OBSERVATIONS
ON
TUBERCLE OF THE BRAIN
IN CHILDREN,

WITH A TABULAR VIEW OF THIRTY CASES OF THE
AFFECTION.

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IN the table which I have now the honour of laying before the members of the Royal Medical and Chirurgical Society, is contained a very succinct analysis of thirty cases of tubercle of the brain in children. Although this affection be extremely rare in adults, it occurs very frequently in children ; yet I am not acquainted with a single work on diseases of children, in which even a few lines are devoted to the subject of cerebral tubercle.

If the Society permit, I shall endeavour to supply the deficiency alluded to, by presenting for its consideration a paper on tubercle of the brain ; in the meantime, I offer the present tabular analysis for the purpose of showing that I possess a certain number of facts as a foundation for my remarks

* The two papers, though read separately, are here printed in continuity.

and conclusions. In diseases of the brain, beyond all others, our conclusions should be based on a sufficient number of carefully-observed cases, and I feel convinced that much of the obscurity at present attending the history of cerebral disease would be dispelled, if all the symptoms in each case were minutely noted, and the *post-mortem* researches conducted with accuracy and minuteness. The spinal marrow, for example, especially its superior portion, should be carefully examined in every fatal case of cerebral disease ; experience has shown me that many of the so-called anomalous examples of disease of the brain, are explained by lesions of the medulla oblongata, which have escaped notice, because the vertebral canal has not been opened.

In the present table will be found the name, age, sex, symptoms, and lesions, of 30 children who died from or with tubercles of the brain.

The ages varied between nineteen months and twelve years ; 13 cases occurred at the period comprised between the ages of two and four years, inclusive ; a greater number than occurred during any other three consecutive years.

With respect to sex, 14 were boys, 16 girls.

In 4 cases, no symptom whatever of cerebral disease existed during life ; in 2, the chronic symptoms were confined to periodical headache ; in 2, to deafness and purulent discharge from the ear ; in the remaining cases the most prominent symptoms of the chronic stage were headache, vomiting, amaurosis, convulsions, paralysis, and diminution

of the intellectual faculties: the duration of this chronic stage varied from one month to three years.

Nine of the patients died with symptoms closely resembling those of acute hydrocephalus; a few with symptoms of softening of the brain; the rest of consumption, small-pox, &c.

The volume, number and site of the tuberculous masses varied considerably in different cases: in one case twenty tubercles were found in the right hemisphere; in another, seventeen; frequently, however, they were single; but the consideration of these and various other points will better find their place in my next communication.

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Name.—Sex.	Age.	Symptoms of Chronic Stage.	Symptoms of Acute Stage.	Lesions.
No. 1. Mary Pischet. Girl.	6	Three months. Constant headache for three months.	Convulsions; vo- miting; strabis- mus. Ocular cho- rea; imperfect paralysis of lower extremities.	Tubercles in both hemispheres, and in left lobe of the cerebellum. Three ounces of serum in lateral ventricles. Miliary tubercles in lungs.
No. 2. J. Humanery. Boy.	9	Two years. Convulsions. Transient Amaurosis. Convulsive movements of face.	Sudden and general convulsions. Amaurosis. Coma.	Tubercle in the left hemisphere, with softening of nervous tissue around it. 1 oz. of serum in ventricles. Tubercles in chest and abdomen.
No. 3. A. Marinet. Boy.	12	Eight weeks. Nervous tremor of arm and leg (left). Epilepsy.	Died of abdominal affection.	Tubercle of right hemisphere, with softening of nervous substance around. Tubercle in chest and abdomen.

Name.—Sex.	Age.	Symptoms of Chronic Stage.	Symptoms of Acute Stage.	Lesions.
No. 4. F. Divè. Girl.	7	One month. Headache; vomit- ing. Irregular fever.	Those of acute hydrocephalus.	Large effusion in ventricles, with softening of central parts of brain. Tubercles in right lobe of cerebellum. Miliary granulations in chest. Tubercles in ab- domen.
No. 5. B. Fessing. Boy.	4	Convulsions. Pec- uliar rotatory motion of head.	Died of pneumo- nia.	Tubercles in right corpus striatum and in right lobe of cerebellum. 4 oz. of serum in ventricles. Tu- bercles in chest and ab- domen.
No. 6. J. Mourgue. Boy.	11	Headache. Amau- rosis. Squinting. Diminished sen- sibility of one side (left), with para- lysis.	Delirium. Coma.	Tubercles in both lobes of cerebellum, with softening of nervous tissue. Tuberc- les in pons Varolii. Tu- bercles in right crus cere- belli. Tubercles in chest and abdomen.
No. 7. L. Patu. Girl.	3½	Two months. Headache. Stupi- dity. Paralysis of left side. Strabis- mus. Constipa- tion. Somnolence.		Tubercles in right crus cere- bri, with green detritus around. Tubercles in chest and abdomen.
No. 8. A. M. Guinet. Girl.	12	Headache.	Died of peritoni- tis.	Tubercles in right hemis- phere, with slight softening around. Tubercles in chest and abdomen.
No. 9. Aug. Raoult. Boy.	4	Headache. Irre- gular fever. Con- vulsive move- ments.	Died of pneumo- nia.	Tubercles in right hemis- phere. Tubercles in chest.
No. 10. Alex. Legros. Boy.	3½	Convulsions with vomiting. Head- ache. Strabismus.	Died of small-pox.	Tubercles in both hemis- pheres. Tubercles in left lobe of cerebellum. 5 oz. of serum in ventricles. Tubercles in chest and ab- domen.
No. 11. L. Boudin. Girl.	11	No Symptoms of an affection of nervous system.	Died of phthisis.	Small tubercle in cerebel- lum. Tubercle in chest and abdomen.
No. 12. Therese Verité. Girl.	4	Ten months. Paralysis. Head- ache. Somno- lence. Total blind- ness. Convulsions. Vomiting.	Died of small-pox.	Tubercle in left lobe of ce- rebellum, with softening of nervous tissue around. Six oz. of serum in ventricles. Tubercles in chest and ab- domen.

Name.—Sex.	Age.	Symptoms of Chronic Stage.	Symptoms of Acute Stage.	Lesions.
No. 13. N. Goisset. Boy.	3	No symptoms.		Tubercles in left lobe of cerebellum. Tubercles in bronchial glands only.
No. 14. Mary Brouet. Girl.	8	Five months. Headache. Dullness of intellect. Irregular gait.	Those of acute hydrocephalus.	Tubercles in centre of cerebellum, with softening of nervous tissue around. Tubercles in chest.
No. 15. E. Vanier. Girl.	9	Deafness only.	Died of phthisis.	Tubercles in left hemisphere. Tubercles in chest and abdomen.
No. 16. Jane Masson. Girl.	10	Six weeks. Headache, with vomiting and constipation. Strabismus. Irregular gait.	Those of acute hydrocephalus.	Tubercles in both lobes of cerebellum; nervous tissue around softened. Tubercles in chest and abdomen.
No. 17. Ad. Desibier. Girl.	9	No symptoms.	Died of phthisis.	Twenty tubercles in right hemisphere. Tubercles in chest and abdomen.
No. 18. Nicholas Baude. Boy.	2	Nine months. Convulsions. Contraction of muscles, with partial paralysis. Vomiting.	Those of acute hydrocephalus.	Tubercles in left thalamus opticus, with softening around. Five oz. of serum in ventricles. Tubercles in chest and abdomen.
No. 19. Ernestine Puchot. Girl.	7	Five months. Epilepsy. Loss of intellect, and power of speech.	Shaking of head; loss of movement, with contracture of left arm. Contracted measles, and died.	Tubercles in left hemisphere, with softening of nervous tissue. Tubercles in chest and abdomen.
No. 20. A. Lejeune. Girl.	3	Six months. Headache; difficult progression; paralysis of eyelid; epilepsy; hemiplegia.	Those of acute hydrocephalus.	
No. 21. J. Bombit. Girl.	4	Nine months. Headache. Change of temper. Somnolence. Convulsions. Paralysis.	Symptoms of softening of the brain.	Tubercles in pons Varolii and in left crus cerebelli, with softening of the nervous tissue around. Tubercles in chest and abdomen.
No. 22. H. Jesus. Girl.	7	Three months. Headache. Vomiting. Constipation. Convulsions.	Symptoms of acute hydrocephalus.	Tubercles in right hemisphere and right lobe of cerebellum. Four oz. of serum in ventricles. No tubercles in chest; some in mesenteric glands.

Name—Sex.	Age.	Symptoms of Chronic Stage.	Symptoms of Acute Stage.	Lesions.
No. 23. A. Kiffer. Boy.	4	No account obtained of. Strabismus.	Convulsions. Coma.	Tubercles in centre of cerebellum. Two oz. of fluid in ventricles. Tubercles in chest.
No. 24. — Bernard. Boy.	7	Twelve months. Headache. Irregular fever. Slight convulsive fits.	Symptoms of acute hydrocephalus.	Tubercles in right hemisphere. Tubercles in right lobe of cerebellum. Four oz. of serum in ventricles. Tubercles in chest and abdomen.
No. 25. M. Mettavier. Girl.	7	Headache.	Symptoms of acute hydrocephalus.	Tubercles in left lobe of cerebellum: tubercles in right lobe also. Three oz. of fluid in ventricles, with softening of central parts of brain. Tubercles in chest.
No. 26. J. Gautier. Girl.	4	Twelve months. Convulsions. Headache. Strabismus. Somnolence. Hemiplegia.	Symptoms of acute hydrocephalus.	Tubercles of left hemisphere. Tubercles of right lobe of cerebellum, with softening of nervous tissue. Tubercles in upper part of spinal marrow. Tubercles in chest and abdomen.
No. 27. E. Thielbaut. Boy.	19 Mos.	Six months. Convulsions. Amaurosis. Paralysis.	Chronic hydrocephalus, with enlargement of head.	Seventeen tubercles in cerebrum: four tubercles in cerebellum. Nearly a quart of fluid in ventricles. Tubercles in chest alone.
No. 28. Charles Blondel. Boy.	2	Convulsions.	Died of pneumonia.	Tubercles in both lobes of the cerebellum. Tubercles in the chest and abdomen.
No. 29. Emile Gabriel. Boy.	2	No symptoms, except purulent discharge from ears.	Died of abdominal disease, with convulsions.	Tubercles in both hemispheres. Caries of both temporal bones. Chest and abdomen not examined.
No. 30. — Landormi. Boy.	5	Four months. Epilepsy: weakness of left leg and arm; then general paralysis. Accesses of fever, with trembling of limbs; vomiting. Pains in head and loins.	Died of pneumonia during measles.	Tubercular mass in the great fissure of the brain, with softening of the nervous tissue. Traces of chronic inflammation of the membranes. Tubercles in chest. Spinal marrow softened in the lumbar region.

I shall now endeavour to draw up, from these cases, a brief account of the history, symptoms and diagnosis of the disease.

Tubercle of the brain is a very rare affection amongst adults, though comparatively frequent amongst children. M. Cruveilhier has never seen an example in a person advanced in life. M. Louis met with a single one, in 117 cases of phthisis amongst adults. In his lectures on tubercular scrofula, M. Lugol assures us that, in his extensive practice, at the hospital of St. Louis, he has seen only eight cases of the disease; in four, the tuberculous matter occupied the cerebrum; in three, the cerebellum; and in one, the pons Varolii. In six of these eight cases no symptoms existed during life; and M. Lugol affirms "that the diagnosis of cerebral tubercle is involved in the greatest obscurity."

Dr. Abercrombie, in his work on diseases of the brain, relates only one case, from his own practice, which occurred in a man 34 years of age.

In children, on the contrary, tubercle of the brain is, comparatively speaking, a frequent affection. I have observed one case to every 51, in 1324 cases of acute disease.*

Age.—The age at which this disease most frequently occurs appears to be from three to seven years, inclusively. This results from a sum of 75

* In the year 1833, 703 boys were admitted into the wards for acute disease in the Children's Hospital; in 1834, 621 girls. Of the 1324 patients, 26 had tubercles in the brain, being a proportion of one to 51.

cases, observed by myself and others at the Children's Hospital.

Seat, number and volume.—With respect to size, situation and number, cerebral tubercles present great variety. They are often single, but as frequently numerous. In one remarkable case (Desibier's) there were 20 tubercles, of various sizes, in the right hemisphere; in another case, which M. Bell presented to the Anatomical Society, there were 50 tubercles in the cerebrum and cerebellum.

In volume, the tubercular mass varies from the size of a small nut or bean to that of the doubled fist.

The seat of the tubercle is also various; but it is most frequently found in the substance of the hemispheres. In the 30 cases contained in my table, the tubercular deposit existed eleven times in the hemisphere of the cerebrum; nine times in the cerebellum; seven times in the cerebrum and cerebellum together; and twice in the cerebellum and pons Varolii, together. I have, however, notes of two cases in which the tubercle was confined to the pons Varolii.

As the symptoms of this disease evidently depend on the mechanical pressure exercised by the tubercle, and on the irritation or inflammation which it excites in the surrounding tissues, it may be well to indicate briefly the different lesions of the brain which accompany tubercle of this organ.

In many cases, even when the tubercle is of considerable size, we cannot discover the slightest

change in the surrounding nervous substance, or in the neighbouring membranes. The gradual development of the tubercular mass seems to pass unheeded by the central nervous system. In other cases the membranes adhere to the cortical substance, over the site of the tubercle, and are more or less infiltrated and thickened. Sometimes, when the tubercle is large, the convolutions are flattened or completely effaced. The colour and consistence of the nervous substance, immediately surrounding the tubercle, present a great variety of modifications. It may be slightly injected and softened to the depth of a few lines only ; or the softening of the nervous tissue, with or without injection, may extend to the central parts of the brain. In some cases nearly the whole of the cerebellum is reduced to a mere pulp. In a few rare examples, on the contrary, the surrounding nervous substance is more pale and of a denser structure than is natural ; sometimes it is soft and of a straw-yellow colour. I have never seen any appearance of abscess or of true infiltration of pus in the immediate vicinity of a cerebral tubercle. Several other lesions of the brain and its membranes might be enumerated, but as they are rather complications than consequences of the disease, I shall not dwell on them here.

Cause.—The deposit of tuberculous matter in the substance of the brain, depends on the same state of the system which gives rise to scrofulous tubercle in other organs ; but I am unable to point out any circumstances which will account, in a satisfactory

manner, for the peculiar tendency of young children to this fatal affection of the brain.

It is, as I have shown, chiefly prevalent about the period of the first dentition; in a few cases the earliest symptoms of cerebral disease occurred after convalescence from an exanthematous disorder, and in several the parents of the child had been cut off by some tubercular disease.

In no instance was the affection confined to the brain. Tubercles or tubercular deposit were invariably found, at the same time, either in the thoracic or abdominal cavities; but in several cases the greater development of the tubercles in the brain leads to the idea, that the disease commenced in the nervous system.

Symptoms.—The symptoms of tubercle of the brain in children are extremely diversified, and succeed each other irregularly at uncertain intervals; hence each case has, as it were, a physiognomy peculiar to it, and there is much difficulty in grouping the symptoms together, so as to furnish a general description of the disease.

In five of the thirty cases recorded in the table, there were no symptoms whatever of cerebral disorder. In three cases headache was the only symptom which existed during the chronic stage; in one deafness, and in one purulent discharge from the ears. We must therefore lay aside these cases altogether, and take account of the remaining twenty cases, in which more than one cerebral symptom was present.

The symptoms occasioned by the presence of tuberculous matter in the substance of the brain may be arranged under two stages, the chronic and the acute.

Chronic Stage.—The duration of this stage varied from six weeks to two years. As I have already remarked, it is extremely difficult to group the cases together, but I have endeavoured to arrange them under the three following classes :—

In the first class the disease commences with headache, and then gives rise to various lesions of sensibility or of muscular power.

In the second class, it begins with convulsions or epilepsy, which gradually terminate in paralysis.

In the third class the first symptom observed is paralysis of one of the limbs.

Class first.—Here the disease commences with headache, which is by far the most constant and characteristic symptom of cerebral tubercle ; it formed a prominent feature of the disease in seventeen of the twenty cases.

The headache is often very severe and of an obstinate nature, preventing the patient from sleeping at night, changing the temper, and sometimes eliciting acute cries like those of hydrocephalus. The seat of the pain is generally in the forehead, but in a few cases where the tubercular mass occupied the cerebellum, the pain was seated in the occiput, and extended down towards the neck. This severe pain is, sometimes, the only symptom which exists ; in other cases, after having been present for a few

days or perhaps for several months, it is succeeded by other symptoms, to be presently noticed.

The attacks of headache are occasionally associated with vomiting, which recurs on each exacerbation of the pain, and cannot be traced to any disorder of the digestive organs. This chronic or sympathetic vomiting was observed in seven cases. The bowels may be constipated at these periods, but costiveness is less frequent than vomiting, and both symptoms are much more allied to acute diseases of the brain.

The symptoms which follow in the train of headache are extremely varied; they chiefly consist, however, in lesions of the senses, the muscular power, or the intellectual faculties. The child's temper may undergo a notable change, and the intellectual faculties may become dull, but the disturbance or loss of the latter is rarely observed, except in cases of long standing, and towards the termination of the disease.

Convulsions sometimes occur at irregular intervals and terminate in partial or total paralysis of one or more limbs; in other cases we merely find a weakness of certain muscles, not amounting to paralysis; the child stumbles as it walks along, and progression is much impeded: particular muscles also may be affected. Thus in one case the only lesion of the motor power observed for some time was a peculiar convulsive movement of the muscles of the eyeball, by which it was incessantly jerked inwards. In a few cases strabismus occurs.

The symptoms connected with derangement of the sensibility are, loss of hearing, feebleness or total loss of sight, and a diminution of the cutaneous sensibility on one side of the body. The various symptoms just noticed are seldom permanent; the headache often disappears after having existed for several months, and returns again: the strabismus and amaurosis may also disappear, but the paralysis generally persists, especially when the limbs are affected by it.

In the second class of cases the disease commences suddenly with convulsive attacks or an access of true epilepsy: these recur at various intervals, and gradually terminate in paralysis or coma. The convulsions may be general or partial, and are often followed by contraction of one or both extremities on the same side of the body, or the head may be drawn to one side, and remain in that position for a considerable length of time. I have not noticed the deviation of the mouth or tongue, which seems to be characteristic of acute hydrocephalus. The convulsive affections often present some peculiar features. Thus, in one instance, the disease commenced with nervous tremor of the left arm, which lasted for six weeks, and then terminated in epilepsy: in another case, several attacks of convulsions were followed by a peculiar rotatory motion of the head: in a third, they were succeeded by squinting, and a lateral motion of the lower jaw. These convulsive attacks are rarely attended, as the headache is, with vomiting or constipation of the bowels.

Instead of convulsions, the first symptom observed may be a sudden attack of epilepsy, which always terminates after a longer or shorter interval, in general or partial paralysis. Convulsive movements existed in twelve of the twenty cases, and epilepsy in five.

In the third class of cases, the disease commences with paralysis of one or more muscles, or organs of sense. The following is a brief sketch of the symptoms observed in a case of this kind:—The child was four years of age: ten months previously to her admission into the hospital, the right arm became feeble and gradually paralytic, the lower extremities soon afterwards became so feeble, that the child was unable to walk. Four months later, she experienced violent attacks of headache, with vomiting, followed by complete and permanent amaurosis. The patient continued in this state for nearly five months, when she was seized with convulsions and stiffness of the limbs on the right side of the body. The power of the right arm was now restored, but the lower extremities remained perfectly motionless. This child died of confluent small-pox, and after death a tubercle, as large as a hen's egg, was found in the left lobe of the cerebellum.

Where the symptoms of a disease are so diversified it is impossible to draw up any general description that will apply to a majority of the cases. The chief and most important symptom is headache, which occurred in seventeen out of twenty cases.

The most frequent, after headache, are partial or general convulsions, epilepsy, paralysis or contraction of certain muscles or limbs, change of temper, and amaurosis.

Acute stage.—In thirteen of the thirty cases, alluded to in the tabular analysis, an acute stage occurred. The symptoms of this stage are likewise irregular and varied. Sometimes we have general convulsions which terminate in coma and death. They may be so violent as to cut off the patient in a few hours from the date of their attack.

In the majority of cases, the acute stage consists in a succession of symptoms of an irregular character, and more or less allied to those of acute hydrocephalus, or softening of the brain. Thus the acute stage of cerebral tubercle may commence as the third stage of acute hydrocephalus, or the symptoms of the different periods of this latter disease may run rapidly into, and be mixed up with, each other. The duration of the acute stage varies from eight hours to eighteen days.

The irregularity of the symptoms which occur in the acute stage of cerebral tubercle, is, I conceive, a very important point in the history of cerebral disease amongst children. Authors frequently mention the occurrence of anomalous cases of hydrocephalus, of cases in which the first stage of the disease was wanting. Is it not probable, from what has been said, that many of these hitherto unexplained anomalies depend on the complication of acute hydrocephalus, with cerebral tubercle, or, to

speaking more correctly, on the fact, that the acute stage of cerebral tubercle generally consists in irregular hydrocephalic symptoms?

The diagnosis of the disease is extremely difficult. This difficulty depends not only on the irregularity of the symptoms, but on the length of time which often separates the appearance of one symptom from another. A lapse of several months may occur before the headache is followed by any other sign of cerebral disease, still our diagnosis must be founded on the succession of certain symptoms. The disease, it may be remarked, almost always occurs in children who manifest signs of a scrofulous diathesis. When, under these circumstances, a child has suffered for some time from severe headache, when the headache is followed by convulsive movements, some paralytic affection, amaurosis, contraction of muscles, occasional vomiting, accesses of fever, and the train of symptoms already mentioned, and when these symptoms succeed each other at various intervals of weeks or months, we have very great reason to believe that the child has tubercle of the brain.

Were there such a disease amongst children as chronic softening of the brain, independent of tumours, &c., it would bear a close resemblance to cerebral tubercle, but I have never seen a case of the kind in children.

The only organic disease then, with which cerebral tubercle is likely to be confounded, is chronic meningitis. The points of resemblance are the

duration of the disease, the change of temper, the occasional headache, and the contraction of muscles, which occur in chronic meningitis. In this latter disease, however, the headache is not so severe or constant: we more frequently observe irregular accesses of fever, and the only permanent lesion of the motor power, which I have seen, was a peculiar flexion of the muscles of the hand and foot.

The paralysis, amaurosis, epileptic attacks, contraction of various muscles, are peculiar to cerebral tubercle, at least so far as my experience goes.

Upon the subject of treatment, I have, of course, very little to say. The disease is necessarily fatal, and all we can do, is to palliate the symptoms as they occur. These depend on congestion, irritation or inflammation of the cerebral substance, excited by the presence of a foreign body. The indications of treatment are therefore clear and simple. Of the various remedies which I have seen employed, the greatest benefit seemed to be derived from setons, or permanent blisters.