THE EPILEPSIES IN CHILDHOOD.

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A convulsion or major fit is a sudden outburst of motor spasm, or involuntary movement, of the whole or of part of the body, usually associated with loss of consciousness. In a minor fit there is a loss or dimming of consciousness without muscular twitching. The mechanism immediately responsible for the fit is generally accepted to be an excessive discharge of cortical neurones, in a state of physio-chemical disturbance. The nature of this disturbance is unknown, but it may be stimulated by a variety of agencies either local or general. Inciting factors of a local nature may be inflammatory, traumatic, neoplastic, thrombotic, or degenerative, and of a general nature, metabolic, toxic, or asphyxial. Convulsions of this character are conveniently referred to as symptomatic, whereas those without any apparent causation are termed idiopathic. The type of convulsions, however, whether symptomatic, idiopathic, or infantile, is indistinguishable. All are epileptic, and therefore it seems preferable to speak of them collectively as the *epilepsies*.

The epilepsies in childhood can with advantage be divided chronologically into three groups: (*a*) those which occur at birth and in the neonatal period; (*b*) those occurring in infancy; and (*c*) from the end of the second year onwards.

(*a*) Convulsions at birth and in the neonatal period always signify some degree of birth trauma. The principal agent in their production is asphyxia, which leads either to asphyxial anoxæmia, or to œdema and intracranial hæmorrhage, depending upon the degree of venous congestion. Venous congestion most often occurs in cases of prolonged and difficult labour, but bleeding may also be due to sudden alterations of intracranial pressure as in precipitate delivery, or to vascular immaturity in the premature. The prognosis is not unfavourable when the twitchings are infrequent, but numerous convulsions of early onset following birth nearly always lead to a fatal termination within a few days or weeks. The latter type of case suggests extensive cerebral damage, and hæmorrhages, retinal, sub-conjunctival and into the anterior chamber of the eye are often observed. Of the infants that survive intracranial damage at birth, only a small number develop chronic epilepsy. The proportion of diplegias, whether in the form of bilateral hemiplegia of natal origin, or of congenital spastic diplegia of antenatal origin, which develops chronic epilepsy, commencing either in childhood or in later life, is less than ten per cent.

On the occurrence of convulsions at or soon after birth, lumbar puncture must only be used as a diagnostic aid to determine the presence of blood in the subarachnoid space. Cranial decompression for the removal of blood cannot be recommended as the extent of the field of operation rarely permits the removal of more than a small portion of the extravasation. Treatment is limited to careful nursing.

(*b*) In Infancy:—

(1). Convulsions due to calcium deficiency. Calcium is a damper of nervous excitability, and the infant in a hypocalcic state is liable to present the manifestations of spasmophilia. Laryngismus stridulus, tetany, and convulsions, however, in such cases are usually presented singly and not collectively. The convulsions occur chiefly in infants between the sixth month and

second year, that is, in the rachitic period, and especially in the winter months, which is the time of greatest seasonal incidence of rickets and tetany. Teething convulsions are probably often of this nature.

The origin of the convulsions is easily recognized when the infant presents obvious signs of rickets at the same time. In such a case estimations of the calcium and phosphorus of the blood show a reduced percentage. When the calcium alone is lowered the infant is more likely to present a condition of pallor, flabbiness and muscular hypotonicity without visible skeletal changes. In place of the normal 9—11 mgm. per cent. of serum calcium, figures between 4 and 8 mgm. per cent. are found. A reduced serum calcium, however, with or without evidence of rickets, does not always give rise to convulsions, for which reason some additional factor must be postulated, such as nervous instability of constitutional origin.

Convulsions of this character respond readily to treatment. When infrequent, the effect upon the calcium metabolism of Radiostoleum, minims 5, three times daily, with artificial sunlight in addition, is sufficient to terminate the convulsions. In more severe cases of greater urgency calcium chloride is administered in doses of 15 to 30 grains four-hourly for two to four days, afterwards gradually reducing the dosage, while cod liver oil and sunlight treatment are continued for a longer period. The effect of calcium chloride by virtue of its chlorine portion is to produce a tendency to acidosis, which promotes the ionisation of the blood calcium, in which form it prevents the manifestations of spasmophilia. The calcium portion is for the most part unabsorbed.

(2). It has long been recognized that in infancy a constitutional instability of the nervous system, often inherited, plays an important part in the production of convulsions. The occurrence of convulsions due to minor upsets of health and febrile disturbances in some children, and not in others, can only be explained in this manner. Estimations of the serum calcium in such cases are commonly normal. Thus we find infants who are subject to convulsions associated with such disturbances as gastro-intestinal upsets, worms, colds, earache, and at the commencement of a febrile attack, as in pneumonia or one of the infectious fevers. Enquiry into the family history often reveals the fact that siblings have been similarly affected, or one or other parent was subject to convulsions in infancy. Treatment is primarily directed towards the source of irritation, whether it be gastro-intestinal or tonsillar. For the fits themselves, bromides and chloral are given.

(3). Fits of a similar character to the above are liable to occur in some children during a febrile disturbance, most often tonsillar, which is associated with a marked ketosis. Vomiting is also a common symptom. During the latter part of infancy and for the next two or three years the ketosis and convulsions are apt to recur each time the tonsils become inflamed. The convulsive predisposition tends to disappear in later childhood. There is no reason to suppose that the fits are due either to the ketosis or to a state of hypoglycæmia, as they cannot be reproduced experimentally in susceptible children on a ketogenic diet. The tonsillar infection calls for attention, while the convulsions are best treated by chloral and bromides.

(4). Convulsions are a common symptom of inflammatory diseases of the brain and meninges. In early infancy, syphilitic meningo-encephalitis is characterized by progressive torpidity, failure to gain weight, unilateral and bilateral

twitchings, and a moderate degree of hydrocephalus. Other manifestations of spirochætal infection, such as osteo-chondritis, may be present to suggest the diagnosis, or there may be a maternal history of stillbirths or repeated miscarriages. A more common condition, giving rise to convulsions, is posterior basic meningitis, which has its greatest incidence in the first year of life. Tuberculous meningitis has its greatest prevalence in the second and third years, but convulsions are more commonly a late than an early symptom. The treatment in this group is that of the primary condition.

(5). "Idiopathic convulsions of infancy," described by the late Dr. John Thomson, is a rare condition. It occasionally happens that a healthy infant of normal birth commences to have convulsions sometimes in the first few months, or even as early as the first week. Boys are more often affected than girls, but the infant may be breast or bottle fed. At first the convulsions are infrequent, but rapidly increase in number and severity from day to day. Both the immediate and ultimate prognosis is good in cases suitably treated. Chloral, by Dr. Thomson's recommendation, is given in doses of one grain for each month of age of the child. The dose is repeated every two or three hours, and continued until the cessation of the convulsions, after which the dosage is gradually reduced in quantity and frequency over a period of a week to ten days. The effects of the drug must be carefully watched, as the aim is to render the child drowsy, but able to take its feeds.

(6). The sudden onset of frequent convulsions with a less favourable issue may occur in children apparently healthy, or following a fever. The convulsions are numerous and severe from the start, and may continue for as long as a week, following which the child is found to have a hemiplegia, or amentia, or both. The integrity of the cerebral functions is impaired permanently, but the condition is seldom fatal. Very little is known of the pathology of these cases, but Strümpell, in 1884, classified them as *sporadic encephalitis,* and considered them to be probably cases of polioencephalitis. This view gained some acceptance at the time, but subsequent to the introduction of lumbar puncture in the following year, in 1885 by Corning, the cytology of the cerebrospinal fluid in such cases was seldom found to conform to the changes characteristic of poliomyelitis.

In the cases under discussion the cerebrospinal fluid frequently shows no alterations from the normal. It is more probable that a variety of causes of a toxic nature are responsible for these cerebral catastrophes, in which hæmorrhagic encephalitis, arterial thrombosis, and acute cellular degeneration are among the conditions to be found on histological examination.

(*c*) Subsequent to the second year, epileptic fits in childhood may be of the type already described occurring in children with nervous instability at times of febrile disturbance, with or without the accompaniment of a ketosis. They are a common symptom of the many forms of meningitis and encephalitis. Fits due to intracranial hypertension may occur in the early stages of acute nephritis, and are common in the terminal stages of chronic interstitial nephritis. In the latter contingency a diagnosis of tuberculous meningitis is apt to be made unless attention is paid to the size of the heart, presence of a raised blood pressure and of albumin and casts in the urine. The withdrawal of blood by venusection has been advocated for the control of fits in the cases of acute nephritis.

In migraine in children, especially in those cases presenting additional symptoms to headache, such as vertigo, tinnitus, or a raised blood pressure, an attack of petit mal, less commonly a convulsion, may occur at the height of the

attack. The prevention of the migrainous syndrome in children, which consists of headache, abdominal pain, and possibly fever and vomiting, consists in giving small doses of sodæ bicarb., pulv.rhei or syrup of senna thrice daily. In cases of a more definite hemicranial type, small doses of dried extract of thyroid and of luminal are sometimes useful.

Pyknolepsy is a rare condition consisting of minor attacks, like petit mal, but without falling or dropping things from the hands and not followed by mental confusion. The attacks commence between the fourth and tenth years, and increase in frequency up to one or two hundred a day. It is stated to be characteristic of the condition that bromides and luminal have no effect upon the frequency of the attacks, but that at or before the age of puberty the fits spontaneously become arrested. The condition is a rare one. As chronic epilepsy in childhood often takes the form of frequent petit mal attacks, an oversanguine and premature diagnosis of pyknolepsy is usually found to be incorrect.

So far chronic or idiopathic epilepsy has not been mentioned, as it may commence in any period of life. In Gower's large series of cases, the onset in three-quarters of the total was below the age of twenty years. There are three periods in childhood associated with a greater liability for the onset of fits; these are in infancy, at the second dentition, and at puberty. Many children are subject to petit mal attacks for years, sometimes unrecognized by their parents, before the occurrence of the first major attack, which often occurs about the time of puberty. It must be remembered that petit mal not only occurs in chronic epilepsy and pyknolepsy, but may be "symptomatic" in congenital syphilis and in mental defectiveness. In the latter group of cases "salaam attacks" and other posturizing attacks are not uncommon. Jacksonian attacks, or fits which remain localized to one part of the body, or spread slowly, are common in children. They rarely signify a local cortical lesion or neoplasm, and after a time are frequently replaced by ordinary major epileptic attacks. The earlier the onset of major fits in childhood, the greater is the likelihood of mental deterioration. Many children, however, with fits at long intervals of a month or so retain their mental powers unimpaired.

Aural, gustatory, olfactory and psychogenic auræ are rare in children. More commonly they experience premonitory epigastric and abdominal sensations. Biting of the tongue and voiding of the bladder do not often occur during a seizure. The epileptic child is like the adult in that the fits may occur fairly regularly at a certain time. The commonest time is about the hour of waking and rising in the morning, or all the fits may be during the night. This periodicity should be utilised in dosing the child, as a well placed dose before going to bed or early in the morning is often of much more value than an indiscriminate taking of drugs throughout the day.

In the medicinal treatment of idiopathic epilepsy there are no indications to show which drug will best suit individual cases. Luminal or gardenal, a derivative of veronal, is usually the most efficacious. It should be given in tablet form, in quarter grain doses up to three-quarters for an infant, and for the older child a half to one grain, once or twice a day. Separately or in conjunction with luminal, the bromides are often useful. The bromide mixture may contain in addition, sod.biborate, grains five, tinct.belladonnæ m. three to seven, or urethane, grains five to ten, or sodium nitrite, grain a half to one. The value of these additions can only be ascertained by trial and effect. If the benefit of these drugs

appears to lapse at any time and fits become more numerous, they may be withheld, and syrup bromocarpinæ, one to two drachms thrice daily for a child of five to seven years, given in their stead temporarily for a period of a few weeks. In a few cases of petit mal in children who are otherwise healthy, bright and intelligent, ephedrine hydrochloride, half a grain twice a day, has sometimes worked extremely well.

In the general daily management of epileptic children, constipation must be avoided, and they should be encouraged to lead a normal life and attend school if possible.

Dietetic treatment consists in inducing a ketosis by means of a high fat—low carbohydrate diet. The ratios employed are from a F1: C1 to a F4: C1. Specimens of ketogenic diets may be found in Miss Simmonds' *Handbook of Diets* (Heinemann, 1931). This method of treatment should only be used for children who are mentally normal, and luminal or bromide therapy is usually combined with it. The results are in some cases encouraging. The value of the ketogenic diet probably depends upon its dehydrating effect upon the tissues.

In *status epilepticus* the convulsions follow one upon the other so quickly that consciousness is not regained between attacks. The chief danger to life is heart failure from toxic degeneration of the cardiac muscle. Provided the physical condition of the patient is normal, the most efficacious and rapid means of overcoming the fits is the hypodermic injection of morphia, grains 1/12, 1/16, or 1/20, according to age. Hyoscin hydrobromide, grain 1/500, may be combined with the morphia. Rectal injections are usually returned during a convulsion which interferes with the administration of chloral or paraldehyde by that route. During the stage of recovery the lower bowel should be washed out with enemata.

THE HIPPOCRATIC TRADITION.

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Part II.—Ancient Greek Philosophy.

Having, in Part I., briefly touched upon the mythological side of ancient Greek Medicine, and glanced at the mystic practices of religious healing, a little consideration must now be given to its philosophical side.

In the Hippocratic writings, reference is made in several places to the attempts of philosophers to bring medicine under the control of philosophic dogma and thereby hinder its progress. According to Celsus, Hippocrates first separated medicine from philosophy, which, as Dr. Moon says, was accomplished by directing men's minds away from the nebulous theories and unverified hypotheses of the early Ionian physical cosmologists and leading them to the observation of facts which must ever be the main foundation of medicine. The Hippocratic writings do, nevertheless, show the influence of certain philosophers and, in order to see them in their proper light, some passing reference must be made to them.

Pythagoras (Circa 550 B.C.). While the fame of Pythagoras rests mainly on his researches into numbers and geometry, he had also a great influence on the medical thought of his day. In common with other philosophers he tried to reason out and explain the cause of disease. The doctrine of immortality and the transmigration of the soul has been traced to him. He also taught