

TUBERCULOUS MENINGITIS, WITH REPORT OF 52 CASES.*

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We report to-day 52 cases of tuberculous meningitis seen in Colorado. Fifteen of these were taken from the records of the County Hospital, most of them having been under the care of one or the other of us. The remaining 37 cases were seen by us, almost equally, in our private and consultation work.

The study has been chiefly a clinical one since post-mortem confirmation was possible in but four instances. The diagnosis has been based upon the classical symptoms of this disease, and it is to be noted that the usual and inevitable termination occurred in all. It was not thought necessary nor advisable to perform spinal puncture in the cases reported. Unfortunately, the records are incomplete as to many of the symptoms, chiefly because more than half the cases were seen but once or twice by one of us in consultation. Many of the symptoms noted might have been differently recorded could we have followed these changeable cases throughout the course of the disease.

Of this number the great majority, 40 out of 52, occurred in male subjects. One occurred at $3\frac{1}{2}$ mos. of age, five between 2 and 5 years, eight between six and ten years, six in the second decade, eleven in the third decade, twelve in the fourth decade, six in the fifth decade. In three the ages are unknown.

It is very striking to note, doubtless owing to our large imported tuberculous population, that 29 cases occurred after 20 years of age, and only 20 under that age. Gowers mentions the great frequency in children between the ages of 2 and 10, and states "that it is not rare in early adult life, but scarcely ever during the later period."

Fourteen of our cases were in the first decade of life, about 27 per cent. We find that nine of these cases were in children under the school age, five in those attending school. There were four housewives, and practically all the remainder gave some indoor occupation.

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Nine were natives of Colorado, largely the children of tuberculous parents. One of our patients was colored.

The duration of residence in Colorado, in those not natives, was given in nine cases as follows: 37 yrs., 18 yrs., 16 yrs., 10 yrs., 6 yrs., 5 yrs., 4 yrs., 2 yrs., 1¼ yrs. In every one of those who had resided in the State for a period of over 4 yrs., there was a history of pulmonary tuberculosis before coming here.

In eleven cases there was a history of at least one death in the family from tuberculosis, one of these deaths having been from tuberculous meningitis in a boy of 7 years. In three instances two of the family had died of tuberculosis, in two instances three, and in one instance six.

As to the history of preceding tuberculosis we have obtained the following facts: History positive but location of disease unknown in 15 cases; right lung involved in 6 cases; left lung involved in 4 cases. Abdominal tuberculosis was also present in one of the above cases.

In one case large tuberculous bronchial glands were detected, and the child died within a few weeks of tuberculous meningitis. This child had had during the preceding summer a tuberculous nurse for several weeks unknown to its mother.

In another child the tuberculous meningitis followed shortly after a severe attack of whooping cough.

The duration of the disease was as follows: 90 days in 1 case, 54 days in 1 case, 30 days in 1 case, 21 days in 1 case, 20 days in 3 cases, 18 days in 1 case, 17 days in 3 cases, 16 days in 1 case, 15 days in 3 cases, 14 days in 3 cases, 12 days in 4 cases, 11 days in 2 cases, 10 days in 2 cases, 9 days in 1 case, 8 days in 4 cases, 7 days in 4 cases, 6 days in 5 cases, 5 days in 6 cases, 4 days in 3 cases, 3 days in 1 case, 2 days in 1 case, indefinite in 1 case.

The duration was ten days or less in about half the cases, while but twelve cases lasted over fifteen days.

We have classed those cases with pulse generally above 80 as "high," those between 60 and 80 as "medium," and those less than 60 as "low." In the first class there are 36, in the medium 9, in the low 3, remainder unrecorded. Irregular pulse is noted in 15 cases, but we believe existed much more frequently, especially early in the disease.

The temperature is classed as high when over 103° for any

great time. Eleven were in this class, one reaching 108° before death and another 107° . Between 100° and 103° there were 17 cases, while generally below 100° there were 24 cases.

The respiration was generally above 30 per minute in 29 cases, between 20 and 30 in 6 cases, less than 20 in one, balance unrecorded. Cheyne-Stokes respiration is noted in 14 cases.

Unconsciousness is noted in 44 of the cases, and in one it is said to have been absent until death approached.

The pupils are noted as unequal and responding to light in nine cases; the right was dilated in ten cases, the left in four cases, both in ten cases. No pupillary response in nine cases. Irregular pupils in four cases. Optic neuritis was noted in the majority of the cases. Divergence of the eyes is noted in eight cases, convergence in two, divergence to the right in three cases, to the left in one case. In one case each blindness, hippus and ptosis are noted.

Rigidity of the neck was noted in 24 cases, while no statement is made in the remainder.

Muscular twitching is noted in the right arm twice, both arms three times, left leg once, all over three times, and general convulsions occurred in three cases.

Rigidity of the right arm was seen once, left arm once, both arms twice, right leg and arm once, both legs twice, all over five times, and the head was turned to the right once.

The reflexes are noted as increased in 14 cases, as decreased in 5, and absent in 14 cases.

In studying the superficial reflexes it is striking that they were absent in 17 cases, slight in one case, and increased in but a single case. The Babinski reflex is noted on the left side only once, on both sides once. Kernig's sign was frequently present, but we have no exact statistics upon it.

Paralysis was absent in six cases. Five cases presented left hemiplegia, four right hemiplegia, one paraplegia, this being the one noted amongst the autopsies as having the notable affection of the cord. In this case severe pain was noted in the lumbar region and the legs.

Aside from a single case of general hyperesthesia no especial sensory phenomena are noted.

The urine contained albumin in eight cases, and casts were

present in four of these. If full records had been available these figures would doubtless have been much larger.

Tubercle bacilli in the sputum are noted in seven cases, their absence in three cases, remainder not examined.

Among the complications noted are the following:—

Erysipelas twice, tuberculosis peritonitis twice, erythema of great extent twice, alcoholism, melancholia, myelitis, acute pneumonia, phlebitis, urcemia, acute bed sores, ulcer of edge of cornea with inflamed conjunctiva and enlarged glands in neck, each once.

In but four instances were we able to obtain post-mortem examinations. In all of them the classical basic meningitis with tubercles was found. In the case with myelitis the cord from the fifth dorsal vertebra downward was of the consistency of cream.

A very large proportion of our cases have been shown to have been in adults, evidently because they have been tuberculous upon coming to the State. We doubt if a similarly large proportion of adult cases could be found in any other State in the Union.

Practically all of the cases occurring in natives of Colorado were in those directly predisposed by heredity. It is probable that in the future owing to the enormous relative proportion of tuberculous parents here, the percentage of cases of tuberculous meningitis in children will become greater than it is at the present time.

In one young man seen with Dr. Drechsler the meningitis was typical, although the examination of the abundant sputum by three different examiners on six occasions showed no tubercle bacilli, but abundant streptococci. This is of interest as bearing on the probable diagnosis of those cases we frequently see in which the usual signs of pulmonary tuberculosis are present but the bacilli are never found.

Tuberculous meningitis might be mistaken for many diseases of the nervous system or for many acute general diseases. The error made in confounding the acute general diseases with tuberculous meningitis is due to the fact that the diagnostician does not give sufficient weight to those symptoms in the general diseases occurring outside of the nervous system.

At times it is difficult to make a differential diagnosis between typhoid fever and the disease under discussion. Headache, delirium and pyrexia occur in both, but in the former the headache

ceases when the delirium is well marked, while in tuberculous meningitis it coexists with the delirium. The pulse in typhoid is not irregular, but is more frequent. The temperature in tuberculous meningitis is very irregular, while in enteric fever it has the characteristic morning fall.

The appearance of facial herpes is always in favor of meningitis, as it is almost unknown in typhoid. In some instances it is impossible to make a differential diagnosis until the appearance of the rash, enlarged spleen, diarrhea and a positive Widal reaction, or positive result from lumbar puncture.

If to the headache, delirium and fever we have added optic neuritis, localized spasms, palsies, or involvement of any of the cranial nerves, the diagnosis of tuberculous meningitis from any of the febrile affections is conclusive.

Anemia of the brain occurring in children, and termed by Marshall Hall "Hydrocephaloid," may simulate tuberculous meningitis, but in this condition the fontanelles are depressed and there are no localizing symptoms. The symptoms are those of extreme exhaustion.

A rapidly growing tuberculous tumor of the pons may produce symptoms resembling those of tuberculous meningitis. The loss of motor power in the limbs in tumor comes on more gradually and the paralysis is definite and focal in character, whereas in meningitis it comes on suddenly and its development is irregular in type. Optic neuritis in tumor of the brain is of a higher grade than that occurring in tuberculous meningitis. The headache in brain tumor is more agonizing and is often localized by the patient. The mode of onset of brain tumors is slow with a prolonged prodromal stage, while in tuberculous meningitis it is more acute with marked variation in temperature.

The differential diagnosis between abscess of the brain and tuberculous meningitis depends principally upon the localizing symptoms, as the abscess occurs in special localities in the brain. The involvement of the cranial nerves is also in favor of tuberculous meningitis.

The temperature of uremia is always subnormal, although there are cases of Bright's Disease where the temperature is high, but this is always due to some inflammatory complication. The careful and frequent examinations of the urine and the presence

of edema or dropsy in some portion of the body along with albuminuric retinitis would establish a positive diagnosis.

In making a differential diagnosis between hysteria and tuberculous meningitis a careful watch for any symptoms of organic disease of the nervous system will prevent this error. The presence of fever, optic neuritis, nystagmus, divergent strabismus or irregular pupils would be in favor of tuberculous meningitis. Strabismus does occur in hysteria, but it is always convergent in character and is attended by spasmodic contraction of the pupil. As to the nature of the meningitis the diagnosis between the various forms can be easily determined by finding tubercles on the choroid or by ascertaining a definite tuberculous family history.

Tuberculous meningitis is sometimes very difficult to diagnose from miliary tuberculosis. In the latter the pulmonary symptoms are prominent and a slight rise in respiration and pulse is observed from the beginning, and there is an absence of involvement of the cranial nerves.

The gastro-intestinal diseases of children can easily be excluded from tuberculous meningitis by the absence of cranial nerve symptoms, the intense headache, optic neuritis and paralysis in any portion of the body.

We would speak strongly of the need of thinking of typhoid fever in every case presenting meningeal symptoms. The usual characteristics of the disease ordinarily suffice for its differentiation, if we only realize that the so-called meningeal typhoid is common in children and is frequently mistaken for some variety of meningitis.

Certain digestive disturbances in children offer almost insurmountable obstacles in the matter of differentiation from beginning tuberculous meningitis. Time easily disposes of this difficulty, but for three or four days the greatest anxiety exists in the mind of the attendant because of the possibility of this disease.

Thus, we saw together a boy of four years, of good heredity, who had long been constipated, had habitually a concentrated urine containing much uric acid, and whose parents had much difficulty in satisfying his capricious appetite. He had large cervical glands during one summer, which decreased under out

of door treatment, cod liver oil and iodide of iron. When winter weather kept him indoors in a flat he was feverish and fretful, slept poorly, lost flesh because he ate almost nothing, was obstinately constipated, complained of headache, lost interest in his play, and was so perverse that no thorough examination could be made. Slight fever existed at times, and the pulse was elevated but never irregular. A calomel purge was very slow in action, and no improvement followed. Up to this time no positive evidence existed and we admit no reason for extreme anxiety. But the dreadful possibility of tuberculous meningitis could not be gainsaid, and every day added to chances. After six days the calomel finally acted freely, the urine became abundant under the administration of acetate of potash, the uric acid disappeared and recovery ensued. Dr. Hall has recently seen a parallel case with Dr. Russell of Arvada. Such cases in children must always cause uneasiness, for most cases of the dread disease start in about this way.