

CHAPTER XVI.

CONVULSIONS.

Infantile Convulsions.—Convulsions from Uraemic Poisoning, Cerebral Extravasation, Hysteria, Alcohol, Epilepsy, Tetanus.

Synonymes.—Eclampsia, Fits, Falling-Sickness, Spasms.

A convulsion is an involuntary contraction of one or more muscles, with or without loss of consciousness. The sensorial and intellectual faculties are seldom affected except in general convulsions. The muscular contractions may be either tonic or clonic. In the former the spasm is continuous, in the latter each contraction is followed by relaxation. The spasmodic movements succeed each other with rapidity. Tonic contractions appertain especially to tetanus. The clonic variety is peculiar to epilepsy and all other classes of convulsions.

Convulsions depend either on an irritation transmitted from the periphery to the nerve-centres, or on an abnormal irritability, arising directly in the nerve-centres, which calls forth excessive and irregular action in the motor nerves.

According to Longet, sensations coming from the periphery to the brain are converted into motor impulses through the tuber annulare.

Irritation of this ganglion, whether proceeding from external sources or acting through the blood, will excite irregular muscular movements throughout the body.

Convulsions are merely symptomatic phenomena, representing diverse pathological conditions; the significance of a convulsion, therefore, depends upon its cause: it may be the premonition of death, or only the result of indigestion. Convulsions may occur at any age, but they are most frequent during infancy.

The rapidly-developing delicate tissues of the child possess a susceptibility which intensifies every irritation, and slight causes will excite irregular action and disarrange the nervous system. As children advance in years this sensibility decreases, and consequently they are less liable to convulsive attacks. In adult life, except under the form of epilepsy, they are comparatively rare.

Infantile convulsions usually occur during the first dentition and early part of that period. The first few months after birth give the greatest percentage of cases. Convulsions *in utero* have been recorded by some observers.

Children whose parents have been subject to eclamptic attacks are more liable than others to the affection. Causes insignificant in themselves develop this hereditary tendency. A debilitated state of the system is a predisposing cause. Those who have soft skulls from rachitis suffer frequently from convulsions. As exciting causes may be enumerated: indigestion, worms in the alimentary canal, teething, burns, scalds, eruptions, foreign bodies penetrating the integuments, the application of mustard-poultices, and blisters, fright, affections of the brain, such as meningitis, congestion, tumors; exanthematous disorders; degenerations of the kidneys, pneumonia, bronchitis, etc.

The attack in many instances can be traced to indigestion, solid food in the alimentary canal, unhealthy milk, and

arrow-root, or other articles partially cooked, and remaining unacted upon by the digestive fluid. An irritation is consequently produced, which is carried by the sensory nerves to the brain, and convulsions follow. Worms in the alimentary canal have a direct irritating action upon the mucous membrane of the intestines. They also diminish the digestive functions, and lower the vitality of the system; hence both causes, acting together, may excite the abnormal muscular movements.

During the first dentition, convulsions are remarkably frequent. In fact, the great majority of diseases peculiar to infancy develop during the evolution of the teeth. At this time the swollen and tender gums give rise to constant irritation. The child becomes fretful and feverish, and if there happen to be a very slight predisposition to convulsive attacks we may depend upon their occurrence. Convulsions proceeding from the reflex irritation of teething are said to be more serious than other varieties, and paralysis is not an uncommon sequence.

Irritating applications to the integument, in the form of blisters or mustard-poultices, are attended with danger. Great care should be exercised in their application. A blister scarcely two inches square may cause alarming attacks.

Diseases of the brain in children are usually marked during some part of their course by convulsions. In acute hydrocephalus they occur in the later stages of the disease—exceptionally they appear in the first stage.

Many of the narcotic medicines cause convulsions. Poisoning by stramonium-seeds is not uncommon. The only reliable test of this occurrence is the presence of the seeds in the matter vomited.

Convulsive movements may affect all the muscles of the body, involuntary as well as voluntary, or be limited to a single muscle, or to one set of muscles; one side of the body may alone be convulsed, or alternate convulsions of each side, or of different limbs, may take place.

In the affection known as *inward convulsions* the diaphragm, the muscles of the abdomen and thorax, and occasionally the muscles of the larynx, are involved.

The symptoms of eclampsia can conveniently be divided into premonitory and immediate. The premonitory signs, however, are not always present.

For a variable length of time preceding the fit, the child may be feverish and restless. The sleep is disturbed, and muscular twitchings are observed. If teething, the child moans, moves its head about, and the jaws are worked from side to side. If undigested food or worms are present, there will be a tympanitic abdomen, and eructations of gas from the intestinal canal. In brain-affections, the abdomen is flattened; there may be vomiting, projectile in character, and without nausea. There is pain in the head, and, when carried rapidly from one place to another, the child screams violently.

The convulsive movements commence suddenly. The child cries sharply, and falls. The muscles for a moment become rigid. The corners of the mouth are drawn down, the eyes are either fixed or oscillating, generally the former. There may be either convergent or divergent strabismus. Respiration ceases. The child's face, which was at first pale, becomes livid, the veins of the face and neck are turgid and filled with blood, and a gurgling noise is heard in the throat. The rigid condition of the muscles, or tonic

contractions, continue but a few seconds, and they are succeeded by alternate contractions and relaxations, or clonic spasms. The limbs are moved violently about, rapidly extended and flexed. These clonic movements cease, and the patient sinks into a deep sleep or a semi-comatose condition.

The convulsive movements in children usually continue longer than in adults. The whole paroxysm lasts from half a minute to two minutes, or even longer. The fits may succeed each other with such frequency as to seem continuous, but this is rare. The immediate effects produced by the muscular contractions are worthy of notice. They may be witnessed in all kinds of convulsions. The abdominal muscles, by pressure on the intestines and bladder, may expel the fæces and urine. It is not unusual for a fit to terminate in this manner. The spasm of the respiratory muscles, including those which govern the glottis, prevents ingress and egress of air, and a partial asphyxia is the consequence. The pressure of the muscles at the base of the neck, and the non-expansion of the chest, by preventing the venous blood from leaving the head, cause congestion of the brain. The muscles which act upon the tongue protrude it from the mouth. When this occurs during the spasmodic action of the muscles of mastication, the tongue is caught between the teeth and severely lacerated. Spasm of the vessels of the pia mater is said to produce insensibility.

All the symptoms described are common to true epilepsy, and it is impossible to distinguish them during the fit. In infantile convulsions the period of spasmodic action is continued over a greater length of time than in true epi-

lepsy. The history of the case will be of assistance in determining its true nature. For instance, in epilepsy, we would probably learn that the patient had had fits before, coming at comparatively long intervals, and without apparent cause. In the other case there would be evidences of worms in the alimentary canal, of indigestion, or some of the other special causes previously enumerated. Again, the occurrence of attacks rapidly following each other would be rather strong evidence that they were not epileptic.

A rigid condition of one or more muscles, after consciousness is restored, is an unfavorable sign, often indicating injury to some part of the brain or spinal cord. These convulsions usually cease when the exciting cause is removed, but the possibility of a fatal termination must not be overlooked.

Convulsive attacks may occasion death—1. By asphyxia; 2. Congestion of the cerebrum, or other injury to the nerve-centres; 3. Syncope; 4. Gradual exhaustion from successive or protracted convulsions.

Post-mortem appearances are of little value in determining the causes of the affection. The congestion of the brain and spinal cord, which we find, is probably the result of the convulsion, and not its cause.

Among the varied sequelæ of infantile convulsions we find paralysis of different parts. It may appear in one limb, or in one set of muscles, or may involve the lower half or lateral half of the body. Recovery from it is rare. Convergent and divergent strabismus likewise occur, the latter most frequently. Idiocy may result from continuous convulsions.

A loss of coördinating power in the muscles which

produce articulate sounds sometimes occasions stammering.

Amaurosis and deafness also occur. Very little can be done to relieve them.

Treatment.—The preventive treatment consists in attending to the general health of the child, and placing it under proper hygienic influences. Its food should be of good quality, its nurse healthy, the sleeping-apartment well ventilated, the clothing loose and not heavy. If worms are present, they must be removed by anthelmintics. Indigestion should be relieved immediately by the ordinary means. Sores or ulcers of the integument are treated with emollient applications, and with sedatives internally.

During the paroxysm, efforts are made to relieve the severity, and as far as possible prevent a recurrence of the attack.

The child should at once be stripped and immersed in a hot bath. A tablespoonful of mustard added to the water will increase its efficacy. The child may remain in the bath from two to four minutes at a time. Some recommend firm pressure around one arm and leg on opposite sides of the body. This procedure is of benefit in that variety of spasm called by Trousseau *tetany*; but in this affection it would be of little service. As soon as the paroxysm has ceased the bowels should be emptied with castor-oil, or by injections of warm water. After the evacuation the following may be administered, by enema—

R. Misturæ assafœtidæ fl. ʒ ss.
Aquæ fl. ʒj. M.

and repeated when necessary. Bromide of potassium, in one

or two grain doses, is also a valuable remedy. The dose of this may be increased if desired. Should the convulsions be violent, protracted inhalations of chloroform may be employed, and repeated with benefit.

Convulsions arising from cerebral lesions, such as inflammation, etc., will not give way to the treatment recommended. This variety might as well be let alone, as it usually terminates fatally.

In all convulsive attacks a rigid investigation into the cause of the convulsion should be instituted, and treatment directed to its removal should be commenced without delay.

CONVULSIONS IN THE ADULT.

Convulsions in the adult acquire an importance which they do not possess during infantile life. In many cases they indicate the presence of constitutional lesions, which may bring about a fatal termination in a short period. An extended description of the diseases which give rise to these convulsions is, with the limited space at command, inadmissible. All the prominent features of each condition, and especially the different signs which lead to a correct diagnosis, will, however, be fully considered. These points of difference cannot be too closely observed, and they should be studied more carefully than the points of resemblance.

These convulsions may be classed under five separate heads: 1. Those which arise from the retention of urea in the blood in disease of the kidneys, viz., uræmic convulsions; 2. Convulsions which characterize epilepsy; 3. Those arising from affections of the brain, such as extravasations of blood in its substance, or upon its surface; 4. Hysterical

convulsions, and 5. Convulsions due to the excessive use of alcohol.

1. URÆMIC CONVULSIONS.—In the chapter on uræmic coma, the source and character of the poison (*urea*) which accumulates in the blood in Bright's disease of the kidneys were fully considered. It is said to act on the base of the brain and medulla like any other irritant, calling forth irregular and violent muscular movements.

These convulsions may also be due to œdema of the brain-substance, which exists in common with œdema of other parts in Bright's disease (*Roberts*). The pressure of the effused serum empties the arteries, and diminishes the amount of blood in the organ.

Preceding the commencement of the convulsion, the patient complains of headache, dimness of vision, dizziness and other symptoms referable to the nervous system. The stomach is irritable, and the bowels are usually relaxed. The countenance has a pale, waxy appearance. There is œdema under the eyes. Pressure on the lower limbs may leave a pit or indentation under the finger, showing the presence of œdema. Coma may or may not occur before the paroxysm. The urine may be scanty, and of a high color.

It must not, however, be forgotten that uræmic convulsions, occurring with the small contracted kidney, may have none of these characteristic symptoms of diseased kidney preceding them.

The paroxysm appears suddenly. The body and extremities become violently convulsed. Spasmodic contractions of the clonic variety succeed each other rapidly. The face becomes livid, the eyes are glassy and fixed, or may oscillate

from side to side (*nystagmus*). The pupils are contracted or dilated, usually the latter. Froth, mixed sometimes with blood, collects around the mouth, and in exceptional cases the tongue may be bitten. There is a strong urinous odor emanating from the perspiration. When the convulsions cease, the patient sinks into a deep coma, which usually ends in death. There may be only one convulsion, or the convulsions may succeed each other at short intervals for several hours. The points of difference which distinguish a uræmic convulsion from epilepsy, or from apoplectic convulsions, require careful investigation.

In uræmic convulsions both sides of the body are equally affected by the spasmodic movements. In epilepsy one side is convulsed more violently than the other. There are few exceptions to this rule. In uræmia we find œdema of the face and extremities, and urinous odor to the perspiration, which are generally absent in cerebral extravasation and in epilepsy. A chemical and microscopical examination of the urine will probably show, in uræmia, albumen, and fatty, granular, or hyaline casts, while in epilepsy and cerebral extravasation they are usually absent. In one case we have an antecedent history of Bright's disease of the kidneys; in epilepsy a history of previous convulsions, with perfect health during the intervals. The tongue is generally bitten in true epilepsy, rarely in a uræmic convulsion. Following the latter, there is deep coma; in the former merely a deep sleep, from which the patient may be aroused. In cerebral extravasation there is paralysis with irregularity of the pupils, which is not present in uræmia. In the former also there is sometimes rigidity of the muscles following the attack; in the latter, this is rarely manifested. The treat-