two months as due to rheumatism, I should have interpreted it as the second exacerbation of chronic articular osteitis.

The first case was not so clear as that of a little girl three and a half years of age, who was brought to me in the winter of 1878 complaining of pain about the crest of the left ilium and in the gluteal region of same side. She had been complaining of pain and had been resting poorly at night for three weeks. There was no lameness, and a careful test of the functions of both hip and spine was attended with absolutely negative results. I had under treatment at the time a sister, a few years her senior, for chronic rheumatism affecting the knee, and I knew her father to be the subject of crippling rheumatism. I had, therefore, no difficulty in diagnosticating rheumatic neuralgia in this case, and put her on treatment for the same. She made a perfect recovery in less than a fortnight, and I learned four and a half years later that she had never had any relapse.

It is unnecessary to cite cases in adults, because these as a rule offer no difficulties in diagnosis, especially in the early stages. The articular varieties are usually associated with similar lesions in other joints, and hence do not offer any obstacles until deformity has arisen. When I come to speak of the diagnosis of the second and the third stages these lesions will come up for differentiation.

To sum up, then, the points in differential diagnosis between the first stage of a chronic articular ostitis of the hip and a rheumatism of the hip,

1. In the one the lameness precedes the pain, in the other the pain comes first, and frequently lameness is not present.

2. In the one there is no hyperæsthesia, in the other muscular hyperæsthesia is a prominent feature.

3. In the one there is as a rule no resistance to joint movements and no reflex muscular spasms in the adductors or flexors; in the other this resistance occurs early and the spasm is easily excited.

4. In the one there is a rheumatic family history, in the other there is often a tuberculous history.

III. NEUROSES OF THE HIP.

The prevalence of nervous diseases in large cities brings us more and more in contact with the true and false arthropathies of neurotic origin. I was formerly under the impression that these phenomena were limited to the period of adolescence, but latterly I have seen them in young children, and hence find it important to differentiate the more closely between these neuroses of the hip and chronic bone disease. It is necessary to fully appreciate this fact, viz., that because a child comes of a neurotic family and even has a decidedly neurotic temperament itself, it does not follow that a true bone disease about the epiphyses is at all improbable. In other words, the neurotic diathesis does not protect against the development of strumous diseases. The two diatheses sometimes run hand in hand. Some of the most destructive cases of bone and joint disease I have ever seen have occurred in patients who were typically neurotic. It must be constantly borne in mind that chronic articular ostitis has its own peculiar clinical expression, and however masked this may be by nervous phenomena this expression should always be recognized. Neuroses, like bone diseases, have their exacerbations, and but for the thoroughness of the remissions, the differential diagnosis would become extremely harassing. Take, for instance, a case I have reported on page 62. This boy had an exacerbation in 1876. Three years afterward he had another, and again after the lapse of four years he was similarly affected. Prompt recoveries were effected on

every occasion, and a limp was not left over. Exceptionally, though, the lameness does persist, and its explanation is possibly in a lesion of the anterior columns of the cord.

I saw, for the first time, a girl eight years of age, in the summer of 1880. The family history was decidedly tuberculous, and the patient was a feeble, poorly nourished child. While she walked with ease there was a marked limp in her gait, and the left hip was favored. I could not elicit any joint-tenderness, and could not detect any atrophy. Considerable muscular resistance was offered to passive flexion of 90° even, and beyond this angle the thigh could not be moved. The other movements were made with ease. I found the dorso-lumbar spine and the limb itself very hyperæsthetic. Four weeks before she came under my observation she fell on the side-walk, but did not seem to sustain any injury. It was two weeks before she began to walk lame and to complain of any pain. Her sleep had not been disturbed. Under a placebo the lameness and the pain disappeared in a month, and I examined her a month afterward with negative result. In tracing out the case three years afterward, I found that the lameness had soon returned, and while I could not discover any symptoms of disease I found this favoring of the limb still present.

In some cases, indeed in nearly all cases of contraction the result of nerve-irritation a little force is all that is necessary to overcome this completely. Last spring a girl twelve years of age came limping into my office, and I learned that all her symptoms and signs came on quite suddenly four days preceding this visit. The mother knew of no cause, and I could not find any. The right thigh was locked, as it were, on the pelvis, at an angle of 135° , and there was an apparent shortening of one and a quarter inches. The girl seemed generally hyperæsthetic, and I at once made up my mind that this was a case of hysterical contraction—a neurosis of the hip. With a little coaxing I succeeded in moving the thigh over a small arc, and then, finding the contraction give way, I rapidly and with considerable force moved it in all directions over the full extent, immediately after which I made her walk across the floor. This she did with scarcely a trace of lameness.

The signs of bone disease have been sufficiently elaborated to make the introduction of further cases in this connection unnecessary, and I shall content myself with an

enumeration of some of the more prominent points in differentiation.

1. In a neurosis of the hip a neurotic element in the family history will, as a rule, be easily obtained; in chronic ostitis of the hip the strumous element will appear in the family history. This may not be found, however, but it will be found either here or as an acquired diathesis in the patient. Furthermore, the neurotic and the strumous elements may be combined in the family history, and the former may even stand out more conspicuously than the latter.

2. In both, the exciting cause, viz., trauma, may be the same, only in a neurosis the effect will, as a rule, follow the more speedily.

3. In a neurosis pain and the initial lameness appear simultaneously, and the exacerbation will be the more acute; in chronic ostitis the lameness appears first, and may continue a long time before an exacerbation appears.

4. In a neurosis there will be areas of hyperæsthesia and paræsthesia in the distribution of certain nerve-branches, and the spine will also, as a rule, be tender in the region whence the nerves are given off; in a chronic bone-disease there is seldom any hyperæsthesia and seldom any spinal tenderness, while the pain is usually in the distribution of the articular branches of the obturator.

5. In a neurosis the muscular spasm about the joint will yield readily to forced movements; while in a chronic bone-disease the contraction becomes the greater on forced movement of the limb. In other words, the reflex spasm in the one yields promptly to force; in the other it is increased by force.

6. In obscure cases a brisk counter-irritant to the lumbar spine will promptly relieve a neurosis, and will have very little effect on a chronic bone-disease of the hip.

IV. INFANTILE SPINAL PARALYSIS.

One would never think of confounding an infantile spinal paralysis with the first stage of a chronic articular ostitis, yet it has been done by men who pride themselves, too, on their diagnostic ability. And then, when the two diseases are compared as to initial symptoms, it does not seem so unpardonable an error to mistake the one for the other. The ages closely correspond; the child, in a sub-

acute spinal paralysis, totters around sometimes two or three days before it actually gives up walking—there can for both be obtained a history of a fall; with the sudden loss of power comes an accentuation of the pains and hyperæsthesia that belong to a poliomyelitis in its active stage; the constitutional disturbance is not any greater frequently than it is in a sharp exacerbation of a bone-disease of the hip. I must confess that a differential diagnosis is not always easy to make.

In the fall of 1874 a male child two and a half years of age was brought to me for examination. He seemed to be in good health, but was cross and hard to control. As he stood in a state of nudity the left natis was flattened a little and the crease was lower than its fellow. Pressure over the trochanter elicited tenderness, and the least passive motion of the limb caused the child to cry aloud as if in great pain. On measurement there was only a shade of atrophy. The skin felt cold and the surface thermometer indicated a slight diminution in temperature. There was lameness, but as the child walked one could see that this was not due to the action of the muscles in protecting the hip; the gait was unsteady; a tottering at the knee was observed, and after walking a few steps the limb gave way, and a fall was the result. The electrical examination was unsatisfactory, though there seemed to be a diminution in the force of the faradic contractions. The mother, in giving the history, stated that seven nights before, without any provocation, so far as she knew, the child became a little peevish and rested badly; slept late, however, the morning following, and walked on rising; but that in a few hours she noticed the child fall, get up, and after awhile fall again; that he cried and moaned the second night, crying the more if the limb was moved; that he was very lame on the second day; that she took him to a surgeon of acknowledged ability—a man whose diagnosis it would be arrogance to question; that after a long examination she was told a hip-splint must be procured as early as possible, that she could not meet the expense of the apparatus, and that she comes to me now two days later hoping to get the needed splint free of charge.

In the family history a maternal aunt is reported to have died of hydrocephalus at the age of eleven years. The history of the invasion, the unsteadiness of the gait, the age of the child, suggested to my mind a paralysis of a

group of muscles of the limb, and to this diagnosis I adhered, especially after an examination on the day following. Santonine was prescribed in order to remove any causes acting reflexly in the intestinal canal. No results were obtained from this, and after one or two more visits the child was lost sight of for nearly a year, when the mother brought him back to be treated for a calcaneo-valgus, paralytic in origin. The usual electrical treatment with the use of apparatus was employed, and the deformity altogether has proven most intractable. This is no isolated case.

Here is one differing a little, yet the result is the same. I have them both under treatment at present for obstinate calcaneus. This one was in a girl two years of age, seen in October, 1877. She was seized with a slight febrile attack five weeks before coming under my care. This continued five days, and at night the child was worse. During that period, and for a week later, the patient refused to walk, and, if placed on feet, would cry as if in severe pain. Gradually improved for a week, but for the past two weeks the improvement had been less marked. Latterly has had no pain whatever even when walking freely. Patient seen twice during the fourth week by a surgeon whom the profession regards as an expert in this specialty, and this gentleman writes that, after careful examinations, he locates the disease within the hip-joint, as he finds unmistakable muscular rigidity about the hip. He makes a differential diagnosis, however, from infantile paralysis.

I found the nates on the left side flattened perceptibly, the calf one-half inch small; motion at the hip joint could be made to the normal extent in all directions without pain, though there seemed to be a little resistance to complete abduction; there was marked diminution of the tibialis anticus in reaction to the faradic current. There was lameness, but this was not like that due to disease of the joint. My diagnosis was infantile spinal paralysis confined to a single muscle or group of muscles, and treatment instituted therefor. There was in April, 1878, a slight degree of varus, the limb was colder than its fellow, there was atrophy, and the child would become lame after moderate exertion—tires easily. Neither had then, nor had had since October, any pain whatever, diurnal or nocturnal, and the limb could be handled without any discomfort.

Unless cases like these two be carefully studied, one can-

not see the difference between such and a chronic articular ostitis of the hip.

One afternoon in July, 1881, a case was sent from one of the general hospitals, and although I had little time for making an examination, the child seemed to be suffering so much and so helpless withal, that I did go over the case rather hastily, finding what I took to be an early and an unusually acute exacerbation in a chronic bone disease of the hip. The patient was a boy three years of age, and had been four days lame; in fact, on this day he was quite unable to walk. The child stood like one very weak from an acute illness. There was limitation to complete joint movements in abduction and in rotation. These were all the signs I recorded, and while I placed an interrogation point after the diagnosis, I somehow felt that the case must develop into one of bone disease. The patient did not remain in hospital, and the next time I had an opportunity of examining the case—two months later—I found paralysis of the quadriceps femoris, and anterior and posterior tibial groups.

It will be seen that there are certain well-defined differences, notwithstanding the close similarity—

1. The limp in a spinal paralysis is not a limp that is assumed to protect the joint. The child is lame because of the weakness of the support; in bone disease the muscles contract to protect the joint and every step is taken with this protection in view. One is a tottering gait, the other is a stiff gait.

2. In one there is no reflex muscular spasm about the joint; in the other a careful search will find one or more groups contracting on passive movement when carried near extreme limits.

3. The galvanic current, after the first week at least, will give the degeneration reaction in a spinal paralysis; in the other the galvanic current will give the normal formula. The degeneration reaction is the reversal of the normal formula. When the more vigorous contraction of a muscle or group of muscles takes place at the time the current is closed by placing over the same the electrode from the negative pole—this is called the normal formula—and is expressed by the signs C. C. C. > A. C. C. which being interpreted is: cathodal closure contraction is greater than anodal closure contraction.

4. The faradic reaction is lost in muscles paralyzed from an infantile spinal paralysis within the first week; it is

merely diminished if at all impaired in the early stage of a chronic articular ostitis. This latter is the more available test for the general practitioner.

V. PERIARTHRITIS.

It is only in the very early stage of a periarthrititis that one need experience much difficulty in making a diagnosis. After the infiltration has presented the signs become sufficiently clear. It must be remembered that I am now speaking of the phlegmonous inflammations around the joint. Children as a rule never have the fibrous form, but this occurs in the adult occasionally, and the diagnosis is made then by exclusion.

Take as a very good illustration of the course a periarthrititis of childhood, the following, in a boy three years of age, who came under my observation in August, 1879. In the early part of July he had an attack of rubeola and was confined to bed for ten days. On leaving his bed no lameness was discovered, in fact he walked as well as he ever did, until a week had elapsed, when he began without known provocation, to favor the right side in walking. A few days later pain became a marked symptom, and the limb would not tolerate any handling. The father was referred to the hospital by his medical adviser to have the child treated for "hip-disease." I found an axillary temperature of 101.5° , a pulse of 132, and an extreme degree of irritability in the patient. It was difficult to secure a satisfactory examination on account of the apparent tenderness of the limb, yet by a little perseverance I learned that the thigh could not be completely extended, flexed or rotated, and that the position assumed in standing was that of the first stage at the height of an acute exacerbation. There was extensive infiltration about the hip and around the upper third of the thigh, though no fluctuation could be detected.

The acuteness of the attack, the rapid development of signs, and the constitutional disturbance enabled me to diagnose a periarthrititis. The subsequent progress of the case fully confirmed the diagnosis made, and in less than two months a cure was fully established.

In February, 1879, I saw a boy nine years of age, two months after his first lameness was observed. An exacerbation had followed soon after the beginning of the lameness, and the second stage was already present at the time

I made my examination. There was an apparent lengthening of one inch, and the natis and thigh were very prominent by reason of extensive infiltration. I found it difficult, however, to flex the thigh to 90° or to extend to 135° . All the other movements were resisted and the diagnosis was made without any hesitation of chronic articular ostitis of the hip. The case went rapidly through the various stages.

The temptation to cite further illustrative cases is very strong, but the chapter on the clinical history of bone lesion is already full enough to convince any one that while certain cases may seem like acute processes, a little more study of details will bring out the chronic nature—the slow processes of the same. It remains now to sum up the points, as my plan is, of differential diagnosis, premising, however a few points of similarity—

1. Both plegmonous coxo-femoral peri-arthritis and chronic articular ostitis of the hip occur at about the same period of life.

2. Both occur in strumous subjects, yet the former is more frequent than the latter in non-strumous subjects.

3. Both may begin with lameness without accompanying pain.

4. The limp of the two may be identical.

Differentially, we have: 1. Pain and acute symptoms within the first few days in a peri-arthritis; these are the *exceptions* in a chronic articular ostitis.

2. In the one there is extra heat and superficial tenderness; in the other these signs are so insignificant as not to be readily appreciable.

3. In the one tumefaction appears as a rule within the first fortnight; in the other several weeks, and months even, elapse before any tumefaction presents.

4. In an early peri-arthritis those movements are limited whose mechanical execution is interfered with by inflammatory processes, and the explanation is comparatively easy: in an early ostitis the limitation is purely reflex there being no mechanical obstructions appreciable, and one is at a loss to explain why certain groups of muscles should be excited to spasm or resistance by attempts at passive motion.

5. Palpation will detect a lesion in the peri-articular tissue in the one; in the other palpation will serve only a negative purpose.

6. In the one the constitutional symptoms are often very

marked; in the other there are, as a rule, no constitutional disturbances in the early stage.

7. In the one the sleep is disturbed by moaning and restlessness; in the other the characteristic night symptom is the ostitic cry.

8. In the one there is no atrophy of the limb; in the other this is an early sign.

9. Finally, if an immediate diagnosis be not required, repeated observations, extending over a fortnight, will clear up all points of differentiation.

VI. BURSTITIS.

The comparative infrequency of a simple uncomplicated bursitis, makes it very improbable that one will have occasion to differentiate between this lesion and a chronic articular ostitis. The mere fact, however, that such lesions do occur, and the fact that they yield so promptly to remedial measures, make it extremely important that one should be able to effect a differential diagnosis.

The signs are usually well enough marked if one look over the case with an unbiased mind. The average practitioner is so prone to regard every case of lameness as one of "hip-disease," that he gets, not only the history, but the symptoms or signs of the disease without any difficulty. I remember with a good deal of chagrin a case of infantile spinal paralysis in which I got an excellent history, ten years ago, of chronic disease of the hip-joint; and what was worse, I kept him under treatment for many months before I recognized my error.

Ordinarily a bursitis presents very few signs of an exaggerated type. The lameness is scarcely appreciable, even at any time during the progress of the disease, the exacerbations are usually mild in character, and the constitutional disturbance is comparatively insignificant. Take, for instance, the case reported on page 111 of this work. The bursa involved lay under the gluteus maximus and over the trochanter major. At times separated by long intervals, the inconvenience was so slight even then, that the patient did not care much for treatment. He was naturally annoyed by the little pain on walking and feared an outburst of joint-symptoms, yet as the years went by his fears became of less consequence and he gradually lost interest in his case. The lameness, it is true, was nearly always

such as one would expect to find in a chronic bone disease whose evolution was exceedingly slow. During the exacerbation he complained only of a moderately severe pain, and was not sufficiently crippled as to think of giving up his work.

Then, again, the girl whose case is reported on page 112 stood with limbs parallel and the lameness was so slight as to lose its significance. The symptoms were mild in type and the patient would scarcely be recognized as a patient. The presence of the sub-gluteal tumor was all that occasioned any anxiety.

The ilio-psoas bursa, in the case of the girl reported on pages 117 and 118, proved in the end far more serious than any with which I have had to deal; yet her acute and distressing symptoms were not due to the bursitis as a bursitis. It was after repeated invasions of the articular cavity that the points in differential diagnosis proved of no avail. All the time prior to the establishment of the joint lesion, the signs and symptoms of the simple bursitis were clear enough for diagnosis. To differentiate, then, an uncomplicated bursitis from a chronic bone lesion in the immediate vicinity of the hip, it must be remembered that:

1. The exciting cause in a bursitis will be the sooner followed by visible effects in the soft parts about the hip.
2. The history of lameness in a bursitis is that of exacerbations with complete remissions; while in a chronic ostitis the remission is never complete.
3. A primary bursitis seldom invades with inflammatory products adjacent tissues; while a bursitis induced by proximity to bone-disease, is surrounded by infiltrated tissues to such an extent that the bursa itself can with difficulty be appreciated. In other words, the one is easy of recognition by palpation, the other is a part of a general tumefaction.
4. In a bursitis the joint is never locked by reflex muscular spasm; while in an ostitis this is a common condition.
5. A bursitis rarely occurs prior to the seventh year; a chronic ostitis more frequently occurs before this age.
6. A hypodermic needle will reveal the existence of serum in a bursal tumor, of sero-pus, or pus in a residual abscess.

VII. ACUTE SYNOVITIS.

In Chapter VIII. I have already shown that when the

synovial membrane of the hip is primarily inflamed the process is acute, and is the more common between the ages of eight and fifteen years. I have also combatted the theory that articular ostitis begins as a synovitis, and while I am prepared to admit that exceptionally such bone lesions begin in this way, I am all the more fully convinced that the initial synovitis can be easily recognized, and if promptly recognized, be controlled before destructive changes occur in the osseous tissue. Apart, however, from therapeutic considerations, the necessity for discrimination is still greater from a prognostic standpoint; for a synovitis, as a rule, will resolve, even if no treatment be employed, and this fact in connection with a chronic ostitis of the hip is but too clearly demonstrated as a fact, viz.: that resolution does not, as a rule, take place under the best form of treatment known to the profession. I shall be pardoned, then, if I insist strongly in detail on the points of difference.

The following case, from the signs found, led me to regard it as one primarily of synovitis. It was in a girl aged ten years, who was fairly nourished, and whose limb as she stood, was in eversion and slight outward rotation. There seemed to be some tension of the nates and the joint tenderness was very marked, the least pressure of the head into the acetabulum exciting sharp pains in the joint and in the knee branches of the obturator. On rotating the limb, pain was referred to the knee. The thigh could be flexed to the full extent and extended to the extreme normal limit with ease. On abduction she complained of pain and the movement was checked by reflex spasm of the adductors. There was no atrophy in any portion of the limb. There was considerable tenderness of the spine. I found a phthisical element in the family history, and the present disease began five weeks before with lameness and lordosis. It was nearly a fortnight before pain developed. She then began to scream at night. In other words, there could not have been a better history of a chronic ostitis, and the subsequent history proved this to be a typical case. Her first exacerbation, as is common in patients of that age, came on early, and I chanced to examine her for the first time as the exacerbation was subsiding.

In the early years of my hospital service I met with a case which puzzled me no little. It was in a girl seven or eight years of age who would come into the hospital in the most acute stage of "hip-disease," and under a little ex-

pectant treatment make a prompt recovery. This was repeated twice to my knowledge. Here remissions were so complete that I could not regard it as true bone-disease. When she first came into hospital, it was in 1870, and her history, as I find it recorded, was that she had a severe fall six months before her admission, and began fourteen days afterwards to walk lame. Shortly after the beginning of the lameness she had severe pains attended with screaming at night and loss of flesh. All these acute symptoms had subsided on her admission, yet she had decided joint-tenderness in response to the different tests. There was no resistance, or, at least very little to normal movements. No diagnosis was recorded; a simple liniment was employed and a month later a careful examination failed to detect any symptoms or signs of disease.

A year and a half elapsed and she was readmitted totally unable to walk, and standing, when it was possible to induce her to stand, almost entirely on the left limb (the right was the one formerly affected as well as now) while this was advanced and everted. The natis was broad yet free of infiltration, while the inguinal glands were enlarged. Flexion and adduction caused great pain, and the opposing muscles were very tense. She seemed to be suffering very acutely, and her symptoms were only of about ten days' standing. She was blistered and poulticed quite freely, and within a week all acute symptoms had subsided, and seven weeks from the date of this readmission she was again discharged cured.

I have seen the girl from time to time, growing up into womanhood, and she has never walked lame or shown any disposition to relapse since the date of last discharge. I cannot do other than regard this as a recurring synovitis from trauma, although my notes are not as full as I should like. Still, the course of the disease in the two instances strengthens me in the belief in my diagnosis. The cases reported in the chapter specially devoted to this subject are much more pertinent, and a study of them will give one a complete picture of this ailment. The differential diagnosis can be made by remembering that:

1. In a synovitis the pain will be coincidental with the lameness, and the invasion will be sharp and clear; in an ostitis the lameness precedes the pain, and the invasion is seldom, if ever, sharply defined.

2. In synovitis the lameness speedily becomes so great

that locomotion is impossible; in ostitis the reverse is the rule.

3. Synovitis occurs after the eighth year of life; chronic ostitis before this age.

4. Joint-tenderness is found in synovitis; and is not found as a rule in chronic ostitis of the hip.

5. In synovitis there will be no periarticular infiltration or bone-tenderness; in ostitis the bone-tenderness is an early sign, and infiltration will be recognized as the second stage approaches.

6. In synovitis atrophy is the exception; in ostitis, the rule.

7. The position of the limb in synovitis is, as a rule, rotation outward, eversion and apparent elongation; in an early ostitis it is parallel, or nearly so, with its fellow.

VIII. PERIOSTITIS OF THE HIP.

Taking a simple periostitis and a periosteal sarcoma, a correct diagnosis become very important. The cases of periostitis generally make a good recovery even if suppuration takes place. The early history of a chronic periostitis does not differ materially from the history of a chronic articular ostitis. In both the lameness is the first notable sign; in both there is bone-tenderness, and in both the exciting cause may be a contusion.

In addition to the cases of periostitis already reported, the following may be of interest: Take that of a girl aged ten years, whom I saw in the spring of 1876. A pretty clear history was given of a severe fall a year previously, and she walked lame immediately thereafter. By and by the lameness grew less marked, yet the pain was a constant symptom, and this was referred to the periarticular tissues about the trochanter. She had always suffered more at night. She was well nourished, and my examination revealed the following points: Advancing of the limb and eversion of the foot as she stood; flattening of the natis, change in the crease, and a little thickening apparently of the periosteum over trochanter, with much tenderness on pressure in this locality; a marked limp, in which the toes and ball only came in contact with the floor; resistance to passive flexion beyond 135° , to abduction and to rotation, but none to extension; no atrophy or shortening. At that

time I was at a loss for a diagnosis. Here were many of the characteristic signs of a central ostitis, and then, on the other hand, there was the clear history of the fall, the localized tenderness, and the continuous pain, but especially the absence of shortening and atrophy after a year's duration. The most plausible lesion was a periostitis, and the parts were blistered. Before a month had elapsed there was scarcely any sign of disease, and at the end of two months she was discharged cured. I found no pain, no limp, no change in natis, and no resistance to any normal movement of the hip.

In the summer of 1882 a girl eight years of age presented with a lesion about the left hip, and a member of the staff, very good in diagnosis, regarded it, after a careful examination, as a chronic articular ostitis. The limbs were of equal length, yet there was one inch atrophy of the thigh and a fluctuating tumor in the upper third. The joint was free as to movements and the articular surfaces were smooth. She limped quite characteristically, and the history was that she had been lame for nearly a year, that it followed a severe fall down seven or eight steps, and that the lameness was preceded by pain. An opportunity was not afforded for another examination until a year afterwards, when I got a clearer history of pain at first, and very gradual lameness subsequently. The abscess had opened spontaneously, and two or three open sinues lay around the trochanter. The atrophy was the same as at last observation, but I made out now a half-inch shortening. I could flex easily to 45° and extend to 180° , while the other movements were very nearly perfect. The limbs were parallel, and the limp was very slight. In other words, no joint lesion could be discovered, and the diagnosis of a periostitis was confirmed.

A reiteration in this connection of the clinical fact that in children over eight years of age articular ostitis often begins as a periostitis, cannot be out of place. In such cases, however, early symptoms and early signs are usually sufficiently clear to enable one to make a diagnosis of the initial lesion.

To enumerate the points in differentiation:

1. In the history of a periostitis pain and soreness precede the limp, and the pain is confined to a distinct area without the joint; in the history of a chronic ostitis lameness precedes the pain by a distinct interval, and the pain when it does make itself manifest is not confined to any

special locality, but may be felt at the same time in the hip joint and in the knee.

2. In a periostitis the trauma is followed by clear and unmistakable signs; in an ostitis the signs are aught but clear and unmistakable. In other words, if one is told that the whole trouble came from a fall or a blow there will be no trouble in finding signs of the same if the lesion be a periostitis, but one will have to search frequently in vain for any tangible signs if the lesion be a chronic ostitis.

3. In a periostitis the muscular resistance to passive movement will rarely be reflex, but purely mechanical, *i.e.*, those muscles which are connected with the seat of disease will respond less freely to attempts at active or passive motion; in an ostitis the reflex muscular spasm in adductors and rotators is usually present early in the case.

4. Palpation in a periostitis will detect thickness and tenderness over a given area; palpation in an early ostitis will only exceptionally detect any thickening or tenderness, and if such does exist it will be found near the digital fossa.

5. The lameness in a periostitis is pretty uniform, and rarely reaches the point when walking is impossible; during the exacerbation of an ostitis the patient is frequently totally unable to walk.

These are the chief points, and others will suggest themselves in a doubtful case if the proper care be employed in an examination.

In differentiating a periosteal sarcoma from a central ostitis about the hip, a few points are necessary, such as, 1. The uniform periosteal enlargement in a sarcoma—an enlargement that takes in the whole circumference of the bone; and 2, the freedom of joint movements. This subject has been treated at considerable length in that portion of Chapter X. which deals with malignant diseases of the hip.

IX. OSTITIS OF THE ILIUM, INCLUDING SACRO-ILIAC DISEASE.

The current pathology of joint diseases, *viz.*, an initial lesion of the soft parts gradually extending to the hard tissues is responsible for "Sacro-iliac Disease." It would be infinitely better, I think, to discard the name from our nosology, and employ the term ostitis, or necrosis, or caries of the sacrum or ilium. This articulation never in my own experience suffers primarily, and it is so well protected, so well fixed by its very construction that when it does become diseased the gravity of the lesion is not enhanced.

It has been my observation that many cases diagnosticated as primary sacro-iliac disease, have proved to be caries of the lower lumbar vertebræ and sacrum, osteitis of the ilium, or chronic articular osteitis of the hip. I have myself diagnosticated many such, and ultimately find just what I have stated. I have notes, too, of cases presented at clinics as typical of sacro-iliac disease that are now undoubted cases of bone disease of the hip in the advanced stage. It is difficult to place them on record without being personal, yet I am just as firmly convinced that the disease in question is one of the rarest of all the so-called joint diseases. Time and again I have followed up cases that have developed abscesses, and have been operated upon in the general hospitals with the idea of finding this articulation involved. and I can not now recall a single case where the operator was willing to put himself on record as finding the lesion he suspected. I am willing to go thus far in a statement, viz., that I have been often asked by the general surgeon whether sacro-iliac disease is a myth or not. In searching the records of nearly twelve hundred cases of disease in the neighborhood of the coxo-femoral articulation I have had the opportunity of examining, I am unable to find a single case that I should like to place on record as one by which I could stand.

I trust that I shall not in these remarks be regarded in the light of disbeliever in the existence of a lesion at this joint. I am too well aware that the many excellent observers, both in my own country and in other countries, have honestly reported cases wherein the evidence seems overwhelming. Only I am desirous of stating my convictions (simply for what they are worth) on the following points:

1. That a primary arthritis of the sacro-iliac synchondrosis is, to my mind, unproven.
2. That the cases recorded, and in many instances well recorded, are secondary to inflammatory bone lesions within the vicinity of this articulation.
3. That a destructive bone lesion of the pelvis is not rendered any more grave as to prognosis by the co-existence of a sacro-iliac arthritis.
4. That for practical purposes and for diagnostic purposes, it makes little difference whether a lesion of this joint be recognized as a distinct entity or not.

I am unprepared to accept the dictum of any man regard-

ing the existence of such cases unless he will so report the case in all its details that I can make my own diagnosis from the symptoms and signs the given case presents.

We must remember that the acetabulum is occasionally perforated at an early stage of ostitis of the hip, and that the pus sometimes burrows along the internal iliac fossa, giving rise to symptoms that would point to disease at or near this articulation. We must further remember that a neurosis may give rise to symptoms of disease in this neighborhood. As above remarked, my own cases of supposed disease here leave me still looking for an unmistakable instance.

Take the case, for instance, I have already reported in the chapter on Pathology (page 179) as one of diaphyso-epiphysial ostitis of one side and caries of the acetabulum of the other. This girl, it will be remembered, had "lameness" as a "constant" sign, had "tenderness over the sacro-iliac synchondrosis" on several examinations, had "motion at the hip-joint on the affected (?) side, free, smooth and painless when the pelvis was fixed, except when carried to extreme flexion and rotation," had "apparent lengthening of the limb." After several examinations, one of which I shall presently copy verbatim from my notes, I made out a diagnosis unhesitatingly of sacro-ilia disease, left side. The quotation points above inserted are placed about symptoms given by Dr. Poore in a classical article published in the American Journal of the Medical Sciences for January, 1878. I shall take occasion again to refer to this article. In the case I am now analyzing I noted January 17, 1879, in my case-book the following: "The mother insisted on the pain being in the left gluteal region. Pressure here, especially over the left sacro-iliac junction, gives pain unmistakably. This, also, on crowding the alæ of the pelvis together. No pain on motion at the left hip. As the child lay on the bed the stocking was pulled on easily without any pain or difficulty. The heel was struck hard, and the child only laughed. She could not be induced to stoop to pick up anything, complaining of pain at the left knee on the attempt. Motion of the spine above the sacrum, however, could be made without pain. As she stands the left limb was apparently lengthened; no real difference by measurement. A careful examination is made as to a possible rheumatic history in the family, but nothing is found on either side." Dr. Poore saw the case next day with me,

and after a thorough examination, without an anæsthetic, confirmed my diagnosis of sacro-iliac disease. The subsequent course of the case and the lesions found post-mortem are already a part of history.

Again, in the case of a boy, reported in the chapter on Periarthritis, pages 104 and 105, I fancied I had a sacro-iliac disease. I found decided tenderness on pressure in the neighborhood of the sacro-iliac synchondrosis, resistance to abduction and pain in groin and about gluteal region. Then fourteen months later I found the sac of an abscess in this locality. Dr. Bull found, on operation, a sequestrum of bone near the synchondrosis, but no sacro-iliac disease.

On account of Dr. Poore's accuracy and honesty of observation, I very much regret that in his elaborate paper he has only two cases of his own to analyze. I am by no means convinced that the first one he reports belongs to this category, as it passed from observation before the diagnosis could be confirmed either by clinical features or by post mortem examination. It is reported, however, so faithfully and with such detail that any one at all familiar with the normal and abnormal types of a chronic articular ostitis, on a careful reading, would be very prone to make a diagnosis of ostitis of the hip. The second case is more to the point, and corresponds closely with the clinical history of the disease. From the perforation of the pelvis, however, it would seem that the sacro-iliac arthritis was secondary to the bone lesion.

He analyzes fifty-eight cases collected from foreign and domestic journals, including his own in the analysis. As I have already confessed, I have no clinical experience in this disease, and I shall only too gladly base my subsequent remarks on the conclusion Dr. Poore has reached.

First, as to the pathology. In twenty-two cases examined post mortem thirteen seemed to have been cases in which the lesion was primary, and nine secondary. Of this nine, five were secondary to disease of the lumbar vertebræ; in three the disease was subsequent to a phlegmonous inflammation of the pelvic-fascia, and in one it was due to disease of the ilium.

In making a differential diagnosis between sacro-iliac disease and chronic ostitis of the hip, I select certain points from the paper to which I am already much indebted—certain points to which I can subscribe.

1. The pain from sacro-iliac disease is behind the hip-

joint; in ostitis of the hip the pain is usually referred to the knee.

2. In the early stage of sacro-iliac disease there is no reflex spasm of any of the groups of muscles about the hip when passive motion is employed. This sign is well known in ostitis of the hip.

3. In sacro-iliac disease there is no pain on pressure, either below Poupert's ligment or behind the trochanter; in ostitis of the hip there is, as a rule, tenderness in one or both of those localities.

4. Pressure on the ilium at right angles to the body or attempts to rotate this bone, always causes pain in sacro-iliac disease; not so in ostitis of the hip.

5. In sacro-iliac disease there is, as a rule, tenderness and periosteal thickening over the joint; in ostitis of the hip tenderness over the sacro-iliac joint is seldom present.

6. In sacro-iliac disease, as a patient stands, the body is thrown on to the sound side; while in ostitis of the hip the body inclines to the diseased side.

7. Greater relief is experienced from absolute rest in bed in sacro-iliac disease; not so in ostitis of the hip.

X. VERTEBRAL OSTITIS.

It was a long time before I could believe that an ostitis of the vertebræ in the first stage could give signs and symptoms that would lead one to diagnose an ostitis of the hip in its early stage. It is no uncommon thing to confound a caries of the vertebræ in which psoas abscess has formed with the second stage of a coxo-femoral ostitis. Some unwelcome facts, however, have forced themselves upon me, and I feel that I shall not make the diagnosis of chronic ostitis of the hip in its early stage complete without a differentiation from vertebral ostitis.

I saw in the spring of 1879 a girl aged eight years who favored the left side in walking. The limp did not seem like a hip-limp, and yet I was unable to classify it. I tested the joint functions, and found them perfect in every respect. There was no shortening and no atrophy, and, indeed, no pain. She simply walked lame, and the lameness had come on very insidiously six weeks before I saw the case. The mother was a typical rheumatic. A hip splint had already been advised by a specialist. I could not make a diagnosis, though I leaned toward rheumatism. Nearly

two weeks elapsed, and I examined the case again without finding any bone or joint lesion. Two days after the last visit the lameness was gone, and now it had just returned, and with it a little pain in the front of the thigh.

This pain soon disappeared under the sodium salicylate, but I found a decided halt in her gait nearly three months later. It was a paretic limp, and there was a half-inch atrophy of the calf. After much walking she referred the pain thereby induced to the posterior aspect of the thigh. I fancied, from a history of periodicity obtained, that there might be a malarial element in the case, and ordered quinine, but at the next visit, a week later, the pain was constant by day but entirely absent by night. The anterior crural branches were seemingly implicated. At this visit I found for the first time resistance and pain to flexion beyond 90° . I was puzzled more now than ever.

A couple of months passed and I found a limp decidedly paretic. She threw her shoulders back unusually far, and there was an inclination also to the left. The resistance to flexion was not present, but adduction carried toward the extreme limit caused pain. There was a half-inch atrophy of the thigh and a marked loss of power. It was a fact, too, that she was lamer and stiffer after sitting awhile, or on rising from bed in the morning. On general principles iodide of potassium was prescribed, and in a week or two she was much better. Then, again, the next month she walked as if there were some defect in the lumbar muscles, and I examined the spine very carefully with negative result. The column was flexible and normal in shape. A spinal brace, however, was ordered by way of precaution. A few weeks afterward I found an inch atrophy of the thigh, and the movements at hip-joint absolutely perfect. Symptoms had varied as the weather changed. At times there was no sign, no symptom of any kind. I lost track of the case early in 1880, and did not see it again until I traced it out in March, 1883, and then I found a well-marked kyphosis in the mid-dorsal region of three quarters of an inch on a chord of six inches. The deformity had come on very stealthily, and the exacerbations had been so insignificant that the parents thought nothing further of seeking any relief. The hip and thigh symptoms had long since disappeared. Ankylosis of the diseased vertebræ seemed to be pretty well established, so that I did not consider a brace necessary.

It was certainly a peculiar case, and the early neuroses are readily explainable now on the theory of nerve-irritation at the foramina of exit. That her symptoms and signs, too, should all be referred to the extremities, though, is certainly very strange.

While on a visit in one of the Western States late in the spring of 1879, I was asked by a medical friend to see a case in which no clear diagnosis had been reached. I naturally felt anxious to examine the patient because of the obscurity attached to the case, and I found a fairly nourished female child, aged four years, with an excellent paternal family history, but a rheumatic, maternal history. One day in October, 1877, the child was exposed to a severe wetting, and complained the next day of pains about the hips. She also walked awkwardly at that time. The pain soon subsided without disturbing the sleep, and the lameness passed away within a week without treatment.

It was observed by the family that, for three or four months thereafter, whenever the weather changed the child would complain of pain about the hips, and be a little stiff in her gait. All these signs and symptoms had disappeared by the spring of 1878, and nothing further attracted attention until October of that year, when, without apparent provocation, the old symptoms returned with increased severity. The left limb seemed to receive the full force of this attack, but in the course of a month or two both thighs became strongly adducted, and reflex muscular spasm would be very annoying, especially during sleep. Apparatus was employed for a rheumatic deformity. Such was the history, and while I aimed to get an unbiassed history I am convinced now that I was prejudiced in favor of rheumatism. The lameness was bilateral, but more marked on the left side. The spinal column was normal in every respect, and I omitted no test in my examination.

The next signs were plain enough, but were thought to be due to the apparatus the child had been wearing. They were: flattening of the natis, resistance to flexion beyond 135° ; rotation could be made only over a very small arc; resistance offered when hyperextension was attempted. All this was true of the left side, but in addition to the apparatus theory there were some signs on the right side which complicated a diagnosis more than ever. These were resistance to flexion beyond 90° , and rotation limited to one half the normal arc.

There was no tenderness in either hip, no infiltration or periosteal thickening about either trochanter, and no difference in the size or the length of the limbs. For my diagnostic points, then, I had:

1. A rheumatic element in the family history.
2. As clear a history of exposure to cold water about the hips as one could possibly get.
3. Exacerbations extending over three or four months, closely connected with changes in the weather.
4. A complete (?) remission of all signs and symptoms for six months.
5. A recurrence of exacerbation when the cold weather approached.
6. Bilateral lameness and other bilateral signs.
7. A six months' constant wearing of apparatus that extended from axillæ to feet.
8. Absolutely negative results on seeking for spinal signs.

With these points and the bias already mentioned, I made a diagnosis, with proper precautions, however, of chronic rheumatic arthritis, and advised the removal of the apparatus and employment of massage and passive motion. The precautions I took in stating this diagnosis, and in giving the advice I did, were: that it was very difficult in such a case to come to a definite conclusion at a single examination, that the family physician should be consulted on the slightest recurrence of symptoms, and that the apparatus should be reapplied on any increase of deformity.

Six or eight months later rumors came that the child had Pott's disease of the spine, and abscesses; later still, that there was "hip-disease" also complicating the case. I began to seek for more definite information, and after much correspondence, lay and professional, I succeeded at last in realizing that I had made an error. I found, on examination, over three years after my first observation, a distinct kyphos in the lumbo-sacral region, with cicatrices in the gluteal region and a moderate deformity of the left hip from chronic articular ostitis, with cicatrices about the thigh.

I am prepared now to state, after the above confessions, that a differential diagnosis between the early stage of a vertebral ostitis, even in the dorsal region, and the early stage of a chronic ostitis of the hip, is at times exceedingly hard to make. Few men, I think, are willing to admit that there can be any difficulty where the dorsal vertebræ are

involved, and I myself was not prepared to admit the difficulty until the above two cases came under my notice so conspicuously. In a conversation with Dr. Schoeneman of this city, recently, I learned that in his opinion, the early signs sometimes run closely together.

As a resumé, briefly, then, we have:

1. Lameness depending on diminution in nerve or muscular power, when it exists in connection with disease of the dorsal vertebræ; the lameness of an ostitis of the hip lacks these elements, and is too well known to require further description. In disease of the lumbar vertebræ, the lameness, on close inspection, will be seen to depend on contraction of the psoas, and there will be more lordosis than is seen in the lameness of an early ostitis of the hip.

2. A patient with vertebral ostitis can stand as well on the lame limb as on the other; not so in coxo-femoral ostitis.

3. Reflex muscular spasm is never excited by employing passive motion of the hip in which lameness is present, the result of vertebral disease; as a rule this sign is always present in articular bone disease.

4. It is the rule to get a history of complete remissions in the lameness of the one, the exception in the other.

I have given only some important points when other and more valuable signs are absent. Very fortunately, we are not called upon for such close discrimination; for disease of the vertebræ, especially in childhood, has a pretty definite clinical history, and rarely is it that the signs point to lesions about the joints of the lower extremity.

Concluding this part of my chapter, I may incidentally mention that an exostosis sometimes exists in the neighborhood of the hip-joint, and gives rise to symptoms as well as signs, that may lead one into error. I have myself had such a case and was saved from error by finding exostoses in other parts of the body. Once in a long while I find a case with certain suspicious signs in connection with the hip, that disappear promptly on the administration of quinine. Dr. John James Berry, of Norwalk, Conn., writes me that he has had a case in a child four years, with pain and resistance to movements at the hip. He used a cathartic, and quinia for three days, when the recovery was complete. Then, again, I have seen cases with signs of disease at the hip in which all signs yielded to the expulsion of lumbricoids.

PART II.—THE DIAGNOSIS IN THE SECOND STAGE.

It would seem presumptuous to discuss this branch of my subject, inasmuch as the impression prevails that any one can diagnosticate an ostitis of the hip when the first stage is passed. To the orthopedist, however, it is very common to find cases wherein it is aught but easy to distinguish the deformity of an ostitis from that of a psoas abscess, an iliac abscess, a perinephritis, or a chronic articular rheumatism. Cases with the second stage signs make a decided impression on the medical attendant, especially when a perfect cure takes place while some method of treatment is being employed, but on the laity the impression borders on the miraculous.

I. PERINEPHRITIS.

During the past six years I have reported so many cases of this affection that I am at no loss for illustrations. In the month of May, 1877, a boy aged twelve was admitted to the hospital, and the following is the record made of his case:

With the exception of one or two of the diseases of infancy he had always been in good health. The father had been a drunkard, and had died phthisical; a paternal aunt had died of "hip-disease;" the mother gave a rheumatic history. The disease for which the boy is now admitted was first manifest six weeks before, supposably originating in a "cold." Loss of flesh had been marked, and his appearance to-day is indicative of much recent suffering. Pulse 116, R. 28, T. $101\frac{3}{4}^{\circ}$. He stands with body inclined to the right, the lower extremity of this side slightly flexed at hip and knee. The spinal column deviates to the same side, though there is no tenderness along the column, no angular curvature, no pain on per- or concussion; the natis is broadened. Lameness is marked, and very like to that of a patient with "hip disease," second stage. The thigh cannot be extended beyond an angle of 165° without pain, but can be flexed and rotated over normal arcs. Measurements of the two limbs identical. He complains of pain about the knee. In the left lumbar region the erector-spinal muscle is full and tense, giving quite a ridge-like prominence; yet there is no pain here, or in the right ilio-costal space; two and one half inches from the spinous processes of the vertebræ there is marked tenderness, which extends to the right in a horizontal plane to a point immediately above the an-

terior superior spinous process, where the tenderness becomes more extensive in area. This area is triangular, extending along Poupart's ligament. There is subintegumentary induration along and above the ligament, with extra heat and comparative dulness. Flexion of thigh relieves pain. There is and has been no intestinal derangement. Suffice it to say, we had no difficulty in diagnosing a perinephritis. The progress of the case differed from the usual type. Suppuration came on in due time, a large abscess being opened just above Poupart's ligament.

In August the case was discharged cured, all deformity and lameness having disappeared.

In typical cases the disease generally begins with a rigor or two, febrile exacerbations more or less severe according to the acuteness of the attack, lancinating pains in lumbar region, loss of appetite, and general indisposition. In fact, the invasion does not differ materially from that of other acute inflammatory lesions, unless perhaps the pain be more localized, and if the child be very young the locality of the pain is not discovered. Constipation, I believe, is always present. Very soon we have preternatural immobility of the spine, a stooping forward with elevation of the shoulders. After a week or ten days, spasm of psoas muscle occurs, and the gait becomes characteristic of that so commonly regarded as the second stage of hip-joint disease. The urine is of high specific gravity, and is loaded with urates. The tumefaction appears and the pain becomes excruciating. If an exit be given to the pus a speedy recovery follows; if this be delayed and the contents of the sac be really pus, it burrows along the cellular tissue, producing an immense abscess, a spontaneous opening is effected, and the convalescence is protracted. If, on the other hand, the inflammatory process has not resulted in suppuration, the contents are most likely serum, and resolution is effected.

The position of the limb is more that of pure flexion, while in the second stage there is generally an element of outward rotation associated with the flexion.

From Dr. Sayre's work I have taken the accompanying cuts, which represent very finely a typical deformity of the second stage of an ostitis of the hip. Fig. 30 represents the earlier appearances, while Fig. 31 represents the more advanced. When abscess appears during this stage the appearances are still more unlike those of a perinephritis.

1. In a perinephritis the characteristic deformity appears within a week after the first symptoms; in a chronic ostitis the deformity is very slow of development, and never appears within the first week.

2. In perinephritis it is the rule to find a history of an initial chill and febrile reaction; in a chronic ostitis a chill is never present as a symptom.

3. In the one the tumefaction is found in the ilio-costal



FIG. 30.—THE BEGINNING OF THE SECOND STAGE.



FIG. 31.—SECOND STAGE WELL ADVANCED.

space, or iliac fossa; in the other it is never found in the ilio-costal space, seldom in the iliac fossa, but as a rule in the vicinity of the trochanter major.

4. In the one, resistance to passive motion is offered only in extension, and traction on the limb increases the pain; in the other, all movements are resisted, especially flexion and rotation, while traction relieves pain.

5. In the one there is never any joint tenderness; in the other joint tenderness is the rule.

These constitute the chief points in differential diagnosis; but in conclusion I must insist on a careful examination, several times if need be, a history obtained without bias, an unalterable conviction that chronic ostitis is from the beginning a chronic disease, and a slowly progressing disease; I wish to insist, I say, on these, as points absolutely essential in making diagnosis. I dislike to be hypercritical, but I firmly believe that ninety per cent.—yea, I am prepared to assert a much larger per cent. than ninety—of the cases of ostitis of the hip reported as cured without lameness or deformity, cured completely, are not and never have been cases of ostitis.

II. PRIMARY PERITYPHLITIS AND ILIAC ABSCESS.

Surgeons, I am well aware, are unaccustomed to look upon a perityphlitis as anything but a lesion secondary to a typhlitis. They call an inflammation which involves the cellular tissue surrounding the vermiform appendix a subfacial or iliocellulitis. Still surgical authorities do recognize a primary uncomplicated perityphlitis, and I have seen cases whose clinical histories were very sharply defined. It is immaterial, however, for purposes of differential diagnosis whether the cellulitis be on the right or the left side. In either event the signs closely resemble those of the second stage of a chronic articular ostitis of the hip.

A case I saw in September, 1878, was in a boy aged six years, whose history was as follows:

Absolutely free from hereditary diseases or the cachexia which often follows in the wake of infantile disorders. True, in the early spring of 1878 he had some fever which, to use the mother's expression, made him "deaf, dumb, and blind," yet he made an excellent recovery after six weeks, and was in good health until the beginning of September (three weeks prior to the day he presented at the hospital), when he came in from play reporting to his mother that he had had a fall. The child's sleep was disturbed the same night; he complained of general soreness, and was apparently quite feverish. No contusions could be found, yet he continued from that time forth to grow more lame and to sleep more uneasily; in fact it was difficult to get a position in bed that would be at all comfortable for any length of time. While quiet the little patient was free from pain; but any movement caused him to cry out sharply. He has

limped from the very beginning, favoring the right limb; at times has been able to go about only on the hands and knees, and at other times he has walked comparatively erect. It was not ascertained whether the patient was constipated during this period, or whether he had vomited, or whether he had eaten anything that would be likely to lodge in the appendix. The mother insisted only on his high fever. The nurse soon discovered that he was obstinately constipated some days after admission.

The case had been regarded as one of dislocation, and an attempt had been made at reduction under ether. This was three or four days previous to admission to hospital, and being sent to one of our consulting surgeons, he could find no evidence of dislocation, but reported it as one of severe strain of the hip-joint which would probably eventuate in disease of this articulation.

The expectant treatment was employed in the hospital. It was recorded, however, that the boy was fairly nourished, could only stand when assisted, and could not walk at all; that the right thigh was flexed on the pelvis at an angle of nearly 90° , extreme flexion being admissible while extension was resisted by muscular action; that there was some swelling about the hip and thigh obliterating the fold; and that further examination was postponed, so excessive was the tenderness. His vital signs were not even recorded, but on the 26th, five days after admission, the pulse in the evening was 120, respiration 36, temperature $101\frac{3}{4}^{\circ}$; and at the same time next day the record stood 124, 27, $103\frac{3}{4}^{\circ}$. From this date until Oct. 16th the temperature ranged between 101° and $103\frac{3}{4}^{\circ}$ for the evening, while in the morning it was normal.

Four days after admission it was observed that there was marked tenderness in the inguinal region, with well-defined induration above Poupart's ligament, that all the movements at the hip, save extension, could be made with care, and that the boy could easily bear his entire weight upon the limb. Joint disease was readily excluded, and the lesion, an inflammatory one, definitely located in the iliac fossa.

Within a fortnight a long, oval-shaped, fluctuating tumor presented above Poupart's ligament, was incised, pus evacuated, and in another fortnight the case was discharged cured.

It is not necessary always for suppuration to have taken

place in order that a diagnosis may be made. I have on my case-books several in which no suppuration occurred. One is noted in detail, and I shall present it in this connection in order that the points in differential diagnosis may be the better illustrated.

Early in the last week of October, 1879, a boy, six and a half years of age, was carried into the waiting-room of the hospital, and so tender was the little fellow that his clothing could with great difficulty be removed for examination. He was in perfect health and sound in limb three weeks previously, and, with the exception of a slight attack of malarial fever two years ago, he had been uninterruptedly healthy. He is reported to have had a fall,—no one saw him fall,—to which his parents attributed the present lameness. His first symptom was pain about the right hip, the night of the day on which he reported his fall; next day he could scarcely walk, and four or five days later medical advice was sought, the surgeon (one in very good standing) pronouncing it "hip disease" (so the father stated) and applying a weight and pulley, which had been employed constantly until the twenty-sixth, the day before this visit to the hospital. During this whole period the patient suffered much pain in the knee and groin, requiring anodynes one or two nights. The condition of his bowels during the first week could not be ascertained. His rectal temperature on this date was $101\frac{3}{4}^{\circ}$. The family history was negative on father's side, neurotic on mother's, *i.e.*, she was insane. The boy was greatly emaciated, and tongue was coated. He was able to stand if assisted, bearing his entire weight on the left limb with the right semiflexed at hip and knee and rotated inward, yet he could not walk.

While sitting on the side of the bed he voluntarily crosses the right leg over the left knee, and as he lies down there is nothing to be seen abnormal save a lateral deviation of the spinal column in the lumbar region to the left.

In the dorsal decubitus he voluntarily flexes the thigh on the pelvis completely, can abduct and adduct, but cannot extend beyond 90° without pain, and if passive extension be attempted, the boy resists, crying aloud. Rotation can be easily made, if made with care. Nothing can be felt per rectum save a few scybalæ. Pressure over the trochanter in the line of the neck gives no pain, nor does concussion of hip. No infiltration about the trochanter or below Poupert's ligament. A cicatrix of recent vesication is seen over

the gluteal region. The abdominal walls are a little retracted, and there is neither tenderness nor infiltration in either ilio-costal space, nor is there any in the left iliac fossa, but in the right tumefaction can be felt distinctly within a triangular area bounded above by a line extending from the top of the crest of the ilium to the median line just below the navel, laterally by the median line and below by Poupart's ligament. There is dulness here and excessive tenderness, but no fluctuation, and no tumor present to the eye.

The result was a resolution of the mass under blistering and hot fomentations. He was well in a couple of months, and the diagnosis was fully confirmed.

From the foregoing histories and remarks the recognition of a case of iliac abscess should depend on a reasonably careful examination. To distinguish this from an ostitis of the hip in the second stage, one should remember that—

1. The deformity is of too rapid development for a chronic ostitis.
2. The constitutional symptoms are too prominent.
3. That resistance to extension alone never occurs in the second stage of the disease.
4. That tumefaction in the iliac fossa alone rarely occurs.

III. THE SUPPURATIVE STAGE OF CARIES OF THE DORSAL AND LUMBAR VERTEBRÆ.

The natural delays in the appearance of abscess from caries of the vertebræ make one peculiarly liable to associate them with the hip or thigh. I have seen most excellent surgeons call a tumor in the gluteal region, for instance, a bursitis or a hip abscess, when a deformity of the lower dorsal or lumbar vertebræ was present, but regarded as perfectly innocuous and unconnected with the aforesaid tumor. Again, old fistulous openings on the hip or the thigh, with deformity of the limb, are time and again looked upon as associated with the nearest joint, and on being explored lead to diseased vertebræ. If one will look upon a caries sicca as an exceedingly rare lesion, and learn that an abscess from bone disease may appear at any time during a natural lifetime, many errors will be avoided. It is especially true of vertebral caries that a residual abscess will take one of several courses, and appear in the most unlooked-for localities. A very common site is

Scarpa's space; and another site nearly as common is the outer and posterior aspects of the thigh. Cases like the following come frequently under my observation.

In the early part of January, 1878, a mother called to report her child, an out-patient of the hospital, as unable to attend, so helpless had he become by reason of the progress of the disease. She mentioned the name of her family physician, whom I knew to be thoroughly competent, from his surgical experience in some of the best hospitals in the city, to take charge of any case, and to him I referred this patient, a boy, aged eleven years, under our treatment since March, 1874, for caries of the lower dorsal. When I last saw the boy in August, 1877, there was a circumscribed tumor over the left hip, and I recognized this as a spinal abscess, ordering appropriate treatment therefor. I instructed the mother to ask the physician to whom I had just referred the case to notify me as to present condition.

I was informed by letter the seventeenth of January, that the child with caries of the spine had also hip-joint disease of over a year's standing, received from a fall; that the leg was flexed somewhat upon the thigh, and the thigh upon the abdomen, the usual position of the limb. I immediately requested a consultation, but the doctor was called out of town, and left word for me to examine at my convenience.

A few days later I made a careful examination, and found a marked angular deformity of the spine, a soft, fluctuating tumor over upper and outer aspect of thigh, measuring three inches vertically, and an inch and a half transversely. The circumference of the limb at every point save over this tumor was identical with that of the other limb; there was no shortening whatever, and the thigh could be moved in every direction without any pain in the hip or at the knee; but when complete extension was made, the skin covering the tumor was put on stretch, and the boy complained of pain here. Rotation was easily accomplished, and I could find no disease at the hip by any of the recognized signs. In the absence of shortening, atrophy, and muscular contractions about the hip limiting motion, and in view of the position of the limb, I could not make out any hip-joint disease, and so reported to my friend the physician.

Two years ago a case in a boy aged five was examined by a member of our staff, and pronounced to be lumbar caries with psoas abscess. The normal curve was lost, and

the spine in this region was suspiciously stiff. The right limb was nearly in the position of the second stage. On palpation an elastic tumor could be recognized in the iliac fossa. Treatment for the spinal caries was promptly begun, and in the course of three months the case presented at another hospital, where, after a long examination, it was pronounced "hip-disease," and, with a look that combined egotism and pity, the diagnostician told the father that the spinal brace was of no service to the boy.

When I saw the patient a month afterward there was a distinct kyphos in lumbar region, a well-marked tumor in iliac region, and resistance only to extension of the limb.

Such cases are not rare, and I could illustrate at great length did it seem necessary. I shall content myself with recounting some of the more important points in the differential diagnosis :

1. In residual abscess about the hip there will be either a history of spinal symptoms or the presence of the deformity, if the abscess come from diseased vertebræ.

In the second stage of a chronic osteitis at the hip, spinal symptoms and signs are wanting.

2. In a spinal caries with deformity at the hip, the resistance on passive movements of the thigh will be confined to the muscles in or about which the infiltration is manifest.

In the second stage of a chronic articular osteitis the resistance, as a rule, is in all the periarticular muscles and the hip is often locked against any movement. In other words, the resistance in the one is from mechanical causes, in the other it is reflex.

3. In the one there is no tenderness at the hip-joint and the patient can easily bear all the weight on the limb; in the other, joint tenderness is usually present, and if not detected by manual examination, becomes quite apparent when the patient makes an effort to stand alone on the limb.

4. The coexistence of a kyphos in lower dorsal or lumbar regions with open sinuses about the upper third of the thigh, in a thigh either parallel with its fellow or at an angle of flexion, furnishes presumptive evidence against a second stage of chronic osteitis of the hip.

5. Finally, a well-conducted physical examination, aided by the use of the probe, will enable one to differentiate in cases, however doubtful they may be.

I have never been able to satisfy myself of the existence

of a primary psoriasis, and hence have not included this affection among the lesions from which a chronic bone lesion of the hip in its second stage is to be differentiated. Admitting, however, the propriety of recognizing such a lesion, we should have the same points in differential diagnosis as have been enumerated in the foregoing diseases.

IV. ACUTE EPIPHYSITIS.

Inasmuch as our observations in acute epiphysitis are generally first made after the initial lesions have been fully established, we naturally find the limb in a position that looks very much like that of a second stage of a chronic epiphysitis. Since I prepared my chapter on this acute articular disease of infancy, I have found a very instructive series of cases reported by Mr. Thomas Smith, in the Saint Bartholomew Hospital Reports for 1874. Mr. Smith writes his clinical paper on "The Acute Arthritis of Infants," and my attention was called to it by reading a report of some similar cases by Mr. Marrant Baker in the British Medical Journal for September 1, 1883. His paper was presented at the last meeting of the British Medical Association, and is entitled "Epiphysal Necrosis and its Consequences."

I very much regret that I did not see Mr. Smith's contribution earlier, for I should then have had a clearer idea of my own cases. Even in this connection I take pleasure in quoting from Mr. Smith the following paragraph, which will lay a most excellent basis for differential diagnosis. He says: "It occurs, so far as my own experience extends, within the first year of life, and is characterized by the suddenness of its onset and the rapidity of its progress and termination, whether the latter be of a fatal or favorable kind. It is very dangerous to life, and intensely destructive to the articular ends of the bones, which, of course, at this period of life are largely cartilaginous. Lastly, I would mention as a feature of the disease, that it rarely produces ankylosis, but leaves a child with a limb shortened, by loss of part of the articular end of some bone, and with a weakened, flail-like joint."

Mr. Baker believes as I do, that the cases Mr. Smith has described had the epiphysis as probably the primary seat of disease. Indeed Mr. Smith stated himself that it seemed "that in many cases the formation of a subarticular abscess in the bone must have been the first step in the joint

affection." Along with Mr. Baker and Mr. Macnamara, I believe that the disease is not exclusively confined to the first year of life. I have not had the experience Mr. Smith had in the mortality of such cases, and was not aware until I had read his reports that there was such destruction to life. However, I am digressing, and shall revert to the object for which I introduced this discussion, viz., differential diagnosis.

1. Acute epiphysitis occurs at a much earlier period of life than does chronic articular ostitis.

2. The progress of the disease is much more rapid and the symptoms and signs are much more pronounced. One is an acute process, the other a chronic process.

3. The infiltration in the one is more of a phlegmonous nature, while that in the other presents the features of a cold abscess.

4. The joint movements in the one, despite the infiltration, are less restricted than those in the other.

Monarticular rheumatism presents many of the features of the second stage of a chronic ostitis of the hip. The signs are so similar that one must rely on the history and the existence of rheumatic signs in other organs.

PART III.—THE DIAGNOSIS IN THE THIRD STAGE.

In this stage the signs are so well marked and so characteristic that the probabilities of error are reduced, it would seem, to a minimum. Yet in my experience there are several lesions which give deformities similar to the one under consideration.

It must be remembered that real shortening is always present, that deformity is always present, and that, as a rule, sinuses and ulcers are present. The favorite position of the limb, it will also be remembered, is in flexion, adduction, and rotation inward. By reason of the varieties in position, it often happens that a unilateral congenital dislocation is diagnosticated as the third stage of a chronic ostitis of the hip. It is frequently reported that a child has become suddenly lame, when on investigation it will be learned that the lameness has always existed. If no history be obtainable, then the diagnosis is often obscure. I do not see, however, how any one can fail to diagnosticate a congenital dislocation if an average amount of care be taken in the examination.

The limb is parallel with its fellow; is rotated outward over a small arc; is shorter, but can be made equal with its fellow by traction; has no abscess or previous signs of suppuration; this freedom of motion, and above all the ovoid, or, globular tumor beneath the gluteal group of muscles, is very characteristic. All these signs, even without a history, are sufficient to exclude a chronic ostitis.

From a traumatic dislocation the diagnosis is not always easy of differentiation. I saw—October, 1880—a boy eight years of age, whose mother gave me the following history: Three and a half months before—June 30th—he was on his way from school as active a boy as there was in the neighborhood, and one as free from lameness, when he passed a house in process of erection. As he passed a beam fell across his back and thigh, pinning him to the sidewalk. He was carried home, and the limb was treated for a fracture of the thigh. In two weeks he was out of bed and going about on crutches. He had been lame ever since the accident. The history was very clearly given, and without any suggestions. I found the limb adducted and rotated inward over a small arc; two inches shortening, both as measured from the anterior spinous process and the umbilicus; the trochanter very prominent, and a rounded globular body beneath the gluteal muscles, moving under my finger as I rotated the limb. There was no infiltration about the hip, but on the anterior surface of the thigh, at its middle third, was an irregular bony mass, about the size of a split walnut, hugging the former closely, and tender on handling. The movements at the hip were good in all directions save in abduction. I made out a dislocation on the dorsum, with possibly an old fracture of the thigh, and had my diagnosis confirmed by one eminent in this branch of surgery. On account of the bony tenderness about the callus, it was deemed inadvisable to make any attempts at reduction at that time.

A few weeks later two of my assistants recognized the same patient at an orthopedic clinic, furnishing a text for a lecture on "hip-disease" in its third stage. The tension of the adductors was referred to as being specially diagnostic.

I confess that I was greatly surprised, and wondered how I could have come so wide of the mark, especially as I had examined the case so carefully, recording every step in the process. I have sought the boy in vain during the past few

months, and hence am unable to give the final conclusion. The case, however, is interesting from the fact that two specialists differed so widely on points that should have been perfectly clear. There is one point on which I may have failed, viz., the early history. The clinical lecturer seems to have learned that the boy was lame prior to the accident. The mother to me asseverated that he was not lame prior to the accident.

Caries of the pelvic bones, with much infiltration and ulceration of the soft parts, is sometimes mistaken for articular ostitis. I have notes of more than one case where such a diagnosis was made by very competent observers.

The deformities of rheumatism are often regarded as those of the third stage of disease at the hip. Last summer a case was sent me from a suburban town by the local physician, who wrote me that the patient had had a rheumatic inflammation resulting in deformity of the hip. Not caring particularly for the deformities of this disease in the adult, I accepted the case with some hesitation. In fact, when first written to about the case I referred the doctor to another hospital. Finally, the patient and a medical friend called to see me, asking at least for my diagnosis. My first impression, on looking at the patient, a man aged twenty-four years, was that I had here an old deformity from chronic articular ostitis of the hip. He was pale, cachectic-looking, and had a marked deformity of the right hip, the limb being in flexion at an angle of about 160° in inward rotation over a quadrant, and the foot touching the floor only by toes and ball. The rotation I desire to emphasize by stating, furthermore, was so great that the outer side of the knee rested against the popliteal space of the left side. There was an inch atrophy of the thigh, and the limb presented a practical shortening of two inches, though there was no real shortening.

The trochanter was not above Nélaton's line, but was an inch and a quarter nearer the anterior superior process than was its fellow.

I looked for cicatrices and could not find any, nor could I find any infiltration. The joint was absolutely immovable. It then occurred to me that I had better get a history, and I learned that he was perfectly well and free from lameness on the 22d of February, when he "caught cold;" that he overheated himself the next day running for a train; next morning was sore in "all his body and limbs." The same

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evening he was decidedly feverish, and did not leave his bed the next day. The symptoms fixed themselves in the right hip, and he lay a sufferer for nine weeks, the limb assuming a position of flexion and adduction. I had no difficulty after so clear a history of diagnosticating a rheumatic peri-arthritis, and advised brisement force under ether.

He entered St. Luke's Hospital, and Dr. Bull, confirming my diagnosis, carried out the treatment I had recommended. The result was all that we could desire; and at present writing the patient has a very useful limb, with a very fair amount of motion.

In closing this chapter I can do no better than insist on the value of an early diagnosis in the first stage. The signs are clear enough, as a rule, when taken in connection with the history. Exceptional difficulties in diagnosis have been enumerated, and repetition is unnecessary.

CHAPTER XV.

THE TREATMENT OF CHRONIC ARTICULAR OSTITIS—GENERAL CONSIDERATIONS.

The treatment best adapted to primary bony lesion of the hip is one of the most difficult problems in the whole range of surgery. Men may talk and men may write, yet the bony lesions of the hip, as a rule, advance to destructive changes. There are many and varied forms of apparatus in use, and nearly all aim to meet the same indication for treatment. All aim to secure rest to the articular surfaces.

The therapeutics of chronic articular ostitis of the hip resolves itself into the following divisions:

1. The constitutional with the expectant for the early stages.
2. The expectant.
3. The mechanical.
 - a. Pure fixation.
 - b. Extension with and without motion.
4. Operative.

While I have employed these divisions, I fully recognize the fact that hard and fast lines cannot be drawn; for nearly all surgeons recognize some hereditary vice as the predisposing cause, and hence see an indication for some internal medication. There are a few, however, who discard all mechanical appliances, especially in the first and second stages, adhering strictly to a constitutional treatment throughout. These, however, rely on topical treatment as well, and aim to relieve symptoms by the application of mild counter-irritants and of vesicants. This cannot be called the expectant plan of treatment, for it is only in the early stages that any effort is made to relieve symptoms. The deformity that arises seldom receives any attention, and certainly no mechanical efforts are made to prevent deformity. In diseases of the ankle, or the knee, or the spine, appliances are employed to prevent deformity; not so in

diseases of the hip. There is a certain angle of deformity that is best for an ankylosed knee, and perhaps it may be considered that the angle at which the disease leaves the hip is generally better than we can bring about by any treatment. This is the explanation I have adopted for the non-interfering method, and before proceeding further it would be well to define my terms.

What do we understand by the term expectant? Literally it means to wait. Waiting for symptoms and signs to arise before treatment is instituted, and thus directing the treatment to these phenomena of disease; discontinuing as they disappear or are modified; resuming on their reappearance—this is what is generally understood as expectant treatment. Physicians who adhere to the expectant treatment are known as conservatives; indeed, expectancy and conservatism have somehow become synonymous terms. If one treats a case expectantly then he is called upon to relieve the symptoms during the exacerbation in any way that he may find the most satisfactory. For instance, if he finds that rest in bed with weight and pulley gives relief the more promptly, he will employ this method; if he finds that local applications, such as cold-water dressings, hot fomentations, mild counter-irritants, or blistering and poulticing,—if he finds that any one of these serves him best he will employ that one, and still be treating the case after the expectant method; if, again, he finds that symptoms yield best to opiates he will employ opiates.

When the second stage is reached, and deformity appears, it will be his duty to adopt such measures as will correct deformity and retain the limb either in normal position or in that position which will assist in bringing about the best possible result. Some employ the weight and pulley, some the crutches and high shoe, and some retentive apparatus. The aim in every instance is the same, and it all forms a part of the expectant plan.

If abscess forms, it is his duty to manage this on what appears to him correct surgical principles. It will occur to one man to open early, thus avoiding the formation of a large sac with extensive suppuration; to another it will seem dangerous to touch the abscess so long as constitutional symptoms are absent. Both are aiming at the same object, viz., the minimum amount of suppuration. When it becomes clear that caries necrotica has advanced to such an extent that spiculæ of loose bone are present in the

joint cavity, then the expectant plan demands a removal of these, as it would a removal of any foreign body which militates against recovery. The minimum amount of cutting is of course expected. As a rule, no operative procedures are resorted to for the removal of such sequestra, as their presence is not known until they are seen projecting from a sinus. Thus a pair of forceps or one's fingers suffice to effect a removal.

Again, when displacement and distortions have not been prevented, it is the duty of him who follows the expectant plan of treatment to reduce the deformity to the minimum. This is sometimes done with apparatus, and sometimes by means of the surgeon's knife.

When resolution does not take place, and when the supuration continues to the production of lardaceous changes, a consistent expectancy would demand the removal of the cause, and the physician who follows the expectant plan might find himself some day excising a hip joint. It is certainly his duty to give his patient the best chance of life, and if he accepts the facts already indubitably established, he will most assuredly give his patient that which offers about the only chance of life. If, on the contrary, he does not accept the facts as recorded he will treat the symptoms as they arise; will administer diuretics, cathartics, etc., etc.

Such then constitutes the expectant treatment, and it remains now to elaborate this method, and to ascertain whether this gives us the best cure.

In a very instructive paper published in the Philadelphia Medical Times during the past year, Dr. Oscar Allis raises the question, "What is the best cure in hip-joint disease?" and proceeds to show that "*nature's cure*" is the best. He claims that ankylosis is a most fortunate termination, and that apparatus should be employed with this in view. Furthermore, the angle of deformity should be 135° , as this will subject the patient to the least inconvenience in any vocation of life. The shortening of the limb, he further claims, is desirable, in that it necessitates the use of a high shoe. This is important, because with the loss of function we have arrest of development in the femur, and by this arrest of growth "the knee is made to approximate the trunk; and the ankle, by the elevation of the shoe, approximates the position of the knee."

Now while Dr. Allis's views may seem extreme and while they give us an apparently gloomy outlook, they are just

the views that many a general surgeon comes to hold who follows his cases closely and who bases his opinions on final results. Dr. Allis, then, represents the surgeon; and while he admits the possibility and desirability of a cure without deformity or ankylosis, he configes his query to the cases that have advanced beyond the early stages, as the following quotation will show:

"I shall have no reference in the following remarks to the early manifestations of the disease and its possible cure. An eminent surgeon has said that 'nine-tenths of the cases can be perfectly cured if taken in time.' Granting this to be true, it is clinical experience that *nine tenths* of the cases are *not* brought to us in the early stage; and the pertinence of my query still applies to the great majority of cases that fall victims to this painful crippling disorder."

I shall, in the course of this chapter, aim to show what the expectant plan accomplishes, and whether we can expect any better results than Dr. Allis accepts as the best, even if we "get our cases in time." And a few remarks on "getting our cases in time" may not be irrelevant. What does one mean by getting, for instance, a case of chronic articular ostitis of the hip in time? Does he want it within the first week of the appearance of signs, or does he want it sooner? Or will he be satisfied if he gets the case before the second stage is reached?

The fact is few men can agree on this point, and the anxious mother who feelingly asks, "Doctor, have I come to you in time with my child?" knows too well by the guarded reply that it is a difficult question to answer.

My own opinion of that conditional expression "if you had only come to me early enough," is that it is a mischievous assumption. It is an assumption, because it assumes that the one using the expression is surely in possession of the means for bringing about a cure. It is mischievous, because it seriously reflects on the previous medical attendant and sows the seeds of dissatisfaction. Besides, it is a poor science that will not allow its devotees to accept the situation and get good results, however adverse the circumstances. Let a man be honest to his brother practitioner, honest to his patient, honest to himself.

THE EXPECTANT TREATMENT.

With a knowledge of the clinical history of this disease the treatment will be directed to the exacerbations. The relief of the pain is the most important object, and this being accomplished the restlessness at night, the loss of appetite, etc., are of minor consideration. Rest in bed and a roller about the hips in the form of a spica bandage generally suffice to relieve in a mild exacerbation. An opiate is seldom necessary. I have seen many cases yield promptly to the application of strong tincture iodine. At the hospital blisters are applied if these means fail, and it is the rule for a child to get speedy relief after such treatment, especially in an early exacerbation.

By far the surest method is fixation and traction. The weight and pulley sometimes act like a charm. The spasm is overcome, the limb is supported, and the child falls asleep without fear. This exacerbation being passed, no further interference is called for until the next one approaches. The interval is occasionally so long that a cure is pronounced, and one feels that he has really accomplished a good result by very simple means.

It is scarcely necessary to mention the importance attached to cod-liver oil. This is used freely and forms the basis of all medication. Many employ an alterative tonic, such as the syrup of the iodide of iron, or the bichloride of mercury with the compound tincture of cinchona. Indeed one of the oldest prescriptions now employed in chronic bone and joint diseases is the twenty-fourth of a grain of the bichloride to a drachm of the compound tincture of cinchona.

When there is much lameness crutches form a valuable acquisition to our armamentarium. Whether we employ crutches in conjunction with a high shoe, or a patten, on the sound foot, or whether they are employed without the shoe, the aim is to rest the hip and at the same time to permit out-of-door exercise. Those who adopt what is known as the Hutchison method, viz., the crutches and high shoe, seldom persist in it longer than a few months. Relief comes, *i.e.*, an exacerbation is passed, in a short time the little patient becomes more confident in his powers, and the crutches are soon discarded; while the physician thinks too that they have served their purpose.

The appearance of a cold abscess is the signal for a good

deal of alarm, and how to manage these pus sacs is often a serious problem in the course of an expectant treatment. Shall they be left severely alone, or shall they be opened early? On former occasions I have quoted Billroth, in favor of leaving them to take care of themselves. For many years I have myself deemed it the part of wisdom to avoid surgical interference. The rule to-day among conservatives is to adopt this plan. The antiseptic system offers, I think, quite as good an outlook as does the process of nature. If the suppurative process in the bone be not exhausted it is thought that the opening of abscess is dangerous, and many cases that seem to favor this view can be adduced. On close analysis, however, these cases fail to convince one that the incision has proven more detrimental than a spontaneous opening. Statistics for comparative study are wanting. An early incision, other things being equal, has the advantage of preventing the formation of an extensive pus sac. The rule holds good, however, as distinctly enunciated by Billroth, that unless one is prepared to remove the diseased bone if suppuration be not checked the abscess should not be touched.

If one can have all the conveniences of the antiseptic dressing and be familiar with all the details of the management of the same, then I should strongly urge the early opening. Yet how few in private practice, and especially among that class of people who are most frequently affected with chronic bone disease, can command the conveniences a hospital affords. I am well aware of this fact, which should not be lost sight of. These abscesses are of trivial import to the orthopedist, whether he practise the expectant plan or the mechanical. His custom is to leave them alone until they get in his way or prove annoying or painful to the patient; then he makes a small incision or aspirates, applies a compress, and awaits the progress of events. When they refill he opens again. It is the practice of some to make frequent aspirations removing only a small portion at each sitting. I know well that many cases have abscess after abscess, have a little hectic the fifth or sixth day after spontaneous opening, experience very little inconvenience, and that the treatment is followed without interruption. It has long been a question in my own mind—not by any means original with me—whether suppuration was not a good thing for an articular bone disease. I believe that far better joints are secured, far

less pain and tenderness and inconvenience are experienced in after life in those hips around which abscess scars can be found than in those that have gone on to ankylosis without any suppuration.

So then I advise that cold abscesses be let alone until they begin to cause inconvenience.

The management of the deformities shall be reserved for a discussion of the various forms of apparatus. Before leaving the expectant treatment I propose to introduce a few typical cases in order that its merits or demerits may be justly appreciated.

The impression prevails that a certain class of cases can be so far relieved that no deformity will remain. I have the records of quite a number of such cases; but, when collecting them for publication, I find the notes so meagre on certain important points that I cannot assure myself even of the correctness of the diagnosis. Take, for instance, a case like the following :

A frail cachectic child, two and a half years of age, was brought for treatment in March, 1877. A diagnosis of "hip-disease, left side?" was recorded, and the only other note made except the one relating to his delicate appearance, was that the disease was of seven weeks' standing. The treatment employed was a liniment and spica bandage, cod-liver oil and iron. Six weeks later it was recorded that there was no shortening, but apparent lengthening of the limb, and that the thigh was fixed on the pelvis and no motion was allowed at the hip. A month elapsed and there was no improvement. The same treatment was continued, and in September (the last note was in May) I recorded a decided improvement in every respect. There was no fulness about the hip and he walked with ease, scarcely manifesting any lameness whatever. The motion at the hip was limited to an arc of only twelve degrees, and the limb was "still rotated outward a little," passive motion in rotation being resisted. In the latter part of October there was "no muscular contraction, no atrophy, and no evidence of disease." A cure was recorded, and I was at a loss to know to what I should attribute this good result. I somehow felt well convinced that I had a true case of "hip-disease," and yet the only signs I had obtained were insufficient to convince one who had not seen the child.

I traced the case at the end of three months and

found that no relapse had occurred. It was in the latter part of June, 1878, that the child was brought to me with the *right* limb advanced, semi-flexed, and everted. There was also much reflex muscular spasm at the hip and the boy was quite lame. All these signs had appeared within a week. The same treatment as before was ordered, and in ten days "the limb was straight, no contraction, motion at joint free in all directions, scarcely any lameness." A week or two later I could not detect by the most careful examination any sign of disease.

Nothing further occurred until May, 1879, when he again showed decided stiffness at the right hip. It could not be flexed beyond 90° or be extended beyond 105° . Indeed it seemed pretty well locked at this last-named angle. There was neither shortening nor atrophy, and no symptoms, such as pain at night, restlessness, loss of appetite, etc. These signs were of brief duration, and passed away as quickly under a liniment. I made it my duty to see the child every two or three months thereafter, and up to the beginning of the present year there has not been any relapse, and on the date of my last examination, January 27th, I could not find any sign of present or past disease.

When I first saw this case I thought it hopeless, and taking together the hygienic surroundings, the apparent providence of the mother, and the frailty of the patient, I could not form any other opinion. I confess, now, that I am unable to make a diagnosis. The successive invasion of the two hips, the predominance of signs over symptoms, and the suddenness of the different exacerbations leads me to regard it as a recurring rheumatism. I have searched diligently for any rheumatism in father or mother or relatives near and remote, have instituted the same search for tuberculosis, and get absolutely negative results.

I could not help thinking, however, in a spirit, perhaps, of carping criticism, that had this patient been subjected to mechanical treatment a brilliant result would have been claimed, and no man could have disputed the claim. And yet this child never had a blister applied, never had any immobile apparatus, never any fixation or traction, never any rest to the joint other than the rest the contracted muscles gave to the joint. Compare this case now with the following:

A boy aged six years, whom I saw in June, 1880, had resistance to flexion and to abduction as the extreme

limits were reached. He had been lame for three months, with the characteristic hip limp, had an appreciable change in the ilio-femoral crease, and there was a half-inch atrophy of the thigh. Following a varicella three months before this date a swelling in the groin had presented, yet there was no history of any marked exacerbation. The diagnosis was recorded as articular osteitis of the hip, but an interrogation point followed the record.

The boy did not come under hospital treatment, and, curious to know whether the diagnosis had been correct, I traced the patient and found him, February 22, 1883, walking very easily; yet, on close inspection, I could trace a little inequality in his steps—the space covered by the right was shorter than that covered by the left. There was still a half-inch atrophy of the thigh and the calf was now a half-inch smaller than its fellow. External rotation was certainly less complete on this side than on the other, and I could not flex the limb or abduct it quite to the normal limit. The parents regarded the case as long since cured, and for all practical purposes he was as active as any boy in the neighborhood.

I learned that he went under treatment shortly after I saw him in 1880, at a similar institution, wore a hip splint, continued its use under directions for nearly a year, and the splint was finally removed by the parents on their own responsibility. I could not get a history of any exacerbations. Whether the disease has undergone permanent resolution, or whether there be an unusually long remission, it is difficult to decide. At all events the parents and the neighbors credit the splint with the cure. So, in the boy whose case is reported on page 230, the prayers of the priest got the credit for the cure. Cases like these, with such well-marked signs of bone disease, are extremely rare. I have seen very many in which I have felt just as hopeful of complete resolution, and have been congratulating myself or some of my surgical friends on the good result, when, on the slightest provocation, an acute exacerbation would declare itself, dissipating all my hopes.

It may be pertinent to inquire what the expectant treatment will do for a chronic articular osteitis of the hip, if begun in the first stage. From my records I have selected some cases, a report of which will show what the method, in its popular acceptation, can accomplish.

A girl, aged seven years, came under treatment near the

beginning of June, 1879, giving a tuberculous family history, and the history of a lameness of three months' standing. At the same time her lameness began, or shortly thereafter, she complained of pain in the groin and night pains soon developed; in other words, the first exacerbation appeared early and persisted at least two months. My notes of her condition are pretty full, and instead of giving them in detail, I shall simply state that there were present nearly all the signs of a typical bone lesion of the hip in the early stage. An error in diagnosis, I think, was out of the question. Under the hospital regimen, cod-liver oil and an alterative tonic, there were no further exacerbations of any significance during the year succeeding her admission. The signs gradually disappeared, and in August, 1881, I recorded an arrest of the disease because I could not detect any lameness, any reflex muscular spasm, any resistance to movements carried to normal limits, any atrophy, or any joint tenderness. I did find, however, a slight change in the contour of the nates, a little flattening, and a little enlargement, apparently of the trochanter. The lesion was probably confined to the diaphysis, and perhaps eventually encroached on the trochanteric centre of ossification.

A case that came under my observation for the first time in the spring of 1878 was instructive for many reasons. The patient was of the same sex as the one just reported and was four years of age. In this case the lameness was more marked in the afternoon, in the other it was more marked in the forenoon. The father of this child was under my care for an osteo-sarcoma involving the knees, and of this he eventually died.

In the beginning of the year, three months prior to her admission to the hospital, she began to walk lame, and it was very clearly reported that the lameness came on immediately after a fall. The signs found on my examination were, slight eversion of the foot and advancing of the limb, a slight yet perceptible hip limp, a broadened natis, a crease shortened and lowered, a deformity at an angle of 150° , with very little, if any, motion by reason of the reflex contraction, and a half-inch atrophy of the thigh. Negatively I found an absence of effusion or infiltration about the trochanter, no shortening, no bone or joint tenderness. When asked to locate the pain she placed her hand on the outer side of the knee. The treatment adopted

was the same as in the other case, and in June, as she was convalescing from an attack of rubeola an exacerbation of pain, restlessness at night, etc., developed. Relief not coming promptly, a fly-blister was applied to the hip, and for a week subsequent to its application she rested much better. A month elapsing the symptoms returned, and it was noted that the parts about the hip were very tender. A second blister was applied, and the child was not allowed to move around unless by means of a rolling-chair.

It was fully a month before any decided relief was apparent, and during the next eight months not an untoward symptom developed. In June, 1879, a note was made that the thigh could be completely flexed without pain or resistance, and could be extended to 160° with equal facility. She had no pain, and walked with great ease. The medicines were discontinued.

Nothing noteworthy occurred during the remainder of the year; only it was from time to time observed that the movements were becoming less free; indeed, on December 12th, I found the arc of motion only one half as great as it was in June. Again, in February of the following year the arc was much greater than it was in December. A circumscribed fulness had appeared near the trochanter, and an abscess was thought inevitable.

During the years 1880-81 she had recurring attacks of naso-facial erysipelas, but no symptoms of any moment referable to the hip. The tumor gradually diminished in size, and the final result of the case, as noted June 10th, 1881, was as follows: a girl in apparently good health, able to walk with very little inconvenience, although the toes and ball of the foot served for the whole sole. There was an inch real, and an inch and a half practical shortening; an inch and a half atrophy of thigh, and an inch of the calf; joint surfaces smooth and free from tenderness; flexion perfect, and extension nearly perfect; a little resistance offered as the limb was abducted toward the normal limit; rotation permissible over about one half the normal arc; the abscess sac barely appreciable.

It will be seen from the foregoing that the case presented a joint pretty completely locked in the early stage, that the exacerbations were few, that an abscess appeared and the contents of the same were probably removed by absorption, and that a very mobile joint was obtained despite the shortening and atrophy of the limb.

I should like to have more such cases to report, but candor compels me to state that these results are exceptionally good.

It is seldom that an abscess does not sooner or later appear, and it is seldom that it takes the same course as the one in the case reported.

The following is an illustration of how poorly a certain number respond to the expectant treatment: In April, 1879, there came into the hospital a fairly-nourished boy four and a half years of age, who had been favoring the left limb for four months. The family history furnished nothing definite as to predisposition, yet it is fair to say that few facts were attainable. It was only two weeks before his admission that an exacerbation showed itself, so that when I first saw him the symptoms were very well marked. There were; a deformity approximating that characteristic of the second stage, a decided limp peculiar to chronic ostitis, a very limited amount of motion, and an angle of deformity at 135° . The pain was referred to the groin, and the limb would not tolerate much handling. The usual treatment was adopted and the exacerbation soon passed off, to be followed three months later, however, by another. For his pains at night a cantharidal plaster was applied and the parts poulticed as is the custom. Ten days afterward relief came, and the next exacerbation—two months elapsing—ended with an abscess which occupied the outer side of the thigh. This increased to a large size and opened spontaneously three months after its appearance. Hectic fever occurred on the sixth day, but did not continue longer than forty-eight hours. About this time another abscess could be recognized in the gluteal region, springing apparently from the digital fossa. The tumor spread rapidly throughout this region, and opened near the sacroiliac synchondrosis within a month. This was the third week in January, 1880, and on the eighth of February I recorded the following note:

"Is greatly emaciated, eyelids puffy, feet œdematous. Liver dulness extends four fingers' breadth below free border of the ribs; the abdomen is distended; an open sinus above Poupart's ligament is discharging quite freely, and there is another over the trochanter. The thigh is flexed at an angle of 90° , and is strongly adducted."

He died from exhaustion four and a half months afterward, and on autopsy I found no ankylosis, but destruc-

tion of the capsular ligament in its upper and lower fourths, where one's finger could be easily inserted, encountering eroded bone dark in color and fœtid in odor. The iliac bone, including the acetabulum, exhibited no lesion whatever, either superficially or on section. On vertical section of head, neck, and shaft the lesions found were, absence of articular cartilage, about one half of the necrotic head the remainder lying in fragments in the acetabulum, a little irregularity in the line of epiphysial union, and about a half inch below this line a yellowish spot in the centre of ossification of the neck.

I could not find a vestige of the ligamentum teres. The liver was enormously enlarged and on section had a waxy appearance, the iodine test also fully confirming the diagnosis of lardaceous degeneration. This was an excellent case for early interference, and the lesion as shown post mortem was one for which the expectant treatment could do nothing. The evolution was unusually rapid, and the appearance of lardaceous changes came on very soon after the opening of the abscess.

A single other case will illustrate some practical points in the management of this disease. It was in a boy twelve years of age, whom I saw first in December, 1880. The maternal history was decidedly tuberculous. In the early part of the year the boy began to walk lame, and the lameness was uninterrupted by an exacerbation until five weeks before his admission to the hospital. The right limb was apparently lengthened, a little advanced, and rotated outward. The changes in nates, the lordosis, the inability to walk, the locking of the joint at an angle of 135° , were salient points in enabling one to recognize this as the typical second stage. There was an extreme degree of tenderness in and about the joint. This was regarded as a fine case for blistering, and a blister was promptly applied. The relief was only temporary as an abscess made its appearance within three months on the outer aspect of the thigh lower third. It grew rapidly and was soon opened by incision. In spite of tonics and stimulants the boy rapidly lost flesh, and in less than two months another abscess involved the whole of the gluteal region, causing a vast deal of suffering. During the summer he had very few days without pain, he grew thin, and the limb assumed a very awkward position. In November, 1881, he was removed. The angle of deformity was 120° , and the case seemed hopeless. He was

taken to a home that was devoid of all hygienic qualifications, a home where intemperance prevailed, and yet within a month the most marked improvement had taken place. In the following May I saw him and the sinuses were closed, his general health was excellent, and the disease seemed to be arrested. Tracing him out during the past spring I found that no exacerbation had occurred since he left the hospital. The deformity was about 135° and he was quite active. The point I wished to bring out is this, viz., that patients sometimes reach a stage in the progress of the disease where removal from a hospital offers the only hope of recovery. They become depressed, get homesick, and all remedies fail. Let the home be ever so humble, ever so unhealthy, the change often works wonders.

The claims that are set up for the expectant treatment are, that

1. As good results are obtained as by other methods.
2. There is less expense and less inconvenience to the patient.
3. The nutrition of the limb is not impaired.

With regard to the first claim, it is not proven. Regarding the second, I am aware that the expense of apparatus is a serious drawback in this specialty, and many patients do object to the cumbersomeness of these appliances, many of which are ill-fitting and fail to meet the indications. The extensive abuse of mechanical appliances has served to bring them into disrepute. So far as my own observation goes, well-fitting splints render the patients very comfortable, and the relief they experience from pain and muscular spasm is so great that it is difficult to bring about a suspension of their use.

Concerning the third claim, the clinical history abundantly proves that the nutrition of the limb does suffer with or without the use of apparatus; indeed it is a clinical fact that atrophy is one of the most valuable signs in diagnosis.

My own conclusion, after twelve years' daily experience with the commonly accepted expectant treatment, is, that

1. In a very few cases of chronic articular ostitis of the hip good results are obtained.
2. In the large majority of cases it is utterly inadequate either to arrest the disease or to secure the best possible result, irrespective of the stage in which the treatment is begun.
3. Whenever one can feel assured that he has a genuine

case of chronic articular osteitis of the hip, science demands, humanity demands, that the so-called expectant method should form no part of the treatment. The rule admits of few exceptions.

4. When one is in doubt as to the diagnosis, and the preponderance of evidence seems to be against the lesion being one in the bones entering into the articulation, the expectant method should be adopted pending the period of doubt.

5. If the evidence is in favor of a bone lesion, abandon the expectant treatment.

I speak advisedly on this subject, and I speak fortified by a faithfully recorded experience.

Cases like the following certainly make an impression. It made a painful impression on me, and I charged it up to the credit side of expectant treatment. The case has already been reported in the chapter on clinical history, and may be found on p. 244. The points are briefly these: He was six years of age, was admitted in January, 1873, had a poor family and a poor personal history, had been limping since June, 1872, had had one or two rather severe exacerbations; on admission his limp was very slight—scarcely perceptible—the gluteal signs were slight yet sufficiently well marked, the deformity was nil, flexion could be made to 90° without pain or resistance, there was no joint tenderness, no atrophy, no shortening. A diagnosis was easily reached, however, the disease not having advanced beyond the first stage. A blister was ordered forthwith, but, on reflection, was postponed because he rested well at night. A liniment of iodine belladonna and soap with a spica bandage was used. In February he began to sleep poorly, to walk with more difficulty, and Fowler's solution was administered. The symptoms subsided in a week, and in May the mother talked of removing him. On examination then he stood squarely on both feet with limbs parallel, and scarcely favored the right hip in walking. There was no articular or periarticular tenderness that I could elicit, and flexion of the thigh could easily be made beyond 90° .

In June it was thought that a cure had been effected so active had he become, still a careful examination would detect a few signs. Early in July he was climbing some scaffolding, and fell striking the hip. He was scarcely able to walk the same day, and cold-water dressings and rest fail-

ing to give relief, a blister was applied a few evenings later. It was poorly applied, and a week or two afterward a second one was applied, getting a good vesication. The poultices were used as is the custom—a fresh one every six hours for three days.

About this time two large boils appeared on the left hip, but were considered the effect of the vesication. The left



FIG. 33.—ARTICULAR OSTITIS, BOTH HIPS.

hip presented signs indicative of bone disease, and it was not long before the second stage was reached. In the meanwhile the disease on the right side was advancing to the third. Abscess formed in gluteal region and on posterior surface of thigh, deformity became extreme, the boy became quite helpless for a long time, and was only able to get about in a rolling chair. Finally in February, 1875, he was able to leave the rolling-chair, and his mode of progression

is well illustrated by a drawing from life. See Fig. 32, which represents very accurately the deformity of both hips. At this time the liver was found enlarged. After prolonged suppuration he was finally discharged as incurable in September, 1876.

My restrictions, I would have it understood, apply to the method as popularly understood. If the system were freely carried out, if not only the aim were to relieve the exacerbation in the early stage, but to prevent and correct deformity, or to bring about that deformity, if deformity needs must come, which will secure the greatest usefulness of the limb, then I should say, By all means retain the treatment, yet never hesitate to abandon it in individual cases where it becomes clearly ineffectual.

CHAPTER XVI.

TREATMENT OF CHRONIC ARTICULAR OSTITIS, BY CRUTCHES AND HIGH SHOE WITH OR WITHOUT FIXATION.

I. THE PHYSIOLOGICAL TREATMENT OF DR. HUTCHISON.

II. COMBINATION OF THE PHYSIOLOGICAL TREATMENT WITH FIXATIVE SPLINTS.

1. The simplest form of mechanical treatment is that brought forward by Dr. Hutchison of Brooklyn, and is called by him the Physiological Method. The body is supported in walking by means of axillary crutches, and the limb diseased is allowed to swing, its own weight being relied upon to make the necessary amount of traction, while the peri-articular muscles by their reflex spasm serve to secure the necessary amount of fixation. The treatment is not complete, of course, without the high shoe, or patten, on the sound foot.

I have not classed the weight and pulley known as Buck's extension as a separate form. This is employed now more as an adjuvant than as an independent mode. It is employed at times in connection with the various splints and appliances, and is used expectantly to relieve urgent symptoms or persisting signs. When the indications are met, it is discontinued. This would be more properly a step in the expectant plan of treatment.

2. Closely allied to the physiological method is the plan employed by Mr. Hugh Owen Thomas, of Liverpool, which is a combination of the physiological and the fixative methods. The principle involved is immobility, and this is best secured, Mr. Thomas claims, by limiting the movements of the joints immediately above and immediately below the hip-joint.

3. Fixative splints, whose sole object is to retain the limb in position, resisting thereby the muscular spasm that is so important an element in the production of deformity. These are called appliances for securing rest.

4. Splints whose object is not only to protect the joint but to make traction. These splints embody what the English choose to call the American idea.

I. THE PHYSIOLOGICAL TREATMENT.

In 1879, when Dr. Hutchison so zealously and so ably advocated this plan of managing hip-joint cases, many of us wondered why it had not occurred to us before, and many more of us fancied that we had at last been freed from the thralldom of splints. It seemed very simple and very useful. Somehow it has always been my misfortune to meet with cases that are grave from the beginning. I seem to meet with hip-disease which involves the bony structures; and, get the cases ever so early, I find them exceedingly tedious, exceedingly slow, and so prone to relapses that I am rendered consequently slow myself in publishing cures.

Since 1879 I have employed this method in quite a number of cases, and I am not ready now to give an analysis of the same. Some of my best cases are still under treatment. I have seen enough, however, of its practical working to form a very fair estimate, I think, of the value of the method. I look upon it, moreover, as but a part of the expectant plan, and, in so far as it gives protection to the joint, I am its warmest advocate. I am convinced, though, that it *does not* prevent deformity, and I have not had anything like the success that is recorded in Dr. Hutchison's book, published in 1880. Let me give one of my best cases; indeed, it is the only one out of a large number that has done well, and yet the the case is not complete.

In July, 1878, I began treating a little girl whose case had advanced to the second stage. Her disease had lasted since March. When I saw her the limb was held rigidly flexed at an angle of 80°, and the adduction was very great. She lived in the country, and as she had just passed an exacerbation, nothing was done further than to prescribe a liniment and an alterative tonic. I did not see the case again until March, 1879; it had been under another physician, but the same prescription had been followed. The deformity was as great as when I saw it in July. The crutches and high shoe were now ordered; and, as her father was a man of much mechanical ingenuity, he fully appreciated the idea, and had directions followed to the

letter. In May and in July I recorded an increase in the mobility of the joint. She found much relief from the treatment; had had only an insignificant exacerbation, and in December I found that the thigh could be easily flexed to an acute angle, could be extended to 135° before any resistance was encountered, and could be abducted and adducted over small arcs. I could rotate the limb, too, quite easily, and there was no apparent shortening, but a real shortening of a half-inch. In the following March I made a similar note. In September, 1881, the treatment having been continued the meanwhile, I found that I could extend the limb to 150° , but I recognized in the iliac fossa a well-marked tumor, which I took to be an abscess. A week before this note was made she had fallen, striking the ilium near the anterior-superior spinous process, and next day complained of pain at the knee. I could not detect any joint tenderness, and could not perceive any diminution in the arcs of motion. I gave no attention to the tumor, and in January, 1882, it had reached the size of a hen's egg, and filled the groin. It had caused no pain or inconvenience, but the shortening of the limb was now one inch. For the tumor I ordered the hot douche twice a day. In March there was a practical shortening of three inches, and a real shortening of one inch. The tumor was as large as ever, and there was a marked tenderness of the joint. Over the trochanter a shade of fulness could be detected. She was crying in her sleep, and was generally indisposed. Hot fomentations at night were ordered, and the crutch and high shoe continued by day.

In July the tumor was perceptibly smaller; otherwise there was no change. I did not see the case again until February of the present year, when the angle of deformity was 135° . Flexion could be made to 45° , rotation and abduction and adduction could be made over small arcs. As the child stood the limb was rotated outward. I looked long and diligently for the abscess, and had to record, "Not found." From the umbilicus to the lower border of the internal malleolus there were two and a half inches shortening (practical), and from the anterior-superior spinous process one and a half inches (real).

My last note was on the twenty-seventh of July. The limb hangs at angle of 150° ; is easily flexed to 45° . There is no infiltration about the trochanter, in groin, or iliac fossa. The tip of the trochanter is one inch above Néla-

ton's line, and the shortening is the same as measured in February. My impression is that I shall get a cure that will compare favorably with any case that can be shown.

It will be seen that after three years' treatment the limb shortened one inch, abscess formed and disappeared, and a most excellent degree of mobility was obtained. And yet I cannot help contrasting this with other cases I have treated without crutches and high shoe. Take for instance the case on page 329. This girl, it will be seen, was in the hospital, not in the country; had a bad family history and a bad personal history. She had a hip, in the early part of her hospital treatment, that was locked against movement. Later the movements were very good, an abscess appeared, disappeared. Finally came out, with an inch and a half shortening, and joint function nearly perfect. The duration of treatment was three years.

Another girl I had under observation a number of years, with sinuses and abscesses, finally made a fair recovery, with the limb in a very serviceable position. The treatment had been constitutional, and in February, 1879, I made a note that the ulcers and sinuses were healed; that she had very little deformity, very fair motion, no pain or tenderness, and that she walked with much ease. At this time she was ten years of age, and her *left* hip had been the one about which the disease had spent itself.

About the first of October, of the same year, she began to complain of pain about the *right* hip, and four or five days later I made an examination, finding it impossible to flex the thigh to a minimum extent, even without pain; considerable infiltration in the groin, and much joint tenderness. Comparative measurements were unsatisfactory, because of the shortening in the other limb. The length of this limb, however, was twenty-six and a half inches. I decided upon the physiological treatment, but the exacerbation was so acute, and the other limb was so insecure, that I waited a few days to devise ways and means. In the mean time a blister was ordered. A temporary relief followed its application, but ten days later she was confined to her bed, and all the symptoms were aggravated. Movements in all directions were resisted, and the limb was held flexed at an angle of 140° . She fairly made night hideous with her shrieks, and had to be propped up with pillows to secure any rest at all. Another blister was ordered. This was the last of October, and three days

later I found her quite comfortable. She had slept quietly all night. With much care I could flex the limb to 120° , and extend to 150° . Abduction and rotation were resisted as soon as attempted. I could not detect any joint tenderness.

Pathologically speaking, I regarded the case as one beginning as an acute coxo-femoral synovitis. It was not many days before I had her on a pair of crutches, with a six-inch high shoe on the foot of the left limb. It required two months to teach her how to get about on her apparatus, and before she was able to move around unassisted another exacerbation came on rendering her quite helpless. The sisters of the girl were very persevering in teaching her to walk, and by the following May I was surprised to find with what ease she moved about. The limb was apparently lengthened, the toe not clearing the floor well as she walked. In June I had twelve ounces of lead attached to the heel, with the desired result. The case progressed slowly, marked by frequent exacerbations, and it was not until December, 1881, that the treatment was discontinued. The right limb then measured twenty-seven and a quarter inches. The limb was very nearly straight, yet the movements were restricted to very small arcs. No suppuration had occurred, and there was no infiltration about the joint. At present writing she walks with comparative ease by reason of compensating deformities. The angle of deformity on the right side is 160° , on the left 130° , and movements on both sides are restricted in all directions. The joints are practically ankylosed.

This certainly was a very fair result, if we consider the difficulties under which I labored. It was certainly better than the result obtained in that of a case I put under the same treatment in the summer of 1879.

In May, 1878, I diagnosticated a chronic articular ostitis in a boy six years of age, after he had been walking lame for two weeks. I did not get the case to treat however until a year afterward. He wore a long splint the latter half of the intervening year, and when he came again under my observation the angle of deformity was 165° and the limb was only a half-inch short. The boy was so irritable that a satisfactory examination as to motion was out of the question. Suffice it to say, this seemed to me a very good case for the physiological treatment, and I forthwith put it into effect. It was at least two months before he learned to use the crutches well, and in January of the following

year, as the deformity seemed to be increasing, I had a piece of lead attached to the heel of the shoe on the suspended limb. The joint became more securely locked, and about this time the first of a series of abscesses made its appearance, the locality being the space beneath the tensor vaginae femoris.

It is unnecessary to follow the case, through these successive abscesses, through the pains and the increasing deformity. It is enough to know that the treatment has been faithfully and persistently followed; that the disease has progressed from bad to worse without a reassuring interval; that lardaceous degeneration has declared itself by unmistakable signs, and the limb is now ankylosed at an angle of about 130° , is at least two inches shorter than its fellow; and that the inguinal region, the gluteal region, and the thigh on both lateral and posterior aspects presents one network of sloughing and burrowing ulcers, open sinuses and cicatrices.

And yet this case does not present so melancholy a history as that of a boy *æt.* nine years, who contracted disease of the bones entering into the formation of the hip in 1877. It had reached the second stage when I first saw the case in February, 1879. It was under the care of the family physician, and was sent to me simply for advice. I advised the crutches and high shoe. In May he was formally committed to my care, and I recorded his angle of deformity, 135° , his shortening, a quarter of an inch, the absence of joint tenderness, and the limitation of movements. The limb did not seem heavy enough to make the desired traction, and ten ounces of lead was added.

A month later the angle of deformity was 90° and the patient was in the height of a very acute exacerbation. The next note, a month afterward, records the subsidence of the exacerbation, but the deformity was unrelieved. It was a month before I recognized that a dislocation had taken place since the treatment had been employed, and he was admitted to the hospital, where a more careful examination revealed the following interesting facts: four and a quarter inches shortening, the trochanter above Nélaton's line, ability to flex the thigh to an acute angle, inability to extend beyond 90° , an extreme degree of adduction, the presence of what seems to be the head of the bone on dorsum ilii, and an absence of any signs pointing to suppuration.

An anæsthetic was administered while the deformity and shortening were overcome. A leather splint was applied, and the weight and pulley employed for a fortnight. He was then discharged from the hospital, but continued under treatment as an out-patient. The limbs were equal in length, and he was put on the crutches again, the high shoe completing the outfit. He wore the leather splint three months, and then relied solely on the crutches and high shoe.

From this time hence his suffering began anew. Night extension was employed, but abscess formed, the limb shortened, and the deformity came on slowly. He continued to go about for nearly a year, but finally took to his bed, the suppuration became profuse, the deformity extreme, and later still the symptoms of lardaceous degeneration declared themselves. He lingered until the spring of the present year.

I have notes of several cases under this form of treatment for a year or two, deriving no benefit, and finally coming under mechanical treatment. It is a clinical fact that patients using the crutches and high shoe do feel encouraged during the first few months, and that they exhibit a certain temporary improvement. Many of us, no doubt, shared Dr. Hutchison's enthusiasm when the treatment was yet new, and we heartily subscribed to the peroration found on page 32 of his work on Orthopædic Surgery:

"What a boon it is to get rid of the paraphernalia with which the diseased limb was formerly encumbered—the harness and the trappings, the weight and pulleys and adhesive plaster, the perineal bands and the iron splints, and all the discomforts which their use implies!"

I was peculiarly impressed with that sentiment, and, in my own copy can be found a long mark of approval about the passage. Would that I could subscribe to it now! I had had no experience then; I have an experience now. In my interviews with various surgeons I have learned that the treatment has been disappointing. In Dr. Bradford's article on The Treatment of Hip-Disease, published in the Boston Medical and Surgical in November, 1880, his conclusions even at that time were that "it meets certain indications, but cannot be relied upon in all the phases of the disease. Patients treated according to this method illustrate that at some stages and in some cases the natural fixation is apparently sufficient, and that at times but little extension is needed; but it is also clear that in many cases the weight

of the limb is not enough to overcome muscular contraction, prevent deformity, and give the patient the greatest amount of freedom from the discomfort due to disease at the hip-joint. As a means of extension it is imperfect, for the reason that it is efficient only when the patient is upright; for fixation, it does not perfectly guard against involuntary motion occurring during sleep; it also is not certain to protect the joint from jar, for in practice many children when not suffering from a painful joint will be found occasionally to kneel upon the affected limb, or take a step, unless watched more closely than is usually practicable."

I have thus quoted Dr. Bradford at length, because all the points he makes are illustrated by cases; and were I to formulate my own conclusions, I should embody the same ideas.

II. FIXATION SPLINTS ASSISTED BY THE PHYSIOLOGICAL METHOD.

There are a number of splints that bear the names of the different surgeons, who have either invented them or employ them, and while some are not expected to require any additional assistance, they all are meant to serve one special object, viz., fixation. All surgeons at the present day who employ such appliances have come to recognize the importance of suspending the body on crutches so that the idea of fixation and rest may be all the more fully carried out. They all aim at immobility of the joint, with extension. There are really very few that are constructed with these two ends in view. These may be enumerated in the following order:

1. *Dr. Hamilton's Wire-Gauze Splint.*—Closely allied to this is the wire-gauze splint of Mr. Barwell. The accompanying diagrams represent a front view and a rear view of the apparatus. It will be seen that it consists of an iron wire frame moulded to the pelvis and thigh. This frame is covered with wire gauze. The whole is kept in place by a pelvic band and a broad thigh band, both of which are secured by buckles. To secure exercise in the open air crutches are used. With a high shoe, the weight of the limb will thus prove an extending force. I have no personal knowledge of the value of this splint, do not even know of any cases that have been thus treated, hence can draw no conclusions as to its value.



FIG. 34.—HAMILTON'S SPLINT—FRONT VIEW.



FIG. 35.—HAMILTON'S SPLINT—REAR VIEW.

2. *Dr. Vance's Leather Splint.*—On the same principle Dr. Ap M. Vance has constructed a splint of saddle leather. The Doctor selects the best saddle skirting, and with soft paper takes a pattern of the sound hip in the position it is desirable to fix the diseased hip. When this pattern is reversed it will fit the other hip, and the leather when prepared for application will have somewhat the shape of the drawing in Fig. 35.

The lettering represents the following parts: P. B. is the pelvic band, and is seen to be of good width; T. B., is the thigh band; T., tongues of thinner leather and sewed to the splint after it has been moulded and fitted to the parts. These are applied in finishing up the splint; S. H., shoe hooks, also attached in the finishing process; R., copper rivets for securing the gusseted portion; A., a gusset to permit of adapting the splint to the pelvis.

The limb is placed in the desired position in one of three ways, according to the exigencies of the case. 1. If but little muscular spasm exists it can be easily forced into posi-

tion by the hand, and securely maintained pending the drying of the leather. 2. If the spasm and contraction be too great for this procedure, the weight and pulley can be employed for a few days or weeks, as the case may be. 3. In the opinion of some surgeons it is better to administer an anæsthetic and bring the limb into position at once by

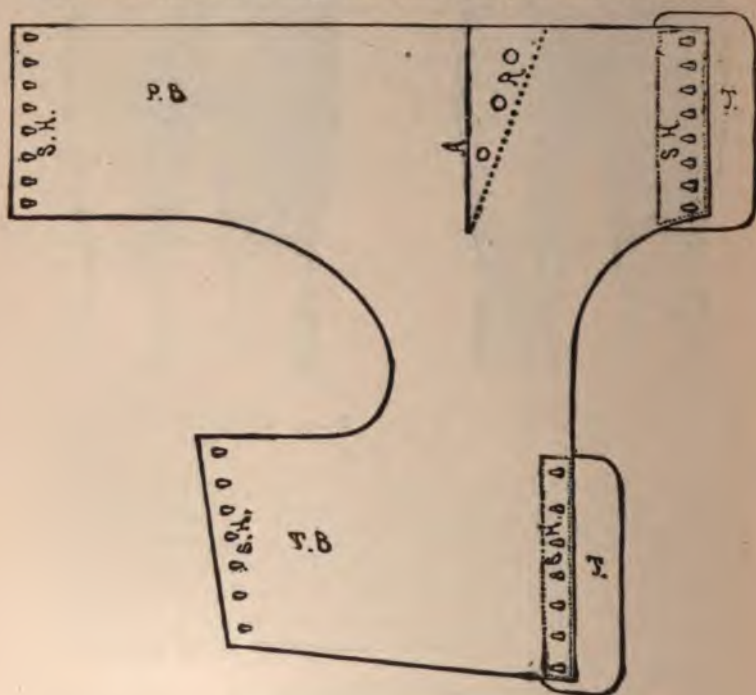


FIG. 36.—LEATHER SPLINT BEFORE IT IS MOULDED TO THE HIP.

force. By reason of our ignorance of the exact stage of the pathological process I deem this last process of reducing deformity exceedingly hazardous. Of course there are periods when it can be done with impunity, but I have seen so many distressing symptoms, so many disastrous exacerbations follow in the wake of these operations, that I always raise my voice against the practice, especially in the pre

suppurative stages. The leather is now immersed in *very hot* water long enough to make it thoroughly pliable. Then, while the hip is in that position we desire, mould the leather about pelvis and thigh, securing it with a roller. In from fifteen to twenty minutes it will "set," and be sufficiently hard to admit of removal without losing the shape. In order to give one time to dress and complete the splint the position of the limb should be secured by weight and pulley. If there be no occasion for haste in completing the apparatus the leather can be left on the parts for twelve hours, and then, when removed for purposes of completion, the limb will be less likely to resume its original malposition.

The edges are pared down, the gusseted portion is riveted as desired, the hooks and tongues are attached, and, if one prefer a perforated splint, holes can be made with a belt-punch without weakening to any great extent the apparatus thus constructed. To guard against excoriation or undue pressure over the crista ilii fenestra are cut in these portions of the splint, and if it be necessary to take special precautions against the recurrence of deformity a strip of steel can be riveted in front, as seen in Fig. 36, which represents the dressing in use. It will be seen also from this figure that the parts are protected by some soft material, such as the leg of a pair of closely-fitting drawers. If abscesses already exist, or form subsequent to the beginning of this treatment, openings in the leather are made when desirable. The special advantages claimed for this splint are, that it is easy of construction, easily fitted, and can be cleansed with soap and water without the least detriment to the material. Furthermore, if it be desirable to change the position of the limb, it can be done as in the first instance, the splint can be immersed again in hot water, and reset as before.

This treatment in intelligent hands I know yields good results. The joint is protected, a good position of limb maintained, the patient is comfortable, and the disease is placed under the control of the surgeon. The objection that is urged against all short splints can be brought against this, viz., that it does not immobilize the joints above and below the hip. It is very easy, however, to make the bands wider, and thus meet this objection. For very young children who cannot be taught the use of crutches it does not fully protect against alterations in the position



FIG. 37.—DR. VANCE'S LEATHER SPLINT.

of the neck of the femur. They will walk when not suffering an exacerbation, and the weight is necessarily thrown on the limb.

3. *The Liverpool Method.*—Mr. Hugh Owen Thomas, of Liverpool, England, has, for a number of years, employed a method of fixation that seems to secure this object better than most of the splints now in use. At the same time, while disavowing any attempt or desire even at extension, he uses in conjunction with his splint the high shoe and crutches. He certainly takes enough precaution to protect the joint from injury, and the zeal with which he pursues his practice, and the favor it is meeting with throughout Great Britain, bespeak for it more consideration than the surgeons in our own country seem willing to give. In Chapter III. of the second edition of his work on "Diseases of the Hip, Knee, and Ankle Joints," he gives very explicit instructions about the making of the apparatus, and it would seem that any surgeon possessed sufficient mechanical tact to construct an instrument for himself. The patient is to stand with weight on the sound limb, while the foot of the side diseased rests on a block, or book, or cushion, sufficiently high to bring the spinal column perfectly straight. Ordinarily, in cases that have not advanced beyond the first stage, the height of the foot-rest sufficient to secure this vertical bearing will be one inch. To secure the best fit, the whole of the posterior aspect of the body, including the lower limbs, must be divested of clothing.

The materials necessary for work are:

1. A flat piece of malleable iron long enough to extend from the lower angle of the scapula to the junction of the middle with the lower third of the leg—just where the calf begins. This should be an inch in width and a quarter of an inch in thickness, for an adult, and three quarters of an inch by three sixteenths, for children.

2. Three strips of hoop-iron: *a*, one for the chest an inch and a half in width by one eighth of an inch in thickness, and for its length about four inches less than the circumference of the thorax; *b*, another for the thigh, three quarters of an inch in width and one eighth of an inch in thickness, and its length two thirds the circumference of the limb in its upper third; *c*, another band of similar strength for the calf, and equal in length to one half the circumference of the limb at this point.

3. A set of wrenches with which to shape the iron bars.

These are made by a smith, and properly tempered. Those marked 1 are enough for all practical purposes; 2 is another form, and may serve a better purpose at times than the other pair. To any one who makes any pretension to the practice of orthopedic surgery these or similar wrenches are very valuable.

This long iron bar now, with the patient in the position above-named, must be moulded over the buttock along the course of the sciatic nerve, through the popliteal space, and over the calf to the lower end. These precautions are

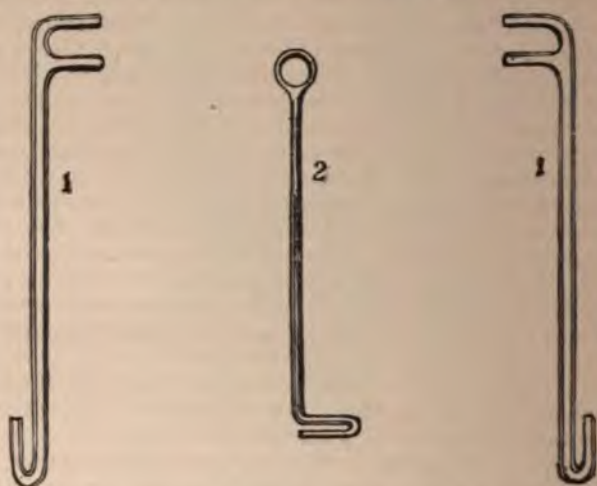


FIG. 38.—SERVICABLE WRENCHES IN FITTING ORTHOPEDIC APPLIANCES.

necessary to avoid excoriations. Indeed, one of the great secrets of success in all forms of apparatus is the extreme care one takes in the application of the same. The lumbar portion of this upright will be a plane surface, in fact, Mr. Thomas insists on it being "invariably almost a plane surface." It is necessary to rotate this bar on its axis at a point just above the buttock curve, in order to adapt it to the individual patient, as some are more plump than others. This can be easily accomplished with the wrenches.

The next step in the preparation of the splint is to mould this longer strip of hoop-iron into a chest-band. It is to be riveted to the top of the upright bar at a point one

third its length, measuring from the end corresponding with the side diseased. The shape will be oval, and this will be found necessary to prevent the splint from turning. The thigh strip is now fitted in the same manner as the one for the chest, and is to be secured to the upright at a point from one to two inches below the ilio femoral crease. The third, or calf strip, is fitted in the same way, and riveted at the lower end. These three are called crescents, and are distinguished as chest, thigh, and calf crescents of the splint. If it be desirable to immobilize both hips when both are diseased, for instance, the other upright is connected to the first by a cross-bar in the lumbar portion. When the patient or friends do not object Mr. Thomas prefers this double splint, even in cases where only one joint is diseased, as he can then feel more certain of its efficacy.

The crescents being riveted to the upright the instrument is ready to be padded and covered. For the padding a single thickness of No. 1 boiler felt is preferable, and for the covering basil leather as used by saddlers is preferable to any other material. A saddler can do this with very little inconvenience. The upper or chest crescent is secured to the body by a strap and buckle. Suspenders are used over the shoulders, as seen in Figs. 38 and 39; the lumbar portion is secured by a common roller bandage, and the limb portion in the same way.

With the patten high enough to clear the foot of diseased limb and the crutches the outfit is complete, and Fig. 38 represents an anterior view of the patient ready for exercise. Even when the instrument has been carefully made and comes from the shop, more moulding and fitting is frequently required of the surgeon himself. The crescents may have to be shaped differently to get the upright in the proper line, and salient points will require a little more bending. Indeed, however lightly one may think of the apparatus as a therapeutic agent, he cannot but help admire the great attention to details which Mr. Thomas exhibits in describing his plan. Some men may have the best instrument in the world and get the poorest results, and *vice versa*.

The surgeon must not think his work done when the splint is applied. He must see it from day to day, for weeks perhaps, and aim to get the best possible fit.

Inward and outward rotation of the limb, abduction, and adduction can be frequently corrected if not too exaggerated

by the uses of the wrenches while the instrument is on the patient. These little tendencies can easily be thus corrected.



FIG. 39.—FRONT VIEW OF MR. THOMAS'S SPLINT APPLIED.

For bandages flannel rollers are the best, and should be employed by all means in young children.

For the correction of deformity, the upright is bent in

the buttock portion and the splint is applied in the deformed position. From time to time the curve of the upright is



FIG. 40.—A POSTERIOR VIEW OF THE THOMAS SPLINT.

lessened by degrees at the point, A, indicated by the arrow in Fig. 40.



FIG. 41.—MODE OF GRADUAL CORRECTION OF DEFORMITY WITH THE THOMAS SPLINT

I have thus given in considerable detail the construction and the mode of application of this instrument, and have confined myself pretty closely to Mr. Thomas's description. For still more of detail, however, I must refer to the work itself.

During the first three or four months after the application of the splint the patient is confined to the bed, and a change in the appliance is never made unless under the direct supervision of the surgeon. While any changes are being made the dorsal decubities must be maintained, and under no circumstances must the sitting posture ever be tolerated. While the patient is thus confined to bed during this period Mr. Thomas calls it his *first stage* of treatment.

The *second stage* of treatment begins when the patient leaves the bed. Then the high shoe and the crutches are employed. There is no definite length of time for the continuance of this stage, as it depends upon the rapidity of atrophy. It must be "continued until the limb is well atrophied about the great trochanter." Considering the variability of atrophy this seems to me a very uncertain guide. A better one in my opinion would be the length of time since the patient had had an exacerbation.

The disappearance too of all inflammatory products in the neighborhood of the hip should also be an element in determining the duration of this stage. Splints that immobilize the joint surrounded by bone disease should be worn from one to two or three years. I am arguing now against contingencies; I am arguing in favor of giving the joint every possible chance.

In the *third stage* of treatment the splint is removed at night, and replaced during the day, the patient still using the crutches and patten. The duration of this period is briefly given by the author as "a certain period." By reference to a few reported cases it will be seen to extend over a period of from two to five months.

The *fourth stage* of treatment begins with the removal of the splint altogether. The crutches and patten are still retained for a few weeks, or months, until the surgeon is satisfied that the cure is permanent.

One naturally wishes to know what the results are. Do the results as obtained justify us in subjecting the child to so much apparent discomfort? And again, is the discomfort greater than that where perineal crutches are used?

During the past summer a medical friend, who has for several years devoted his attention chiefly to orthopedic surgery, spent some weeks with Mr. Thomas, and he went over strongly prejudiced in favor of the "American method." This friend called to see me on his return, and I asked him particularly about the discomfort to which Mr. Thomas's patients were subjected. He replied by saying that he saw very few signs of any discomfort, that the patients seemed happy, and that good results were certainly the rule. Analyzing a few years ago the few reported cases Mr. Thomas has published, I found: one received in first stage, duration of disease and angle of flexion not specified, length of treatment twelve months, the first three months of which required the horizontal position in bed, with an ultimate "cure" for the result; four in second stage, two of which were of five months' standing, indicated by any given angle of flexion, say 150° , the other two, three and four months standing respectively, not indicated by any given angle of flexion; three were "cured," one "recovered," one kept the bed three months, one five months, one nine months, and one twelve months; five were received in the third stage, and in three relief was afforded, one recovered in three years' time, and one died twenty days after an excision.

In Dr. Bradford's paper, to which allusion has before been made, the method is not warmly advocated. From a few cases he had under observation he reports that "one, an active child too young for crutches, visibly lost in general condition from the confinement of the splint. Another gained both locally and generally, but complained of the irksomeness of the apparatus. A third has improved and is free from active symptoms, but is inclined to lay aside his crutches and step on the affected limb."

The following case is reported by Dr. Bradford as showing the value of extension over this fixation splint:

"A boy aged five, with hip-disease, had been treated for several weeks by complete fixation in bed, and an extension by weight and pulley. The symptoms, which had been acute, had subsided. There was no swelling, pain, or tenderness about the hip, and the case had been progressing favorably for some time. A Thomas splint was applied and accurately fitted. On the following night there was severe nocturnal pain, which increased on the next night. The next day the hip was found swollen and tender, and the

limb sensitive on jar. The symptoms all disappeared immediately on removal of the splint and the readjustment of the extension. The boy has since been progressing well, as before. The coincidence was so marked that there could be no doubt that the disease had been aggravated by the splint, and that this exacerbation was stopped by its removal. It should be said that in six other cases where Thomas splints were applied nothing of this sort has occurred."

The objections urged against immobilization are, to my thinking, without ground, and I believe with Mr. Thomas that the closer one can come to securing perfect rest the better the final result will be. It seems a rational theory he advocates, viz., that the movements to which a joint are subjected by muscular irritation, by strain or by jar, by inflammatory products excited by blistering, or by any other means, contribute largely to the ankylosis so common in this disease. In our treatment by the expectant method or by extension splints, we caution the patient against falls or strains of any kind, knowing that these little mishaps are often the direct cause of an exacerbation, and knowing that an exacerbation means the extension by contiguity of the inflammatory process to the joint and to the periarticular tissues.

If this plan will secure a movable joint the inconveniences are as nothing. At all events let American surgeons give it a trial.

CHAPTER XVII.

THE TREATMENT OF CHRONIC ARTICULAR OSTITIS BY EXTENSION APPARATUS, WITH OR WITHOUT MOTION.

This plan is almost exclusively American, and to American surgeons we are indebted for a large number of appliances, all of which claim these same principles.

The one practical idea, however, to which all these splints tend is immobilization or fixation, with the associated idea of motion if desirable. The aim of all is to transfer the weight of the body from the articulation to the perineum or the axillæ. Nearly all the forms of mechanical appliances for the hip possess screws of some kind that will permit motion or arrest motion. In the preceding chapter the apparatus described is not constructed with this idea of motion in view. Extension and counter-extension, unremitting and invariable, is what some of those who have constructed splints insist upon; while others, more rational in their ideas, modify those ideas according to the indications.

A history of the evolution of the extension treatment is not pertinent to this discussion, as all text-books and all papers lead us up the different steps. The original Davis splint is not used now I believe by any surgeons, and hence I have not represented it in these pages. It has no pelvic band, and is inferior as an ischiatic crutch to the splint devised by Dr. Andrews, of Chicago. As a means of extension, however, it served a good purpose. Better splints followed.

Similar in principle and not so extensively figured in the text-books is the Washburn splint. It has no screws or ratchets, and the lower end fits into a piece of steel attached to the shank of the shoe, while the extension is made by means of adhesive strips attached to the limb. The tabs pass through holes in the shoe, and are fastened to buckles connected with the foot-piece. It is represented in Fig. 41.

Dr. Bauer, of St. Louis, employs a splint consisting of inside and outside bars, with attachment to shoe. There

is no pelvic band to this splint. It is represented in Fig. 42, and is practically a combination of Andrews' ischiatic crutch and Davis' original extension splint.

The splint just represented is different from that employed by Dr. Hutchison, of Brooklyn (Fig. 43), in that the latter has a pelvic band, and a joint at knee, which can be fixed as desired. Both have the single perineal strap condemned by nearly all orthopedists, and both are attached



FIG. 42.—DR. BAUER'S SPLINT.



FIG. 43.—DR. WASHBURN'S SPLINT.

to the shoe, being used only by day. The weight and pulley are used by night, however. Since Dr. Hutchison began the treatment by "physiological rest" he does not employ splints so much; in fact, he says in his book "his occupation's [as an orthopedist] gone."

Before proceeding further it may be interesting to record a few points concerning extension that seem to be settled.

1. Traction does not produce any appreciable separation of the head of the bone from the acetabulum.

2. It does induce fixation and prevents concussion.
3. It relaxes muscles by overcoming reflex spasm.
4. Fixation is considered of far more value than pure extension.
5. Traction to be efficacious must be in the line of the deformity.

Those who hold most zealously to the treatment known as extension with motion insist in the acute stage on *fixation*, or "absolute rest to the joint," and yet all or nearly all admit that it is quite impossible to get absolute rest at the hip-joint.



FIG. 44.—DR. HUTCHINSON'S SPLINT.

What is known as the long splint at the present day is the splint which bears Dr. C. F. Taylor's name. He it was who made certain modifications of the Davis splint, and nearly all who make modifications aim to meet certain indications not met by the Taylor splint. And yet Dr. Taylor confines himself less than do any of his followers to one form of splint. In the *Boston Medical and Surgical Journal*, for March 6th, 1879, may be found a very fair enunciation of this gentleman's principles concerning the "mechanical treatment of disease of the hip-joint." The two following propositions form the key-notes to his practice:

"First. All organs while in a state of disease require rest from the performance of their functions in the direct ratio of the amount, quality, and intensity of the abnormal movements. Second. What is rest for an organ in one condition is not necessarily rest for it in another condition; that is to say, an organ, in a certain degree of *progressive* inflammation, presents conditions essentially different from the same organ in the same relative degree of inflammation in the *retrogressive* stage."

What he understands by the "so-called mechanical treatment" is the *working out* to practical conclusions the



FIG. 45.—Dr. TAYLOR'S MODE OF REDUCING DEFORMITY.

indications which the above propositions furnish. He aims, in the first place, to overcome contracted muscles by extension and counter-extension. The splint is applied in the line of deformity, and with weight and pulley fastened to the lower end of the splint the traction is made.

The patient, however, is placed on an inclined plane, with conveniences for adapting the angle to the amount of relaxation gained. Fig. 44 represents the appliance, splint



FIG. 46.—THE MODIFIED TAYLOR'S SPLINT.

and all save the weight and pulley. The force exerted is the extending power of the splint plus that of the weight, and varies according to the amount required to bring about relaxation—usually from ten to seventy pounds. The recumbent posture is maintained from one to four or five weeks. In addition to the improvement in posture gained this preliminary treatment, he claims, "relieves nervous depression, gives time for the patient to accommodate himself to the novel situation, enables us to save the amount of his weight from the perineal straps, and by that amount increase extension and hasten the effects of treatment." Fig. 45 represents what is known in the shops as Taylor's splint with the abduction screw. It is not really the splint he employs at present. The pelvic band is too long, and there will be seen other changes which correspond closely with the long splint represented in Fig. 46 and used by Dr. Taylor. This modification is accredited to Mr. Reynders, and is described in Dr. Sayre's last edition as follows:

"The improved parts are where the long rod is attached to the pelvic band. The long rod is attached at A to a revolving plate, B, which is fastened to the pelvic band.

When the plate, B, is revolved (partly), the long rod moves forward and backward. From the point, A, the long rod moves from and toward the other leg, as shown by the dotted lines toward L. C is a screw terminating at D in a small square stem of steel, fitting to a key. This screw turns in and out of the revolving plate, B, and has at the end of its thread a little knob, which is a little larger than the perforation at the upper end of the long rod, so that, when the key is applied at D, and turned, the screw, C, will force the long rod in the direction toward L. In this manner abduction is made. At F the long rod is divided into two parts; the lower part holds an endless



FIG. 47.—THE LONG SPLINT USED BY DR. SAVRE.

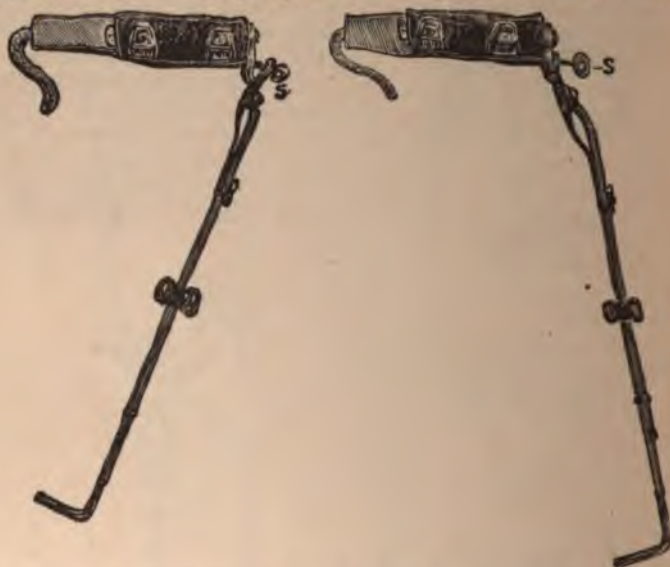


FIG. 48.—DR. SHAF-
FER'S LATERAL
SCREW.

screw transversely, which is worked by a key, and rotation thus produced."

Dr. Shaffer has found the abduction screw insufficient for purposes of adduction, and has devised a modification, which is represented in Fig. 47. This "consists of two parts, A and B, joined by the lateral hinge, C. The part, A, is fastened to the pelvic band. The part, B, is attached

to the shaft of the splint. Through the everted lip, D, there passes a screw, S, which operates through a button (which revolves on a horizontal axis), and which is fastened into another button (also revolving on a horizontal pivot), in the part, A. By turning the screw, we can either approximate the lip, D, toward the part, A (producing *abduction*), or, by reversing the screw, we can separate D from A, and *adduct*. E, E, represent the screw-bolts by which



FIGS. 49 AND 50.—DR. SHAFER'S LATERAL SCREW APPLIED TO THE TAYLOR SPLINT.

the apparatus is attached to the hip band and shaft of the splint."

In using this "screw to *abduct*, the ordinary perineal pads, which form the basis of the counter extension, will also be the point of resistance. When we use the screw to *adduct*, it will be necessary to supplement the *perineal* with *shoulder* straps, and to apply a little more extension than is required, so that, as we use the 'lateral screw,' the extra force may be transferred to and lost upon the shoulder."

Dr. Judson has aimed to correct certain defects in the splint, defects which many surgeons of large experience

have encountered. The principal defect is this, viz., "the straps which are fastened to the adhesive plasters at the lower part of the apparatus, for the purposes of extension, become relaxed whenever the patient assumes the erect position and throws his weight upon the limb" (Judson). He argues that the cause of this is due to a too lightly-constructed upright, a pelvic band on too high a plane, and perineal straps too flexible. The points are argued in detail in the *Medical Gazette*, for December 10, 1881, and seem to be well taken.

The apparatus used by him has a stronger or less flexible upright and pelvic band than is commonly found in the long hip splint, and also a bolt and nut connecting the two parts, by the use of which they can be fixed at any angle desired by the surgeon. It is provided with suspending straps, buckled to the pelvic band in front and behind and passing over the shoulders, by which the plasters and the affected limb are relieved of the weight of the splint in walking. It also has a U-shaped attachment, made of steel, at the level of the lower part of the thigh, by which motion is more fully arrested than by a flexible knee-pad, as it serves to retain the limb more closely in a line parallel with the upright of the splint.



FIG. 51.—DR. JUDSON'S U-SHAPED ATTACHMENT FOR BETTER FIXATION.

Dr. Taylor does not use the abduction screw, but employs a different splint when much adduction exists, *i.e.*, after the preliminary recumbent treatment is completed. The ordinary splint is so modified as to throw the weight of the body on the *opposite side* of the pelvis, and is called the "jointed supporting splint."

The mode of applying the splint is as follows:

Two strips of adhesive plaster the entire length of the limb, about four or five inches wide at the upper end and one third that width at the lower, are prepared by cutting into five tails, as shown in Fig. 52. From the centre tail a piece from four to six inches long is cut and added to the lower end for additional strength. Buckles are sewed to the lower end of these strips, and the whole thus prepared are laid against the lateral aspects of the leg,

the lower ends beginning about two inches above the malleoli. The centre tails reach the entire length of the limb, to the perineum on the inside and the trochanter on the outside. The lower strips, or, tails, are wound spirally about the leg, extending up to the pelvis, and then the other two pairs are wound about the thigh in the same



FIG. 52.—ADHESIVE STRIP
PREPARED FOR APPLICATION
TO LIMB.



FIG. 53.—THE PLASTER
AS APPLIED.

manner. This network of plaster is represented in Fig. 53. It will be seen that the thigh has at least three fourths of the attachment, and that the force exerted will meet with the greatest resistance here. Over this a roller is applied and the buckled ends are left out for the straps

at the lower part of the splint. A legging of twilled muslin provided with eyelets and laced up the inner side of the limb is a convenient substitute for a roller bandage. The stockings have holes cut through which the buckles pass, and the top of the shoe is cut off.

The pelvic band is then applied, with the perineal straps buckled short in order to keep the band in a low plane. The shaft is then shortened a little, and the tabs are secured by the buckles. Traction is then made by the key, and the proper adjustment secured, and finally the knee-pad or the U-shaped attachment is applied. Frequently a leather strap is buckled around the leg and splint above the ankle.

Dr. Judson uses traction to fix the joint rather than to oppose muscular contraction, and is satisfied with a moderate degree of traction, such as may be obtained by two vertical strips of plaster extending up the leg and thigh. He finds that the deformity of the active stages of the disease is reduced without special attention by the unconscious efforts which the patient makes during locomotion to place the limb in a useful position. He believes that the fixation allays inflammation, encourages repair, and relieves pain, and yet is not so inflexible as to prevent reduction of deformity, "which takes place spontaneously while the patient uses the perineal straps as an ischiatic crutch in locomotion." (Judson.)

A high shoe is worn on the sound foot, and very frequently crutches are employed. I have seen patients under Dr. Taylor's care going about with this "combination method." Indeed, this name was given by Dr. J. A. Wyeth to a plan of treatment which he reported in the *Medical Gazette*, April 17, 1880. He combined the extension splint with the "physiological treatment," and claimed for this "combination method" advantages superior to all others.

Dr. Sayre uses the long splint in larger children, or when his short splint fails to afford the necessary protection to the joints.

When it is desirable to have a joint at the knee, and when it is no longer necessary to immobilize the hip-joint or take such precautions against injury—in other words, during convalescence—Dr. Taylor uses a splint represented in Fig. 55. "The lower steel plate is riveted to the upright, but the upper one is fastened by three 'keepers,' which



FIG. 54.—THE TAYLOR SPLINT APPLIED.

enable it to be raised or lowered in adapting the instrument to the length of the leg. B is a foot-piece intended to rest under the foot inside the shoe. The broad band of leather is C, is cut down at the top where there is a firm pad, F, terminating in the strap, G, which, when the instrument is applied, fastens in the buckle, H. The leather, C, has the



FIG. 55.

thin metal plate, E, riveted to it to give it more firmness." (Taylor.)

With the exception of Mr. Barwell's splint, those I have named comprise all the more common long splints now in use. The splint known by Mr. Barwell's name is not a protective apparatus, and hence has not been employed, so far as I know, in this country. The aim with American surgeons is to get the patient out of doors. Mr. Thos. Bryant, of Guy's Hospital, has devised a splint for maintaining the

parallelism of the limbs. This, however, requires that the patient shall be confined to bed. Two years since I saw it in use in one of Mr. Bryant's wards, at Guy's, and this distinguished surgeon pointed out to me many advantages. The patient was very comfortable and the limbs were in good position. Many of the leading English surgeons at the present day speak highly of the splint and treatment advocated by Mr. Hugh Owen Thomas.

When patients must keep their bed and none of these

modes of making extension are at hand, the prone couch described by Mr. Hugman in his treatise on Hip-Joint Disease, in 1856, affords a very simple method of securing extension. This consists of a horizontal plane about two feet in width, the length being determined by the patient. It is made "to extend from the top of sternum to the bend of the hip, and upon the upper portion of this is placed a movable chest-board which slightly elevates the chest and shoulders, and the whole is covered with a soft hair mattress. Depending from the horizontal plane, at an obtuse angle, is an inclined plane about four feet in length, covered also with a similar mattress, but divided along the centre, so that one portion (that corresponding to the affected side) can be made to



FIG. 56.—DR. WILLARD'S SPLINT.

extend by means of a sliding framework; the movable portion is furnished with a padded leathern strap placed at its lower part. The upper and horizontal part of the couch is supported by two legs, the height of which is determined by the length of the inclined plane, the lower end of which rests upon the ground." (Hugman, p. 17.)

There are several short splints, the best known of which is the one used by Dr. Sayre, and the one in fact which has

his name. A splint, however, which scarcely bears the name of an extension splint, is one devised by Dr. Willard, of Philadelphia. It has a single joint opposite the articulation so that the patient can sit down with comfort. It is represented in Fig. 56, and is made of leather over a cast. The principle on which it is made and fitted to the body is about the same as that of the Vance splint, on page 345. After it is moulded and has thoroughly dried the pelvic and thigh portions are separated, and connected again by a joint attached to two spreading steel arms, as seen in the figure. A mortise, or, slot is made in the thigh section, and into this slot fits a bolt with a knob or head, by means of which it can be worked through one's clothing. It is only a fixed apparatus when the patient is standing and when the bolt fits into the slot.

Dr. Willard says it is applicable to a limited number of cases, *i.e.*, those in which the inflammatory symptoms are not acute. It is always used in connection with crutches and a high shoe.

The Sayre splint is applied by means of adhesive plaster and buckles in very nearly the same way as the long splint is applied. For many years there was no pelvic band and only a single perineal strap. The present one is a decided improvement on the one figured in Dr. Sayre's last edition. The one he now employs consists of a pelvic band partially encircling the body. The upright is attached by means of a ball-and-socket joint, and is divided into two sections, one running with the other and controlled by a ratchet and key. At the lower extremity of this inner bar are two projecting branches going over to the inner surface of the thigh. Cylindrical rollers with two buckles are at the lower end



FIG. 57.—DR. SAYRE'S SHORT SPLINT.

and here the tabs of the plaster are fastened. My own objection to this short splint is, that it does not sufficiently protect the joint, and is not equal to the amount of extension sometimes demanded of a splint. It is easily misapplied, and I confess that I am far more familiar with its abuse than with its use. Dr. Sayre has borne testimony himself time and again to the failure on the part of practitioners at home and abroad, to fully understand its



FIG. 58.—MR. CHANCE'S APPARATUS.

application; and until the introduction of the pelvic band and the two perineal straps irreparable damage to the joint could be done in a short time by its misapplication. Occasionally crutches are used. Noble Smith, in his work on the "Surgery of Deformities," speaks very highly of a short splint devised by Mr. E. J. Chance, of one of the London hospitals for hip-disease. Mr. Chance uses both the prone couch and the mechanical appliance. This appliance is so constructed that the joint can be fixed at any angle, and in case of deformity from muscular spasm the splint can be applied to correspond, while, by means of the controllable joint, the deformity can be overcome by degrees day by day. He appreciates the importance of fixing the pelvis and indeed the spinal column. To this end he employs an abdominal band which is worn in conjunction with the splint, constructed as follows:

"A pelvic belt, A, is adopted below the iliac crests. An upright bar, B, passes from this belt to the height of the shoulders, and terminates in a pad. From this pad proceed straps, C, forming armllets, or, shoulder-straps. From the pelvic belt proceeds a stem, D, which is fixed by a leathern casing to the thigh, and the stem is movable by means of rack joints, E, in the direction of flexion and extension as well as abduction and adduction." See

Fig. 58. Mr. Smith speaks of Mr. Chance's treatment, in the same glowing terms that we Americans are familiar with. Indeed one would imagine Mr. Smith giving expression to an opinion concerning some one of the splints that are constantly being devised or modified in our own country. He speaks of "the almost immediate relief from pain which the patient experiences when the splint is applied; and, above all, the good results which are ultimately obtained, have convinced the author of the excellence of Mr. Chance's plan of treating this disease."

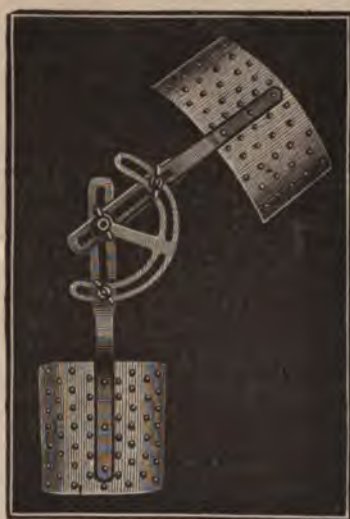


FIG. 59.—DR. STILLMAN'S SECTOR SPLINT.

Another short splint combining all the movements of the ball-and-socket joint, but with the movements under the control of the surgeon, has been devised by Dr. Chas. F. Stillman, of New York. At my request he has furnished me with a description, a pretty full abstract of which I take pleasure in inserting. The aim of the apparatus is extension with or without motion and at any desired angle. It furthermore seeks to overcome the compensatory lordosis. This apparatus is very similar in construction and design to the apparatus last described.

A sector splint (Fig. 59) is placed on the outer side of the

thigh over the hip, and is employed either as a "bracket" or as a "brace," the difference being that the bracket is to be secured by plaster of Paris or some inflexible bandage which does not admit of removal, while the brace can be removed at pleasure.

The sector splint, it will be seen from the figure, is com-



FIG. 59.—DR. STILLMAN'S SPLINT APPLIED.

posed of two plates of perforated tin that partially encircle body and thigh; of two slotted arms connected at one end by means of a clamp, and each attached at the other end to one of the perforated plates, near which a sharp curve is seen to prevent undue pressure over prominent parts; and of a slotted sector attached to the slotted arms by three

clamps. This sector has been fully described by Dr. Stillman in the journals, and further description in these pages is unnecessary.

To apply this bracket, first, several strips of moleskin adhesive plaster are wound tightly around the thigh just below the hip, and around the pelvis above the hip. Second, thigh, pelvis, and waist are encircled by the plaster-of-Paris bandage, which is allowed to partially set. Third, the bracket is applied over this plaster, the angle being fixed as desired, the clamps having been previously loosened and the slotted strips shortened as much as possible. Fourth, the bracket is now fastened by a few turns of the plaster bandage, and this is covered by a dry muslin roller to ensure cleanliness. When the plaster is set the whole constitutes the splint, and is represented in Fig. 59. Enough precautions have been taken to secure the desired amount of firmness, and the apparatus extends from axilla to knee, the underlying adhesive plaster preventing any slipping or sliding on thigh or trunk.

To make extension the slotted strips are pushed away from the centre, thus increasing the distance between body and thigh attachments. The degree of extension gained is secured by the clamps on the slots.

By means of the clamps on the sector fixation may be secured, or motion may be allowed and extension be maintained at the same time. Dr. Stillman combines this plan with the crutches and high shoe. The advantages he claims for his splint are: 1. Local extension of the joint diseased; 2. Fixation at any angle with or without extension; 3. Motion with or without extension; 4. Gradual reduction of the flexion; 5. Opportunity for local inspection and topical applications.

When a brace is desirable—and, by reason of the uncleanness of plaster, it is desirable to do away with this mode of application whenever anything different can be afforded—a removable apparatus has been constructed by Dr. Stillman, and is represented both in back and side views in Fig. 61. The back frame here represented is provided with abduction, rotation, and flexion clamps for overcoming the obliquity of the pelvis. A rotation joint on the side of the brace below the hip is also provided for the correction of inward and outward rotation.

The apparatus is attached to the thigh and trunk in the usual manner by straps and girths, and if additional

extension is desired a perineal strap is attached above and an adhesive plaster noose below the joint is added.

Still another short splint is used by Dr. M. Josiah Roberts, who has kindly placed a description of the same at my disposal.

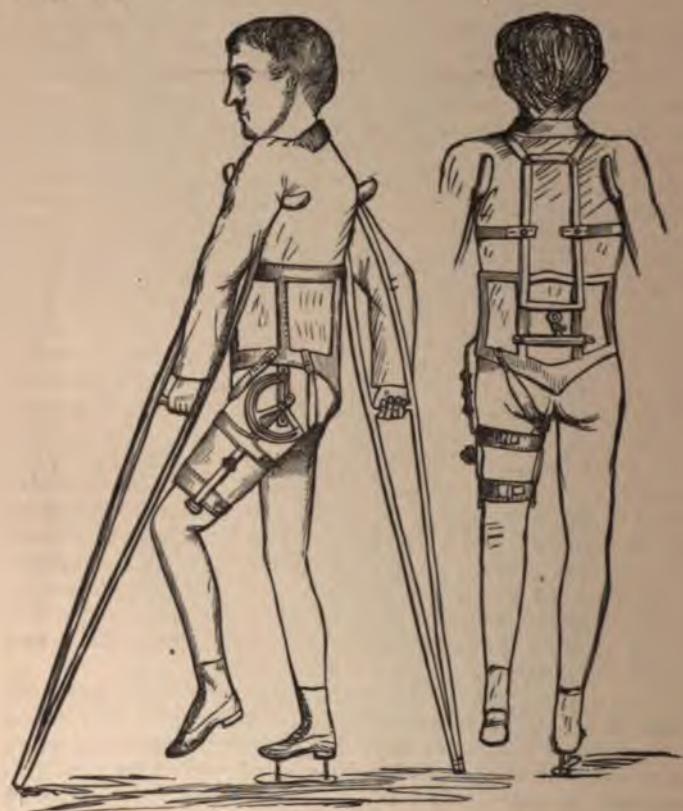


FIG. 61.—DR. STILLMAN'S BRACE FOR HIP AND PELVIC DEFORMITY.

The instrument consists of a pelvic and a femoral segment. The former is made of very thin sheet steel covered with leather on the outside and thoroughly upholstered on the inside. It is broad, and to secure a good fit he moulds it over a plaster cast of the patient's pelvis. The latter

(the femoral segment) is composed of two compound side-bars, which extend down along the thigh upon the inner and outer aspects, and are constructed with special reference to exerting *continuous elastic linear traction* upon the thigh. The mechanism by means of which this is accomplished can be understood by reference to Fig. 62. Two side-bars are here represented; one is provided with expanded margins which have been turned over so as to perform a shell through which the other slides. The upper or proximal end of the shell is converted into a rectangular loop which completely closes over the sliding bar, and upon this a brass pin, A, is soldered.

The lower or distal end of the sliding bar is likewise provided with a brass pin, B. Any force which brings these two pins nearer together must of necessity lengthen the instrument, as shown by the dotted line in the figure. It must also as a consequence exert a traction force upon the limb to which it is attached. In order to make this traction force *elastic*, or, in other words, like manual traction a narrow strip of strong elastic webbing provided at one end with a buttonhole is slipped over the brass pin at A. To the pin B, which is screwed into the opposing end of the other bar a buckle is attached.

The instrument having been applied and screwed into position, with the brass pins at the greatest possible distance apart, we can by means of this strip of webbing and the buckle exert any desired amount of elastic force. By doing this the opposing ends of the two bars are approximated and the instrument is thus lengthened. It is in this way that the traction force is graduated. By substituting a *non-elastic* strip for the elastic one *fixed or rigid* traction could be maintained by the same mechanism. The distal ends of the side bars are fixed to a metallic band which encircles the limb just above the knee. This band is secured in position by means of strips of strong adhesive plaster placed longitudinally around the thigh with their lower ends turned up over it (the band) and retained in position with a roller bandage. The lower ring is thus prevented from being pushed down over the knee when traction is made as above described.

At X (Fig. 63) a simple hinge-joint connects the outer side



FIG. 62.

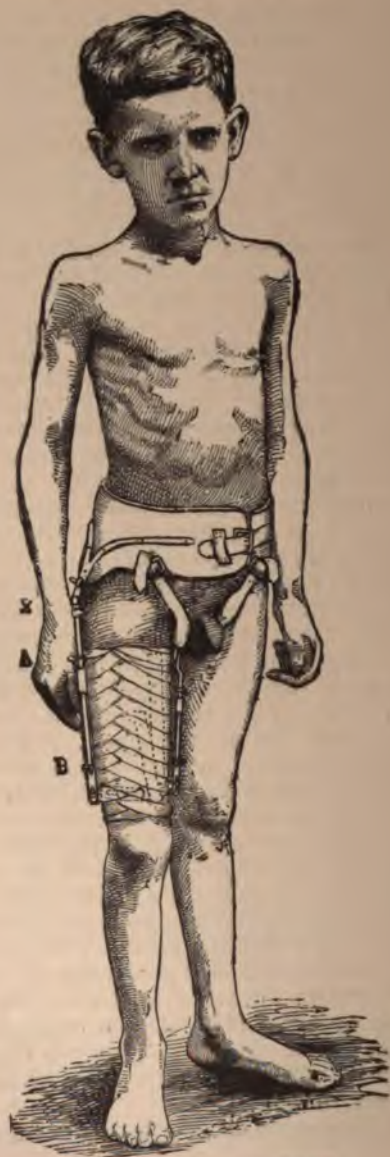


FIG. 6.—DR. FORSTER'S SPLINT.

bar with the pelvic segment. A like joint is found at the proximal end of the inner side bar at its junction with the perineal strap. These two joints permit, it is claimed, articular action at the hip during locomotion and in changing from the sitting to the standing posture or the reverse. By continuously exerting *elastic* traction, it is further claimed, articular motion becomes possible without inter-articular pressure or friction, and without giving rise to the slightest discomfort to the patient.

Under these circumstances Dr. Roberts thinks it is evident that the condition of the joint more nearly approximates that which we find in health than it would were it fixed. The Doctor argues that in this way we avoid the depreciating influences which prolonged immobilization of an articulation necessarily has on the local nutrition, that the circulation through the limb is facilitated, that we get the maximum amount of nutrition in the joint through the agency of which a favorable temperature is sustained for the growth and development of adjacent parts, and that repair in decayed tissues can the more readily be promoted.

Passing over the joint anteriorly at X is a semicircular rod upon which a coiled steel spring is placed, the action of which is to oppose flexion of the thigh on the abdomen. An adjustable nut on the curved rod furnishes the surgeon with the means of exercising his discretion as to how much motion at the joint shall be permitted.

The splint as applied is represented in Fig. 63, and it will be seen that no other joints save the one diseased are restricted in their normal movements. The sustaining power of this apparatus lies in its elastic attachments, and not in the steel bars which compose the framework. The office of these bars is only to give direction to the force exerted by the elastic side-straps. This principle enables the Doctor to construct the splint of such light material that it is easily portable and equally durable with the heavier iron and steel appliances. Another advantage he claims is that it does not interfere with the impact of the foot upon the ground during locomotion, thus preserving the foot sense, which is of the greatest possible advantage to the patient in averting sudden jars and traumatisms. To still further reduce the effect of jar incident to locomotion he has his patients wear soft rubber heels in their shoes.

To recapitulate the advantages claimed by its author for this splint.

1. It protects diseased areas from traumatism.
2. It furnishes sufficient artificial support to counterbalance the loss of power on the part of the affected member.
3. It places the movements of the diseased articulation absolutely under the control of the surgeon at all times.
4. It permits inter-articular pressure.
5. By its use we can maintain the general and local nutrition at the highest possible standard for the purposes of carrying on the repair of the diseased tissues.
6. The nullification of reflex muscular spasm.
7. Its easy portability.
8. Its non-interference with the performance of the functions of healthy joints.

I have given at some length many of the forms of apparatus now in use, their construction and their claims, and with so many in vogue one wonders why it is that we have any imperfect cures in our midst. The fact remains, however, that children do get well with stiff and deformed joints, that many are subjected to various operations, and that many die of the disease, notwithstanding they have been subjected to both the mechanical and the expectant treatment. It is also a significant fact that go where you will some one tells you of a friend or an acquaintance who has had "hip-disease," and when you begin to inquire about the result, you will hear of a short limb, a stiff joint, or an enfeebled constitution. You will hear furthermore that the patient was under Dr. A's care or Dr. B's care a number of years, but that Dr. C or Dr. D had the patient first and this accounts for the result.

I am well aware that patients are neglectful, that they tire of this treatment or of that, and that they fall into the hands of charlatans both in and out of the profession. Still my claim is that we should know of more of those fine results claimed. In other branches of medicine men publish results of cases, publish statistics of cures, and yet one has to look through a vast field of orthopedic literature to find good cases, and when he does find them they are often so imperfectly recorded as to be unfit for statistical purposes. What then does the treatment of chronic articular ostitis of the hip by splints accomplish?

In the paper of Dr. Taylor's from which I have already quoted there occur some representative cases. One was in a boy four years of age who had a slight halt in his right leg. A history of a traumatism was obtained, and the first

exacerbation followed immediately on the accident. This subsided, and Dr. Taylor saw him some weeks afterward. The difference in the motion of the two joints was very slight. The case did not come under treatment, and three months later another exacerbation more severe than the first came on, and the Doctor was again consulted. Treatment was again postponed by the parents. The case was at that time advancing into the second stage. Three months later abscess had appeared, and the patient was harassed by another exacerbation still more acute and still more persistent. At this time the deformity in flexion was very great. Treatment was now accepted, the splint was applied, the recumbent position was assumed, and the weight and pulley were attached to the distal end of the splint over the inclined plane. The extension force employed was thirteen pounds. This stage of the treatment was persevered in for three months, the abscess being opened in the meanwhile and discharging copiously for two months.

On leaving the bed the joint was well protected by the splint, and traction both day and night maintained. During the next five months the long splint was worn, the sinuses caused very little discomfort, the limb was held in good position, there was a tolerable mobility of the joint, and the general health of the patient was very good. Later the "joint-supporting" splint was applied, say twelve months after treatment was begun. At the end of another twelve months he was discharged cured, and the report reads: "He does not limp. There is a slight difference in the lengths of the lower extremities, but not enough to be noticeable in his locomotion. He is directed to return frequently during the next two years for examination."

Another case is reported. This was in a girl seven years of age who had manifested the first signs of a bony lesion at the hip some nineteen months before coming under Dr. Taylor's care. The treatment during fifteen months of this time had been by weight and pulley, and there was no pain from the beginning nor any during the whole time she was confined to the bed. Her general health too had continued good during this long period of confinement. The deformity was very slight, yet there was limited movement at the joint. It required two weeks in bed with the extension splint to completely relax the muscles. Then the long splint was worn ten months, when the patient was discharged perfectly restored. Two years later he examined the girl,

finding that "the child has been going about like other children; there is perfect motion at the affected joint, and no discoverable difference between the affected joints, and no discoverable difference between the functions of the two limbs. Both trochanters are on the same level."

Still another case is reported with an equally good result. I have now under observation a case that came under the same treatment about eight years ago with such a deformity as the first one reported had. It seemed to have been a genuine case of bone disease that had not yet resulted in abscess. This patient had eight years of faithful treatment, going through all the stages of the same, and to-day the hip is stiff, the angle of deformity is about 150° , there is one inch real and two and a quarter inches practical shortening, and the case would not make a good one by which to illustrate any special form of treatment.

The following statistics from Dr. Taylor's papers are interesting, and I incorporate his report with much pleasure:

"Leaving out of consideration all cases whose histories, subsequently to their treatment, are unknown or in doubt, I find that there remain ninety-four private cases of hip-joint disease which were under personal observation and continuous treatment from the time they applied until they died or were cured, and whose present condition is now, or was very recently, a matter of personal knowledge, for no case whose ultimate fate is not positively known deserves a moment's consideration in any estimate of the probable value of treatment for the hip-joint. Of the ninety-four cases three died,—two of the disease, and one was run over and killed. Among them there were twenty-four with suppurating joints and discharging abscesses,—nearly all in that condition when first applying. Of these twenty-four with abscesses, two died,—the same as stated above,—and in five the discharge has not yet ceased. Deducting these seven, there remain seventeen fully recovered, or seventy per cent of the suppurating cases. Three of the seventeen recovered cases have ankylosis, and fourteen recovered with practicable joints—the majority with ample and some with perfect motion. The ratio of motion to ankylosis, in the cases recovering after suppuration more or less extensive, is as eighty-two to eighteen. In two of the cases still discharging ankylosis is progressing favorably, and in three there is excellent motion, and, except for the slight discharge remaining, they would be among our

best cases. The joint motions are nearly perfect, and the joints themselves are apparently well, the present discharge being supported undoubtedly, as it so often is, by eccentric periosteal excoriations. In such cases nothing so tends toward recovery as the action of the muscles contiguous to such eccentric implantations.

"The above enumeration includes all cases of the class previously specified for the nine years preceding November, 1877, but excludes the cases received since that date."

In view of the fact that the term hip-joint disease with Dr. Taylor is not synonymous with chronic articular ostitis of the hip, these statistics are not as valuable as they might be if only cases of true bone disease were embraced in these ninety-four private patients.

During the past year I have, through Dr. Judson's kindness, had an opportunity of examining with him three patients whose cases he reported in the *Illustrated Quarterly of Medicine and Surgery*, No. 2, 1882. The cases are, I think, classical in the literature of mechanical surgery, and I feel justified in reproducing them, in abstract, in these pages.

No. 1 was a boy aged six, and presented, when Dr. Judson saw him, an enormous abscess with all the usual signs of the third stage of the disease, which was of nineteen months duration. The abscess opened spontaneously the same day on which he was examined. The general condition was bad, the limb was strongly flexed and adducted, and the slightest attempts at motion elicited screams of pain. It was found that the same case had come under my own observation only a month before the above notes were made, and in my records I find my own notes corresponding very closely with Dr. Judson's. I find also this significant remark, that the boy had been under the splint treatment for twelve months by a distinguished orthopedic surgeon, in conjunction with the family physician, and that the parents were very much dissatisfied with the combination.

Six days after Dr. Judson saw the case the long splint of Dr. Taylor's was applied and the patient was about the house daily from the very beginning of treatment. The deformity disappeared in due course of time. The progress was slow, abscess followed abscess, until finally there were nine sinuses about the joint, all leading to carious bone. Five extended in a line down the outer side of the thigh from the trochanter to the middle third of the thigh, and from one of

these a fragment of bone extended. There were well-marked exacerbations from time to time, but these were not of a very painful nature. Some of the sinuses closed in time, the adhesive straps were finally removed, and for several months the splint was suspended from the shoulder and he walked upon an ischiatic crutch. An elevated shoe on the sound limb was worn all the while.

He was under treatment two years and five months, and his condition six months later was as follows: "The limb is in good position, neither abducted nor adducted, and flexed at a slight angle sufficient to allow him to sit comfortably, and yet not to interfere with locomotion. The motions of the knee are perfect. He walks with firmness, runs rapidly, and never uses a cane . . . an inch of shortening . . . absence of motion at the joint. . . . The cicatrices are firm, deeply depressed, and in some instances attached to the bone beneath."

Three years and six months afterward his condition was reported:

A point of moisture simply, at the upper end of scar over tuberosity of ischium; atrophy of thigh, two and three-quarter inches; of knee, three-quarters of an inch; of calf, only a half-inch.

The position of the limb was 150° in flexion and about 15° in adduction. The real shortening was one and a quarter inches, the practical, two and a half inches, with no attempt at arranging the limbs symmetrically. The knees were equally flexible.

No. 2 was a girl three years of age, with a tuberculous family history. The disease involved the right hip, and had existed at least one year. An immovable dressing of plaster of Paris and subsequently a long splint with a single perineal strap and applied without adhesive plaster, had been her previous treatment. When the patient came under treatment at the hands of Dr. Judson there was marked adduction and flexion of the thigh, characteristic of the third stage. For several weeks previously she had suffered from intense pain and suppuration was suspected. The treatment was the same as in No. 1. The pain soon abated, the position of the limb improved, adduction giving place to abduction and the flexion being materially diminished. Abscess formed, nevertheless, and was opened five months after the beginning of treatment. The sinus was followed in the ensuing eighteen months by five others,

variously located about the joint, and the pus secreted was abundant and offensive. The mechanical treatment was supplemented by cod-liver oil, wines, and chalybeates. Exacerbation marked the approach of new abscesses, and some were noted for their high febrile reaction and emaciation, threatening a fatal termination. Mechanical treatment was continued for two years and seven months. Strong traction was used during the first half of that time, and during the latter half the apparatus was applied more loosely, and for several months it was worn only in the daytime, as an ischiatic crutch merely.

Eight months after the removal of the splint her condition was reported as follows:

Her health is perfect, and she is able to walk and run without assistance of any kind. The position of the femur is favorable both for walking and sitting, there being no abduction or adduction, but a moderate degree of flexion, and the shortening is only one fourth of an inch, evidently due to a diminution in all the measurements of the limb. When she walks slowly it is difficult to perceive any limping, although the motions of the joint itself are so slight as to be of very little if any advantage in locomotion.

It was two years and four months after the above note was made that I saw the child with Dr. Judson, and we found her still in good health and very active. Her shortening as measured from the umbilicus with no attempt at symmetry was one and a half inches; measured from the anterior-superior spinous processes it was a half-inch without, and a quarter of an inch with, an attempt to place the limbs symmetrically. We could not detect any motion at the hip, and her angle of deformity was 160° in flexion, with about 5° in adduction. She was not able to button and unbutton her shoes in the natural way.

No. 3 was a boy who was seven years old at the time he came under treatment, and had suffered from the disease for four years. He had worn a light hip splint, and to this Dr. Judson attributed his lack of progress. The reporter states that the usual signs of the third stage were present, without stating the degree of the deformity and the consequent inconvenience in locomotion. An abscess was, however, already recognizable. He had the same line of treatment as was adopted in the two cases just reported. Suppuration progressed, however, and finally, after great distension of the parts, four sinuses were established, one of

which was in the groin and one above Poupart's ligament. "The severity and persistence of the symptoms, the number and position of the sinuses, the long continuance and often offensive nature of the discharge, and the character of the resulting cicavlices, of which two are attached to the bone, clearly show that the case was one of destructive ostitis and disorganization of the joint." And such was his history. At the end of a year repair began, and the fixation of the joint was no longer necessary. Up to this time he had persisted in the use of crutches. These were now laid aside, but the splint was worn for three years longer. Eighteen months after all treatment was discontinued he was an active robust boy, taking long walks to and from school, was a good skater, and when he walked slowly there was no perceptible defect in his gait. There was a half-inch shortening, limb was in good position, *i. e.*, the angle at a useful degree of flexion, and there was no motion at the joint.

Three years after the above condition was found I examined him with Dr. Judson, and we found the boy still as active and still as healthy. There was a shortening of one and a quarter inches as measured from the umbilicus (practical shortening), and an actual lengthening of a half-inch as measured from the anterior-superior spinous process, with the limbs symmetrically placed. There was an arc of motion of at least 10° in flexion, and a slight amount of abduction, adduction, and rotation was possible. The trochanter was not above Nélaton's line.

Now these cases are very instructive, and they were reported just as they were. I have notes of many that are now under the long-splint treatment, and while they are not ready for a final report I can at least report progress. All are comfortable, in all the limbs are in good position, and all are out of doors most of the time.

I have notes of a few that have been under the short-splint treatment, and nearly all have done badly. Two that I now recall went on to distressing deformity.

From a study, then, of the mechanical treatment of this disease, I am persuaded that

1. The short extension splints which permit motion exert very little if any influence on the average case of chronic articular ostitis of the hip.

2. The long splint in competent hands secures for us better results than does any of the splints in general use.

3. It is better to combine the extension splint with the crutches and high shoe.

4. An intelligent use of the splint is but a very important part of a true expectant treatment.

I am indebted to Dr. Judson's paper for the following: "If we recall the morbid anatomy of this disease, in which the integrity of the central portion of the bone is invariably assailed, we can better understand the comparison of hip-disease to a fracture of the bone, and the more readily recognize the propriety of treating it by fixation. If hip-disease were synovitis, invading, under the pressure of reflex muscular contraction, first the cartilage and then the bony tissue, it would be right to try to diminish this pressure by traction, or any other method believed to be practicable. We might even attempt the difficult combination of traction with mobility, in the hope that motion without friction would perhaps assist the process of repair and secure a recovery without impairment of mobility. But the disease is not synovitis. It is osteitis, beginning in the cancellous tissue, or at the epiphysal junction, excavating the bone, undermining its strength, progressing from within outward, and involving in time all the structures of the joint. In this view it is clear that the proper local treatment is protection from the pressure and concussion incident to walking, and the prevention of motion in the joint. As in a fracture, so in hip-disease, the part should be placed in a favorable position for the action of the natural reparative processes which, aided by appropriate general treatment, are, as a rule, able to limit this morbid process when it occurs in parts which, like the ankle, are more easily protected from disturbance and violence by the voluntary efforts of the patient."

CHAPTER XVIII.

OPERATIVE TREATMENT IN CHRONIC ARTICULAR OSTITIS.

For the arrest of disease in its incipiency surgery is not to be credited with any brilliant results. It has often occurred to me that much might be done by the judicious use of the drill. This instrument has not been used to any great extent in this country, *i.e.*, I am not familiar with any cases published in which it has been employed. If one can feel reasonably sure that the disease is confined to the femur, then the joint might be saved by establishing a drainage on the distal side of the capsular ligament. The question forces itself on one, whether even this procedure would prevent the extension of the lesion by contiguity to the articular surfaces.

I was aware that Mr. Macnamara had drilled the head and neck of the femur in cases of serous synovitis of the hip, and in a conversation with this surgeon some two years ago I learned that he had also employed this treatment in chronic articular ostitis of the hip. The results in his synovitic cases were very encouraging, and are recorded in his "Diseases of the Joints." Recently I received from him a summary of the cases treated, and I take pleasure in giving the substance of his communication.

During the three years ending in 1882, he had drilled the trochanter neck and head of the femur twenty-seven times for the relief of "hip-joint disease," and of this number he is convinced that twenty-four have made good recoveries. "Several," he says, "have grown up into strong healthy children with an amount of compensatory movement in the spine which enables them to go about like other healthy children." One case, a girl aged twelve years, died three months after the operation, and it was found that the drill had passed into the middle of the head of the bone, and not into the joint. The passage taken by the instrument, was filled with a comparatively soft fibro-cellular substance with islands of cartilage in which calcification of the cartilage was in progress. A layer of newly-formed articular

cartilage covered the head of the femur, and a very thin layer of what seemed to be the original articular cartilage lay loose in the joint.

In two other cases of the twenty-seven, at periods varying from four to seven months, the disease was not checked by the operation, and he was compelled to excise the head of the femur.

His conclusion is that he does not now think drilling should be performed for osteo-myelitis in this locality until other treatment has failed. His management of a case at present is this:

When it is clear that well-marked symptoms have developed the patient is put under the care of an experienced nurse in such a locality that the best possible hygiene can be maintained, plenty of fresh air and light, proper food, principally fresh milk. At night the limb is secured by weight and pulley, and by day a Thomas splint is applied, while the child is encouraged to go about as much as possible, aided by crutches and high shoe. If, at the end of from four to six months no improvement follows this treatment, he resorts to the drill, dividing at the same time the adductor muscles, and it may be the tensor vaginae femoris. A modified Bryant's splint is applied immediately after the operation, and secured to both limbs and pelvis by means of plaster-of-Paris bandages. No extension or traction is made, the necessity for this being obviated by the division of the muscles.

I have thus been explicit in the details of the treatment employed by Mr. Macnamara, because I believe him to combine very happily the conservative and the advanced surgical ideas of our British cousins. The question, as I remarked before, occurs to us whether with the means he employs for fixation at the time the exacerbations are at the height would not accomplish all that he gains by the additional drilling?

I can see how an early drilling with the limb secured in the best fixation would act as an issue, would change the character of the inflammation, and would thus bring about a more speedy recovery. One reason I fancy why Mr. Macnamara gets stiff joints is that he permits too much freedom of motion; for instance, in removing the splint at night and substituting therefor the weight and pulley. Then, again, I think his drilling would serve a better purpose in the early stage of the disease.

It will be seen that my object now is to save the articular surfaces, and I am not convinced that any plan of treatment at present employed will accomplish this object in the majority of instances. One needs to know this fact whenever a case presents in its incipiency. An anatomical diagnosis is essential above all things. Drilling is the only operation, except an early excision. Early excisions will never be popular, for the reason that the operation is too grave in appearance for so apparently simple a lesion. Free incision and drainage may be resorted to, but even this is not advised unless there exist epiphysial necrosis.

Operations for the arrest of disease, where it has already advanced to the destructive stages, consist of free incision gouging, and excision. The latter is by far the more common, and has become a very popular operation among general surgeons. The orthopedist who relies strictly on mechanical contrivances, seldom advises such extreme measures. He can afford to await the slow processes of Nature in her efforts to throw off the effete products. He waits occasionally until amyloid degeneration, or, as Mr. Barwell prefers to call it, lardaceous degeneration, is far advanced, and then the case is considered hopeless.

The question of excision no longer turns on the mortality of the operation. True, the danger in all surgical procedures is to be considered, yet antiseptic surgery has contributed largely toward removing this element. When I say antiseptic surgery has done this, I mean that it has done so directly and indirectly. Those surgeons who oppose Listerism have, in order to maintain their position, grown more cleanly in their operations, more careful, and more discreet. It is seldom now that a patient dies of shock from an operation, and especially from an excision. The objections that the extreme conservatives bring up against the operation are, that it does not always arrest the disease, and that it does not leave the limb so useful as when a cure takes place in the natural way. These really are the only arguments worth considering, and the first has no weight as an argument. When one decides that there is no hope left the patient—that he must surely die by exhaustion, either from the suppuration or the lardaceous disease, the operation of excision or of amputation becomes as imperative as does tracheotomy when a child is dying from laryngeal stenosis. No man—even its greatest champion, Dr. Sayre—ever claimed that excision

will *always* arrest the disease and save life. It gives the patient, even *in extremis*, the last hope, and, as Dr. Yale remarked in an interesting paper before the Academy of Medicine, a few years ago, it is often the best febrifuge we can command. Indiscreet enthusiasts have done as much as the extreme conservatives have in bringing the operation into disrepute, by claiming too much. When one looks over statistical tables, and sees the names of patients reported as cured, patients whom he knows have long since succumbed to the disease for which the operation was performed; when he sees other names, with the result given as a quarter of an inch shortening and a very useful limb, patients whom he knows have from one to three inches shortening, and who use a cane or a crutch; when he sees names of patients who are reported as free from disease, patients whom he knows to be suffering from draining sinuses and exacerbations as of old—when one, I say, has an experience of this kind, he is apt to condemn the operation rather than the statistician. The time has certainly come when excision can rest on its merits. Statistics are to it as a fond mother is to her favorite child.

Apart from the unquestionable relief it affords to suppurating joints, it has been conclusively proven during the last decade that lardaceous degeneration may be arrested by this means. Cases that cannot be disputed are multiplying, and before long the evidence will be overwhelming. Take a single case, one among several that have come under my own observation:

In 1872 a boy, aged eleven years, was admitted to the hospital. The family history was tuberculous. The history states that when he was two years of age he was lame in the right hip for one month, but, under the use of liniments, made a perfect recovery, and was active and free from lameness until three months prior to admission to hospital. When I examined him I found as he stood the right limb slightly advanced, and the foot everted. The weight was borne chiefly on the left limb. The limp, while characteristic, was very slight. There were the usual changes in the nates; the joint and trochanter were tender; the joint movements were limited only a very little, and there was neither shortening nor atrophy. In other words, the disease was in the first stage and the prognosis was good, *i.e.*, from the views I then held concerning "hip-disease."

The tenderness subsided within a month, the usual hospital treatment having been employed. During the winter—three or four months after admission—he was thin and poorly nourished, but the hip gave no annoyance until the following summer, when after an exacerbation the second stage was fully at hand. A year from the date of admission an abscess occupied the whole of the gluteal region, and a month later opened spontaneously over the coccyx. The usual hectic followed, but it was not severe, and he had comparative immunity from pain until the approach of another exacerbation, two months later, more acute and more distressing than any he had experienced. At this time two openings existed, and through one a spicula of necrotic bone was exfoliated.

At the end of the second year the patient was feeble in health, the limb was in the position of third stage. The soft parts were dotted with ulcers and the openings of sinuses. His lungs at this time were the subject of much apprehension, physical signs revealing bronchial changes, and altogether the case was aught but hopeful. During the winter no marked changes occurred, but in the summer—three years now from admission—the urine was light in color, gave on standing awhile a whitish flocculent deposit, and, on the addition of the usual test, five per cent of albumen. In the field of the microscope it furnished an abundance of granular and hyaline renal tests. This particular examination was made July 9, 1875. The notes for next day read: "Little or no œdema present. For past week has complained of some headache, nausea, and constipation, the significance of which is manifest by the urinary examination."

Another examination of the urine was made a fortnight later, and the specific gravity was 1020, while the specimen was loaded with albumen. I found also on examination hepatic dulness three fingers' breadth below the free border of the ribs. A month afterward he was discharged, lardaceous degeneration being fully established and the suppuration being unchecked. The prognosis, as recorded, was, "death from amyloid degeneration within three years."

The boy was admitted to St. Mary's Hospital, I learned, shortly afterward, and the hip was there excised by Dr. Poore, who has already placed the case on record.

In December, 1879,—four years after the operation—I had an opportunity of examining the boy, and I found his

general appearance excellent. He walked without any support save a high shoe. Without this he used a crutch, although he could bear his entire weight on the limb without difficulty. He could actively flex the thigh beyond 90° with about one half the normal force; could extend, abduct, and adduct over normal arcs, and with a little less than one half the normal force. The cicatrices all seemed old, and there were no open sinuses anywhere to be seen. The measurements, as I found them at that time, were as follows:

Right side: Thigh, 12½ in.; knee, 11 in.; calf, 10½ in.; instep, 8½ in.

Left side: Thigh, 17 in.; knee, 13 in.; calf, 12½ in.; instep, 9½ in.

The right limb in length was 25½ in., the left, 32½ in.; the right tibia, 12½ in.; the left, 14 in.; the right foot, 8; the left, 9. He had no cough and his lungs were in an excellent condition. Dr. Ripley examined the lungs after I did and fully confirmed the result I had obtained.

The condition, as described by Dr. Poore at time of operation, was as follows:

"At the time of his admission the right thigh is flexed, shortened, and inverted; the knee-joint is also flexed and stiff. He suffers much pain, so that he is confined to the bed most of the time; he lies in bed, propped up with pillows; he has not been able to lie down for two years. [?] There are four sinuses about the joint, through most of which dead bone can be felt. There is considerable discharge. Patient is thin and pale; appetite poor; liver enlarged. There is some albumen in his urine, but no casts can be found.

"On May 21st the joint was excised—present, Drs. Peters and Watts. The head of the bone was found lying in the cavity of the acetabulum in pieces; the neck was also splintered; the bone was divided below the trochanter minor; the shaft was found extensively diseased; the bone was soft, thin, dark-colored, and the medullary cavity enlarged, so as to easily admit the finger for two or more inches; the shaft was divided again lower down; the periosteum was loose; the condition of the bone at the point of second section showed the same diseased condition. The acetabulum was not perforated, and but slightly diseased.

"Wound brought together in part, and patient placed in a cuirass, with extension so as to bring the knee down."

The important point about my examination was, that I found the liver dulness normal—it did not extend below the free border of the ribs. I had him pass a specimen of urine, and I found it of a specific gravity of 1012, and containing the faintest trace of albumen. In four specimens examined microscopically I could not, after prolonged search, find any casts or epithelium.

I have since seen the boy about the streets, and he seemed to be gaining in every respect.

There are many cases where the lardaceous degeneration is not arrested by the excision, but subsequent amputation succeeds in arresting this process. There are cases wherein the excision has failed to remove all the disease and where the suppuration continues.

Mr. Barwell reports a very instructive case of this kind on page 392 of the American edition of his work on "Diseases of the Joints." The patient was seven years of age, and Mr. Hancock had performed excision twenty-two months before. When amputation was performed, "the liver filled the whole right side of the abdomen, its lower edge being lost within the crista illii; it extended far to the left of the middle line; the spleen was large. The urine was sufficient in quantity; it contained albumen and some hyaline casts, none of which, however, were of the smaller size, and were mixed with endothelial cells." The amputation was on November 2d, 1872. "She made a rapid recovery; the wound did not suppurate; the liver and spleen were rapidly diminished in size, the albuminuria ceased, and she left the hospital fat and strong, on February 1, 1873."

In September, 1880, he made this note: "I have seen this girl twice since the amputation. She grew very rapidly, and was remarkably strong and large. During the month above named I heard of her, that she was a large, strong, and remarkably healthy woman."

In the Medical Times and Gazette for August 18, 1883, Mr. R. W. Parker details a case that is full of interest in this connection. The child was two and a half years of age in April, 1879, when admitted to the East London Children's Hospital. It had never been a strong child, and during the few months preceding admission to hospital it had several "small abscesses" in different parts of the body, for instance, on scalp, back axilla, and wrist. Eleven days before admission the right buttock was similarly affected, and when Mr.

Parker saw the case he found "a large fluctuating swelling around and behind the trochanter, the skin over which is normal." The thigh was held in slight flexion and outward rotation, but there was "*no pain in, or fixation of, the hip-joint.*"

The abscess was very promptly opened in its most dependent part, and a drainage tube inserted. The limbs were fixed in the extended position by weight, more with the idea of correcting rachitic curves that were very marked. A month later pain was complained of about the hip, and after another month moving of the limb caused considerable pain. The abscess cavity had contracted, and a probe introduced did not come in contact with any bare bone. Disease slowly invaded the diaphysis and the epiphysis, the ordinary signs and symptoms accompanied, and two months after it had been fully recognized excision was performed. The head of the bone was in part absorbed, while the remainder was necrotic. "The neck was extensively carious, soft, and fatty." The recovery was slow, and the child was sent into the country during convalescence. The sinuses gradually closed, the boy grew fat and looked well. In February, 1883—fully three years having elapsed since the wounds healed—he came under observation again for "dropsy." The wounds were still healed, but the cicatrices were white and supple. There did not seem to be any evidence of local disease. The urine was loaded with albumen, was acid, and had a specific gravity of 1019. Remedies were administered for the kidney lesion—which, by the way, was supposed to be scarlatinal nephritis. Two weeks later the urine was more copious and the stools were watery. Vomiting had become an annoying symptom. Another week elapsed and the examination of the urine showed it to be pale straw-colored, scanty, and almost solid on boiling. No casts were found, and no blood-corpuscles. The stools became more frequent, and he died twenty-two days after coming under observation for his "dropsy."

There was no fluid in the abdomen, in the pleura, or in the pericardium; the lungs were œdematous. "The liver was waxy, and weighed twenty-seven ounces and a half; the kidneys each weighed seven ounces and a half, their capsules readily peeled off; the cortical substance was swollen and the whole organ pale. The joint was examined carefully: it was at first hoped that a specimen of repair after excision would have been found. On the contrary, a process

of slow caries was going on in the iliac bone; it was surrounded by thick inspissated pus which had raised the periosteum from the pelvic surface of the bone, leaving it finely eroded. The upper part of the femur was connected to the remnants of the old capsular ligament by firm, unyielding, gristly connective tissue."

Mr. Parker very properly heads his report, "*Peri-trochanteric Abscess—Subsequent Coxitis—Excision—Apparent Recovery—Lardaceous Disease three years later—Death—Autopsy.*"

The other objection to the operation, viz., that the limb is left insufficiently strong as a support, is certainly an objection worthy of consideration. Still this is of insignificant importance when compared with death by slow, torturing suppuration.

The questions then are reached:

1. Shall we ever excise? Yes.
2. In what cases shall we excise?

To answer this question let me cite an hypothetical case or two.

Suppose one gets a case in the early stage, and learns at that time or subsequently that a tuberculous element exists in some member of father's or mother's family, near or remote. Let this point be always borne in mind for prognostic purposes. Suppose, furthermore, that the treatment adopted is treatment that is known to be attended usually with a fair amount of success. Suppose resolution does not take place, but that the disease goes into the second and then into the third stages. Suppose the suppurative process is unusually severe and unusually prolonged, and that the patient is losing ground steadily despite treatment; suppose that the urine is of low specific gravity, and that this low specific gravity persists until the child begins to complain of pain in the hepatic region. Given now a case like the above, whether the evolution have been slow or rapid, no time should be lost, when these urinary changes have thus advanced, in removing every particle of diseased bone. If excision will not do it, resort to amputation. Lardaceous disease is impending, and life is at stake.

Suppose, again, in this same patient you can get no evidence at any time of a tuberculous element, but that suppuration has existed long enough to induce an exceedingly low vitality and is accompanied by unexplained attacks of diarrhœa; the operation should then be done. These cases die by exhaustion, and these little disorders of the intesti-

nal tract are but the precursors of a general dissolution.

Suppose, still again, that you get a case that has reached the advanced stages without treatment, and that the above conditions exist; it is useless to waste time with any forms of mechanical treatment.

It will be seen that I have placed the operation on the basis of a necessity—a last resort. If time be an important enough element in the case it may be performed even before the third stage is reached. I do not know but that the remarks of Mr. Holmes fairly represent my own views, and I take pleasure in quoting them, as does Mr. Macnamara:

“I would sum up what I have to say about excision of the hip in a very few words, by the simple statement that it ought to be very rarely indeed required if the disease were treated properly at its commencement. In cases seen at an advanced stage of the disease, it is chiefly when sequestra exist that the operation is *necessary*; though it may be *advisable* as a means of shortening the treatment in other cases, also, when the patient cannot obtain the prolonged surgical care which is essential to natural recovery.”

There are many cases, be it understood, that go the same way after excision, and if lardaceous disease be still present amputation should be performed. After all, this question must be left to the good sense of the intelligent practitioner, and he must be guided in addition by correct surgical principles. The chances of life and death, of prolonged suffering and relief from suffering, must be carefully weighed, and judgment be rendered accordingly.

Given then the cases, how shall the operation be performed? There are several incisions, the semilunar, the vertical, the transverse, and the T. The mode of operating, as practised by Dr. Sayre, seems to be the most generally accepted, and, with antiseptic precautions, this should be done as follows:

“Select a strong knife, and drive it home to the bone at a point midway between the anterior-superior spinous process of the ilium and the top of the trochanter; then, drawing it in a curved line over the ilium, and the top of the great trochanter, extending it, not directly over the top of the trochanter, but midway between the centre and its posterior border, and complete it by carrying the knife forward and inward, making the whole length of the incision from four to six inches, according to the size of the thigh. In

this manner a curved incision is made through all the soft parts down to the bone and *through the periosteum*. If you do not feel certain that the periosteum has been divided over the femur by the first incision, carry the point of the knife along the same line a second and, if need be, a third time."

Dr. Wyeth has, by anatomical research, demonstrated that in the above mode of making the incision no hemorrhage of any significance is encountered.

The parts being held aside by retractors, the operator is in view of the trochanter. A narrow thick knife is now used for a "second incision through the periosteum, only at right angles with the first, at a point an inch or an inch and a half below the top of the great trochanter, as the case may be, just opposite the lesser trochanter or a little above it, and extend it as far as possible around the bone." The periosteum is detached by means of a periosteal elevator separating the attachments up to the digital fossa. The rotators of the thigh at this point are usually divided with the knife. Dr. Sayre lays special stress on the smallness of the incision in this locality, and upon the necessity of elevating enough periosteum in order that the muscular attachments may be preserved.

With a slight adduction movement the head or what remains of it can be thrown out of the acetabulum, the section being made with a saw. Some prefer the chain, some the finger. Bone forceps are undesirable. With a proper base a chisel would be preferable, as no sawdust would be left as an irritating substance.

The place of section should now be subjected to careful inspection for disease of the shaft, and if any is found section must be made at a lower point. It will naturally suggest itself to the operator that the acetabulum should be carefully explored and all necrotic bone, so far as practicable, removed. Thorough cleansing antiseptically, rectification of deformity, drainage tubes, and appropriate dressings comes next in order.

Dr. Sayre again lays stress on the avoidance of cotton or lint as plugs. He uses oakum soaked in balsam Peru.

As a splint for securing immobility, the most convenient is the modification of Bonnet's *grand appareil* (figured as No. 64). This is well padded, and the patient is placed in the apparatus the sound limb being strengthened and secured by making the foot fast to the foot-piece, which moves by an adjustable screw. The diseased limb is se-

cured with pads about salient points to prevent excoriation. This can be worn continuously for a month if the full Lister dressing be employed; otherwise it will be necessary to change the dressing in from twenty-four to forty-eight hours. At the end of a month or six weeks the apparatus can be removed and other splints substituted.

In England the Bryant splint is used, with modifications. Indeed splints which preserve the parallelism and secure immobility may be extemporized and the cuirass can be dispensed with. Works on surgery give the dressings and appliances in detail; but, for a complete description, Dr. Sayre's work on Orthopedic Surgery is the best for reference. This operation is successful in proportion to the care in execution and subsequent nursing given the patient.

Some surgeons obtain permission to remove the limb, before attempting the operation, in case the disease is found so extensive as to make the removal of all portions impracticable. One never knows just how much caries he will meet. Sometimes, as in one or two of Dr. Poore's cases, the whole shaft is diseased.

The remaining operations are for the correction of deformity, and to Dr. W. T. Bull I am indebted for assistance in the preparation of the remaining portion of this chapter.

The operation for bony ankylosis consists in division of the neck of the femur with a saw subcutaneously, and it has been done, without question, with good results.

It has also been done with a chisel by Volkmann, Maunder and Macewen. It makes very little difference whether the bone is divided with a saw or chisel. Of late years most surgeons prefer the chisel to the saw. In either case the operation is practically the same: sink the knife right



FIG. 64.

down to the bone above the upper border of the great trochanter, and then either pass a saw or a chisel through this opening and divide the bone.

Theoretically, the saw is open to the objection of leaving sawdust behind, but both means give uniformly good results. The wound generally heals perfectly, or with very moderate suppuration. Some wounds, when the bone is divided with the saw, heal subcutaneously. It is desirable to do such operations antiseptically as far as possible.

Adams's operation is only practicable in cases of bony ankylosis where the head of the bone is in its place, and these are cases of ankylosis from rheumatism or rheumatic arthritis, ankylosis from long-continued rest, and Adams includes pyæmic inflammation of the hip-joint—in fact any inflammation where the head of the bone remains in place; as long as the head is there, the operation is feasible.

But cases of hip-joint disease where the head of the bone has been absorbed, where there is a high position of the trochanter above Nélaton's line are not amenable to Adams's operation.

Such cases require an operation first performed by Barton, but which should be done nowadays after the manner made more precise by Volkmann.

Barton's operation consisted in cutting through the femur below the trochanter minor. An incision was made sufficiently large to separate the periosteum from the bone, and then a chain-saw was passed around the bone, thus dividing it. Several American surgeons repeated this operation. Sayre modified it by making one end of the bone convex and the other concave, and claimed to obtain motion by this artificial joint, which persisted for two years (reported on page 420 of his work). There is an objection to this operation proposed by Barton, from the fact that the bone is cut completely across, and when the effort is made to straighten the limb, it is likely to throw upward or forward the upper end of the lower fragment. One case occurred in the practice of a surgeon in this city, in which the femoral artery was pressed upon and gangrene took place.

The Volkmann operation is the one Dr. Bull performs. In this the bone is not sawn or chiselled entirely through, but a wedge-shaped piece is removed from the outer surface of the bone, the apex of which extends nearly to the compact tissue on the inner surface of the bone. This

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leaves a thin layer of compact tissue on the inner surface to be fractured through in the effort to straighten the limb, and serves to hold the lower fragment in place.

In addition to removing the wedge-shaped piece of bone, it is generally necessary to divide the sartorius, tensor vaginæ femoris, and sometimes the rectus where the thigh is strongly flexed; and in addition to these muscles the adductors also should be divided when the limb is adducted as well as flexed.

The operation to which Volkmann gave the name "Subtrochanteric Osteotomy," is performed as follows: An incision is made directly over the long axis of the femur on its outer side, about one and a half inches in length, directly down to the bone. The middle point of this incision should be from one to one and a half inches below the top of the great trochanter. The periosteum is separated from the bone over the outer and posterior surface, and with the chisel a wedge-shaped piece is removed embracing the whole thickness of the bone, with the exception of the inner layer of compact tissue. The width of the base of the wedge should be greater or less according to the amount of flexion, and the base of the wedge must be sufficiently large to permit the cut surfaces of the bone to come in contact when the limb is straightened. This varies from one half to one inch.

After removing the wedge of bone, the pelvis should be steadied by an assistant, and the limb brought down to a straight position by fracturing the layer of bone which has not been cut through, and before the limb can be perfectly straightened it may be found that division of the adductors sartorius and, sometimes, the tensor vaginæ femoris is required. This may be done by subcutaneous incision or by an open wound; probably the former method will suffice in the majority of cases, and is to be preferred on account of the smaller or insignificant character of the wound. If, however, extensive division of these muscles should be found necessary, some surgeons prefer to accomplish this by the open method.

The subcutaneous tenotomy (myotomy?) is easily performed, by putting the muscles on the stretch by straightening the limb, entering the skin close to their origin with a sharp-pointed tenotome, then passing a blunt-pointed tenotome underneath the muscle, taking care to keep close to the point of insertion in the bone and cut-

ting toward the skin while the fibres are kept upon the stretch.

The wounds should be kept open and covered merely with a Lister dressing, which should reach from the lower third of the thigh to the crest of the ilium. Over this a plaster-of-Paris bandage should be applied from above the knee, embracing the pelvis, and a weight-and-pulley extension applied to the limb, a weight of five or ten pounds being sufficient. In place of the extension and plaster-of-Paris, a long external splint, reaching from the axilla to below the sole, should be used in young children.

This operation has yielded perfectly satisfactory results only where antiseptic details have been strictly carried out; and while it is no longer considered necessary to use the spray upon a wound during operations, it is certainly desirable that the parts to be operated on, the instruments, and hands of the operator and his assistants, should be carefully disinfected, and a typical Lister dressing should be used. In view, however, of carbolic-acid poisoning in children, especially those of a strumous diathesis, it seems to Dr. Bull at least preferable to substitute for carbolic acid in the wound a solution of bichloride of mercury, of the strength of one part to one thousand.

The dressing need not be removed unless a discharge appear at its edge, or there be some constitutional disturbance.

At the end of six weeks union will have occurred at the point of section of the bone, and a week or two later the patient may be allowed to go around on crutches. In many cases the wound in the soft parts will be reduced to a mere granulating surface, or entirely cicatrized at the end of three weeks, and a more simple dressing may be substituted for the Lister gauze.

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