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DIPHTHERIA AND ITS SEQUELS:

A NARRATIVE.

BY

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DIPHTHERIA AND ITS SEQUELS.

DIPHTHERIA, as it is now called, was prevalent in Edinburgh and its neighbourhood during the year 1826. It was fatal in a large proportion of cases; and by its alarming rapidity, and resistance to the means of treatment employed, as well as by its numbering amongst its victims some of the younger members of distinguished families, produced a great sensation.

It was at once regarded as a new disease: the sudden sinking of the vital powers under which so many succumbed, and the laryngeal complication which was equally terrible and scarcely less frequent, had hitherto been unknown in the history of sore-throat.[1]

Dr Hamilton, jun., then Professor of Midwifery in the University, in his "Hints for the Treatment of the Principal Diseases of Infancy and Childhood," and, subsequently, in the second volume of the Edinburgh Journal of Medical Science, described the disease as it had fallen under his notice, as "a peculiar modification of sore-throat which occasionally affects children." Dr Abercrombie also (who had seen the disease during the year of its prevalence), in his work on the Diseases of the Stomach and Intestinal Canal published in 1828, refers to it as a modification of disease of the mucous membrane of the mouth and throat, and recognises it as the affection which had been described by Bretonneau and other French writers, and whose history had been communicated for the first time in memoirs read to the Academy of Medicine of Paris in 1821.

I remember well the first occasion of this form of disease coming under my notice. It was in the summer of 1826. The subject was a child of six years of age, the youngest of a family of five, residing with their parents in a remarkably healthy locality, situated on a rising ground, about a mile and a half from the confines of the city. The house they occupied was large and airy, surrounded by pasture

[1] Recent research has shown that this is incorrect. The disease was, in all probability, known to the ancients, and had been observed in all times.

lands, and in every way favoured as to the means of securing freedom from sickness. Diphtherite, however, had entered, but in what way it was not discovered. The patient, a little girl, previously enjoying good health, had been confined to bed for a few days before my first visit. She had a febrile attack, accompanied with slight sore-throat. I found her pallid and sickly. Her skin was warm, but not hot; her pulse was frequent and feeble; her tongue loaded; her mouth and throat red and swollen, and on the centre of the left tonsil, there was a pale, ash-coloured patch,—a thin film or pellicle, about the size and shape of a horse-bean. It had well defined edges all round, and no appearance of ulceration could be detected. The external glands were not affected, and only slight difficulty of swallowing was experienced. I pronounced, too readily, a favourable prognosis, and prescribed the usual febrifuge remedies, together with the free use of acid gargles for the throat, and milk and farinaceous food as diet. No marked change was perceptible in the symptoms during the two following days, saving that the little patient appeared daily more exhausted. The pellicle on the tonsil did not extend its boundaries, and the general redness and tumefaction of the fauces did not increase. No fœtor of the breath, no huskiness of the voice attracted notice. No vital organ appeared to participate in the general disorder, till on the morning of the fourth day—the seventh from the invasion of the disease—the heart was found to labour. The pulse became more and more unsteady, the breathing slow, the extremities cold, the countenance livid; and in spite of wine, ammonia, and other stimulants, the little patient, who, during her illness, had scarcely acknowledged suffering of any kind, passed unconsciously into the sleep of death,—death, the result of the general disease of the system, not of any complication, —exhaustion of the vital powers, the work of some hidden poison exerting its influence on the blood or on the nerves.

Some weeks passed before I was again summoned to witness the progress of diphtherite. It was under altered features, and in somewhat different circumstances. The subject was a girl of the age of four years, residing with her parents in a humble dwelling situated in one of the dirty and over-crowded streets now swept away through the operations of the railway engineer. In a low dark room, in a confined and airless bed, in this abode of poverty lying at the base of the Calton Hill, there lay this child who had sickened some days before, and, beside her, a sister a year older, who had just succumbed to a similar fate. Both these children were plump and well nourished, and, by those around them, regarded as very healthy. The younger, who first claimed my attention, was restless and hot; her pulse was frequent. She complained of sore-throat, of sickness, and thirst. Her tongue was coated with a whitish fur; the uvula, palate, and tonsils were swollen, and discoloured by a dark rosy congestion; and on both sides, and extending into the fauces, there was a large patch of the ash-coloured

pellicle, obscured by a copious secretion of mucus issuing from the posterior nares. Deglutition was painful and difficult, and the voice low and whispering. The larynx became more involved; and in the course of the following day, all the symptoms which characterize ordinary croup were fairly developed. It was a sthenic case, and admitted of active treatment. Leeches were accordingly applied to the neck, and followed by warm poultices. Emetics were administered from time to time, and calomel, the great remedy of the day, prescribed in oft-repeated doses. Caustic was also applied to the tonsils and fauces, but all unavailingly. No effort of vomiting, no frequency of cough dislodged the false membrane, whose extrication we then regarded as symptomatic of the arrest of death. The voice became more and more stridulous, the breathing more and more rapid and impeded. The countenance assumed a livid hue, the pulse a feebler character; and death by asphyxia closed the scene on the third day of my attendance.

Before that day arrived, the elder sister and bed-fellow of this poor child had become an object of much anxiety. The disease, as manifested in the younger, rapidly developed itself in the elder sister, in all its virulence, save in the laryngeal complication. The voice was not affected. The fever rose high; vomiting was urgent; the pulse was rapid; the pain and difficulty of swallowing extreme. The leathery pellicle occupied the tonsils, the uvula, palate, and posterior wall of the pharynx; and, dreading its extension from the fauces to the glottis, the child was rapidly brought under the influence of calomel. I cannot affirm that to this mode of treatment can be ascribed the exemption from croup which she experienced; but I cannot but fear that the mercurial played a part—a mischievous part—in the diarrhœa which supervened, and under which, with rapid sinking of the strength, such as is too often seen in diphtheria, with no adequate cause to account for it, the little patient breathed her last.

Permission was given to examine both bodies after death. In the former case, the mucous membrane of the pharynx was red and thickened, and covered with a thin layer of soft membraniform lymph. In the larynx and trachea this had acquired a greater consistence, and could be peeled off from the subjacent mucous surface, leaving it red and raw-like. The upper part of the bronchial mucous membrane was inflamed, and covered here and there with thin lymph. The extreme bronchial tubes were loaded with mucus, and the substance of the lung partially solidified from recent pneumonia. In the latter case, the only appearances discovered were those of inflammation and ulceration of the mucous membrane of the smaller intestines, particularly the ileum; but no sign of pellicular exudation was any where discoverable, save on the mucous surface of the mouth and pharynx.

A quarter of a century and upwards passed away, and I saw no other case of the disease which had then proved so formidable and

so fatal. During the prevalence of protracted epidemics of scarlatina, and with many opportunities of watching the progress of sore-throat in various forms in the interval, I saw no instance of the pure pellicular affection. I could speak of diphtherite only as I had witnessed its features in 1826. About four years ago, however, the disease became epidemic in the south of England, and has since visited in that form various other parts both of England and Scotland. It has not assumed the epidemic character in Edinburgh or its neighbourhood. Many of the practitioners here are still unacquainted with it from personal observation. Some remember it only as it exhibited itself in 1826.

I renewed my acquaintance with the disease in the spring of 1858, when I was requested by Dr Paterson to visit along with him, in North Leith, a child who had recently arrived there from London. I learned that another child in the same family had lately been affected with diphtheria in the same house, and that the disease had terminated fatally through the laryngeal complication. The child, then ill, presented the well-marked features of the pellicular disease, such as I had previously observed it. It was treated by the free exhibition of wine and other stimulants, and by chlorine water as a wash for the mouth and throat, as well as for internal use, and made a good recovery, being considered safe about the eighth day of the attack. One child in the family, a boy of two years of age, remained at this time unaffected, and circumstances rendered it desirable that he should be sent to friends in the north of England. On his arrival there, symptoms which had raised some suspicion developed themselves in the form of severe diphtheria. He struggled through it, and made a slow recovery. Both these children were affected during their convalescence with disordered vision of an amaurotic character, which continued for nearly three months. They perfectly recovered. Some time afterwards I was asked by Dr Finlay to see a boy of seven years of age, who had recently arrived from Fife on a visit to friends in Newhaven. In this case the distinctive character of the disease was well marked, and the boy sank rapidly on the fifth or sixth day, partly through the virulence of the general disease, but not before the larynx had shown signs that the inflammatory exudation had spread, and involved its lining membrane. In the spring of 1859 I was called to visit, with Dr Wylie of Errol, the daughter of a gentleman residing in that district. She was suffering from the disease in an aggravated form. The larynx had become affected, and all the distressing symptoms of croup were endured. She quickly sank, asphyxiated. Dr Wylie informed me that for some time the disease had been very prevalent in the district in which he resided, and that scarlatina of a malignant type had at the same time been very fatal. I was struck by the remark of an aged relative of the young lady whom I was called to see, to the effect that she had never seen such a sore-throat for nearly thirty years, when she had witnessed

the same "white leather spot" with all its terrors in the case of an aunt of the patient then expiring.

In the autumn of that year the disease was more prevalent in the neighbourhood of Edinburgh. I saw, with Dr Graham Weir, on the 24th September, the daughter of a gentleman residing in the northern part of the town, a well-marked case of the disease. The little girl, aged six, had been seized on the evening of the 21st with a distinct rigor, followed soon after by severe and urgent vomiting. The sickness continued during the 22d, accompanied by drowsiness, heat of skin, thirst, and sore-throat. She became restless on the following day, and on examining the mouth and throat, the ash-coloured pellicle was found on the tonsils and on the arch of the palate. In the course of the 24th she had become cold, with sinking pulse and strength. She rallied, and for some hours the skin was covered with a scarlet rash, which quickly passed away. The voice now became husky and croupy. Under a liberal use of wine, the internal administration of the chlorine in water, and its inhalation by means of impregnating the air of her chamber with it in the form of gas, she improved. The disease ran its course without further complication, and the child recovered. On the day on which I took my leave I was asked to visit, with Dr Renton of Dalkeith, a child in that town, who had sickened immediately after the death of a brother from sore-throat. Vomiting was an early and urgent symptom, accompanied by drowsiness and febrile reaction. On examining the mouth and throat, the tonsils, uvula, and fauces were found red and inflamed, and patches of considerable size of thick, ash-coloured exudation were distributed over them. The voice was husky and weak, and deglutition painful and difficult. No remedy availed, and the child rapidly sank, apparently from the specific poison of the disease. In the first week of November I saw with Dr Peddie, in the south side of the city, a little girl who had sickened soon after the death of a sister from diphtheria. The larynx was not affected in either case, but the general disease was severe, and the local affection in the mouth and pharynx well marked. The second case recovered.

I have now seen twenty cases of diphtheria, of which eleven have proved fatal. This large proportion of deaths, however, must not be considered as indicating the average mortality from the disease. The number of the whole is too small from which to draw any accurate conclusion; while it must be kept in mind that my attendance in almost all the cases was requested only on account of their more than usual severity. Of these eleven deaths, five occurred in children under 5 years of age, three between 5 and 10, one between 10 and 15, and two in adults, aged 49 and 53. Four of the number died from the laryngeal complication, the remainder from the gravity of the general disease. Of the four who perished by the former, three were under five years of age, and one a little above it. Of

the two adults, one died rapidly, the other more gradually, of the general disease.

Of the nine who recovered, six were known to have suffered from the diphtherial palsy in some form or other, the remaining three were not known to have manifested any such consequences.

In ten of the twenty the disease was traced distinctly to infection from a blood-relative or friend residing in the same house. In ten the origin was not ascertained.

The cases I have recently visited differ in no essential character from those I observed in 1826, and it would be useless to relate them in detail, even had my means of doing so been more accurate and extensive than they necessarily have been. I shall content myself by a notice of one or two family groups, in order to bring out the chief features of the disease.

Miss A., aged 15, the eldest of a family of ten children, residing in an airy situation in the vicinity of Leith, had been observed to be languid and listless for some days, when she began to complain of sore-throat. On the 1st of March 1861 she was seen by Dr Paterson. On examination, he found the fauces generally red and swollen, with patches of a whitish-yellow colour of considerable size over the tonsils, uvula, and back of the pharynx. This condition of the throat was accompanied by a soft, feeble, rapid pulse, vomiting, and great depression of the vital powers. I saw her with Dr Paterson on the 4th. She was much prostrated. The exudation had extended, deglutition was painful and difficult, and the voice low and whispering. There was also much somnolence. Under the free use of wine, and the regular administration of the muriated tincture of iron, together with the frequent employment of Condy's fluid to the mouth and throat, an improvement took place, and continued from day to day. The larynx was not farther involved, and the general disease ran its course to convalescence. A brother, aged 10, had sickened at an early period of his sister's illness, and on the first day of my attendance presented the well-marked features of the disease, but in a mild form. The diphtheritic pellicle was confined to the tonsils, and the general febrile disturbance was slight. His convalescence was coincident with that of his sister. His seizure had been four or five days subsequent to hers. At an early stage of their illness, Dr Paterson had recommended the removal of the younger members of the family from home. They had been strictly kept apart from the sick from the commencement of the illness, and were now sent in two parties,—one of two and the other of six,—the former to friends in the neighbourhood, the latter to Musselburgh. They were considered to have remained unaffected by the disease. The larger party, after a residence of fourteen days at Musselburgh, were permitted to visit some relatives in the neighbourhood of Stirling. On the sixth day after their arrival, the youngest child of this family sickened of the disease, and in succession two others, the second fourteen days after the first, and the third fourteen days

after the second. The first died about the fifth week of the disease, having recovered from the immediate effects of his illness, but sank under what was considered hooping-cough and paralysis of the lower limbs. These paralytic symptoms were preceded by the nasal voice and mumbling articulation which characterize the palsy of the velum palati. The second, a boy of fifteen, appeared to make a good recovery, but was afterwards affected by symptoms which I shall immediately describe. The third, a young lady of twenty, whose illness was slight, made a perfect recovery, and had no nervous or other sequelæ. Meantime their relative, Miss A., whose case I first noted, during her convalescence was affected with imperfect vision, which gradually increased, assuming the character of amaurosis, and complicated with depraved sensation and diminished power of the right hand, and with want of command of the lower limbs, so as to give the character of paralysis to the impaired motor power, especially below the knee. In three months she had perfectly recovered. We return to the second case of the family near Stirling, to whose house Miss A.'s six brothers and sisters, who were believed to have escaped the disease, had gone during her illness. On the 16th of July I was called to Musselburgh to see a lad who had been brought there for the benefit of sea-bathing after a tedious illness, and discovered in him the subject of that case. More than three months had passed since he had recovered from the attack of diphtheria. During his convalescence he had been affected with loss of power over the lower limbs, gradually increasing, and now amounting to almost complete paraplegia. He was unable to leave his seat or walk across the room without assistance, and his best efforts resulted in his dragging his limbs in a shuffling, jactitating manner. There was also partial loss of power and sensation in the upper extremities. Yet he looked well, —perhaps a little anæmic,—he felt well, he ate well, and he made no complaint but of the loss of power of his limbs. These symptoms had been preceded by snuffling voice and impaired vision. He perfectly recovered under the use of iron and of nux vomica. And here I must mention a remarkable coincidence in connexion with this family group, if, indeed, it be not a link—an important link—in the chain of events we are now recording. On the 25th of March 1861, just three weeks after I had been called to Miss A., I was requested by Dr Coldstream to visit with him a little girl, aged four years, residing with a family in the immediate vicinity of the residence of Miss A., and maintaining with her family a friendly intercourse. This child was affected with some remarkable paralytic symptoms. She had lost the use of her lower limbs, was unable to support herself or to make one step in advance. She had also lost in a great measure the command of her arms, was unable to use her hands or lift them to her head. On being raised from the sofa on which she always reclined, and on which she appeared motionless, her head fell to one side, and always required the support of the

person in whose arms she was placed. She had previously, and as an early symptom, been affected with difficulty of articulation. She made a snuffling noise, and mumbled in her talk. Deglutition was difficult, and in attempting to swallow fluids especially, they were partially lost, escaping from the angles of the mouth. Her intellect was unaffected, and she was otherwise in good health. Under the persistent use of nux vomica she made a gradual recovery, and is now quite well. Now this child, I have learned, had sickened a short time before Miss A. was seized with diphtheria. Her illness commenced with vomiting and gastric irritation. The tongue was much furred. She complained of sore-throat and difficulty of swallowing, referable to the gullet, but no pellicular exudation was discovered within the mouth, and the disease ran its course under the name of gastric fever. It was during her convalescence from this illness, and about a month from the period of her seizure, that I found her with the symptoms first described. These paralytic or pseudo-paralytic symptoms were not at the time suspected of being in any way connected with the febrile attack which preceded them: they were considered independent of it, and that illness was never supposed to be of the nature of diphtheria. Nevertheless, I incline to the belief that such was its essence, and such the connexion between it and those disordered functions of the nervous system just described. In this opinion I am joined by Dr Coldstream.

In the development and progress of such a disease as diphtheria, a general or constitutional disorder, we are not to expect in every case a manifestation of its anatomical character. We every now and then meet with cases of scarlatina without eruption, and of rheumatic fever without the affection of the joints. In the one case, we are taught for the first time the true nature of the malady by the occurrence, by and by, of albuminous urine and œdematous feet and eyelids; and in the other, we are left in no doubt as to its real character, by the peril in which our patient is involved when the heart participates in the general disorder. So may we expect to find during an epidemic of diphtheria, cases of the true disease, though no wash-leather-like spot appears upon the fauces, and only form a late diagnosis when the paralytic symptoms have removed all doubt.

Diphtheria is a blood-disorder which manifests a predilection for the mucous membrane of the pharynx, on which to display its anatomical character; but that character may be demonstrated on other parts and other textures of the body, still constituting a true diphtheria. The exudation of lymph may be trifling, and yet the general disease may be severe. The pellicle may exist on some part of the mucous membrane not visible to the eye, and the patient, all the while, be the victim of an unseen and dangerous diphtheria.

Mr Spence has recently communicated to me an interesting case, which bears on this subject. Being called upon by Dr Menzies to operate on a child affected with croup, tracheotomy was performed under the impression that the disease was primary, and of a local

nature, examination having failed to discover any affection of the fauces. Some days after the operation, a second examination revealed the true nature of the disease. The posterior wall of the pharynx was then found to be the seat of diphtheritic exudation, which, in all probability, had spread from the larynx to the membranes of the pharynx, reversing the usual order, and proclaiming the constitutional origin of the disease. The child survived till the sixth day after the operation, and died, apparently, of the general disease.

We may hazard the conjecture that, in the case of the child supposed to labour under gastric fever, the gullet and stomach were the parts on which the exudative inflammation was spread; a conjecture which gains strength from the fact, that these parts have been found in other cases, after death, to be the seat of this peculiar deposit of lymph.

One link in the chain of sequences in this family history is still wanting: the one, namely, which connects the infection of the family in Stirlingshire by means of the children from Musselburgh. At first sight, the contagion was supposed to have been conveyed by clothes, carried directly from the house in the vicinity of Leith, where the disease first appeared, to the residence of the family in Stirlingshire. There is no ground, however, for believing that the contagion of diphtheria can be so transmitted, and we must seek another clue. It has been already stated that the six children left Musselburgh, and arrived at their relative's house, supposed to be in good health. One of their number, however, it now appears, was observed before leaving his father's house to be dull and dispirited. He was ailing while in Musselburgh, but the character of his illness has not been noted or remembered correctly. This, however, is known of him, that before he left that place, the early indications of disordered innervation betrayed themselves in feeble, unsteady walking, that they increased while in Stirlingshire, and on his return home, presented the form of paraplegia, now known as the sequel of diphtheria. He remained under the care of Dr Paterson for a month, and perfectly recovered.

I take another family history. Miss D., aged 14, living in one of the healthiest parts of Edinburgh, was seen by Dr Warburton Begbie for the first time on the 21st of January, presenting the well-marked features of diphtheria, in a copious exudation of lymph over the tonsils and posterior wall of the pharynx, accompanied with considerable constitutional disturbance. The disease pursued its course favourably, and on the eighth day there occurred the nearly complete separation of the pellicle from the left tonsil and palate, and the throat was left very tender. A marked improvement in deglutition followed. The voice, however, continued nasal, and fluids were occasionally rejected through the nostrils. On the 10th of February, the twentieth day from the first occurrence of sore-throat, the difficulty of swallowing, which had considerably abated, re-

turned, and great care was required, in order to guard against the rejection of food, especially of fluids, by the nose. The velum palati was now free of lymph, but hung loose and immobile. Numbness, prinkling, sleeping of the toes, feet, and legs came on, and to these succeeded difficulty of moving the lower limbs. In a day or two there followed indistinct vision, and inability to read even large-type print. At this stage, she was placed under quinine and nux vomica, and, by and by, was sent into the country. She soon improved in all respects, with the exception of sight, which still continued weak and imperfect. On lifting, perchance, a pair of spectacles suited for aged sight, and placing them before her eyes, she was surprised to find vision considerably aided. She is now (March 15) free from all ailment, and the only inconvenience she experiences is that arising from impaired vision, which is also gradually abating. No albumen was at any time discovered in the urine.

On the third day of Miss D.'s illness, she was joined by Miss F., a lady of 53 years of age, who occupied towards her the responsible position of guardian, and discharged the duties of her office with remarkable fidelity. She was much by the bedside of her ward, and underwent great fatigue. On the sixth day of watching, she complained of slight sore-throat. On examination, the fauces was found red and swollen, and on the left tonsil there appeared a small but distinct patch of exudation. There was scarcely any febrile disturbance, and it was with difficulty Miss F. was persuaded to retire to her bedroom. On the following day the pellicular exudation had greatly extended. The tongue was furred, and the odour of the breath very offensive, while the constitutional disturbance had become considerable. The voice assumed the nasal sound, deglutition became more difficult, and pain stretching to the ears gave much discomfort. Cough from time to time was observed, but no physical sign on examination of the chest. For some days there was little change in the condition of the throat; but a considerable discharge of dirty shredy matter was brought off by the operation of gargling. The voice became whispering, and the cough sharp and somewhat stridulous. On the eighth day of her illness the countenance became more anxious, and the face somewhat turgid and swollen, and Miss F. complained of oppression over the chest, but she expressed herself hopefully regarding the issue of her illness. No indication of pulmonary affection, on exploring the chest, was discovered. The throat had at this time assumed a cleaner and more healthy appearance, the constitutional symptoms were less grave in character, and hopes were entertained that she was progressing towards recovery. On the following day, however, the ninth of her illness, without any aggravation of the local symptoms, there was observed, from an early hour in the morning, a decided failure of the vital powers. She sank into a semi-comatose state, and died soon after mid-day. At the commencement of the

illness the throat was freely touched with nitrate of silver; and Condy's fluid, as a wash, was used throughout. Poultices were freely employed, particularly in the early stage of the disease. The strength was supported by wine and beef-tea in liberal measure, and the tincture of the muriate of iron persistently administered every third hour. These two patients were members of a family ten in number, and the only two who had not passed through scarlatina.

These illustrations will be found to contain some of the chief points in the history of diphtheria. The cases first recorded bearing on the symptoms and appearances which characterize its febrile stages, and the two family histories touching the manner of its transmission, and the disorders of the nervous system which so frequently supervene during convalescence. In regard to the latter phenomena, however, it must be noted that they have been observed to present themselves in characters much more formidable than any I have recorded. The heart itself has been found to suffer what may be called a paralytic stroke, and death has followed with awful rapidity. I have not witnessed such a termination; nor have I witnessed the slower, but not less sure, dissolution preceded by failure of the heart's action; the great organ of life giving out its solemn pulsations at the unwonted rate of 24 per minute. The eyesight suffers in a variety of ways, from the mere indistinctness to the almost total loss of vision,—from a paralysis of the moving and accommodating muscles, to that of loss of power in the retina itself. Squinting and double vision sometimes occur, and give to the case, especially when combined with other cerebral symptoms, a character of suspicious gravity. I saw an example of the kind with Dr Traill of Arbroath, in a young gentleman in that part of the country, recently returned from school in the south of England, where he had suffered a severe attack of diphtheria. His convalescence was progressing at home, when he began to manifest some unsteadiness in walking, which, by and by, amounted to loss of power over the limbs. He suffered some febrile attack, complained of headache and giddiness, and was confined to bed. His sight became confused, and double vision and squinting came on, and were persistent for several days. The pupils were irregular and dilated, and at times there was intolerance of light. The disordered vision was somewhat peculiar: at one time he described a person as having two heads, one above the other; again, as side by side; and sometimes as having only one half of a head. At times there was difficulty in swallowing, apparently from loss of power in the pharyngeal muscles and œsophagus; and, on attempting to stand or walk, the loss of power of limbs was greater on the left side. The previous attack of diphtheria enabled us to give a more favourable prognosis than we otherwise could have done. The symptoms gradually subsided, and perfect recovery took place. No trace of albumen was discovered on examination of the urine.

Two views have been propounded in explanation of these morbid phenomena presented by the nervous system during the convalescence from diphtheria:—one, namely, that they are of reflex origin; the other, that they are essentially toxemic. The variety of shades, and the changing aspects of these cases of disordered innervation, as well as their amenability to treatment, and frequent and speedy termination in health (though in some instances death has unexpectedly occurred), forbid the notion that they are connected with any serious lesion of the nervous centres; while their analogy to the nervous disorders occasionally seen after small-pox, typhus fever, syphilis, gout, and rheumatism, point in a marked manner to their dependance on a specific poison. We cannot fail to acknowledge the fever-poison of diphtheria,—to recognise its contagion,—to observe its period of incubation—its general and local manifestations—the efforts of nature to dislodge it from the system—and its successful or unsuccessful elimination. Neither can we lose sight of the serious blood changes which take place in the course of the disease, as manifested by the albuminuria which frequently attends it from the beginning, disappearing during convalescence, and reappearing in connexion with the paralytic symptoms.

It may be asked, if there is a diphtherial poison in operation, how is it that the nervous system is so late in affording evidence of its existence? It is during convalescence, often after recovery, from diphtheria that these paralytic symptoms manifest themselves. The poisonous excrement has surely by this time been thrown out by the great emunctories. I point to the kindred disease of scarlatina and its secondary disorders in order to show that it is precisely at the same stage, namely, from the twentieth day and onwards, that the specific poison of that disease still demonstrates itself in bloody and albuminous urine, and in dropsy. The one poison still lingering in the system, has an affinity in one direction, and the other in an opposite. They each appear to exert their influence at the same period, but on different tissues,—the one selecting the capillary, the other the nervous structure. They have each, in their own manner, manifested their character in the production of a special disease; and before their complete elimination, and probably after undergoing changes which we shall one day be able to demonstrate, they have shown that they are still capable of influencing the functions and structure of the body in a manner scarcely less fatal than when first implanted.[1]

Diphtheria, like scarlatina, is sometimes rapidly fatal from the severity of the general disease. Dr Jenner has recorded a case in which it proved fatal in a few hours. The most rapid case which has come under my notice was that of A. S., a retired butler, aged 49, whom I saw with Dr Thomson of Teviot Row, on the evening

[1] This toxæmic, anæmic, or spanæmic condition, resulting from special blood-disease, operates, I apprehend, on the nervous fibre, by means of impaired nutrition.

of the 5th of January last. He was in the enjoyment of perfect health, when, on the morning of the 3d, he was seized with rigor, followed by vomiting and febrile symptoms, so slight, however, as not to prevent him keeping an appointment he had made for the evening. He then passed a restless night, complained of sore-throat and urgent thirst. He was unable to leave his bed on the following morning, and throughout the day felt increasingly worse. Pain and difficulty of swallowing succeeded, and the voice became feeble and whispering. It was not till towards evening that he requested the attendance of Dr Thomson, who, recognising the gravity of the case, begged me to be conjoined with him. At 9 P.M., when I first saw him, he was sinking; his pulse was rapid and feeble; his voice husky; his countenance pallid and anxious; his extremities cold; his breathing was somewhat laborious, and performed with a wheezing sound, heard all over his chest; his intellect was unclouded. On examining the throat, the surface of the tonsils, arch of the palate, uvula, and pharynx, as far as the eye could reach, were found covered with a thin ash-coloured pellicle, which, here and there, also appeared in patches inside the cheeks. The exhibition of large and oft-repeated doses of stimulants failed to produce the smallest effect on the circulation, which rapidly declined, and he died a little before midnight.

The most protracted case I have seen before terminating fatally was that of a young lady, aged 14. She was seen by Dr Peddie on the 7th January last, having sickened twelve days before. When first seen by Dr Peddie the entire fauces were covered with a thick yellow pellicle; the pulse was rapid and weak; the stomach was irritable, and frequent vomiting took place,—the ejecta being of a watery character and very copious. There was little or no suffering, and no complaint but of exhaustion. She became weaker from day to day, in spite of every effort to sustain her strength, and died on the 14th, the twentieth day of her illness.

Death from the laryngeal affection is most common in children, and is usually witnessed within the first week of the disease. Death threatened from the general disease is often rapidly consummated, even when the patient appears progressing towards convalescence. Of this we have an instance in the case of Miss F.

The opinion is entertained by some that the general disease may be arrested by topical applications to the throat, hence the assiduous employment of caustics and disinfectants. Trousseau is decided on this point. He teaches that by interposing energetically to combat the first manifestation in the throat, we may sometimes arrest the progress, and prevent the ulterior manifestation of the general disease. I agree with Dr Jenner, that all we are to expect from the use of such active means is the arrest of the exudative process before it reaches the larynx, and the prevention of the absorption of fœtid matters. I have seen no satisfactory case of the arrestment of the exudation by means of nitrate of silver or mineral acids. I

have sometimes satisfied myself that good has been obtained from the employment of chlorine in vapour, and in solution as a drink and wash for the mouth and throat. The same may be said of Condy's fluid, which has the advantage of being more palatable to children.

My experience leads me in the treatment of the general disease to place most reliance on remedies calculated to sustain the system during the currency of a disease of asthenic character. The free use of wine and brandy has been clearly indicated in all the cases I have seen, even in an early stage of the disease; and recognising the value of iron, in the form of the muriated tincture, in erysipelas, and in some forms of scarlatina, I have satisfied myself that its persistent use, during what may be called the poisoning stage of diphtheria, has had a salutary influence. As a remedy also in those peculiar paralytic affections, which so frequently supervene during the convalescence from the disease, or even after recovery from it has been established, it is equally valuable. Hitherto I have seen no case of diphtherial paralysis which has not completely recovered under the administration of this preparation of iron, either singly or in combination with nux vomica.

In regard to the aid which surgery affords in those terrible cases of threatened suffocation, where the larynx has become involved in the diphtheritic exudation, I am not prepared to speak with confidence. I have seen too little of the operation of tracheotomy in such circumstances to enable me to form a decided opinion of its value. The opening of the windpipe has, no doubt, in some cases, rescued the victims of diphtheria from the immediate grasp of death, prolonged existence, and even saved life; but it has often failed to secure more than a temporary respite from the threatened doom; while in some cases, from the irritation produced by the mechanical means employed for supporting respiration, the facilities given to the passage of poisonous matters into the bronchi, and the difficulties imposed at the same time to the free expectoration of morbid secretions from the air-tubes, sources of distress and danger have arisen which render it doubtful how far the operation has proved a blessing. If, however, it has saved one life—and there is no doubt that it has—it is the duty of the practitioner to offer the chance of its success in every case where not debarred from doing so by utter hopelessness. The only object for which it is to be undertaken is to arrest threatened suffocation, and so afford time to the general disease to run its course in safety, if happily it had been the design and effort of nature so to conduct it, when a new, but not unlooked-for element in the progress of the disorder had unhappily intervened to embarrass and counteract her.

A fine chubby boy, scarcely two years of age, had been from the previous day under the care of Dr William Zeigler for a smart attack of diphtheria of some days' standing, when, on Sunday the 12th of January last, I was requested to see him. The exudative

inflammation, previously confined to the tonsils, uvula, palate, and posterior wall of the pharynx, had now extended to the larynx, and the child suffered all the agonies of croup. Before evening, asphyxia had nearly done its work, when it was arrested by the timely aid of Mr Spence. Tracheotomy lengthened out the life of the little sufferer, and placed him in comparative ease. He breathed; he slept; he took nourishment. He passed a tranquil night; and on the morrow we found him cheerful and happy, surrounded by his toys, in which he took a full interest, and little disturbed by the simple mechanism which science had interposed between him and death. The respite, alas! was very short. As the day advanced he was seized with vomiting; he became restless and oppressed; his pulse rose in frequency and fell in strength; his breathing became hurried; the obstructed air-cells obtained no adequate relief; and, before the evening closed, he expired, exactly twenty-four hours after the operation. It was a tranquil death compared to that with which he was threatened; and in justice to the operation of tracheotomy, and to those who advocate its performance, it may be allowed that, if it secured nothing more than relief from the agonies of slow suffocation, by substituting a less painful and distressing mode of dying, it is surely entitled to our grateful consideration.

The histories now recorded tend to confirm the views generally entertained in regard to the nature of diphtheria, and go to establish—

1*st*, That it is a constitutional disorder having the character of fever, running a definite course, and bearing a closer affinity to scarlatina and typhoid fever than to any other specific disease.

2*d*, That its local manifestation is chiefly observed on the mucous membrane of the mouth and throat; the tonsils, uvula, and palate with the pharynx being first affected; but that it has a tendency to spread to the adjoining passages, and is particularly prone to invade the larynx.

3*d*, That this local disease is of the nature of inflammation of asthenic character, with exudation of lymph in the form of pellicle.

4*th*, That the disease is contagious, and that youth and consanguinity powerfully predispose to it.

5*th*, That it is fatal from the severity of the general disorder, or from the exudative inflammation invading the larynx, and causing suffocation; or that death may result from the nervous disorder supervening in the form of paralysis.

And, lastly, that as we have no specific remedy for diphtheria, the disease and its sequels must be treated on the general principles which regulate our practice in fever, and in inflammation, and in nervous disorders of asthenic character.

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