DIPHTHERIA.

B. BROWN.

REMINISCENCES OF PERSONAL EXPERIENCE

IN THE

HISTORY OF DIPHTHERIA

BY

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DIPHTHERIA.

My personal experience in the history of diphtheria dates back to March, 1856—nearly thirty years time. Since that period I have witnessed the disease in every type and form, both in civil and military practice. I have also since that time witnessed a very great advance in our knowledge of its pathology without a corresponding advance in our knowledge of its successful treatment.

The malignant types are almost as fatal now as nearly thirty years ago.

The first case of malignant diphtheria which came under my immediate observation, impressed its characteristic features upon my memory in a manner never to be forgotten. In the early period of March, 1856, I was called to see a case in consultation with a medical friend in a remote part of the county, which he regarded then as peculiar. The patient was an exceedingly bright and interesting boy of ten years, the son of most respectable parents, living in the highest degree of comfort, with ample means, in a large airy residence, surrounded with grounds perfectly cleanly and well kept, with no apparent surroundings capable of inducing disease. I am induced to mention these facts because of their bearing on the origin of the case.

This proved to be the first case of genuine diphtheria which had ever appeared in that entire section within the memory of its residents. In personal experience, the disease was entirely novel to both myself and professional friend.

To a novice in this remarkable complaint, the appearance of the internal structures of the throat when exposed to inspection seem extraordinary and strange indeed. In this case when the throat was expanded an enormously enlarged tonsil, round, smooth, covered with a thick, tenacious, pearly white coating as if painted with a brush, and projecting out, filled the entire cavity of the pharynx, pushing aside the uvula and opposite tonsil, presented the appearance of a small white egg which had been forced into the throat. The child was suffering extreme distress from

difficulty of breathing and deglutition. There was complete aphonia. The pulse was feeble and very slow. The temperature of the extremities particularly was below the normal. These indications in the midst of such grave symptoms impressed me as very peculiar at the time. The kidneys were exceedingly torpid. The first question which presented itself to our minds was the title and character of the disease with which we had to deal.

We both reached the conclusion that it was a case of genuine diphtheria, of which we had read the imperfect and meagre descriptions of the day, but of which neither had personal experience. Within a few hours the case terminated fatally. This proved to be the starting point or centre from which the infection or morbid influence radiated in every direction, until this fearfully mortal scourge invaded every section of the county as an epidemic.

The second case witnessed by myself occurred in a family nearer home, and in which I generally practiced. It presented some peculiar features, and caused me much anxiety and perplexity until the true character was thoroughly developed. A small abrasion on the hand of a young girl of fifteen in this family assumed a rather aggravated form of erysipelatous inflammation, but of limited extent. Soon the lymphatics of the affected arm began to participate in the process, as indicated by numerous red lines extending up, and finally swelling and inflammation of the axillary glands. At this stage the throat became inflamed with small ulcers on the tonsils. Soon the characteristic diphtheritic membrane spread over the entire pharyngeal surface. This proved to be another case of diphtheria, occurring without any connection with the other whatever. The second case in this family, when first attended by myself, had been, as supposed, but slightly ill for the preceding twenty-four hours. The tonsils were but very slightly inflamed. There was but a mere speck of membrane on their surface—only enough to let you know that the disease was lurking there. The pulse rate was about fifty to the minute, and exceedingly soft and feeble. The skin was below the normal temperature, and the patient, mentally, totally indifferent to all surrounding circumstances. I need not say that the patient, a girl of ten, died in less than ten hours from paralysis of the heart—the result of diphtheritic poisoning.

My fourth case was a little boy in the same neighborhood, who had been for a few days suffering from a supposed whitlow on the thumb.

The entire arm suddenly became inflamed and enormously infiltrated from phlebitis. Very soon malignant diphtheria appeared in the throat.

In an adult patient who had long been afflicted with hæmorrhoids, while laboring under a severe attack of diphtheria the infection attacked the hæmorrhoidal tumors, external and internal; extensive membranous exudations formed, extending up the rectum. The patient for some days passed large quantities of this formation *per anum*. This patient ultimately recovered, after suffering from long and excessive prostration. I well remember the remarkable impression which the first experience of this most extraordinary disease made upon my mind. Its peculiar features, rapid, singular, and unlooked-for changes, and sudden terminations, its unforeseen tendencies, presented a picture unheard of before, and exceedingly curious to our uninitiated minds. In consulting authorities on medical practice previous to 1857, I find in a few only passing allusions to the disease, and described by them chiefly as a mere local affection of the throat, under various names, as putrid sore throat, angina maligna, and in some as diphtherite. Old Watson, in his most admirable work on Practice, makes no allusion to it whatever. Wood, in 1852, devotes about two pages to a very imperfect description of the local features.

Other eminent authors barely allude to the subject. Thus when I was called to see a family in the spring of 1856, and found six children prostrated with this singular disease, and one with scarcely any local disease, but with paralysis of the muscles of deglutition, and while walking about the room regurgitating all liquids taken through the nose; another, a little infant, with what then appeared to be membranous croup; still another, a healthy, vigorous boy of eight years of age, with enormous glandular swellings of the neck, and a throat intensely inflamed and covered with diphtheritic membrane, while the remainder were prostrated with similar symptoms, with the limited information then at hand, I was totally unprepared to act. I know of but few more appalling scenes to the conscientious physician than that of an entire family prostrated with the malignant form of this disease, even in our present advanced state of scientific research and knowledge.

Diversity of Tendency to Death.—Probably no disease on record has a greater diversity of tendency to death than the one under consideration. Thus there is tendency to death by septicæmia, or toxæmia, from diphtheritic laryngitis, nephritis, suppression of urine and uræmia, from

paralysis of the reflex system of muscles, as those of deglutition, paresis of the sympathetic or organic system of nerves, and the vaso-motor system, and consequently paralysis of the heart, stomach and secretory and assimilative organs, causing a complete state of inanition and blood impoverishment or fatal anæmia. When we for a moment reflect, and consider the numerous and varied tendencies to death which beset the patient laboring under an attack of genuine diphtheria, the great fatality of the disease need not be a cause of astonishment. If we would, in my experience, be successful in the management of diphtheria, it behooves us, in this hydra-headed disease more than any other, to adhere to the maxim taught years ago by the sagacious Watson, of "studying constantly the tendency to death." In studying the progress of diphtheria, we really have but little to base a future calculation upon, either in regard to its tendencies or termination.

It may, and often does, take a course directly opposite to what we expect, and we must ever be on the alert to check the tendency to death, no matter in what form it may appear. Two of the most marked tendencies in the graver forms of diphtheria are to an early and rapid decline in the strength of the heart's action, as manifested by the pulse, and cardiac impulse and sounds, and of the corporeal temperature down below the normal standard towards 97°. The decline in the heart's action is often so sudden and rapid as to present all the indications of a genuine paralysis, whether from disease or malnutrition of the cardiac ganglia of the vaso-motor system, or from softening of cardiac muscular tissue, is not known. Probably both changes are concerned. Whatever other directions the progress of the disease may take, these tendencies to cardiac paralysis and abnormal decline of temperature always exist in malignant diphtheria. There is also in the grave types of the disease an equally marked tendency to a decline in the normal proportion in the number of red corpuscles in the blood. This coexists with the tendencies alluded to. The agents at work on the blood and the assimilative organs cause a destruction and havoc of an amount of blood corpuscles within a few hours which would require months, and, it may be, years, for ordinary causes to accomplish. The complexion often in twenty-four hours acquires a dirty, pallid, anæmic cast, which presents the appearance of months of suffering.

Thus the algid types of diphtheria are always associated with the tendency to anæmia and cardiac depression and paresis.

Non-identity of Diphtheria and Membranous Croup.—Previous to the first case of genuine diphtheria, which I saw in the spring of 1856, for a period extending over about nine years, cases of true membranous laryngitis, or what is known as membranous croup, came under my observation and professional care during every winter and spring. The appearance of this affection sporadically was expected to make annual visitations. They pursued the usual course of that disease, some ending in recovery after expulsion of the false membrane, but the great majority proving fatal solely and alone from mechanical obstruction of the respiration by the membranous exudation. This was alone the cause of death. There existed in these cases no other tendency to death but that from the mechanical presence of the membrane. The pathological process of the entire thing was confined to the larynx and trachea, and the cause of death simply from mechanical causes—just as if death had been induced from obstruction in the larynx from any extraneous cause, thereby cutting off the supply of atmospheric air to the lungs. The pathology of membranous croup is exceedingly simple and uncomplicated, and confined in its progress and operations to a limited locality. Excepting as it acts through obstruction of respiration, and in this way affecting the system at large, it produces no other fatal pathological result. On the contrary, the pathology of diphtheria is one of the most complex, uncertain and indeterminate known to our profession. The pathology of croup is simple, and easy of investigation. Diphtheria is obscure in its etiology and progress, and fraught with difficulties of comprehension. And inasmuch as in diphtheria there exists a lurking poison pervading every portion of the body, the entire nervous system—voluntary, reflex and sympathetic—succumbs sooner or later, in all malignant cases, to its toxic action. I never saw a case of membranous croup previous to the invasion of diphtheria followed by paralysis of the voluntary or reflex systems of nerves. The kidneys, in a large proportion of cases of diphtheria, present remarkable lesions of structure and peculiar derangements of function, as engorgement, nephritis, albuminous urine, suppression of urine, uræmia, and occasionally dropsy. Previous to my first case of diphtheria, twenty-eight years ago, I never saw any of these pathological phenomena, or anything resembling them, in any case of membranous croup coming under my observation. I never witnessed in any case of membranous croup, previous to 1856, a tendency to the formation of

membranous deposit on any other portion of the body excepting the larynx and trachea, as exists in the progress of diphtheria. When it comes to the question of temperature, there is a marked difference between the two affections. The temperature in croup previous to and during the process of membranous exudation, is always high, and continues so until the mechanical obstruction to respiration causes carbonic acid poisoning, when it begins to decline.

On the contrary, the tendency to decline of temperature after the first forty-eight hours in all serious cases of diphtheria is often decided, and constitutes one of the tendencies to death of this peculiar disease. Who in the treatment of croup in its active stages previous to obstruction concerns himself about the sudden decline of temperature? Who, in diphtheria, if he understands his subject clearly, does not apprehend danger from its sudden fall? In genuine diphtheria there are always decided indications of septicæmia or blood-poisoning, causing a universal state of malnutrition and vital depression. For instance, a wound in diphtheria will not heal while the diphtheritic poison is in operation, but will take on unhealthy action and assume anomalous types. In membranous croup, previous to my first acquaintance with diphtheria, I never observed any indications whatever of septicæmia or blood-poisoning, or typhoidism. I never saw in any case of croup previous to the appearance of diphtheria in 1856, membranous deposits on the rectum, vagina or skin.

In diphtheria the salivary glands and also the cervical from the absorption of poison from the diseased pharyngeal and nasal cavities become inflamed and enormously infiltrated, causing excessive swelling.

In membranous croup I have witnessed no complication of this kind.

I have never observed extensive glandular swellings of the neck in this affection. When diphtheria invades a family the disease is almost certainly communicated to others by infection or contagion, causing numerous other cases in the same family. In all my professional experience I have never seen two or more cases of membranous croup in a family at the same time. Diphtheria in its malignant form usually prevails epidemically. Simple membranous croup never does. The membranous croup which came under my observation previous to my first case of diphtheria I never saw invade entire families, neighborhoods and counties, as was the case with the latter disease.

Action of Diphtheritic Poison on the Sympathetic and Vaso-Motor Systems of Nerves.—Probably one of the most important and interesting

features of diphtheria is the peculiar action of its infective poison on the various ganglia of the sympathetic and vaso-motor systems of nerves. The action of this toxic agent is manifested by its paralyzing influence on the cardiac and renal ganglia and solar plexus of the sympathetic, deranging and impairing the functions of the vital organs presided over by these nerves, as in the case of its similar action on the muscles controlled by the reflex and voluntary nerves. Hence, we may have paralysis of the heart, the stomach and other digestive organs, and also renal organs just as exists from the same cause in the voluntary and reflex muscles.

This paralyzing influence of the diphtheritic poison on the sympathetic ganglia may be either partial or complete. Paresis of the cardiac ganglia is indicated by excessive depression of the heart's action. The pulse usually becomes slow and very feeble. There is a marked tendency to reduction of temperature. There is also a decided tendency to the accumulation of blood in the venous system and the right side of the heart. Or when the paralysis is complete, there ensues a quick, speedy and fatal syncope, which all who have experience in diphtheria have witnessed.

When the renal ganglion is the recipient of its action, there is partial or complete suspension of the functions of the kidneys, these organs becoming engorged and undergoing rapid structural changes, ending in suppression of urine and uremic poisoning. DaCosta found that any disease of the renal ganglion invariably produced structural changes in the kidneys. The great heat regulating centres of the nervous system are also extremely liable to be affected by this paralyzing influence of diphtheritic poison.

From my earliest acquaintance with this disease, I have observed that those cases which had considerable fever every day until the local systems abated, always succeeded the best. On the contrary, in those cases wherein the fever abated rather suddenly and early, without abatement of the local symptoms, though the pulse might become slow and the patient more comfortable, it indicated a certain tendency to that algid form of the disease, which is almost surely fatal. It indicated, furthermore, that the vital heat-regulating centres were paralyzed, that heat production was partially suspended, and heat dissipation was left uncontrolled.

When the all-important solar plexus, presiding over the functions of digestion and assimilation, is paralyzed by the infectious poison of diphtheria, we have presented those alarming and fatal cases wherein the

digestive process seems to be suspended in toto. All ingesta taken into the stomach are either vomited or, if retained, undergo fermentation and putrefaction. The formation and secretion of gastric fluids are, of course, either partially or entirely suspended.

In my experience this class of cases rarely recover. There is something more than the impairment of tone of the digestive organs here.

There is more or less paralysis of the organic ganglia and nerves which preside over these functions. Thus it will be seen that the force of the diphtheritic poison is directed with peculiar power towards the various component parts, voluntary, reflex and sympathetic, of the entire nervous system. They are all liable to suffer alike.

Treatment.—During a professional experience of nearly thirty years in the observation of diphtheria, both epidemic and sporadic, I have lived to test the various remedies and methods of treating this disease which have been proposed and introduced in that period of time. They have been numerous and varied in character. Many were purely empirical, others arose from the peculiar views entertained at the time of the pathology of the disease. In its early history, and at the time when it first appeared in my native section, it was regarded as a malignant type of local disease, inducing death by the severity of inflammatory action, without reference to its infectious powers in the production of blood poisoning. Hence our therapeutic measures at that time were very much confined to the application of local means, with the view of subduing the localized inflammation. Probably at that time the nitrate of silver, before sad experience proved to the contrary, used freely and frequently, gave to the professional mind more hope than any other local agent. But, notwithstanding the severe and repeated cauterizations to which the diphtheretic throats were subjected at that period, the mortality in malignant cases was not diminished in the least. Alum and tannin next came to the surface of professional favor. Their failure to arrest the throat affection gave rise to the use of the tincture of the chloride of iron, and subsequently the tincture of iodine.

At an early stage of this particular epidemic, there was a faint idea on the mind of the members of the profession of my acquaintance that diphtheria belonged to the class of the so-called putrid or septic diseases, and that antiseptic agents, locally applied, might be useful. The use of antiseptics and disinfectants internally had not at that time suggested itself to

the profession. With a view to local disinfection, a combination of tinct. myrrh, creosote, and oil of turpentine, came very much in vogue during the epidemic of 1857-58.

A popular local remedy of the times was a combination in mild form of the sulphate of copper and zinc, dissolved in honey and tar water. I think it was quite as good in its effects, as a disinfectant and astringent, as any of them. Labarraque's solution of chlorinated soda was also introduced as a local remedy at the time. Indeed, almost every conceivable form of astringent, stimulant, alterant and caustic were resorted to by the profession and people then as local applications, without in any way changing the fatal tenor of the disease. In fact, I often see now local remedies introduced to the profession and vaunted for their efficacy which were fairly tested and found wanting twenty-six or seven years ago to my knowledge. Indeed, we made no progress towards a successful management of the disease until it began to be regarded as a disease of debility, and our remedies took the direction of tonics and stimulants.

Probably the earliest efforts at a general treatment of epidemic diphtheria by the profession of my acquaintance consisted in the use of emetics first, followed by the mercurial or calomel treatment. It was at the time just preceding the decadence of mercury as a potent alterative remedy for all inflammations. This plan was very soon discarded. In no way did it ameliorate or curtail the ravages of the disease. Calomel was given first in large or so-called sedative doses. This failing to benefit, it was then given in small and repeated alterative doses, with the hope of altering the intensity of inflammatory action, and breaking down and preventing the further exudation of membrane. It all amounted only to a signal failure, though I see its use in this disease vaunted in some quarters at present. Soon after this the chlorate of potash came into notoriety and use. Then the trial of the chloride of iron and finally sulphate of quinia were added in combination. Probably this combination has maintained its position and reputation in the therapeusis of the disease longer than any other, which has been at least for a quarter of a century. In a large class of cases of ordinary severity, but not malignant in type, this combination is well adapted and serves a good purpose. The mild cases will usually recover with but little treatment. But it cannot save the truly malignant cases. I have, in this class of cases, seen it tried and tested fairly in my own hands and in those of others without any good results.

These agents, as we all know, are positively tonic in their action, and will accomplish all that such remedies can. There are other therapeutic agents needed, in addition, to reach other morbid conditions. These are the most potent stimulants and disinfectants and antiseptics which we possess. These will largely cover all of our present views of the pathology of the disease. The decided paralytic tendencies of the diphtheritic poison on the nervous system have invited the very free resort to the use of alcoholic stimulants. I can say with regard to these, that in the past twenty-five or six years no bad case of diphtheria has ever recovered in my own hands that stimulants were not used as freely as circumstances permitted. I can also say that in every malignant case in which there were contraventions to their use, either from nausea and vomiting, or an unwillingness or resistance on the part of the patient to their use, or natural repugnance or other cause, the case has usually succumbed to the disease. In those cases of threatened paralysis of the great sympathetic centres, thus destroying the powers of the heart, stomach and kidneys, we need not only general or diffusible stimulants, but those directed in their action specifically to the sympathetic system itself. Among these belladonna and strychnia are the most potent, when combined with the comp. tinct. of cinchona. If these stimuli fail to sustain the partially-paralyzed and feeble heart, no other in my knowledge will.

The introduction, in the past fifteen years, of the germ and antiseptic theories of the cause of diphtheria, has brought with it also the use of disinfectants and antiseptics as corrective means. In a want of this knowledge the old practice was a failure. Putrid and highly infective and deadly poisonous matters were permitted to accumulate in the throat, and particularly in the nasal cavities, without removal or disinfection, thereby becoming sources of systemic poisoning, and with a very inadequate conception of the consequences. The septic theories have gradually developed the need of antiseptic correctives. *Materia medica* fortunately furnishes a very numerous and varied class of these agents. First on the list stands the sulphurous, then the chlorinous, thirdly the carbolated, then those extracted from wood-tar, as the creosotic; fourthly, the brominous; and, fifthly, those in combination with manganic acid. These constitute the leading varieties of antiseptics. They are all valuable, and are applicable as general and local disinfectants, both. Locally, antiseptics can be used almost *ad libitum*, with the exception of carbolic acid and bromine.

In the general use of antiseptics the important question arises, whet we can with safety, when the entire system has been subjected to the poison of diphtheria, introduce within the circulation a sufficient quantity of the disinfectants to correct the evil and save the life of the patient.

When the blood has been poisoned, and its constituent properties destroyed as to their nutritive value, the introduction of all antiseptics and disinfectants possible cannot restore lost vitality and save life. But, where the injury is only partial, it is possible, by the combined agency of antiseptics, nutriment, and stimulants, to repair the damage and turn the scale in the direction of health. In all grave cases of diphtheria there exists invariably more or less anorexia.

But, in addition to this, there is always impairment, in more or less degree, of the functions of digestion and assimilation. In all of my experience in this disease, I have never seen a serious case in which this was not a standing difficulty in the way of progress. It is a difficulty which is not always fairly appreciated. In all malignant cases the digestive organs are in a more or less paralyzed condition. All ingesta when taken into the stomach remains often for many hours in an undigested state undergoing fermentation and putrefaction.

In this condition the system can receive no fresh accession of nutriment, and must die from inanition if from no other cause. A vital consideration in the treatment of diphtheria is to maintain the functions of digestion in a condition as near the normal as possible, and to do nothing in the administration of food and medicine which can impair the tone of digestion or create nausea.

In all my experience in diphtheria, I have never had cause to regret the free use of stimulants and nourishment. These, in connection with cleanliness and disinfection of the nose and throat, I believe, will save more cases than any other method.

The following is one of the best local antiseptics:

℞.	Listerine,	℥ss.
	Aq. cinnamo,	℥iv.
	Liq. sod. chlorinat.,	℥ss.
	Acid carbol.,	gtt. vi.
	M.	

This antiseptic preparation can be applied, by means of the syringe or atomizer, to the nose and throat, and combines well the leading vegetable and mineral disinfectants.

The continued use of Listerine only tends to increase my confidence in its value, as an antiseptic and disinfectant, both for its efficiency and safety. It is something which can be used *ad libitum*, which unfortunately cannot be said of most of the other potent antiseptics.

All who have much experience in diphtheria know that as yet no specifics have been discovered for its successful treatment. My own experience has taught me that, in this absence, the line of practice which has been the most successful in my hands is that which has been governed by the great principles of sustaining the system of the patient by means of a liberal amount of diffusible stimulants, nourishment, and tonics, with thorough cleanliness of the diseased nose and throat, the unceasing disinfection of the morbid and infectious products of these cavities, cleanliness of the sick chamber, the bedding, the person, and the entire surroundings of the patient, with an abundance of pure, fresh air.

The salivary and cervical glands participating in the infectious disease usually cause a dangerous degree of infiltration in the surrounding structures. Of late years I have resorted to the following lotion with more satisfaction than any other of my acquaintance: Chloride of ammonium and chlorate of potash, each ℥ij; rose-water and alcohol, of each ℥iij. This is to be applied to the external swelling frequently and freely.

This preparation combines in an eminent degree cooling and refrigerant properties. The hemorrhagic variety I have found most amenable to the combined influence of oil of turpentine, ergot and digitalis internally, and the local action of the spray of a dilute form of Monsel's solution.

As an internal disinfectant and tonic, I have used the following preparations for some years with good effect:

℞.	Ferri tinct. chlor.,	℥ij.
	Potass. chloratis,	℥i.
	Tinct. nucis vom.,	gtt. xxx.
	Tinct. digitalis,	℥ss.
	Aquæ,	℥iiss.
	M.	

A teaspoonful to a child of five years every one or two hours in water.

℞.	Sodæ hyposulphit.,	℥ij.
	Acid sulphurosi,	℥iij.
	Aquæ,	℥ij.
	Glycerine,	℥i.
	M.	

A teaspoonful every alternate hour with the former.

With the recent treatment of Dr. Wm. Pepper, by means of minute doses of bi-chloride of mercury and tinct. of nux vomica, I have no experience. He writes me that his own experience with these remedies has been encouraging.