A Clinical Lecture

ON THE

PATHOLOGY AND TREATMENT OF LARYNGISMUS, TETANY, AND CONVULSIONS,

ILLUSTRATED BY CASES OF THESE DISORDERS IN CHILDHOOD, AND ALSO BY A CASE OF THE TETANY OF ADULT LIFE.

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(Concluded from page 921.)

THE next point of importance, and one of the first moment to us as physicians, is the cause. What gives rise to tetany and the allied conditions, laryngismus and convulsions? Let us take the case of adults first. Trousseau styled the affection the rheumatic contraction of nursing women. This arose from the fact that the first few cases which he saw were all in women who were suckling; and he deemed the affection rheumatic probably because of the pain and swelling of the extremities, really due to the pressure of muscular cramps, and because exposure to cold appeared to be the exciting cause. Subsequent experience led him to modify this view, and he acknowledged many conditions as predisposing. Another antecedent supposed to be almost invariable was diarrhoea. In Trousseau's cases diarrhoea was almost invariably present. He gives one case, however, in which the bowels were obstinately constipated. In ten cases of adults I have found recorded elsewhere, diarrhoea was noted in two only, as absent in four, and in the remaining four not noted. Then another point. In all nineteen cases together—Trousseau's and others—twelve were in women. Of these twelve, seven were suckling, two were pregnant, and one had had several miscarriages recently. Four of these had diarrhoea, and two menstruated while suckling. Tetany comes on in adults also as a sequel to acute specific fevers, especially in cholera and typhoid fever, in which diarrhoea is a prominent symptom. In the vast majority of cases, then, if not in all, tetany supervenes in patients whose nutrition is impaired by drain or flux—that of lactation or pregnancy, or diarrhoea or hæmorrhage.

Let us take now the case of children, and see whether the conditions which favour the occurrence of the disorder in them are in any degree similar. In the first place, the affection in nearly every instance occurs in children under three years of age—the period of rickets, the period of dentition. In the second, in every instance which I have seen the child has also had well-marked rickets. In every one of the fourteen cases collected by Dr. Abercrombie there was marked rickets. Further, in every instance which I have seen the tetany was associated with the first spasmodic disorder—viz., laryngismus. In all Dr. Abercrombie's cases there was likewise accompanying laryngismus. Now, according to my observations, laryngismus is invariably associated with rickets.¹ Again, the third spasmodic disorder is associated with rickets—viz., general convulsions²; and a considerable proportion of these cases of tetany and laryngismus suffer from convulsions. Therefore in children spasmodic disorder in these three forms—viz., laryngismus, carpo-pedal contractions or tetany, and general eclampsia—are essentially associated with the rachitic condition. This is, indeed, the key to the subject. The constitutional state in rickets in children, fruitful of tetany and all kinds of convulsion, is closely analogous to the constitutional state in which tetany is apt to occur in adults. Rickets, remember, is not mere defective nutrition of bone, but defective nutrition of *all* structures—of muscle and nerve, as well as of bone. It arises largely on a diet of starchy food—i.e., not by the evil effects of starch and sugar, but because the diet is deficient in animal albuminates and

animal fats. It arises frequently, too, where nutriment is drained off by frequent and long-continued vomiting and diarrhoea. Sometimes, again, in a condition closely allied to it, as the result of the cachexia of congenital syphilis. In the child, then, as in the adult, the constitutional state which predisposes to spasmodic disorder is subnormal nutrition. This state is, however, brought about in a different way in the two cases. Children get into the state which favours laryngismus, tetany, or convulsions when the nutrient milk is not given, or its equivalent of animal albuminates and fat. The nursing mothers get into the state which produces tetany from loss of the same nutriment in the milk they yield. In the case of children the fault of insufficient supply is constantly aggravated by the drain of diarrhoea or vomiting. In the case of adults the fault of drain by flux of milk or diarrhoea is frequently aggravated by insufficient supply. The condition of nervous system which renders it so unstable, this hyper-excitability, would appear to be due to defective nutrition of motor cells. Their protoplasm is as ill-nourished as we know the nitrogenous element of muscle to be in like cases. Look at the myoidema of wasting diseases. Muscle is hyper-excitabile in this condition; nerve centre is hyper-excitabile likewise. There is no affection of the governing cerebrum, for there is no affection of the sensorium, but an undue excitability of the motor ganglia of the cord; probably no permanent organic change.³ This is perhaps not all. There is an immediate exciting cause; the reflex irritation of diarrhoea, or teething, or exposure to cold, or indigestible food. But the constitutional defect is the essential antecedent, the predisposing cause underlying all, rendering the nervous organism morbidly sensitive to slight irritation. As in the strychnia-poisoned frog, tetanic symptoms may not be developed if it remains quiescent, but the stimulus of a shake or jar brings on a convulsive seizure. Now, gentlemen, I lay stress upon these points of etiology and pathology, because they bear so strongly upon treatment, and this is of vast importance. The disease, indeed, involves little risk to life in the case of adults. I know of two cases only on record in which the disease proved fatal.⁴ With children, however, the case is otherwise. They do not die of the tetany, but they do die of laryngismus and convulsions, sometimes of concurrent exhausting diarrhoea, or bronchitis, or catarrhal croup. The majority get well, but now and again death occurs. So long as the condition of excessive irritability of the motor nervous system evidenced by the carpo-pedal contraction and attacks of laryngismus remains, so long is the child in danger from spasm of the glottis, fatally prolonged, or the supervention of general convulsions.

Treatment.—In the olden time treatment was chiefly divided towards relieving a supposed congestion of the brain and cord. Trousseau relied upon bleeding for this purpose in tetany, and claims great success for it. He also gave quinine, opium, belladonna, and chloroform inhalations. Yet his claim to success seems hardly borne out by the evidence. In the case of one woman who died, bleeding aggravated the symptoms, the muscles of respiration became affected, and asphyxia appeared imminent. Twelve leeches were then applied behind the ears, but before they had fairly taken the patient succumbed. In the case of a man also who had tetany in the most severe form, bleeding from the arm, repeated several times, was followed on every occasion by increased contractions involving the muscles of respiration and threatening asphyxia. Cupping along the spine, however, appeared to give decided relief, and the patient recovered, possibly in spite of the treatment rather than in consequence of it. But, indeed, bleeding, in persons already exhausted by drain or deficient nutriment as these patients are, would seem to be the very worst therapeutic measure possible. We know, moreover, that loss of blood in quantity tends to produce the convulsive state. Animals bled to death die convulsed; animals starved to death sometimes die convulsed. In the case of these poor debilitated, rickety children, bloodletting, even in the mild form of

³ In a fatal case of mine (examined by Dr. Abercrombie) the brain and membranes were healthy, the medulla and cord seemed rather firmer than usual, and the grey matter, if anything, too pale. No other change in any organ. Langhaus (quoted by Abercrombie), in a fatal case in a man aged forty, found some changes, especially in the anterior white commissure of the cervical enlargement—viz., thickening of the tunica adventitia of small arteries and veins, due to the presence of lymphoid cells in the reticulated stroma. (Is this the result of congestion set up by convulsion?) The affection is transient; it is not *a priori* likely that it depends on permanent organic changes.

⁴ Trousseau's case, and that of Langhaus noted by Abercrombie.

¹ Dr. Gee found this fault—viz., rickets—in 48 out of 50.

² Dr. Gee noted general convulsions in 19 out of 50 cases of laryngismus. No. 3324.

leeching or cupping, is out of the question. The practice is based upon a pathological error.⁵ The condition of the nerve centres is really one of anæmia already, not of congestion.

The objects to be sought in the treatment of tetanoid laryngismal convulsive disorder of childhood are threefold—(1) to relieve dangerous convulsive seizures when they occur, (2) to ward off these attacks from recurring, and (3) to remove the constitutional rickety state which predisposes to them. For the first purpose:—In laryngismus, a dash of cold water in the face, a hot sponge to the larynx, a finger in the throat to induce the act of vomiting, are approved methods to unlock the dangerous spasms. In general convulsions, the vapour of chloroform may be given between the seizures, or ten grains of chloral and twenty grains of bromide may be given by injections into the rectum, or from one to three grains of chloral in solution injected hypodermically in an urgent case. The latter I have tried once only, but with an excellent effect. It is often impossible to give medicine by the mouth, and a hypodermic injection acts more quickly and more certainly than one into the rectum. For the second purpose (i.e., to ward off attacks) give chloral and bromide. Each good, but best both together. They have a marvellous power, chloral especially, in averting tetany and laryngismus, and probably in preventing general convulsions. They must be given in fairly full doses and at regular intervals of sufficient frequency, so that the system is kept constantly under their influence. For a child of six months, half a grain of chloral to one or two grains with three of bromide every four hours. For one a year old, from one to three grains of chloral with five grains of bromide every four or six hours, and so on in proportion. Children bear chloral well. Dr. Wilks gave to a boy three years old with tetany ten grains of chloral three times a day with the best effect. Bouchut gave thirty grains to children of two to five years, sixty grains to children of seven years, to produce anæsthesia for operation. I should not hesitate to give much larger doses than those I have indicated should urgent symptoms arise. In one case of severe tetany in a boy of two years, in which chloral (two grains) and bromide (five grains) given every four hours failed to produce improvement, I gave one-twelfth to one-fifth of a grain of Calabar bean with good effect. With larger experience I should try much larger doses of chloral in a similar case before resorting to Calabar bean. Let me give, however, this warning with regard to the free use of bromide and chloral. Bromide in five-grain doses every four hours for some days occasionally produces severe pustular rupial eruption. Chloral at most induces drowsiness, therefore rather push chloral than bromide in case of necessity. This treatment by sedatives may have to be continued in greater or less degree for weeks and weeks, until the tendency to spasm permanently declines. Thus gaining time by keeping the nervous system in safe quiescence, you proceed to treat the rickety state, the evil condition which underlies and is the prime source of all. For this purpose give milk, cream, or raw meat if milk cannot be borne, with the best kinds of infants' food, or entire wheat flour (rich in phosphates and nitrogenous matter); later, cod-liver oil and syrup of lacto-phosphate of lime or of lime and iron. Another useful adjunct in increasing nutrition and aid in increasing blood flow to the anæmic nerve centres in these cases is brandy, half a drachm to a drachm, given in half an ounce to an ounce of food every four or six hours. It has also another advantage: it acts on children chiefly as a sedative and narcotic, and produces no excitement. And I must enforce the paramount importance of this full nutrient treatment, because there is a common and grave error pervading practice in these cases—viz., that of adopting a spare and lowering diet, such as barley-water, weak broths, and arrowroot. Such had been the medical advice given in the second case which I related: a most pernicious plan, against which I wish to protest as strongly as possible—the remnant of the old idea that the morbid condition at the root of the disease was one of plethora and active congestion, instead of debility and anæmia. Moreover, many confound a full nutritious diet with an indigestible irritating diet. Raw meat, for instance,

is not indigestible; it is most digestible as well as most nutritious—i.e., the soft pulp scraped free from the fibre; and so with cream. A spare, thin diet, such as veal broth, barley-water, and arrowroot, is no more digestible, and infinitely less nutritious. Let me repeat, then, that the food should be as digestible and nutritious as possible, with a high proportion of animal albuminates and fats. Then, again, this evil of low diet in these cases is constantly heightened by the over-use of strong purgatives and depressant drugs: aiding artificially the very condition of draining off of nutriment and deficient vitality we know to be the prime fault of the disorder. If the immediate exciting cause of convulsion be the irritation of undigested food, a dose of castor oil should of course be given at once; or if there be obstinate constipation, sufficient doses of some simple laxative, such as magnesia, may be given to relieve it, or a single dose of calomel may be useful on occasion. But the free and frequent use of strong purgatives does nothing but harm. Lastly, if diarrhoea be present—and you will remember that it is an almost constant accompaniment of the rickety and tetanoid state—it must be controlled. For it is injurious in two ways: (1) by draining off nutriment from the alimentary canal before there is time for it to be absorbed, and (2) by the reflex irritation it sets up. For the relief of diarrhoea bismuth is one of the best remedies. It should be given in the form of the insoluble trisnitrate, and in full doses; the doses usually given are far too small to be really effective: four or five grains every four hours to a child six months old, and more in proportion to age, and with it a quarter of a drop of laudanum, or the castor-oil mixture of the Hospital Pharmacopœia, one, two, or three drachms every four hours, with a quarter to one drop of laudanum according to age; or, if there be sickness with the diarrhoea, from half to one grain of grey powder, with from a quarter to half a grain of Dover's powder, according to age, may be given every four hours; or a mixture of chalk and catechu with hæmatoxylum and small doses of tincture of opium, if the alvine discharges are watery and profuse. But astringents are less valuable than drugs like bismuth, chalk, and the sedative opium.

Lectures

ON

INJURIES OF NERVES.

Delivered at the Royal College of Surgeons,

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LECTURE II.

TROPHIC CHANGES CAUSED BY NERVE INJURY.

MR. PRESIDENT AND GENTLEMEN,—In addition to the partial or entire loss of sensation and motion in the parts supplied by the divided nerve, the various tissues are liable to undergo changes which are chiefly of a degenerative nature, though sometimes combined with inflammatory conditions. The extent to which these changes are dependent on a want of nerve force will be left for future consideration, and for the present it will be sufficient to study the morbid processes themselves. The first authors to draw attention to the altered nutrition of the parts supplied by a divided nerve were Hilton in his lectures on Rest and Pain (p. 199), and Paget in the *Medical Times and Gazette* of March, 1864; but since then they have widely occupied the interest of surgeons, and it would be impossible to allude here to all the writers on this subject, amongst whom the names of Charcot, Weir Mitchell, and Hutchinson occupy the foremost places. It must first of all be premised that many of the changes to be described, which will be known once for all as "trophic changes," are not by any means the invariable sequel of nerve section, but rather that, instead of such conditions being the rule, some of them are the exception.

The skin.—The condition of the skin most characteristic of nerve lesion is a smooth shiny-red appearance, generally known by the name of "glossy skin." The description of Paget in the *Medical Times and Gazette*, already alluded

⁵ Experiments show that convulsive seizures and spasm (apart from organic disease, such as meningitis, tumour, &c., or poisoning) are produced by two causes chiefly: (1) carbon products in blood—venosity; (2) anæmia of nerve centres. Kussmaul and Tenner (see Stirling and Landois, vol. ii., p. 901) found the spasm centre in the medulla could be excited by (a) suddenly producing a highly venous state of blood, either by asphyxia or by compressing the veins coming from the head, or (b) by sudden anæmia of the medulla, either in consequence of hæmorrhage or ligation of the carotids and subclavians. In all these cases the stimulation of the centre is due to the sudden interruption of the normal interchange of gases.