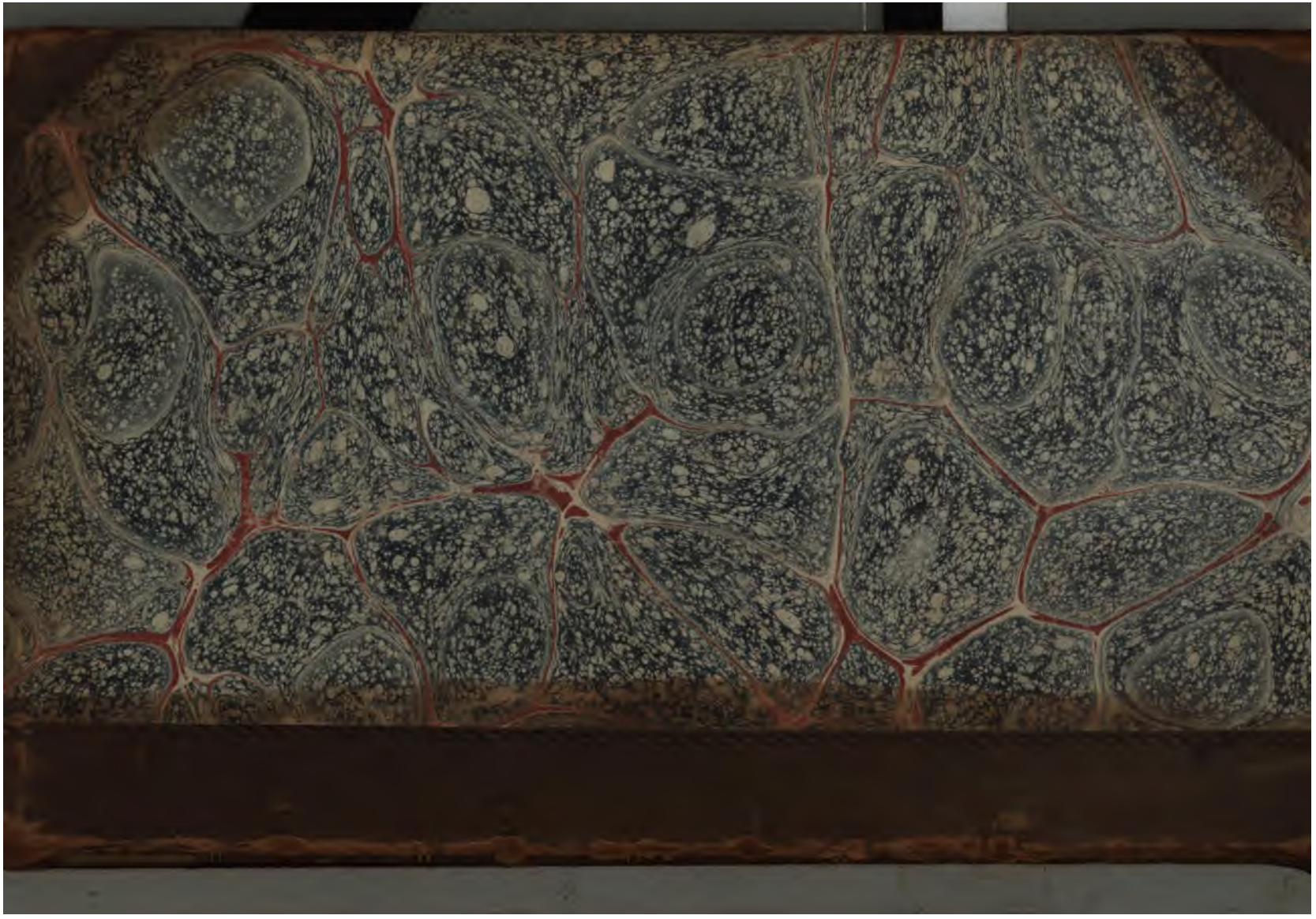

A

SYLLABUS

OF

SURGICAL LECTURES

ON THE

NATURE AND TREATMENT

OF

FRACTURES, DISEASES OF THE JOINTS,

AND

DEFORMITIES OF THE LIMBS AND SPINE:

CONTAINING

DESCRIPTIONS OF THE MODES OF APPLYING

TWELVE NEW APPARATUSES,

ILLUSTRATED BY TWELVE PLATES;

WITH

CASES

SHOWING THE ADVANTAGES ARISING FROM THE PLANS OF TREATMENT RECOMMENDED BY

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PREFACE.

THE constitution of the human mind is such, that it cannot always, unassisted, retain the connexion which exists between even the plainest principles which a teacher may endeavour to inculcate. It is, however, of the utmost importance, in many instances, that our notions should be clear and properly arranged; and in no art or science is this more necessary than in the art and science of surgery—without correct ideas our judgments cannot be sound, nor are we likely to conduct, to favourable terminations, the cases which we are called upon to treat. In surgery we know that a single misconception may lead to false inferences, which, if acted upon,

may cost the patient a limb, or even his life. Upon these considerations, I have been induced to bring into a small compass the heads of my Lectures, in order to assist the gentlemen who attend them in their endeavours to avoid the evils which an imperfect knowledge of my views may occasion. The work, containing these heads, I now offer to their notice, under the title "Syllabus," to the matter of which they might easily append the facts and observations which I relate to them in detail; and I am disposed to believe that they will find in it sufficient to enable them to bear in mind the principles and the practice which I have from time to time to lay before them.

I have frequently observed that gentlemen, who have made themselves acquainted with many of the principles, which as far as I know are original with myself, have

failed in a very great measure, and sometimes altogether, in their attempts to act upon them so as to benefit their patients. In private, and in the wards of our hospitals, I find my apparatuses, which are constructed upon those principles, applied in every imaginary way, but rarely in the right. This has cost me some pain and has led me to seek a remedy.—Is it probable that the apparatuses, employed in the manner here alluded to, often apparently without reference to principle or action, will be productive of the great advantages which, by proper management, I have been able to obtain with them? It would be as reasonable to suppose that the most absurd treatment will be followed by the best results. To obtain, I may say, without ostentation, the extraordinary advantages which the apparatuses are capable of affording, it

is necessary that they should be properly applied and properly managed. With a view to obviate the evils which improper application and improper management give rise to, in some degree, and I hope entirely with those who are acquainted with my principles, I have ventured to deviate in some measure from the usual manner of composing a syllabus, by introducing descriptions and illustrations of the modes of applying twelve of the apparatuses which I have had constructed for the treatment of fractures and deformities. This innovation, I flatter myself, will be of service in removing the evils of which I complain. It will prove not only advantageous to my pupils, but also to those gentlemen who may wish to use the apparatuses, though unacquainted with the principles upon which they are constructed.

Had I designed to publish a treatise, instead of a syllabus, I should have thought it advisable to bring forward a large number of cases, to prove the superiority of the practice which I recommend; but in a work like this, cases seem superfluous. I thought, however, that I could not better illustrate the utility of my apparatuses, than by transcribing from my case book, which I have done almost indiscriminately, a case wherever it appeared advisable to show the effects of any peculiar plan of treatment.

I cannot close my prefatory remarks without offering my warmest acknowledgements to Sir Astley Cooper, Mr. Foster, Mr. Green, Mr. Travers, and many other surgeons, for the liberality they have shown me, in their public capacities, by furnishing

me with cases to illustrate the plans of treatment which I have introduced.

The wide field of observation and experience, in which their kindness has allowed me to luxuriate, has afforded me opportunities of testing my apparatuses, in almost every variety of the cases for which they are adapted—especially in those which under ordinary treatment are found the most unmanageable; and I have collected from these sources, and from my own public and private practice, such a body of evidence of their great superiority and efficacy, in bringing about those results which it is the surgeon's business to obtain, that I am now enabled to recommend them to the profession, with a degree of confidence which I could scarcely have anticipated; and for which I must have waited many years, if I

had not had thrown open to me, the resources with which I have been favoured, in addition to my own practice. Those who have been active in favouring me with cases, in order to enable me to establish new modes of treatment, and thereby to diminish the sum of human suffering, have shown themselves to be men void of any invidious feeling. For the assistance they have afforded me, they have my gratitude. This, indeed, is of little value; but then they have the approval of their own consciences—the gratification of reflecting that they have contributed largely and honourably to the benefit of the profession and the public; which is the highest reward that noble minds can receive.

Great Surrey-street,
Jan. 1827.

Note.—The Author's apparatuses may be obtained, correctly made, at Mr. Grafton's, No. 56, King-street, Borough.

ERRATA.

Page 65, line 7, *for* connecxons, *read* connexions.
— last line but one, *for* stillet, *read* stellated.
67, line 18, *for* stillet, *read* stellated.
114, fourth line from the bottom, omit the article the.
120, fourth line from the top, *for* joints, *read* joint.

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ON THE TREATMENT OF FRACTURES OF THE UPPER THIRD OF THE THIGH BONE.

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Never used with any advantage to the patient.

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The use of the short splints.

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Boyer's apparatus.

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Described. Answers all the indications which have occurred to him. So constructed that it might be used upon any size bedstead.

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When this apparatus is used, three pieces of board should be procured, long enough to rest upon the sides of the bedstead by which it is to be raised from the floor. One of these, c, c, should be placed near the lower end of the frame, a, a; another near the lower end of the upper plane, e; and the third near the upper end of the frame. The middle and lower planes, d, d, being raised to the proper degree of elevation, the hair mattress should be laid over the three planes, d, d, e, as they lie connected together. Over the mattress should be placed a blanket and sheet, with a hole in each, corresponding to the hole in the mattress. These should be stitched round the edge of the mattress, l, l, l, and round the hole in the centre, which is

placed opposite the trap-door, f, in order to prevent them from getting into folds, which would incommode the patient.

These preliminaries being arranged, the patient should be placed upon the mattress, with the perineum opposite the hole in the middle plane of the apparatus; and the lower limbs over the double inclined plane, d, d, so as to make the legs bear equally upon the lower plane. The foot of the injured limb should then be fixed to the foot-board, k, which will keep it upright, and the heel close down against the mattress. This being done, the middle plane, d, h, should be adapted to the length of the sound thigh, which may be accomplished by moving the two portions of board of which it is composed upon each other, so as to elongate or shorten this plane as the case may require. This plane should be fixed in such a manner, by the screw, g, as to occasion a firm but easy pressure to be exerted upon the back of the leg of the sound limb; and the same effect being produced upon that which is injured, we might infer that the injured limb is extended as much as is proper, and no more. It will of course be seen that the middle plane of the apparatus must be elongated equally on both sides.

Thus three important indications which are common to fractures of the upper third of the thigh bone may be answered, viz. the pelvis and the

limb may be kept perfectly quiet, and in this way motion of the fractured extremities prevented; extension, if necessary, may be made in the line of the thigh bone, and *undeviatingly kept up;* and thus retraction of the limb may be prevented, and at the same time the foot is so fixed that neither inversion nor eversion can take place.

The manner of placing the limb for fractures of the neck of the thigh bone.

When the apparatus is used for the treatment of fractures of the neck of the thigh bone, whether within or external to the capsular ligament, the middle and lower planes should be so placed that the limb may lie at an easy degree of flexion.

Besides those indications which are common in the treatment of fractures of the upper third of the thigh bone, we have two others to answer in the management of fractures of the *neck* of the thigh bone; one of which is to prevent the upper end of the femur from dropping out of its natural line, and the other to keep the fractured surfaces in close apposition. The first of these indications may be answered by placing a small pad judiciously under the trochanter major upon the mattress; and the other by a splint, g, placed along the outer side of the thigh, and confined to the pelvis and the lower end of the

thigh by two bits of common roller. One of these should be passed round the limb over the splint at the knee, s; and the other, t, round the pelvis, and tied so as to exert a sufficient degree of pressure to keep the fractured surfaces closely applied to each other.

The treatment of fractures of the trochanter major above the neck.

In the treatment of fractures of the trochanter major above the neck, the limb may be placed in the bent position upon the author's fracture bed, as in fractures through the neck. In these cases we should keep the pelvis and the limb quiet, as in the treatment of fractures of the neck of the bone. The limb too should be kept in that position where the great toe is in a line with the anterior superior spinous process of the ilium. In these cases there can be no shortening of the limb, unless the fracture of the trochanter be complicated with a fracture of the neck of the bone; therefore there will be no occasion for keeping up extension. With respect to keeping the fractured surfaces in contact, I may observe, that we must consider the direction in which the fracture may extend through the bone; and by the application of a bandage and a compress above the trochanters, we should endeavour to resist the action of the glutei muscles, and to press the fractured surfaces together. The

bandage employed for this purpose may be modified in its application, according to circumstances; but I am disposed to think, that a four-tailed bandage will usually be found to be the best. The middle of this bandage being placed above the trochanter upon a pad of lint, two tails may be carried round the pelvis and tied. These two tails being drawn rather tight will keep the bandage from slipping off the pelvis. The other tails being carried round the upper part of the thigh upon a pad, and fastened as close as circumstances may require, will counteract the contraction of those muscles whose constant tendency is to separate the fractured surfaces. After this bandage is applied, a splint should be placed upon the outer side of the thigh, and fastened round the thigh and round the pelvis, in the same manner as I have recommended in the treatment of fractures of the neck of the thigh bone. The object of this splint is to keep the trochanter in a proper line with the shaft of the bone.

The treatment of fractures between the trochanters just below the neck of the bone.

The treatment of fractures immediately below the neck between the trochanters, will differ very little from that which I recommended when speaking of the treatment of fractures of the

neck of the bone. The pelvis and the limb must be kept at rest; extension must be kept up in a line with the thigh bone; the toe must be kept in a line with the anterior superior spinous process of the ilium; the trochanter must be prevented from dropping, which may be done by means of a hard pillow applied with great nicety beneath it. A splint should be applied to the outer side of the thigh in both cases; and in both, the pressure of the splint should only amount to gentle support. The indication for the use of the splint in the two varieties of fracture is somewhat different. In fractures of the neck of the femur, it is employed to keep the fractured ends of the neck of the femur in close apposition; in fractures between the trochanters, it is used to keep the upper and lower portions of the bone in a proper line, so that they may unite without deformity.

The treatment of fractures immediately below the trochanter minor.

The apparatus which I have recommended to be used in the treatment of fractures of the neck of the thigh bone, and in the treatment of fractures of the trochanter major; and in those which pass through the bone between the trochanters, will also be found the best for those which take place just below the trochanter minor. With this apparatus every indication may be answered with ease both to the surgeon and the patient.

The fracture bed must be prepared in the same manner as I described when speaking of the treatment of fractures of the neck of the bone. This being done, place the limbs over the double inclined plane, fixed at a right angle, and extend the injured limb to its natural length by elongating the middle plane as much as may be necessary; then place a piece of common splint, padded, under the thigh upon some straps. This splint should be long enough to reach from the tuberosity of the ischium to the ham. Another splint, padded, should then be placed upon the outer side; another upon the inner; and a fourth upon the front of the thigh. These splints should be made so as to keep up equal pressure upon the thigh bone; and particular pressure may be made, as will be required in oblique fractures, by padding them in such a manner as to press the fractured surfaces together.

The period during which it is proper to confine the patient in the management of each variety of fracture that has been mentioned.

Prognosis.*

* I shall not relate any cases illustrative of the advantages of the treatment which I have recommended for fractures of the upper third of the thigh bone, as the apparatus which I have introduced

Observations upon the plan usually recommended of extending the limb over the common double inclined plane or fracture box.

The evils arising from this, which might be termed most injudicious practice. The knee joint sometimes laid open by the pressure of the apparatus against the part behind the condyles of the femur. The os calcis sometimes bared. Effects upon the fractured parts, calculated to increase the deformity, as may be easily demonstrated.

LECTURE VI.

ON FRACTURES OF THE MIDDLE AND LOWER THIRDS OF THE THIGH BONE.

Fractures of the middle of the thigh most frequent. Common at all periods of life. Easily discovered.

does not act upon any new principle. The principles upon which it is constructed have been long since published; I claim for it only certain improvements by which it is rendered more portable and more easily and nicely adjusted.—AUTHOR.

Direction of the fracture.

Knowledge of it important.

Displacement.

Nature of—in fractures downward and outward—downward and inward—downward and forward—downward and backward.

Symptoms which accompany fractures of the middle third.

Fractures of the lower third of the bone.

Common at all periods of life.

Direction of fractures in this situation.

Comminuted fracture of the condyles.

Symptoms of fracture in this situation—Of one condyle.

Displacement.

Physical causes of. Action of the flexors of the thigh in producing displacement. Manner in which the action of the flexors of the thigh is resisted by the weight of the limb. Pain produced by the separation of the fractured ends. The effect produced by the action of the flexor muscles of the thigh, diminishes in proportion to the distance of the fracture from the pelvis. The action is the same when the fracture is

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The action of the gastrocnemius and popliteus.

Effects of—when a fracture exists near or through the condyles—when one condyle is split off.

Causes of retraction.

Extensors of the leg sometimes pierced by the shaft of the bone.

Direction in which displacement takes place in fractures of the lower third of the thigh.

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Application. Position of the limb.

The author's experiment showing the inadequacy of the short splints to support the fractured parts. Rotatory motion easily produced by any accidental motion of the body, or of the limb. Lateral motion. Lateral displacement. Retraction. The result of this treatment is deformity of the limb.

The short splints reach the condyles. No benefit likely to accrue from this. The trifling effect which these splints have upon the fractured parts, is less when the fracture is near the condyles than when near the middle of the bone. They cannot be at all depended upon in any case of complete fracture of the thigh. Displacement of the broken extremities and shortening of the limb take place much the same as they would were no splints applied.

Mr. Pott's plan of treatment.

His principle of relaxing the muscles.

Mode of placing the limb on the side.

Effects of this position upon the integuments covering the trochanter; inflammation; ulceration; sloughing.

Effects of this position upon the fractured extremities of the bone. Usually followed by eversion of the foot. The manner in which this defor-

mity takes place explained. Retraction of the limb.

Only one indication answered by this plan of treatment out of four that have been mentioned.

Fracture box and double inclined plane.

Neither prevents the fractured ends from moving when the pelvis is moved intentionally or accidentally. Neither is calculated to keep up permanent or steady extension. Shortening and often other deformities of the limb follow the use of these apparatuses. Neither of them ought to be used where there is the least danger of retraction.

Straight position of the limb.

Principle—advocates for.

Boyer's apparatus.

May be made to keep up extension, and that is all. It cannot be used without sacrificing two most important indications. The straight position shown to be most injurious in many cases, and is contra-indicated by the natural figure of the limb. Effects of this position upon the fractured bone more or less injurious according to the situation and nature of the fracture. Effects when the fracture is in the upper third—in the lower third. Deformity of the limb which follows this practice.

LECTURE VII.

ON THE TREATMENT OF FRACTURES OF THE MIDDLE AND LOWER THIRDS OF THE THIGH BONE.

The author's mode of treating these fractures.

The limb fixed so as to prevent any motion from taking place in the fractured part, when an impetus is given to the limb either above or below the fracture.

Anatomical connexions of the thigh bone. The femur fixed when the pelvis and the leg are fixed.

Action of the muscles of the limb.

Voluntary power. Involuntary power. Can the involuntary contraction be controlled by mechanical means? The author's experiment, showing the involuntary action of the muscles might be readily overcome under ordinary circumstances; and the fractured extremities easily fixed, even though the limb be passively moved. The effects of moving the pelvis easily prevented. In what manner this is accomplished.

The peculiar form of the limb should be attended to in the construction of apparatus used for fractures of the thigh.

How is this to be done, so as at the same time to obtain those advantages, which might easily be obtained were the limb straight? The author's experiment, showing that the fractured parts may be readily prevented from moving, and at the same time the natural figure of the limb preserved.

Other indications to be answered by mechanical means.

The proper position of the foot. Flexion of the limb. Advantages arising from this. Retraction to be prevented. How. Points of resistance.

The author's apparatus for fractures of the middle and lower thirds of the thigh bone, simple and compound fractures of the leg, and simple and compound dislocations of the ancle.

Description of, as far as relates to fractures of the thigh.

The manner of fixing and padding the apparatus for fractures of the middle of the thigh.

The thigh piece of the apparatus, a, plate 2, which is intended for the injured side, should be connected to the leg-piece, c, and fixed by means of the steel bar, d, at an angle of about 25 degrees, which is a sufficient degree of flexion for a fracture in this situation. This may be done with a sufficient degree of accuracy, by putting the brass foot-piece, attached to the steel bar, upon the third tooth of the rack. The apparatus should then be adapted to the length of the sound limb, by moving the foot-board, e; and the sliding plate, which is connected to the upper end of the thigh-piece, so as to lengthen or shorten the instrument, as the case may require. The foot-board, e, should be so placed that the heel of the foot may nearly touch the sole of the shoe, f, when the foot is placed in it. The sliding plate should also be fixed in such a manner, that its upper part may reach within a very little of the tuberosity of the ischium, when the apparatus is forced down, so that the back of the leg-piece may press firmly against the back of the leg.

Having adapted the apparatus to the length of the sound limb, the next object is to superintend the construction of a pad to lie upon the apparatus. This should be made of thick flannel, about six times doubled, and long enough to reach from the edge of the heel of the shoe to a little above the brass plate. The flannel should be covered

with soft linen or calico. Near the upper end, and upon the upper surface of the pad, two tapes should be fixed, to confine the pad to its proper situation upon the apparatus; which is done by tying these tapes round the bars at the back of the brass plate, in such a way as to draw and fix the end of the pad over the end of the apparatus. The apparatus thus padded should be again placed under the sound limb, and drawn down with the limb upon it as before. This is done with a view to ascertain the little alteration which the thickness of the pad may render it necessary to make in the situation of the brass plate, or in the foot-board.

Great care should be taken in fixing these parts of the apparatus in their proper situation, for the result of the case will much depend upon the accuracy with which the instrument is adapted to the length of the sound limb. If it be properly adapted to the sound limb, it will be sure to answer for that which is injured, the natural length of the two limbs being the same.

We must always remember, that the thigh part of the apparatus is to support the back of the thigh; and at the same time to prevent retraction, which it does by resisting the action of the muscles till the bone is united. The apparatus acts as a temporary bone, one part resting against the tuberosity of the ischium, and the other against the back of the leg; therefore, if

the apparatus be not placed with great nicety, these effects cannot be produced.

The apparatus being bent to the proper angle, and adapted to the natural length of the limb, it is proper in the next place to notice the natural form of the calf of the leg, and of the thigh; and if it should appear that the hollowed part of the leg-piece is too deep for the calf of the leg to lie easily in, when it becomes a little flattened, which it always does during the continuance of the pressure, some tow or other soft material should be placed between the pad and the instrument (not between the pad and the limb), and also some between the pad and the thigh part of the instrument, if the back of the thigh would not otherwise be sufficiently supported to keep the broken portions in that line which is natural to the bone: always bearing in mind, that the natural figure of the femur is that of a curved line, the convexity of which is placed anteriorly.

When called to patients who have this apparatus applied by other persons, I frequently observe, that they complain of pain under the knee, just where the limb rests upon the angle of the apparatus. This is an evil which is very easily remedied, and one which always arises from want of proper attention to padding. In order to prevent the occurrence of this inconvenience to the patient, a sufficient quantity of tow should

be placed behind the calf of the leg, between the pad and the leg part of the apparatus, extending up to the angle of the apparatus (not over it) to prevent the angle from exerting any undue pressure upon the back of the limb; also some upon the thigh part, behind the pad, extending up to the angle of the apparatus. When this is properly attended to, the angle of the apparatus is so rounded by the padding, that it just fits the bend of the knee, which therefore has an equal bearing, and consequently lies upon the apparatus with comfort to the patient.

A little care taken in padding this part of the apparatus will save the patient from much unnecessary pain, and the surgeon from much unnecessary trouble. If pain comes on in this situation, notwithstanding the care that is taken to prevent it, no attempt should be made to relieve the patient, by pushing tow or other padding between the pad and the limb, just where the pain is complained of, for this often only increases the evil; but, on the contrary, place the padding a little above and below the part where the patient complains of pain, so as to take off the pressure of the angle of the instrument; and this being done, the pain will subside; if the undue pressure has not been allowed to continue so long as to produce excoriation.

Application of the author's apparatus as for fractures of the middle of the thigh.—See Plate II.

Having padded the apparatus and also the short splint to be used with it, place the pelvis strap, m, between the bars and the plate of the sliding portion, and commence the application. In the first place, a spiral bandage should be placed round the limb to the knee, and some strips of soap plaster, each about two inches wide, round the fracture to support the soft parts. This being done, let an assistant take the small of the leg in one hand, and place the other hand under the knee, and then gradually raise the limb, and at the same time keep the knee bent and the thigh extended. When this is managed adroitly, the patient suffers very little pain. If the limb be lying upon the side, the assistant should turn it round upon the heel, and the patient should at the same time turn round upon his back.

The limb being raised, the surgeon should place the apparatus under it, and desire the assistant to lower the limb down upon the apparatus, placing the foot in the shoe, f, which should be hanging loose upon the foot-board, e, and should have in it a thin soft pad for the heel to rest upon. The shoe should now be buckled over the instep, and the foot-board a little raised, so as to place the foot at an easy degree of flexion.

The shoe must be placed and confined upon the foot-board in such a manner as to give easy support to the heel. The shoe might be placed upon the foot before the limb is raised, and afterwards confined to the foot-board in that position which the case may indicate.

The foot being secured, our next point is to fix the leg. This is done by placing a piece of common split deal splint, properly padded, g, upon the front of the leg, and buckling two straps, h, h, carried round the limb over the apparatus and this splint, so as to secure the leg to the apparatus.

The foot and leg being fixed to the apparatus, the assistant should take the apparatus and the knee between his hands, and gradually draw down the limb and the apparatus together, till the surgeon, who during this time supports the apparatus against the back of the thigh, finds that the upper end of the apparatus occupies the same relative situation with respect to the tuberosity of the ischium, which it occupied when placed upon the sound limb. The assistant should keep the apparatus in this situation while the surgeon applies the short splints. The longest of these, k, should reach from the upper part of the great trochanter to the lower part of the outer condyle; the shortest should be placed upon the inner side of the limb, and should reach from the pubis to the lower part of

the inner condyle; and the other, i, should lie on the front of the thigh, and extend from a little below the anterior superior spinous process of the ilium to the knee. The splints being thus placed, the whole should be secured by straps, l, l, l, fixed to the back part of the apparatus, and carried round the limb over the splints and buckled. The pelvis strap, m, should now be carried round the limb, under the strips of leather attached to the short splints, and made to cross on the outer side; and then the buckle end, with the sliding pad, should be carried round the pelvis and made to meet the other end in front, where it should be buckled *.

The limb may be thus put up as soon as the inflammation arising from the injury is sufficiently got under, which is usually in the course of three or four days. Previous to this period, the front splint, i, should be omitted, and the other two short splints should be confined upon the limb, by means of a bandage carried round the limb over them and the apparatus. This plan sufficiently secures the limb, provided it be kept upon

* When carrying the short straps round the thigh, for the purpose of fixing the short splints and the apparatus to the thigh, it is advisable to give the end of each strap a twist round one or more of the strips of leather, which are placed upon the short splints, as these splints otherwise get out of their proper situation.—AUTHOR.

the heel, and at the same time enables the surgeon to apply evaporating lotions to the injured part.

When all the splints are applied, the position of the limb may be either upon the heel, or half way between the heel and the side, where it may be retained by pillows placed under the knee and the foot, as the limb leans to the side. I prefer the latter position generally for a continuance, because the patient may turn round upon his back without producing any twist in the limb, which he cannot do if the limb is laid flat upon the side. The pillows bear a part of the weight of the limb, which is sometimes an advantage, for the pelvis strap, when strained to the necessary degree of tightness to keep the apparatus close up against the back of the thigh, presses harder than can easily be borne by persons who have delicate skins, when the limb is kept altogether upon the heel. The position of the limb however may be altered, whenever either becomes irksome to the patient, by *passively* moving the limb from the heel to the side, or from the side to the heel. When this apparatus is applied, the patient may have his bed made with impunity, as often as may be necessary for his comfort; and, in some cases of transverse fracture, may even himself be allowed to alter the position of the limb *passively* at pleasure; but of course this must always be done with

great care, and is a liberty which should never be given to persons whose attention cannot be depended upon.

Case.

A man aged 20, in St. Thomas's Hospital, under the care of Mr. Green, had a transverse fracture of the thigh through the middle third produced by the wheel of a waggon as it passed over the limb. Two days after the accident, the author's apparatus was applied, and the man was desired to place the limb in any position most comfortable to himself, and to have his bed made every other day. This line of treatment was continued for a month, and at the end of this period the bone was found united. He continued to wear the apparatus however another week.

This man was desired to throw aside his crutches, at the end of the sixth week from the time of the accident, as the limb was so strong that he was able to walk without their assistance.

The bone united without the least discoverable deformity or shortening.

Application of the apparatus when the fracture is in the lower third of the bone, just above or through the condyles.

The only difference in the application of the apparatus for transverse fractures of the middle and lower thirds, consists in placing the leg and

thigh portions at a sharper angle. In the latter the apparatus should be bent nearly to a right angle, in order to relax the gastrocnemius and popliteus muscles as much as possible.

I do not think it advisable to allow the patient to move the limb in these cases, for if the fracture is close to the condyles, or extends through them, the short splints applied with the apparatus may not have a sufficient hold of the lower part of the bone to keep it from moving; but the surgeon may move the limb *passively*, with as much facility and safety as when the fracture is in the middle of the bone, and suffer the patient to have his bed made with impunity under his superintendance. It is scarcely necessary to state, that the patient should in all cases be moved for this purpose with great care.

I believe that fractures in this situation are quite as easily managed, and may be made to unite without deformity, as well as fractures of any other part of the bone; but the patient cannot be allowed so much liberty as in some fractures which extend through the middle third.

Case.

A woman, aged 70, was admitted into St. Thomas's Hospital, under the care of Mr. Green, for the cure of a fracture of this description, produced by a fall upon the knee. The fracture was just above the condyles. By Mr. Green's request

I assisted my friend Mr. Wilkin, who was the dresser for the week, and had the management of the case, in applying the apparatus The woman wore the apparatus for six weeks, and when it was taken off, the bone was found united, without shortening or other deformity, any more than existed previous to the occurrence of the accident.

Application of the apparatus for oblique fractures of the middle and lower thirds of the thigh.

In oblique fractures it is proper that the pads should be made so as to suit the particular case in hand. Suppose the fracture extends downward and outward, the pads should be made in such a way, that when applied they may press rather more firmly upon the inner side of the lower portion, and upon the outer side of the upper portion, than upon any other part. By this simple management, the fractured surfaces may be kept closely applied to each other; but on the contrary, if the pads be so constructed as to exert greater pressure upon the outer surface of the lower portion and the inner surface of the upper, in such a case, it must be evident that the pressure would act upon the two portions of bone in such a way as to keep the fractured surfaces asunder; and the least evil that could be expected under such circum-

stances would be a very tardy union; and it is probable that no union would be produced by the intervention of callus.

What I have said with respect to fractures extending downward and outward, applies equally to all other oblique fractures of the thigh. It is proper to consider the direction which the fracture takes through the bone, and to adapt the pressure in such a manner as to keep the fractured surfaces in close apposition.

In oblique fractures it is not advisable to allow the patient to move the limb, but he may have his bed made; and the surgeon may move the limb passively, as in transverse fractures of the thigh, extending through the middle or lower thirds.

During the treatment of fractures of the middle and lower thirds of the thigh with the author's apparatus, after the short splints are applied, the straps round the thigh must be kept firmly buckled, so that they may produce sufficient pressure upon the splints to keep the fractured ends from becoming displaced laterally. The surgeon must take care too that the instrument does not ride over the tuberosity of the ischium, and that the patient does not move the limb by the exertion of its own muscles. If the patient wants to have it moved, it should be done either by his own hand (in such cases as will allow of it), or by an attendant, taking care always that

whatever motion is given to the limb should be *passive*, and not by the muscles inserted into the bone. The reasons for these two directions will immediately appear. The riding of the instrument indicates that the fractured ends of the bone overlap, and if the patient attempts to move the limb by its own powers, he incurs the danger of displacing the upper fragment; for the muscles, which lie as cushions between the splints and the bone, have but little influence in preventing the effects of those whose actions may tend to produce displacement*.

On the propriety of keeping the patient in the horizontal position during the union of the fracture.

On the effects of altering the position of the pelvis with respect to the thigh before the bone is united.

Prognosis.

* I have thought it right to say, that I do not think it advisable to allow the limb to be moved in any other way than passively in any case, though I have sufficient evidence to show, that if it were moved by its own muscles instead of passively, when the apparatus which has been recommended is properly applied, the practice would not in every case be followed by an unfavourable result. I am led to draw this conclusion from a case which occurred in St. Thomas's Hospital, and one which occurred in my private practice, but which I need not now relate.—AUTHOR.

On the facility of managing the apparatus recommended for fractures of the middle and lower thirds of the femur, and the power which it enables the surgeon to acquire over the fractured parts.

On the advantages which the patient obtains from the use of the apparatus when properly managed.

LECTURE VIII.

ON SIMPLE FRACTURES OF THE LEG.

Bones of the leg.

Connexions.

Fractures may take place in any part of the bones of the leg, and extend through one or both.

Causes.

Symptoms.

Most common situation of fractures in the leg.

Indications of cure.

Usual modes of treatment.

Do they answer the indications which have been mentioned?

Split deal splints.

Shown to be of little use. Often produce deformity.

Double inclined plane.

Not often used for simple fractures of the leg.

Assilini's trough.

Application.

Does not admit of being adapted to limbs of different sizes. When used the limb must be confined in the straight position. Consequences of this in many cases. Does not support the heel. Does not prevent motion of the fractured ends. Does not prevent retraction.

Common leg splints.

Most commonly used.

Application.

Modes of placing the limb with the evils attending them. When placed upon the heel. Bowed state, which occurs when the limb is so placed with these splints applied. Pain and motion in

the fracture produced by the frequent attempts made to place the bones in their natural line. When the limb is placed upon the side. Deformity which arises from this position and want of support. In what way this position gives rise to eversion of the foot. Motion occurs in the seat of fracture in whatever position the limb may be placed. These splints do not prevent retraction in any case where extension is required. May be used in some cases with impunity, but ought not to be recommended in any. They cannot be employed without confining the patient to bed till the bones are united. This practice shown to be quite unnecessary, and is calculated to retard the cure.

The author's apparatus recommended to be used in the treatment of simple fractures of the middle and lower thirds of the thigh bone.

Description of, as far as it relates to simple fractures of the leg.

Intended to put every variety of fracture of the leg under the complete command of the surgeon, as far as respects the mechanical management of it.

On setting fractures of the leg. The manner of fixing and padding the author's

apparatus for the cure of simple transverse fractures of the leg.

In the treatment of simple fractures of the leg, the brass plate and pelvis strap are not employed.

The leg piece and the thigh piece, proper for the injured limb, should be fixed together at an angle of about 25 degrees, and adapted to the length of the sound limb; placing the foot-board higher or lower upon the leg piece as the length of the leg may require. The leg and thigh parts of the apparatus should now be padded in the same manner as for the treatment of fractures of the thigh.

Application of the author's apparatus for simple transverse fractures of the leg immediately subsequent to the accident.—See Plate III.

In the first instance, the shoe, e, should be placed upon and confined to the foot by means of the ribands or straps attached to it. Then an assistant should be directed to place one hand under the knee and to take the foot in the other, and, raising the fractured limb, bring it round so that he may place it upon the heel. When the limb is raised, the surgeon places the apparatus under it, and brings the angle of the apparatus opposite the bend of the knee, and then directs the assistant to lower the limb upon

it. The surgeon now fixes the shoe, e, to the foot-board, d. By the assistance of this shoe, the surgeon is enabled to raise or lower the foot according to the length of the heel or thickness of the calf, so as to bring the upper and lower portions of the fractured bone into their proper line, as far as respects any angular projection backward or forward.

The foot being placed in the shoe, and the shoe fixed to the foot-board, let the foot-board be raised to nearly a right angle with the leg piece, and fixed in this position by the strap, f; taking care that the bottom of the heel does not press against the bottom of the shoe.

Now the thigh part of the apparatus should be fixed to the thigh by means of the straps, m, m, which are to be passed over a splint padded, l, and placed upon the front of the thigh.

The surgeon should now observe particularly how the fractured ends are placed; and if the foot requires to be raised or lowered, it may be done with the greatest nicety by means of the strap which suspends the shoe to the foot-board.

That part of the pad which lies under the small of the leg should be raised and brought into contact with this part of the leg by means of tow or other soft material placed between the pad and this part of the apparatus, so that the whole length of the back of the leg may have an equal bearing upon the pad.

The lateral splints are next to be applied. The longer of these, g, should be placed along the outer side of the leg, and should be long enough to reach from the foot-board to the upper part of the outer condyle of the femur; the inner, h, from the foot-board to the inner condyle. The lower ends of these two splints should be fastened to the foot-board with narrow tape or riband; and the upper ends kept close to the leg by the circular strap, i, passed round the limb over the splints and the apparatus.

The limb thus fixed should be placed with the apparatus resting upon the heel. In this state sedative lotions may be applied to the leg; and if it should be necessary to apply leeches, the surgeon has only to unbuckle the circular strap, i, and throw the side splints back, in order to have the whole of the leg exposed for this purpose, which might be done without any danger of disturbing the fractured parts. When the inflammation is sufficiently got under, which is usually in the course of three or four days, varying according to the severity of the injury, the treatment requires to be altered.

Application of the author's apparatus, as for simple transverse fractures of the leg, when the inflammatory action has subsided. —See Plate IV.

Some strips of soap plaster are now to be applied

round the limb, not tight, but sufficiently close to support the soft parts. The ends of these strips of plaster should be crossed on the side of the leg and cut off, so that they may be easily turned back, if necessary, to see how the broken extremities lie, without disturbing the fracture or giving the patient pain. This being accomplished, re-apply the side splints padded, and now also the shin splint, a; the unsplit part of which should lie upon the shin. *Three* straps should now be carried round the leg over the apparatus and splints, and buckled sufficiently close to support the limb.

The whole being thus secured, the patient should be furnished with a sling, b; which should be fixed to the lower end of the leg part of the apparatus, so that it cannot act upon the foot-board, and that it may be prevented from shifting its situation when used or lying loose.

By means of the sling, the patient can move the limb passively at pleasure. He may get out of or into bed, recline upon a sofa, or rest his leg upon the seat of a chair. When he can suffer the limb to hang down, he may be allowed to walk with the assistance of crutches, as his inclination may direct. When the patient walks, he should carry the limb by the assistance of the sling thrown over the neck in the usual way. *He must take care, however, that he never moves the limb by the action of its own muscles, but always passively by means of the sling.*

After the limb has been confined about a fortnight, or from that to three weeks, according to circumstances, the foot-board should be shifted up a little so as to press the fractured surfaces together. This causes consolidation of the fracture to take place more speedily than it otherwise would.

Case.

A man, aged forty-two, a patient of Mr. Travers, in St. Thomas's Hospital, had a fracture of both bones of the leg, produced by the force of a heavy body which fell upon the limb. The fracture of the fibula was about two inches above the point of the malleolus; and that of the tibia extended, a little obliquely downward and backward, through the inner malleolus, commencing about an inch above it.

I saw this case on the fourth day after the accident with Mr. Travers, when the man was admitted into the Hospital. The limb was placed between two common leg splints. The foot was pointing, and the fractured surfaces separated considerably from each other. Mr. Travers, to whom I am indebted for many cases, politely offered me the management of this. The apparatus was now applied as for transverse fractures of the leg, there being in this case no probability that the fractured ends would overlap.

On the 7th day after the accident the man was

walking about the ward with the assistance of his crutches. He wore the apparatus twenty-four days, and continued to walk about the ward whenever he liked, which was more or less every day during this time, as he felt inclined. The apparatus was now taken off; and the bones were found united firmly, without the least appearance of deformity; and he soon recovered the use of his limb.

Application of the author's apparatus as for oblique fractures of the leg.

When both bones are broken, and the fracture of the tibia happens to be very oblique, it is necessary to modify the treatment a little. In such cases we must keep up extension till the fibula is united, in order to prevent the bones from riding. For this purpose the thigh piece of the apparatus must be pressed up closely against the back of the thigh; and the foot-board shifted down so as to make the space between the foot-board and the thigh piece longer than the leg. The shoe should be buckled to the foot, and an assistant should be directed to make extension so as to bring the fractured parts into their proper adaptation. This being done, the extension must be kept up by buckling the strap, which is fixed transversely to the sole of the shoe, round the foot-board; which is so constructed that it cannot rise above a right angle

with the leg piece, and therefore forms a permanent point of resistance to the action of the muscles, which tends to produce retraction. In these cases I keep the patient in bed till the fibula is united, which is usually at the expiration of about three weeks.

In oblique fractures there is very generally a disposition in the fractured surfaces to separate laterally. To obviate this, without producing deformity, requires a good deal of nicety in the management of the case. The fractured surfaces, however, must be brought into contact, or union will take place only by the intervention of ligament. When the fractured surfaces are suffered to overlap, nature brings some parts of their sides into contact, and ossific union is produced; but by keeping up extension we prevent the bones from overlapping, and thus prevent nature from following her own course of reparation; we must consequently provide her with an equivalent by art. If there were only one bone this could be easily accomplished, without any danger of producing deformity, by placing pads in such a manner as to press the fractured surfaces together; but as there are two, we must take care that we do not press the bones together, as well as the fractured surfaces.

The way I manage these cases is as follows:—The side splints being attached to the footboard, and padded as for transverse fracture, I

introduce *on the inner side* a sufficient quantity of tow between the splint and the pad, to throw the whole of the pressure of the inner splint upon that portion of the tibia which projects to the inner side; which, in a fracture downward and inward, is the upper portion. On the outer side, I place a piece of linen rolled up like a common roller between the pad and the splint, so as to throw the greatest part of the pressure of the outer splint upon that part of the tibia which is displaced to the outer side; which, in a fracture downward and inward, is the lower portion. This must be done without pressing at all upon the fibula.

In this way the fractured surfaces are pressed together; and the fractured ends of the fibula, being acted upon by the interosseous ligament, are brought into proper adaptation.

Case.

I was called to a person at the west end of the town whose leg had been fractured five days. On examining the limb, I found the fracture of the tibia extended downward and inward, and the fractured surfaces much separated and overlapping. The surgeons in attendance had informed the patient that he must expect to have a deformed limb, as the fracture was of such a nature that it could not be united without deformity.

I applied the apparatus in the manner just stated. The fracture united readily; and after the apparatus was taken off, and the little tumefaction which remained had subsided, the situation of the fracture could be found by examining the limb carefully with the hand; but it could not be discovered, by looking at the limb, while covered with a thin stocking, that it had ever been broken.

The number of persons which I have had under my care with this description of fracture, enable me to say that I believe such will be the result in every case of oblique fracture of the leg which is properly managed.

A summary of the advantages obtained by the use of the author's apparatus. The safety and certainty of the practice which he recommends, &c.

LECTURE IX.

ON FRACTURES OF THE LEG AS THEY OCCUR IN CONJUNCTION WITH DISLOCATIONS OF THE ANCLE—FRACTURES OF THE PATELLA; AND FRACTURES OF THE RIBS.

The bones which enter into the composition of the ancle joint.

The connexions of these bones to one another.

Dislocations of the ancle almost always accompanied with fracture of the tibia or fibula.

The kinds of dislocation to which the ancle bones are subject.

Dislocation of the tibia inward.

Symptoms.

Appearances upon dissection.

Causes of dislocation inward.

Dislocation of the tibia outward.

Symptoms.

Appearances upon dissection.

Causes of dislocation of the tibia outward.

Dislocation of the tibia forward.

Symptoms.

Appearances upon dissection.

Causes of this accident.

Partial dislocation of the tibia forward.

Symptoms.

Appearances upon dissection.

Causes of partial dislocation forward.

The modes of reducing dislocations of the ancle.

Treatment.

Indications to be answered in the treatment of dislocations of the ancle.

The common mechanical treatment inadequate, as shown by the author's experiments, and the usual results of these cases when such means are employed.

Application of the author's apparatus—already recommended for simple fractures

of the middle and lower thirds of the thigh, and simple fractures of the leg—as for dislocations of the ancle.

Whether the dislocation be inward, or outward, or forward, or backward, let the limb be placed upon the apparatus in the same way as I have directed for simple fractures of the leg during the existence of active inflammation; and that too as soon as possible after the accident. As soon as the apparatus is properly secured, the surgeon has the whole of the limb completely under his command.

If the dislocation be forward, the surgeon should regulate the elevation of the heel by raising the shoe of the apparatus; and if necessary, depress, or push back the tibia to its proper situation upon the astragalus, by pressing upon the front of the leg. When the tibia is pressed back as far as is natural to the joint, it may be kept in that situation with the greatest facility by a bit of bandage, applied so as to pass round the leg over the leg piece of the apparatus.

This being done, the tibia cannot advance nor the heel recede. The foot is kept at a proper angle with the leg by means of the strap which supports the foot-board (see Plate III.), without any danger of becoming displaced.

If the dislocation be to the inner side, a piece of linen rather wider than a common roller should

be passed transversely over the leg, within a short distance of the ancle. The two ends of this linen should be made to meet upon the outer side of the outer splint, where they should be tied as tight as may be necessary. The bandage thus applied has the effect of preventing the tibia from slipping inward off the astragalus.

If the tibia be displaced to the outer side, the surgeon must not apply a piece of linen round the outer side of the leg, and tie it over the inner splint, the reverse of what has been said respecting its application for dislocations inward; if he were to do so, he would certainly deform the limb: he would approximate the tibia to the fibula, and thus produce an evil which he should be always most careful to avoid. In these cases pressure must be exerted upon the outer side of the tibia, by placing a piece of linen rolled up between the splint and the pad, so that it may exert its influence upon the outer side of the tibia without pressing at all upon the fibula. This must be done in the same way as I have directed pressure to be made on the outer side of the limb in oblique fractures of the tibia.

The side splints should now be applied. They should be confined to the foot-board, and a circular strap should be passed round the limb over these splints, and the leg part of the apparatus just below the knee, as is seen in Plate III.

of the middle and lower thirds of the thigh, and simple fractures of the leg—as for dislocations of the ancle.

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This being done, the tibia cannot advance nor the heel recede. The foot is kept at a proper angle with the leg by means of the strap which supports the foot-board (see Plate III.), without any danger of becoming displaced.

If the dislocation be to the inner side, a piece of linen rather wider than a common roller should

plied my apparatus, on the day of the accident, in the manner recommended for dislocations inward, in the recent state. The inflammation which came on in consequence of the injury which the parts had sustained, subsided quickly under the use of the means usually employed for this purpose. At the end of ten days the shin splint was applied, and he was permitted to move his limb in bed. At the end of a fortnight he was allowed to hang the limb down, and to walk about his room with the assistance of crutches. At the expiration of three weeks the apparatus was taken off, and the fibula was found united, and the foot in its natural position. This man soon recovered the use of his limb, and there is not now the least appearance of deformity.

ON FRACTURES OF THE PATELLA.

Causes of fracture of the patella.

How produced by the action of the muscles inserted into it.

Symptoms.

Fractures of the patella sometimes comminuted—rarely compound.

Direction which the fracture commonly takes through the bone.

Usually accompanied with separation of the fractured surfaces. Separation sometimes very great.

Use of the large pad and long strap.

Use of the small pad.

Application of the apparatus which the author recommends in the treatment of fractures of the patella.—See Plate V. Fig. 1.

In the course of three or four days after the accident, or as soon as the parts will bear the application of apparatus, the limb should be placed upon the leg and thigh parts, a, a, of the author's apparatus for simple fractures of the leg, &c. fixed in the straight position (or a piece of board long enough to reach from a little below the tuberosity of the ischium to a little below the heel), and raised upon pillows, m. This being done, an assistant should be directed to push down the retracted portion of the patella to its proper situation, and confine it there with his fingers, while the surgeon applies the large pad, b; which is confined in its proper place by means of straps, c, c, c, attached to it. These straps are carried round the limb, over the thigh part of the apparatus, and buckled. This being done, the small pad, g, should be placed below the apex of the patella, and confined there by the circular straps, h, h; which should pass round the limb, over the leg part of the apparatus, placed under the limb. The

strap, d, attached to the large pad, should now be carried round the sole of the foot, over a thick solid shoe, and buckled sufficiently tight to keep the upper portion of the patella down as far as is proper. This strap passes through the loops, e, placed on the sides of the shoe, which have the effect of keeping the strap from slipping off the shoe. The straps, i, which connect the two pads together, should now be buckled with a sufficient degree of firmness to hold the fractured surfaces in contact.

The surgeon should place a bit of roller, k, round the limb, over the patella and the splint, to support the integuments over the patella; another bit of roller, l, should be placed round the leg over the splint, at the back of the leg, to assist in steadying the limb upon the splint. A third piece may be carried round the thigh over the splint, for the same purpose as that which is placed round the leg.

Case.

A woman, admitted into St. Thomas's Hospital, under the care of Mr. Green, had the apparatus applied three or four days after the accident. The limb was kept raised upon pillows for a few days. The woman was then permitted to sit upon her bed with the apparatus on, which she continued to do daily till the apparatus was removed, which was at the expiration of about five weeks from the time of the accident; when the

fractured surfaces were found closely united together, by the intervention of ligament.

The fracture was transverse, produced by a fall, and the separation of the fractured surfaces was considerable previous to the application of the apparatus*.

ON FRACTURES OF THE RIBS.

Part in which fractures of the ribs most frequently occur.

Displacement of the fractured extremities.

Injury which the viscera of the chest sometimes sustain. Consequences of such injury.

Symptoms of fracture of the ribs.

Treatment.

By means of a flannel roller. Objections to this practice.

Plan of treatment which the author has found the most advantageous.—See Plate V. Fig. 2.

I employ a towel or a wide piece of strong linen, a, a, near one extremity of which are fixed tapes, in the form of loops, b, b, b, b, b, and near the

* The treatment I have recommended for fractures of the patella is the best I am acquainted with, but I think it still admits of improvement, which I may hereafter perhaps be able to effect. —Author.

other extremity tapes, c, c, c, c, c, with the two loose ends opposite the loops.

The towel thus equipped is placed round the chest, and is supported in its proper situation by two pieces of linen attached to it, passed over the shoulders in the form of braces, f, f.

Case.

A very corpulent woman had a fracture of the fifth and sixth ribs, near their angles, produced by a fall from some steps. I saw her the third day after the accident. She had now a most teasing cough, which gave her great pain in the side, whenever it came on. The flannel roller was applied by the surgeon who was first called to her assistance. The relief which she obtained from the use of the roller was much less than she had been led to expect. I applied a towel in the manner I have described, with a sufficient degree of firmness to support the ribs; and the difference in the degree of relief obtained by this mode of treatment was very striking. The tapes were drawn tighter from time to time as occasion required; and the bandage was removed at the end of three weeks, when the bones were united.

Advantages of this plan of treatment.

Treatment when the fracture is accompanied with inflammation of the viscera of the chest.

Treatment when several ribs are broken.

Effects of bleeding from the intercostal arteries.

LECTURE X.

ON FRACTURES OF THE CLAVICLE.

Description of the bone.

Ligamentous connecxons.

The use of the clavicle.

Causes of fracture of the clavicle.

Symptoms.

Displacement of the fractured ends.

Direction in which they most commonly become displaced.

Indications to be answered in the treatment of fractures of the clavicle.

How far are these indications answered by the usual modes of treatment?

The stillet bandage.

Its action.

Its inadequacy.

Its injurious effects.

Desault's mode of bandaging for fractured clavicle.

Difficulties attending this mode of treatment.

Objections to this plan.

The apparatus commonly used in our hospitals frequently called the German Apparatus.

The injurious consequences attending the use of this apparatus.

Description of the author's bandage for fractures of the clavicle.

Application.—See Plate VI. Fig. 1.

In applying the padded pieces of linen, the surgeon should commence by placing the thick part of that intended for the injured side, a, in the axilla, taking care that the pad is underneath the bandage. He should then carry one end of the linen over the point of the shoulder, and the other behind the shoulder, where both ends are brought together and firmly tied. The other pad, e, should now be fastened round the opposite shoulder, but more loosely.

The surgeon then takes a portion of linen, f, of the width of a common roller, and introduces

it beneath the ties which confine the pads, a and e, round the shoulders; and, directing an assistant to push the shoulders back, places himself behind the patient, and ties the piece of linen, f, sufficiently tight, to keep the shoulders back as much as the case may require. The surgeon now ties the tapes, b, which have the effect of keeping the pad, a, from slipping up too high upon the shoulder, so as to press upon the clavicle; and then the tapes, c and d, which prevent this pad from sliding down the arm. These tapes have the effect of securing the circular pad, a, in the situation which it ought to occupy, provided it be made of its proper dimensions.

The next point is to prevent the piece of roller, f, from sliding up upon the neck, which, if no care were taken, it would do in the same way as the common stillet bandage. This is readily accomplished by means of the piece of roller, g, which is fastened to the cross back piece, f; and then the two ends are separated and carried round to the front of the chest, where they are tied.

The shoulder is now to be raised, in order to bring the scapular portion of the clavicle in a line with the sternal; which is easily done with a common sling, h. The sling should be carried over the opposite shoulder, and the two ends tied there upon a small pad; which prevents the sling from pressing injuriously upon the neck.

Our next business is to fix the elbow to the side; which has the effect of throwing the point of the shoulder off from the side, as much as the case may indicate, when there is a pad in the axilla. This is done by means of a piece of broad linen, i, which is passed round the chest over the elbow and sling; and, after one end is carried under the piece of linen, g, in front of the chest, the two ends of this wide piece of linen are brought together and tied in front of the chest. The piece of linen, i, should be tacked to the sling, to prevent it from slipping off the elbow. The manner in which the pieces of linen, g and i, are connected in front of the chest, has the effect of securing both in their proper situation, so that the one cannot slide up too high nor the other down too low.

The facility with which this bandage may be managed, so as to secure the fractured extremities in their proper situation, without any necessity of removing it till the fracture is united.

Advantages arising from the use of this bandage.

Case.

A man received a blow on the point of his shoulder, which produced a loose oblique frac-

ture about the middle of the clavicle. Fourteen days after the accident, I saw him for the first time. At this time the surgeon in attendance had tried all the plans in common use, and also an invention of his own, without being able to keep the fractured parts in any thing like tolerable apposition. The man had suffered greatly from the application of these various means, and now his armpits were much excoriated. The fractured ends of the bone overlapped about an inch, but no union had taken place.

I applied the padded bandage in the manner I have described, and at the end of three weeks, I had the pleasure to find that the bone was firmly united; and so even and natural was it joined, that at the expiration of twelve months, when the superfluous callus was absorbed, no one could discover through the integuments which of the clavicles had been broken. The bandage did not shift its situation, requiring only to be tightened from time to time, as the linen stretched in consequence of the strain that was made upon it. It was worn with ease to the patient, the excoriated parts having been properly protected from its action.

LECTURE XI.

ON SIMPLE FRACTURES OF THE HUMERUS.

Fractures of the neck of the humerus.

Sometimes much comminuted.

Age in which these fractures commonly occur.

Sometimes not easily discovered.

Symptoms.

Fractures of the middle of the bone.

Occur at all ages.

Symptoms.

Fractures just above the condyles.

Occur most frequently during the growth of the body.

Symptoms.

Fractures of the inner condyle.

Symptoms.

Fractures of the outer condyle.

Symptoms.

Displacement in fractures of the humerus.

Nature of, when the fracture is just below the tubercles and above the insertion of the deltoid muscle.

When just below the insertion of the deltoid.

When near the lower end of the bone.

When the inner condyle is broken off.

When the fracture extends through the outer condyle.

The fractured ends not always displaced in the same directions, though they may appear similar in situation, and in the direction which they take through the bone.

Principles of treatment.

How far similar to those which were noticed when speaking of fractures of the thigh.

In what respect the management of fractures of the humerus and femur should differ.

Indications which should be answered in the treatment of fractures of the humerus.

How far answered by the usual plans of treatment.

The author's experiment, showing that the short splints are inadequate—in some cases almost useless. Their application is frequently followed by deformity, and sometimes non-union.

Slight effect which the soft parts have in preventing lateral displacement.

Displacement by the action of the muscles.

The author's experiment, showing the principles upon which the mechanism used in the management of these cases should act.

The author's apparatus described.

Application as for recent simple fractures. See Plate VI. Fig. 2.

The apparatus should not in general be applied till the high inflammation produced by the injury is considerably got under, which is usually in about three or four days, more or less, according to the degree of injury sustained in the soft parts; but if the fractured ends ride, or if the patient is restless, it is proper to apply it lightly as soon as possible after the accident. The slight pressure of the apparatus will be much less injurious than the broken ends of the bone moving among the contiguous textures in a state of inflammation.

The surgeon should place the fore-arm at a right angle with the humerus, and then support the integuments, by means of a spiral bandage, as high as the fractured part. This part being nicely adjusted, should be surrounded with strips of soap plaster, which should be drawn sufficiently close

to support the integuments surrounding the fracture.

The surgeon, having had pads properly made for each splint, should now commence to apply them to the arm, by placing the angular splint, a, a, upon the fore-arm and front of the upper arm; and the longest split deal splint, f, beneath the fore-arm. This splint and the angular splint should now be confined to the fore-arm, by means of the straps, g, g, g, attached to the latter. This being done, an assistant should keep the fore arm and humerus at a right angle; and, if the fractured ends overlap, he should be directed to make extension with the limb in the bent position, while the surgeon places the upper part of the angular splint in a line with the biceps muscle; and adjusts the fractured parts.

The straight splint, c, belonging to the apparatus, being placed upon the back of the arm, in a line with the humerus, the assistant should be directed to support this splint and the angular one in their proper situations, with the fractured bone between them.

The surgeon should then place a piece of common splint on the inner side of the arm, so that it may extend from the axilla in a line with the bone to the inner condyle; and another on the outer side, d, extending from the point of the shoulder to the outer condyle. The proper straps fixed to the angular and back splints, e, e, should now be carried round the arm over the

splints, and buckled moderately tight. It is advisable to place an additional strap round the arm, between these, as it assists in keeping the splints steadily and firmly together.

The splints and apparatus being properly secured, the arm should be carried in a sling, extending from the elbow to the wrist, and just short enough to support the arm comfortably as it hangs by the side.

When the surgeon wishes to examine the fracture, he may do it without disturbing the fragments in the least, by removing the splint placed along the outer side of the arm, while an assistant keeps the apparatus from shifting its situation. If the injury be a fracture of the inner condyle, the inner splint must be removed instead of the outer.

After a fortnight or three weeks have elapsed, according to the age of the patient and the severity of the case, the sling should be a little shortened, so as to press the fractured ends of the bone gently together, taking care that they are not made to overlap.

Case.

A man, twenty-nine years of age, admitted into Guy's Hospital under the care of Sir Astley Cooper, had a slightly oblique fracture of the humerus just below the insertion of the deltoid muscle, which was produced by a fall from a height of about twenty-five feet.

I saw him the fourth day after the accident, and at this time the lower fragment was drawn up considerably, indicating the fracture to be of the loose kind. I assisted the dresser of the week in applying the apparatus in the manner I have described; and the man was directed to carry his arm in a sling. At the expiration of a fortnight, after the application of the apparatus, the sling was slightly shortened; and at the end of three weeks the apparatus was taken off; and the bone was found firmly united.

The limb was frequently rotated and moved in various directions, to show the pupils the power which the apparatus has when properly applied in holding the upper fragment; but the motion which was passively given to the limb never produced pain in the fracture; nor was the process of union retarded: evidently showing that the effect of an impetus given to the limb when put up in the manner which the author recommends, is not felt in the fracture, but is propagated by the splints to the shoulder joint, where the centre of the motion produced by every such impetus is placed.

LECTURE XII.

ON SIMPLE FRACTURES OF THE FORE ARM.

The bones of the fore arm.

Their connexions.

Their relative position.

Fractures of the ulna.

Of the olecranon.

Causes of fracture of the olecranon.

Symptoms.

Indications which should be answered in the treatment of fractures of the olecranon.

Treatment commonly recommended.

How far adequate.

Treatment recommended by Sir A. Cooper.

Investigation of.

Objections to—painful—inadequate.

Opinions respecting the possibility of bony union.

No physical cause why a fracture of the ulna, in this situation, should not unite by bone.

The author's plan of treatment described.

The effects which each part of the apparatus is intended to produce.

Consequences of too great extension.

How to ascertain the proper degree.

Application of the author's apparatus for fractures of the olecranon. See Plate VII. Figs. 1 and 2.

When the active inflammation is got over, which is in the course of a few days, according to the severity of the accident, the surgeon should place a roller upon the arm in a spiral direction, from the wrist to a little below the fracture; taking care to draw down the integuments of the fore arm and fix them under the bandage, so that they may not pucker over the fractured part. When the bandage is brought up to this point, an assistant should press down the retracted portion of the olecranon, and at the same time draw up the integuments of the arm above the joint, then the surgeon should pass the roller three or four times round the arm above the olecranon and fix it.

A split deal splint, Fig. 2. a, long enough to reach from a little below the arm-pit to the wrist, should be padded in such a manner that when applied to the *sound limb*, it may press upon it equally throughout its whole length, when the limb is extended to the utmost. The assistant

continuing to keep the fractured surfaces in contact, the surgeon applies the padded splint in front of the injured arm; and fixes the lower pad or part, Fig. 1. f, of the apparatus by the circular straps, g, g, g, attached to the pad. These should be carried round the arm over the splint, a, Fig. 2, and buckled with a sufficient degree of firmness to keep the pad in its proper situation; which is with the lower end a little above the wrist and the middle opposite the ulna.

The upper pad, a, Fig. 1, should now be fixed in the same way, with the middle of the lower end placed immediately above the point of the olecranon. A small pad, consisting of a fold of linen, should be placed under the lower strap of this pad to prevent uneasy pressure. The assistant, placing his hand upon the pad, should force it down, so as still to keep the fractured surfaces closely applied to each other; while the surgeon fixes the two pads together, by means of the straps, d, d, Fig. 1, in such a manner as to maintain the fractured surfaces in accurate apposition.

Case.

A lady fell in the street upon her elbow and broke her olecranon. The fracture was accompanied with considerable retraction of the upper portion. The arm was placed upon a pillow, and means employed to subdue the inflammation occasioned by the accident. On the fourth day,

I applied the apparatus in the manner I have directed; and tightened the straps from time to time, as the soft parts yielded to the pressure produced upon the limb by the pads above and below the olecranon. I removed the apparatus at the end of the fifth week, when the fractured surfaces were held in close contact by the interposition of a strong ligament.

I brought about the action of the joint by means of my screw instrument for soft anchylosis of the elbow joint, hereafter to be described*; which had the effect of restoring the motions of the joint without elongating the ligament which connects the fractured surfaces.

Fractures of the coronoid process of the ulna.

Rarely occur.

Causes.

Symptoms.

Indications of cure.

Treatment.

Prognosis.

Fractures of the body of the ulna.

Symptoms.

* This instrument acts so gradually that it does not elongate the ligament which connects the fractured surfaces together, provided it be properly managed.—AUTHOR.

Treatment.

The same as for fractures of the radius or of both bones.

Fractures of the neck of the radius.

Rarely occur. Reasons for their rare occurrence.

Fractures of the radius below the tubercle.

Symptoms.

Fractures of both the ulna and radius.

Symptoms.

Deformity after fractures of these bones.

How far dependent upon the action of the muscles attached to the bones. How far upon the treatment resorted to.

Relative position of the bones.

Situation and attachment of the muscles which have an influence upon the fractured ends, in these cases.

Indications which should be answered in the treatment of fractures of the fore arm below the olecranon.

Treatment usually recommended.

Split deal splints.

Injurious consequences arising from the employ-

ment of these splints. Not indicated by the construction of the limb. Inadequate in many instances.

The author's splints for fractures of the fore arm, below the olecranon, described.

Application of the author's splints. See Plate VII. Figs. 3 and 4.

When the inflammation is sufficiently subdued, which is usually in the course of three or four days, dependent however upon the severity of the injury, as in other cases, the surgeon should provide a narrow split deal splint long enough to reach from the elbow to the tips of the fingers; and having had pads made for this and the two convex splints, he may commence to apply them.

An assistant should raise the arm and turn it so as to bring the bones in a proper line, and the hand in a position nearly supine. Then the surgeon should apply the long convex splint, a, Fig. 3, upon the back of the fore arm, so that its most convex part may be opposite the space between the ulna and radius. The short convex splint, a, Fig. 4, must be also placed in such a manner that the middle of its convexity may be opposite the middle of the fore arm. The assistant must now hold these two splints, with the arm between them, while the surgeon places

the split deal splint along the line of the ulna. The straps, b, b, Fig. 3, and b, b, Fig. 4, fixed upon the convex splints, are then to be buckled round the limb, so as to secure the splints and produce a moderate degree of pressure. The hand should be secured to the back splint by means of a bit of bandage, c, Fig. 4; and the arm placed in a sling.

During the union of the fracture it will be necessary to buckle the straps a little tighter, from time to time, as the tumefaction subsides, or the soft parts yield to the pressure exerted.

Great care should be taken to make the sling press equally, or as much at the elbow as at any other part; and it should be left long enough to allow the fore arm to hang at a right angle with the humerus.

Case.

A man, aged twenty-seven, had a loose transverse fracture of both bones of the fore arm near the middle, produced by the kick of a horse. I applied the convex splints in the manner directed, and removed them at the end of three weeks; when the bones were found united without the least deformity.

If the fracture extends only through the radius, and is so low down that the splints cannot hold the lower fragment sufficiently to keep it in its natural situation, it will be advisable to allow the split deal splint not to extend further than

the wrist; and to suffer the hand to drop as low as possible before it is confined to the back splint. The sling, in such a case, should not be allowed to extend further than the wrist. If the hand be suffered to hang in this way, it will act as a lever upon the carpal portion of the radius and tend to raise it; and thus assist the splints in keeping the carpal portion in a proper line with the humeral.

LECTURE XIII.

ON COMPOUND FRACTURE.

Definition.

Some simple fractures are attended with more laceration than some compound fractures. Compound fractures commonly the more serious injuries.

On the propriety of amputating.

Circumstances which render amputation necessary. When the fracture extends into a large joint. When attended with a wound of the principal artery of the limb.

Results of compound fracture modified by the influence of age; constitution; habits of life.

The influence of severe injuries upon old persons, and persons whose constitutions are irritable. Bad compound fractures, in which the

state of the limb would justify amputation, sometimes get well.

State of constitution in which such cases usually occur.

Reduction of the fracture.

How managed when the fractured ends do not protrude. Sometimes proper to saw off part of the bone; sometimes to enlarge the wound.

Removal of splinters.

General indications to be answered in the early treatment of compound fracture.

Usual means shown to be inadequate to answer these indications.

The manner in which the fractured ends of the bone ought to be supported. Proper support may be given by the apparatuses recommended. The complete command which the surgeon is able to obtain with them over the limb. The beneficial effects which they have upon the injured parts when properly managed.

The early treatment of the wound.

Observations upon the application of lint dipped in blood. The manner in which it proves beneficial. Some cases do not admit of having the wound closed in this way.

Treatment of the parts surrounding the wound.

Constitutional disturbance which occurs often as a consequence of compound fracture.

The symptoms vary according to the degree of local excitement.

The most common causes of the dangerous symptoms. Often to be attributed to the usual modes of treatment. The injurious effects of motion and displacement, which these modes of treatment are not calculated to prevent.

The appearance of the limb when gangrenous.

Treatment which this state requires.

Constitutional treatment when there is extreme debility from gangrene.

Injurious consequences which often arise from keeping the limb a long time upon the side with a common splint under it. Such mischief occurs in a great many cases.

The injurious consequences of confining the bowels with a view to keep the patient quiet in the recent state of compound fracture.

Effects of this treatment upon the constitution—upon the limb.

LECTURE XIV.

THE AUTHOR'S TREATMENT OF COMPOUND FRACTURE MORE PARTICULARLY CONSIDERED.

Apparatuses which should be used in the management of compound fracture.

The modes of using them.

The mechanical management of compound fracture of the leg in particular.

Position of the limb. The straight position when the fracture is compound shown to be attended with greater advantages than the bent.

Application of the author's apparatus, for simple fractures of the leg, &c., as for compound fractures of the leg.—See Plate VIII.

When the apparatus is used for compound fractures of the leg, it is proper to use the brass plate, and the pelvis strap; and to fix the apparatus in the straight position. The apparatus should be padded as for fractures of the thigh, and placed under the sound limb to ascertain the

situation in which the foot-board should be fixed. The brass plate should be brought up to the tuberosity of the ischium; and the foot-board placed sufficiently low upon the leg-piece, to allow the limb to lie easily upon the apparatus; without pressing the heel at all against the heel of the shoe, or indirectly against the foot-board. The surgeon having thus fixed the apparatus according to the length of the sound limb, and provided a splint padded, b, to lie upon the front of the thigh, and the lateral leg splints, may commence the application of the apparatus to the injured limb.

The shoe having been very carefully placed upon the foot and fastened, the assistant should raise the limb with great care, grasping it at the ancle and at the knee. If there are two assistants present, one may take the limb at the ancle and the other at the knee, taking care that both parts of the limb are raised simultaneously. The injured limb being raised, the surgeon places the apparatus under it, in the same manner as under the sound limb, and having previously laid upon the pad a piece of oiled silk, long enough to extend from one end of the leg-piece to the other, directs the assistant to lower the limb upon the apparatus. The surgeon then places the thigh splint, b, upon the front of the thigh, and confines it and the apparatus to the thigh by means of the straps, d, d; he then fixes the foot

at a proper degree of elevation upon the foot-board; the assistant all this time steadying the limb, and assisting the surgeon to fix it. The strap, g, which supports the foot-board, should now be drawn sufficiently tight to keep the foot-board nearly at a right angle with the leg-piece of the apparatus. The small of the leg should be properly supported, by placing tow between the pad and the apparatus; and the pelvis strap should be buckled, by passing it round the thigh and the pelvis, as for fractures of the thigh. The pelvis strap should always be applied in compound fracture, as it gives the patient the power of steadying the limb more effectually, when he is in the act of raising the pelvis to answer the calls of nature.

The surgeon should now take great care to see that the upper and lower portions of the fractured bone are lying in a proper line; and if he finds that extension is required, which is always the case in oblique fractures, but never in transverse, it may be made by drawing down the foot and fixing it to the foot-board, so as to keep the limb upon the stretch, while the upper end of the apparatus rests against the tuberosity of the ischium. Of course, for extension to be properly kept up, the foot-board of the apparatus must be fixed lower upon the leg-piece than would otherwise be necessary.

The fractured ends being in proper adaptation,

and the apparatus fixed in the manner described, the wound should be dressed; and then the lateral leg splints should be fixed to the footboard and to the limb, in the same manner as for simple fractures of the leg, during the existence of high inflammation.

The apparatus should now be raised to a line inclining towards the pelvis, and left resting upon the heel; in which position it should be secured by means of tapes fastened to the bedstead. The line of the apparatus should approach more or less to the perpendicular, during the existence of active inflammation in the limb, according to the degree of such inflammation; and as soon as it is subdued, the pillows should be removed, and the apparatus should be placed in the horizontal position.

Case.

A man, 45 years of age, had an oblique compound fracture of the leg, produced by a severe blow about twenty-four hours before I saw him. Both bones were broken near the middle of the leg. When I arrived I found the limb lying upon the side, where it had been placed by another surgeon, and much bent at the seat of fracture. The wound was covered with lint dipped in blood, but not in the manner which I conceived most likely to benefit the patient. The pulse was rapid, and the man had become very restless.

I now applied the apparatus as I have directed, and dressed the wound in my own way. I then prescribed a lotion, composed of spirit of wine and Goulard water, to be applied to the leg in such a manner as to avoid the dressing which covered the wound; and gave him an aperient, which produced two copious evacuations in the night.

On my visiting my patient the next day, I found that the act of emptying the bowels had produced no disturbance or pain in the limb. The pain in the limb was much less than it was previous to the application of the apparatus, and the febrile irritation was much diminished.

Five days after the application of the apparatus, the patient had his bed made by my desire, without pain or inconvenience. This was occasionally repeated during the cure; and added much to the comforts of the patient while he was confined.

Fourteen days after the accident all irritation had subsided. A small quantity of pus now issued from the wound, which made its way out under the lint. My *first dressing* was at this time removed; and the wound, which was about an inch and half long, was filled with granulations on a level with the integuments.

Mild dressing was now applied to the wound, which healed speedily. Extension was kept up till the fibula was united. The apparatus was

taken off at the end of eight weeks from the time of the accident; and the bones were found firmly united, with the fractured ends in proper apposition.

The manner in which the wound should be dressed directly after the accident.

The injurious effects of thick pledgets of lint when strapped down tight upon the wound with adhesive plaster.

The author's method of dressing the wound immediately after the accident.

Observations on the oozing of blood from the wound after the dressing is applied. On the formation of pus in the wound. On the manner of dressing the wound after suppuration is established.

Constitutional treatment in the early stage of a compound fracture.

Observations on the effects of bleeding.

Observations on the use of aperients—beneficial effects of.

Constitutional treatment during the early stage in old people.

Treatment required for compound fracture in the advanced stage, when the constitutional and local symptoms are severe.

Constitutional treatment.

Local treatment.

Case.

I was called to see a gentleman, in the Strand, who eight days previous, in stepping from a boat, fell with such force as to produce an oblique compound fracture of the leg. Both bones were fractured. The fracture of the tibia extended through the bone obliquely. I found the fractured ends much displaced, and the limb in a high state of inflammation, bordering upon gangrene; accompanied with frequent convulsive twitches of the muscles of the limb; and great debility. He had a dark dry tongue, small quick pulse, and other symptoms indicative of great danger.

I placed the limb upon the apparatus, in the manner I have described; and pursued the local and constitutional treatment above recommended; and had the happiness to find, that this gentleman's dangerous symptoms soon subsided; and he recovered with his limb as strong and useful as before the accident occurred.

This gentleman was confined to the horizontal position for eight weeks after I first saw him. He was placed upon a mattress; but it is immaterial whether the patient lies upon a mattress or a bed. The patient should not, however, be placed upon a very soft bed; for it gives way so

much under the pressure of the nates, that the nurse finds some difficulty in introducing the bed-pan.

ON COMPOUND DISLOCATION OF THE ANCLE.

Inadequacy of the usual modes of treatment.

Injurious consequences of the positions which these modes of treatment require.

Application of the author's apparatus in compound dislocations of the ancle the same as for compound fractures of the leg without dislocation.

The constitutional and local treatment the same in the early stage, and when the accident is followed by an appearance of gangrene and great constitutional debility, as has been recommended for compound fracture in similar states.

The apparatus must be fixed and placed as for compound fracture of the leg; but the natural relative position of the injured parts in compound dislocations must be maintained in the same manner as in simple dislocations.

Definition.

Observations upon the term made use of to designate this state of fracture.

Powers of the system exerted in uniting bone.

Causes of non-union.

Constitutional.

Local.

Observations on the opinions respecting the prevalence of a peculiar state of system in these cases *.

State of the fracture.

* The author is of opinion that no peculiar state of system exists (as has been imagined) sufficient to prevent the union of fractures, or at least is not common, unless indeed it be indicated by a strong health and a vigorous constitution. Were such a state common, he thinks he must have met with some peculiar constitutional symptoms indicative of it; but no such symptoms have occurred to him, in any one out of twenty-nine cases of non-union that have come under his observation.

LECTURE XV.

ON THE TREATMENT OF FRACTURES OF LONG STANDING.

The cause of non-union to be first discovered. In what manner the case is to be managed when the fractured ends are prevented from uniting by the interposition of a portion of muscle. When by a portion of dead bone.

The first object which the surgeon has to accomplish in ordinary cases of non-union.

The modes by which a new action is usually created in the fracture.

The effects of blisters applied over the fracture. Rarely of any use.

The effects of rubbing the fractured surfaces together. Now and then followed by ossific union. The effects of irritating the ends of the bone by rasping or cutting off the ligamentous coverings. Seldom of any use.

The effects of sawing off the fractured ends of the bone—rarely beneficial. Should the operation

ever be performed? Its extremely painful nature. Its injurious consequences. The mode of performing the operation.

The effects of seton passed between the ends of the bone.

Occasionally followed by consolidation of the bone after many months confinement. This operation much less severe than that of sawing off the ends of the bone and causticating them, but often worse in its consequences.

The means commonly employed to bring about a new action, are either inadequate or too severe.

The great cause of non-union is inadequacy of the mechanical treatment during the recent state of the fracture. Such treatment not likely to be followed by success after a new action has been excited.

On the propriety of producing a new action in fractures of long standing.

The manner in which this is occasioned by the means usually employed.

Circumstances which influence the secretion of callus.

The period in which ossification commences, in ordinary cases of recent fracture.

Symptoms which commonly accompany the process of ossific union.

Indications which should be answered in the treatment of fractures of long standing.

In what manner these indications may be answered.

The author's mode of treating non-union in the humerus.

The apparatus which I have recommended, to be used in the treatment of recent simple fractures of the humerus, is equally applicable in the treatment of fractures of this bone which have resisted the usual means of cure.

When the surgeon has ascertained that the fracture has remained disunited in consequence of the inadequacy of the mechanical contrivances resorted to, and not from any of the other causes enumerated, he should apply the apparatus in the same way as I have directed for recent simple fractures of the humerus; and keep the fractured extremities strongly pressed together by a short sling or some other contrivance, as the circumstances of the case may indicate. The first case, of non-union in the humerus, that was placed under my care, was a patient of Sir Astley Cooper, in Guy's Hospital. The fracture had existed *ten months* *.

* I have not had any case of non-union in the humerus which had existed longer than that which occurred in the person of

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came to consult me, the two bones were
pproximated; and an obtuse angle was
projecting backward considerably at the
f fracture. The limb was very weak, so
he was unable to do any thing with it; and
perceptible motion could be felt in both
nes.

applied the convex splints, which I have
already described, in such a manner as to re-
move the deformity as much as possible; and at
he same time to keep the fractured surfaces
losely applied to each other.

The man was admitted into the hospital with a simple transverse fracture of the middle of the bone a few hours after the occurrence of the accident. Ten months after the accident, I happened to be present when Sir Astley was examining the arm; and stated to the man that the only chance he had left of benefiting him, was by an operation. I now requested Sir Astley to allow me to try the effects of the apparatus which I have described for fractures of the humerus. Having obtained his consent, I applied the apparatus in the same manner as I directed when speaking of recent simple fractures of the humerus; and supported the limb in a sling sufficiently short to keep the shoulder much elevated above the other.

I removed the apparatus at the end of the sixth week, and had the happiness to find that the bone was firmly united.

The man soon recovered the use of his arm.

The author's mode of treating non-union in the fore arm.

In the treatment of non-union in the ulna and ra-

J. F. Esq. M. P. for Hampshire. When this gentleman placed himself under my care, the fracture had existed *eleven months*. He was detained in the country on particular business for some days longer than I expected, and consequently wore the apparatus a greater length of time than I intended; I cannot, therefore, say, in this case, at what period consolidation of the bone took place.—AUTHOR.

dius, exclusively of the olecranon and of the coronoid process, I have not hitherto found it necessary to employ any other means than the convex splints which I use in the management of recent fractures of these bones; though I am disposed to think that in some cases other means may be required.

Case.

A gentleman, recommended to me by Mr. Green, fell upwards of seven months before I saw him, with such violence as to produce a compound fracture of both bones of the fore arm. The wounds were small, and healed by the first intention. He wore the common split deal splints for a considerable time, and afterwards a leather case buckled round the arm; but no union took place from the employment of these means.

When he came to consult me, the two bones were nearly approximated; and an obtuse angle was formed projecting backward considerably at the seat of fracture. The limb was very weak, so that he was unable to do any thing with it; and very perceptible motion could be felt in both bones.

I now applied the convex splints, which I have already described, in such a manner as to remove the deformity as much as possible; and at the same time to keep the fractured surfaces closely applied to each other.

The splints were taken off at the end of the seventh week, and, on examining the limb, I found that it had assumed nearly its natural appearance, but there was still an unnatural approximation of the ulna and radius.

The radius was firmly united, but I had some doubt whether the union of the ulna was quite so firmly joined as would justify me in removing all mechanical support, though he was now able to use his arm freely; I therefore directed him to wear a guard to protect the bones from injury, and not to endanger the union which had taken place by any violent exertion. The arm is not yet quite so strong as the other.

The author's mode of treating non-union in the thigh.

Fractures of long standing in the middle and lower thirds of the thigh unite sometimes solely under the influence of the apparatus, which I employ for simple recent fractures in the same situations: in others, additional means are required to assist in pressing the fractured surfaces together.

Case.

A gentleman in the city, aged 55, whom I attended with Mr. Dendy of Stamford-street, in getting from a stage coach, fell, and broke his thigh at the lower part of the middle third. He was conveyed to an hotel, and treated with the common

short splints in the usual way; but no union of the fracture took place while they were employed.

I saw this gentleman, for the first time, about eleven weeks after the accident in company with Mr. Dendy. The fracture extended through the bone in a direction downward and inward, and the fractured extremities were connected only by loose adhesions.

The limb was much deformed, there being an angle in the thigh at the seat of fracture, projecting greatly to the outer side, while the foot was twisted inward. He was unable to raise the limb—in short it was perfectly useless.

The apparatus was applied, but not with that nicety which it admits of under ordinary circumstances, as the gentleman has an anchylosis of the knee joint, the result of a disease with which he was afflicted at an early part of his life; and he had also a sore in the integuments, on the side of the inner condyle, apparently produced by the pressure of the splints which he had been wearing. In consequence of this sore, the pressure necessary to bring the upper and lower portions of the bone into their natural line could not be so effectually exerted. However much was done in the accomplishment of this desirable object.

On the removal of the apparatus, two months* after it was first applied, I found the bone was united with the foot in its proper position; and the thigh bone only slightly curved to the outer side†.

The author's mode of treating non-union in the leg.—See Plate IX.

I employ in the treatment of these cases the apparatus, which I make use of in the treatment of recent simple fractures of the leg.

When the apparatus is used for the cure of a fracture of long standing, in the leg, the leg and thigh pieces, a, a, should be fixed together nearly at a right angle. The foot piece, f, should be supported at a right angle with the leg piece, by means of the strap, e; and the whole should be applied so as to press the fractured surfaces closely together; and to prevent any motion of the fractured ends of the bone.

* This gentleman, possessing an irritable constitution, was very restless during the cure, which probably delayed the accomplishment of the union many days.

† It might be observed, that previous to the accident, the injured limb was shorter than the other, the thigh bone was slightly curved outward, and the foot everted so, that he walked with the inner side of the foot turned forward; though he now walks with the foot in its proper position; and he thinks the curve in the thigh is less than previous to the accident.—AUTHOR.

Case.

A gentleman, whose leg was fractured by a musket ball, while endeavouring to quell the negroes in Demerara (on the 18th of Aug. 1823), came to this country *nine months* after the accident with an ununited fracture of the tibia, and applied to me in consequence of the recommendation of Sir Astley Cooper.

I applied the apparatus in the manner I have described, and directed him to walk with the assistance of his crutches, as much as he felt inclined; and to take an airing daily in any convenient vehicle.

This mode of treatment was persevered in for *thirty-three days* from the time the apparatus was first applied, and at the expiration of this period I removed the apparatus, and found the bone was firmly united. He soon recovered the use of his limb*.

* I have treated twelve cases of fracture, which had resisted the usual plans of treatment, with the means above described, and have not hitherto found any difficulty in curing them. Some of these cases are already before the public.—See Med. Repository, Vol. XXII. I am of opinion that cases of fracture of eight or ten months standing, admit of being united with nearly, if not quite as much facility as recent simple fractures.—AUTHOR.

LECTURE XVI.

ON DISEASES OF THE SPINE.

A general view of the anatomy of the spinal column.

The power of the muscles of the spine.

The bones of the spine not easily displaced.

Varieties of deformity which occur in the spinal column.

Excurvation.

Symptoms.

Displacement of the bones. Distortion of the chest.

State of the general health—sometimes much impaired.

State of the bones in the most simple case of excurvation.

State of the muscles.

Position of the scapulæ.

The manner in which destruction of the vertebræ takes place.

Parts of the vertebræ which suffer most in excurvation of the spine.

Caries of the vertebræ.

Chronic inflammation of the spine.

Absorption of the vertebræ from the pressure of tumours.

The various kinds of destruction to which the bones of the vertebræ are subject.

Spinous processes sometimes united by anchylosis.

Deformity of the ribs which accompanies excurvation of the spine.

Effects of displacement of the bones of the spine upon the muscles of the back.

Effects of displacement of the bones of the spine upon the muscles of the abdomen.

Effects of displacement of the bones of the spine and chest upon the diaphragm and intercostal muscles.

Consequences of the displacement of the bones of the spine and chest, and the altered

condition of the muscles attached to them upon the respiratory functions.

Effects of excurvation of the spine upon the muscles of the extremities.

Effects of excurvation of the spine upon the spinal ligaments.

State of the vertebral canal in this distortion.

State of the foramina which give passage to the nerves.

Effects of excurvation upon the nerves of the spine.

Effects of excurvation upon the vascular system.

Effects of excurvation upon the thoracic duct.

Effects of excurvation upon the viscera of the chest and abdomen.

LECTURE XVII.

ON THE CAUSES OF CURVATURE OF THE SPINE IN GENERAL, AND THE NATURE AND TREATMENT OF EXCURVATION IN PARTICULAR.

The remote causes of curvature—the proximate.

Different causes produce different varieties of curvature.

Causes of excurvation of the spine.

Caries of the bones does not always produce curvature.

When caries is the cause of excurvation, several bones are usually involved in the disease.

State of the intervertebral cartilages.

In what manner dislocation of the spine is prevented.

The effects of absorption of the vertebræ upon the position of the spine illustrated.

Effects upon the position of the vertebræ the same as is here shown, from whatever cause the destruction of the bodies of the vertebræ may arise.

The muscles and ligaments oppose some resistance to the progress of deformity.

Dislocation of the vertebræ not considered the cause of deformity.

The importance of forming an accurate diagnosis in spinal diseases.

Prognosis in different states of the disease.

Local treatment.

When excurvation arises from debility of the muscles. When from bad position. When inflammation exists in the spine.

Indications of cure applicable to all curvatures of long standing.

Observations upon the inclined plane.

Observations upon the horizontal position.

Observations upon the dorsal position.

Observations upon the facial horizontal position.

Effects of this position upon the ribs—upon the spine.

Observations upon position, assisted by extension and pressure.

Observations upon the manner in which extension and pressure should be employed.

Observations upon the employment of friction; setons; issues.

Observations upon the different mechanical contrivances lately introduced for the removal of curvature of the spine.

Constitutional treatment.

The results of judicious treatment will be materially influenced by the particular state of the deformity, and by the causes which may have given rise to it.

Treatment proper for some time after the deformity is removed.

LECTURE XVIII.

ON THE NATURE AND TREATMENT OF INCURVATION OF THE SPINE, AND LATERAL CURVATURE.

Incurvation less frequent than excurvation.

The manner in which this curvature is formed.

Appearances which this variety of curvature presents on dissection.

Cause of this curvature when in the loins.

Effects when in the neck.

Symptoms.

Commonly easily removed when in the loins. Not so when in the neck.

Treatment.

LATERAL CURVATURE.

Period of life in which it most commonly occurs.

Symptoms.

The manner in which deviation of the spine from its natural line affects the vertebræ.

Appearances of the scapulæ and claviculæ.

Position of the ribs.

The situation of the ribs with respect to the ilia.

Position of the head.

Appearance of the sternum.

Appearance of the vertebræ upon dissection.

Situation and extent of the curves.

Spine sometimes contorted.

Appearance of the scapulæ when the soft parts are removed.

Caries of the vertebræ rarely observed in this complaint.

Appearance of the muscles.

Effects of this deformity upon the capacity of the chest. Upon the spinal canal. Upon the nerves. Upon the viscera of the chest and abdomen.

This deformity increases rapidly after constitutional disease.

Pain seldom felt in the line of curve.

Health often not impaired.

Causes of lateral curvature.

Remote.

Causes of its frequent occurrence in young ladies.

Proximate cause of lateral curvature.

Prognosis in different states of the disease.

Treatment of lateral curvature.

When from a difference in the length of the lower extremities. When from debility of the muscles of the spine. When from rickets.

Treatment in cases of long standing.

Positions in which the body should be placed.

The effects of extension by means of well-contrived apparatus.

The effects of local pressure and friction.

Of separating the ribs.

Treatment when accompanied with actual disease of the vertebræ.

Treatment after the curvature is removed.

LECTURE XIX.

ON THE NATURE AND TREATMENT OF ANGULAR PROJECTION OF THE SPINE, AND OF LUMBAR ABSCESS.

Situation in which angular projection of the spine most commonly occurs.

Age in which it is most frequently met with.

Early symptoms.

Progress of the disease.

Causes of angular projection.

Indications to be answered in the treatment.

Treatment.

Prognosis.

LUMBAR ABSCESS.

Commonly a secondary disease.

Early symptoms.

Constitutional disturbance which attends this disease.

Prognosis.

Sometimes destroys the patient.

Appearances of the diseased parts after death.

Treatment of lumbar abscess.

Cause of the aggravation of the constitutional disturbance which takes place after the bursting of a lumbar abscess.

Nature of the fever.

Constitutional affection varies according to the state of the abscess.

Causes of inflammation in the cyst.

Cause of the large size to which the lumbar abscesses sometimes attain.

They commonly arise from diseased bone.

Local treatment.

Of dispersing lumbar abscesses.

Of puncturing them.

Of dressing the wound after the matter is evacuated.

One or more of the healed punctures sometimes ulcerate—consequences.

Advantages of the treatment recommended.

LECTURE XX.

ON THE DISEASES TO WHICH THE JOINTS OF THE EXTREMITIES ARE SUBJECT.

Kinds of disease which occur in the joints.

Nature and use of the synovial membrane.

INFLAMMATION OF THE SYNOVIAL MEMBRANE.

Symptoms.

When in the hip. When in the knee. When in the ancle. When in the elbow. When in the shoulder.

Joints in which inflammation of the synovial membrane occurs most frequently.

Inflammation of the synovial membrane differs in degrees of intensity.

Constitutional disturbance produced by this disease.

Consequences of neglect.

State of the joint when affected with inflammation of the synovial membrane, as it appears after death.

Periods of life in which inflammation of the synovial membrane most commonly occurs.

Causes of inflammation of the synovial membrane.

Treatment of this disease.

Constitutional.

Local.

State of the joint after inflammation of the synovial membrane has subsided.

In what manner it should be treated.

On restoring the motions of the joints after they have become stiff from the consequences of inflammation of the synovial membrane.

The manner in which the stiffness should be treated when in the knee.

Description of the author's apparatus, invented for the purpose of restoring the motions of the knee joint.

The power of the apparatus.

The facility with which it restores the motions of joints, after all the common plans of treatment have failed.

Evils arising from the usual modes of treating stiffness of the knee joint.

The manner in which these evils are avoided by the use of the author's apparatus.

Cautions to be observed in using it.

Advantages arising from its use in chronic inflammation and other affections of the knee joint.

Application of the author's apparatus as for stiffness of the knee joint.—See Plate XII. Fig. 2.

When the stiffness is of such a nature that the use

of the apparatus is indicated, the surgeon should apply it in the following manner:—

He should place the apparatus under the limb, with the joint opposite the back part of the joint of the knee, and the split deal splint, d, affixed to the thigh part of the apparatus on the outer side of the limb; he should then turn the female screw, b, so as to bring the leg and thigh portions of the apparatus to the position in which the knee is fixed. The apparatus, properly padded, is then to be confined to the limb, around which a spiral bandage should be previously applied as high as the knee. This is done by means of four straps, g, g, g, g, which are passed round the limb over the apparatus, and the splints, e, f; and a pad, h, adapted to the knee.

The apparatus being thus secured, the limb is rendered passive to its action. The surgeon may now turn the female screw in the direction which the case requires; and regulate its action according to the state of the joint, and the effects which the action of the apparatus produces. The surgeon should endeavour to make himself well acquainted with the state of the joint, and the power of the apparatus; he will otherwise be in danger of reproducing inflammation in the joint, an occurrence which the apparatus always prevents if judiciously managed.

Case.

The knee joint of a young woman, aged 25, became stiff, in consequence of inflammation of the synovial membrane, which commenced three years and five months before I saw her. The inflammation had been several times subdued, but had been as frequently reproduced by the attempts which were made to restore the motions of the joint *. The limb was fixed in such a manner that she could only bring her toe to the ground in the act of walking.

The screw apparatus was applied and used as above directed. The motions of the joint being re-established, the apparatus was removed at the expiration of five weeks from the time it was first applied. This young woman is now able to straighten the limb and walk in a natural manner without difficulty.

There were no symptoms of inflammation in the joint during the use of the apparatus †.

* This is a very frequent result of the treatment usually adopted.

† This apparatus is equally beneficial, when the limb is rendered useless in consequence of a fixed contraction of the muscles of the thigh.

A young lady, recommended to me by Mr. Iliff, Lambeth-road, had been unable to stand for five years, in consequence of a fixed contraction of the flexor muscles of the thigh. The leg was confined so as to form an acute angle with the thigh. During this

Description of the author's apparatus used in restoring the motions of stiff elbow joints.

Application as for stiff elbow joints.—See Plate XII. Fig. 1.

The surgeon having placed a bandage spirally upon the arm, applies the apparatus, a, a, in the front of the limb, one part of the beech resting upon the arm in a line with the biceps muscle and the other upon the fore arm; he also places a piece of split deal splint padded behind the humerus, in a line with the triceps muscle, and another under the fore arm. The apparatus and these splints are confined to the limb by the straps, b, b, b, b, as represented in the plate.

period the lady was lifted into and out of bed, and was carried from place to place in the arms of her attendants or in her carriage.

I applied an apparatus to each limb, in the same manner as for stiff knee joints. The limbs were straightened in a week; and she was able to walk across the drawing-room without the apparatus, at the expiration of twelve days, from the time they were first applied; steadying herself only by holding a friend's arm. The power of the muscles soon returned, and the limbs have been ever since quite well.

I might add, that this lady had previously submitted to various modes of treatment, recommended to her by some of the most able surgeons in London, all of which had completely failed. —Author.

The surgeon having adjusted the apparatus, turns the female screw, e, according to the direction in which he wishes to move the limb, so as not to produce inflammation in the joint by the action of the screw; which he might do without care, as in stiff knee joints, when the screw-knee apparatus is employed.

Case.

A supervisor of the excise applied to me to restore the motions of his elbow joint, which had become fixed at an angle of about 25 degrees, in consequence of a compound fracture of the inner condyle of the humerus, which happened about four months previous to my seeing him; and had united with the inner condyle in an unnatural position.

I conceived that the position of the inner condyle would impede my efforts to restore the motions of the limb; but at the same time I was of opinion, that the functions of the joint might be brought about, at least so far as to enable him to follow his usual avocations, which he was now prevented from doing in consequence of the stiffness of the joint.

The screw-arm instrument was applied, and moved by degrees in opposite directions; first so as to bend the arm, and then to straighten it. In three weeks I succeeded in straightening the limb, and in bending it so that he could touch

the chin with the wrist. The apparatus was now removed, in order to restore the muscles to their natural state of activity and power.

The author's apparatus used in restoring the functions of stiff ancle joints hereafter to be described.

DISORGANIZATION OF THE SYNOVIAL MEMBRANE.

Periods of life in which this disease commonly occurs.

Symptoms.

Progress of the disease.

Appearance of the joint upon dissection.

Treatment.

Prognosis.

LECTURE XXI.

ON ULCERATION OF THE CARTILAGES OF THE JOINTS, AND SCROPHULOUS DISEASE OF THE JOINTS.

Ulceration of the cartilages as a primary affection.

Period of life in which it is most commonly observed.

Symptoms of this disease when in the hip joint.

Local.

Constitutional.

Prognosis.—Sometimes destroys the patient.

Symptoms of ulceration of the cartilages of the knee joint.

Local.

Constitutional.

Symptoms of ulceration of the cartilages in other joints.

Local.

Constitutional.

Progress of ulceration of the cartilages.

Appearances of the joints affected with this disease upon dissection.

Treatment.

Constitutional.

Local.

Treatment of abscess from ulceration of the cartilages.

SCROPHULOUS DISEASE OF THE JOINTS.

Description of persons in whom it most frequently occurs.

Periods of life in which it occurs most commonly.

Sometimes confounded with other diseases of the joints.

Symptoms.

The bones which are most commonly affected.

Appearances of the joints affected with this disease upon dissection.

Treatment.

Constitutional.

Local.

Prognosis.

LECTURE XXII.

ON DEFORMITIES OF THE LIMBS.

From rickets.

Periods of life in which this disease most commonly commences.

Description of persons in whom this disease usually appears.—State of constitution.

Progress of the disease.

Causes.

Appearances upon dissection.

Treatment.

Constitutional.

Local.

In-knee.

Nature of.

Out-knee.

Nature of.

Periods of life in which in-knee and out-knee commonly commence.

Causes of these deformities.

Progress.

Indications of cure.

Treatment.

Local.

Constitutional.

CLUB FOOT.

Nature of. Different in different cases.

Cases which admit of cure.

POINTED TOE.

Nature of.

Causes.

Indications which should be answered in the treatment of this deformity.

The author's apparatus for the removal of pointed toe described.

Application.—See Plate X.

The pads of the apparatus, a, should be strapped to the limb above the condyles, sufficiently close to prevent them from slipping down, but at the

same time not so close as to interrupt the circulation materially.

The apparatus being fixed as represented in the plate, the surgeon turns the female screw, e, so as to elevate the toe gradually; bearing in mind that the action of the screw is very powerful, and that it should be used in such a manner as not to injure the patient.

Case.

A boy, in St. Thomas's hospital, a patient of Mr. Travers's, had a deep laceration of the muscles of the calf of the leg, part of which were torn away. After the accident, the muscles situated on the back of the leg acted spasmodically; and the toe became pointed, so that the front of the foot was placed nearly in a straight line with the front of the leg. The usual means were resorted to in order to elevate the foot, but without effect.

The wound on the back of the leg was nearly healed when I first saw the patient, in company with Mr. Travers; and on my observing to Mr. T. that I had derived great benefit from the use of the instrument which I had invented for pointed toe, he ordered one to be procured. The apparatus was applied and used according to my direction; and we had the gratification to find that it soon removed the deformity, so that the boy left the hospital with his limb as useful as before the accident occurred.

Causes.

Treatment.

The author's apparatus for the removal of this deformity described.

Application.—See Plate XI.

The inner side of the sole of the boot should be raised, and the apparatus should be fixed to it on the concave side of the ancle joint, which in this deformity is the outer side.

The boot with the apparatus affixed being placed upon the limb, the strap, c, which confines the tin plate in its proper situation should be buckled; and also the strap, d, sufficiently tight to support the ancle joint, and to bring it into its proper situation as fast as the nature of the case and the state of the parts will admit.

Case.

A young gentleman, recommended to me by Mr. Travers, had the ligaments of the ancle joint so much elongated, that when the weight of the body was thrown upon the feet, the malleoli interni were brought nearly into contact with the ground. This elongated state of the ligaments was accompanied with preternatural weakness of the flexor muscles of the feet, which much increased the difficulty the gentleman experienced in the act of walking.

I employed the apparatus which I have described in such a manner as to meet the circumstances of the case, and found it highly beneficial.

About six months after the apparatuses were first applied he sent me one of the boots, as one of the screws of the apparatus had given way; and at this time I observed that the ancle was no longer thrown to the inner side, but was supported in its proper situation.

This gentleman had worn irons for several years before I saw him, but with little apparent advantage.

INVERSION OF THE SOLE OF THE FOOT.

The treatment which is required when the sole of the foot is thrown inward, is the same as that which I have just recommended, requiring only that the outer side of the sole of the boot instead of the inner should be raised, and that the steel bar, &c. of the apparatus should be fixed to the inner side of the boot instead of the outer.

Treatment of in-ancle and out-ancle in young children.

THE FOOT SOMETIMES LOSES ITS NATURALLY ARCHED SHAPE.

Nature of this complaint.

Treatment.

DESCRIPTION OF THE PLATES.

PLATE I.

A view of the outer side of the limb, placed upon the AUTHOR'S *double inclined plane or fracture bed, as for fractures of the neck of the thigh bone.*

a, a, The frame of the apparatus.

b, The side of the bedstead.

c, c, Pieces of board extending across the bedstead, and supporting the frame, a, a, of the apparatus.

d, d, The middle and lower planes of the apparatus, placed so as to form a double inclined plane.

e, The upper plane.

f, The folding trap door let down.

g, The screw which fixes the sliding plane, d, h.

i, A rack in the frame to support the middle and lower planes at the necessary degree of flexion.

k, The foot-board to support the foot in a proper position.

l, l, l, The mattress covered with a blanket and sheet, which are tucked in under the mattress and tacked to the side.

m, m, The left limb fixed upon the middle and lower planes, as for fractures of the neck of the thigh bone.

n, The bandage passed round the foot over the foot-board, to fix the foot to the foot-board.

o, The pad placed between the foot and the (left) leg, p, of the foot-board, to give the foot an equal bearing; and to assist in securing it effectually in the proper position, without incommoding the patient.

q, The splint placed upon the outer side of the thigh.

r, The pad placed between the splint and the limb.

s, The bandage which confines the splint to the lower part of the thigh.

t, The bandage which confines the upper part of the splint to the pelvis.

u, u, The bed clothes turned back and resting upon the right limb.

PLATE II.

A view of the outer side of the right limb, with the AUTHOR'S *apparatus applied as for fractures of the middle of the thigh.*

a, The thigh part of the apparatus.

b, The screw which fixes the sliding plate to the thigh part of the apparatus.

c, The leg part of the apparatus.

d, The steel bar to fix the leg and thigh parts of the apparatus straight, or at any degree of flexion which the case may indicate.

e, The foot-board.

f, The sliding shoe attached to the foot-board by a perpendicular and a cross strap.

g, The piece of common split deal splint padded and placed upon the shin to protect the integuments covering this part of the leg from being injured by the action of the straps, h, h.

h, h, The straps passing round the leg over the leg part of the apparatus and the split deal splint, to confine the leg to the apparatus.

i, The splint padded and placed upon the front of the thigh.

k, The outer splint padded and placed upon the outer side of the thigh.

l, l, l, The straps passing round the thigh over the apparatus, to which they are attached, and the three short splints.

m, The pelvis strap, by means of which the apparatus is connected to the pelvis.

PLATE III.

A side view of the right leg with the AUTHOR'S *apparatus applied, as for simple fractures of the leg; while the high action, which comes on immediately subsequent to the accident, continues.*

a, The thigh part of the apparatus.

b, The leg part of the apparatus.

c, The steel rod which fixes the leg and thigh parts of the apparatus together, either straight or at an angle.

d, The foot-board.

e, The shoe fastened to the foot-board by the perpendicular and cross strap.

f, The strap attached to the sides of the thigh piece, and passed round the foot-board to keep the foot at an easy degree of flexion.

g, The outer side splint fastened to the foot-board at the lower end.

h, The edge of the inner side splint which is also fastened at the lower end to the foot-board.

i, The leather strap passing round the limb over the side splints, and the leg part of the apparatus.

k, The small pad of lint placed under the strap upon the front of the leg, to prevent the strap, a, from pressing unpleasantly upon the shin.

l, The splint padded and placed upon the front of the thigh, to prevent the straps, m, m, from injuring the soft parts.

m, m, The leather straps passing round the limb over the thigh part of the apparatus, and the splint, l, to fix the apparatus to the thigh.

PLATE IV.

A view of the outside of the right leg, with the AUTHOR'S *apparatus applied, as for simple fractures of the leg, a few days after the accident; when the patient is allowed to sit up, and walk with the assistance of crutches.*

The shin splint, a, and the two lateral leg splints, are applied, and the limb is thrown across the seat of a chair by means of the sling, b, which is confined to the lower end of the leg piece of the apparatus. The sling enables the patient to move the limb *passively* at pleasure without the assistance of a second person.

PLATE V.

Fig. 1.—*A view of the outside of the right leg with the* AUTHOR'S *apparatus applied, as for fractures of the patella.*

a, a, The leg and thigh pieces of the apparatus for fractures of the leg, &c. fixed in the straight position.

b, The pad placed upon the front of the thigh above the retracted portion of the patella.

c, c, c, Straps fixed tothe pad, b, and passed round the limb over the thigh part of the apparatus, a.

d, The strap fixed to the wide pad and passed round the sole of the foot over a shoe, and brought up on the opposite side; where it is drawn sufficiently tight and buckled, to keep down the upper portion of the patella.

e, The loop fixed to the side of the shoe, f, to keep the strap, d, in its proper position.

g, The pad placed below the apex of the patella, and confined to the limb by means of the straps, h, h, which pass round the limb over the leg part of the apparatus, a.

i, The web straps, one on each side of the knee, to fix the upper and lower pads together, so as to keep the fractured surfaces in apposition.

k, A bit of bandage passed round the limb over

the apparatus, a, to support the soft parts over the patella.

l, A bit of bandage passed round the limb over the apparatus, a, to confine the leg to the leg part of the apparatus, a.

m, Pillows upon which the limb is raised as the patient lies in bed.

Fig. 2.—*A view of the front of the chest with the bandage for fractures of the ribs partly applied.*

a, a, The piece of strong linen cloth doubled, and passed round the chest, and made to overlap in front.

b, b, b, b, b, Tapes looped, and attached to the cloth.

c, c, c, c, c, Tapes attached to the cloth so that the two ends may hang loose. At d, d, d, one end of the tape is received into the loop opposite (as at e), and tied to the other end, with which it is attached to the cloth.

f, f, Pieces of tape sewed to the bandage behind, crossed, and brought over the shoulders to the bandage in front, where they are pinned.

PLATE VI.

Fig. 1.—*A back view of the* AUTHOR'S *clavicle bandage applied.*

a, The pad for the injured side, tied tightly round the shoulder.

b, The straps attached to the pad, a, to keep it from sliding up too high upon the shoulder.

c, The tape attached to the upper part of the pad, a, and tied to the tape, d, which is affixed to the pad, e, to keep the pad, a, from slipping off the shoulder.

f, A piece of roller passed under the ties of the pad, a, and e, and tied tight enough to keep the shoulders sufficiently back.

g, A piece of roller passed over the crossed back piece, f, and carried round the chest to the front, where it is fastened.

h, The sling passed under the elbow of the affected side, and tied over the opposite shoulder upon a pad to keep the injured shoulder elevated.

i, The broad piece of cloth passed round the body over the sling, h, and the elbow of the injured side to the front of the chest, where one end is passed under the piece of roller, g, and then tied to the other to keep the elbow to the side.

Fig. 2.—*A side view of the* AUTHOR'S *apparatus for fractures of the humerus applied.*

a, a, The angular splint.

b, The bar which holds the two pieces of beech together.

c, The back splint belonging to the apparatus.

d, The split deal splint placed upon the outer side of the arm.

e, e, The straps attached to the apparatus, and passed round the arm over the splints to fix them in the proper situation.

f, The split deal splint padded and placed under the fore arm, to prevent the straps from injuring the integuments, and to form an easy bed for the fore arm.

g, g, g, The straps attached to the fore arm part of the apparatus, and passed round the arm over the apparatus, and the splint to fix them firmly to the fore arm.

h, A roller passed spirally round the arm to give an easy support to the integuments.

PLATE VII.

A view of the front and back of the arm, with the AUTHOR'S *olecranon apparatus; and his convex splints applied.*

Fig. 1, a, The leather pad placed above the olecranon.

b, b, b, The straps attached to the pad which confine it to the arm.

c, The fold of linen placed under the lowest strap of the large pad.

d, d, The straps attached to the lower end of the pad, a, and received by the buckles, e, e.

f, The leather pad placed upon the fore-arm.

g, g, g, The straps attached to the pad, to confine it to the fore-arm.

h, The bandage rolled round the arm.

Fig. 2, a, The split deal splint padded, and placed along the front of the arm.

b, b, b, The straps attached to the large pad.

c, c, c, The straps attached to the small pad.

d, A bandage rolled round the arm.

Fig. 3, a, The long convex splint padded, and applied to the back of the fore-arm.

b, b, The straps attached to the long convex splints with buckles, which receive the straps, b, b, attached to the short splint, a, Fig. 4.

c, A bit of bandage passed round the hand over the hand part of the long convex splint.

Fig. 4, a, The short convex splint padded, and applied to the fore-arm.

b, b, The straps attached to the short convex splint with buckles receiving the straps, b, b, attached to the long splint, a, Fig. 3.

c, A bandage passed round the hand over the splint, a, Fig. 3.

PLATE VIII.

A side view of the AUTHOR'S *apparatus applied as for compound fractures of the leg.*

a, a, The leg and thigh part of the apparatus, with the sliding plate attached, fixed in the straight position.

b, The splint padded, and placed upon the front of the thigh.

c, The pelvis strap passed round the upper part of the thigh over the splint and the apparatus, and round the pelvis.

d, d, The straps passing round the thigh over the splint and the apparatus, to confine them to the limb.

e, The foot-board.

f, The shoe.

g, The strap which supports the foot-board.

h, The outer side splint padded, and confined to the foot-board by a bit of tape.

i, The strap passed round the upper part of the leg, over the two side splints and the apparatus.

k, A pad of lint placed upon the front of the leg, to prevent the strap, i, from producing uneasy pressure upon the shin.

l, The dressing upon the front of the leg.

m, The pillows placed under the apparatus, so as to make it form an inclined plane.

PLATE IX.

A view of the right lower extremity, with the AUTHOR'S *apparatus applied as for fractures of the leg, which have resisted the usual means of cure.*

a, a, The leg and thigh parts of the apparatus.

b, The steel bar which fixes the leg and thigh parts of the apparatus at the necessary degree of flexion.

c, The splint padded and placed upon the front of the thigh.

d, d, The straps which confine the apparatus and the splints to the thigh.

e, The strap which supports the foot-board, f.

g, The outer leg splint padded.

h, The front leg splint padded.

i, i. i, The straps which confine the splints and apparatus to the leg.

k, The sling by means of which the limb is *passively* moved.

PLATE X.

A side view of the right leg and foot, with the AUTHOR'S *apparatus for pointed toe applied.*

a, The pads strapped round the limb above the condyles.

b, The steel guard to keep the straps off from the knee.

c, The buckle which receives the strap, d.

e, The female screw which turns upon a pivot at f, and receives the male screw, g; to which is attached a steel guard, to keep the straps, i, from the sides of the foot.

k, The piece of steel placed under the foot, and fastened to the bottom of the shoe.

PLATE XI.

Fig. 1.—*A view of the outer side of the boot, with the* AUTHOR'S *apparatus affixed, as used for the cure of in-ancle or out-ancle, or that state of the foot in which the patient walks with the ancle thrown inward or outward, considerably beyond its natural bearing.*

a, The steel bar of the instrument employed in such cases.

b, The tin plate padded.

c, The leather which confines the tin plate to the leg.

d, The strap which supports the ancle, and draws it into its natural situation.

Fig. 2.—*A view of the inner side of the boot represented in Fig.* 1.

a, The strap which confines the tin plate to the limb.

b, The situation of the strap which supports the ancle.

c, The raised sole.

PLATE XII.

Fig. 1.—*Represents the* AUTHOR'S *arm-screw instrument applied as for stiff elbow joint.*

a, a, The two portions of beech connected together by means of a hinge, and fixed to the arm with straps, b, b, b, b, which pass round the arm over the beech parts of the apparatus, and the splints; one of which, c, is padded, and placed at the back of the upper arm; and the other, d, at the back of the fore arm.

e, The female screw, which turns upon a pivot, and receives the male screw, f; which is attached to a sliding foot piece, that admits of being fixed to the brass at pleasure in any part of the groove, g, in which it is placed, by the thumb screw, h.

i, i, A roller passed round the arm.

Fig. 2.—*Represents the* AUTHOR'S *knee-screw instrument applied as for stiff knee joint.*

a, a, The two portions of beech connected together by a hinge joint.

b, The female screw receiving the male screw, c.

These screws are fixed to the beech in the same way as in Fig. 1.

d, d, Split deal splint attached to the beech of the apparatus.

e, Splint placed upon the front of the thigh.

f, Splint placed upon the front of the leg.

g, g, g, g, Straps which confine the apparatus and the splints to the leg.

h, The knee pad confined to the knee by means of its proper straps.

THE END.

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