July 1884

Thesis for the Degree of M.D.

"Tubercular Meningitis"

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June 19th 1884.

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The following cases of Meningitis were during the last eight months admitted into Belvidere Fever Hospital, Glasgow under my charge. They illustrate in an interesting manner how difficult it is at an early stage, before its true nature is manifested, to distinguish between this disease and one or other of the Specific Fevers.

Six were sent to Hospital as Enteric, & one as Typhus Fever. In one of the cases Meningitis arose as a complication of Enteric Fever.

I shall now detail briefly the clinical histories, & post mortem appearances of each case.

Case I

A. C. aet 4 was admitted on the 4th October 1883. Seven days previous to admission the child was seized with rigors, very severe frontal headache, and diarrhoea.

On admission the appearance of the patient

indicated intense suffering. She rolled her head continually on the pillow, kept crying out, and was scarcely for a minute at a time still. The pulse was very frequent and the temperature 104°. The abdomen was distended, but whether painful or not to pressure, it was impossible to determine owing to the constant moaning and crying of the patient. No rash could be detected. In the evening squinting was observed. The pupils, when examined, were found equal and quickly responded to light. Tache Cérébrale was absent. The motions were frequent, green in colour, and contained curdled milk.

The child remained in this condition until the 11th October, when notwithstanding the utmost care on the nurse's part, a bed-sore formed over the right trochanter, and quickly spread until the whole sacral region was involved. On the 12th October sores formed on whatever part of the body was in contact with the

bed — the cheeks, forehead, elbows, knees &c. & such were the sufferings of the patient, that it was necessary to keep her constantly under the influence of Chloral Hydrate.

At 12 noon on the 13th October the child died.

The temperatures were:-

		morning.	evening
October	4th		104°.
"	5th	104°.	103°4.
"	6th	103°2.	103°4.
"	7th	102°.	103°.
"	8th	102°.	102°6.
"	9th	102°.	102°6.
"	10th	102°4.	103°4.
"	11th	103°.	103°4.

The condition of the patient rendered further accurate thermometric observations impossible.

Post Mortem Examination:-

On removing the Calvarium the membranes were found congested. The structures at the base of the brain were matted together with inflammatory exudation, which extended up the

fissures of Sylvius. The left lateral ventricle was distended with fluid. The thoracic organs were normal. In the intestines in the neighbourhood of the Ileo-Colic valve typical Enteric ulcers were discovered.

Case II

W. McL. aet 9. was admitted on the 29th October 1883. His illness began five days before, with sickness and severe headache. On admission the boy could answer questions intelligently, and was able to sit up in bed. The tongue was furred, and the breath offensive.

Next morning a distinct change had taken place. The boy lay in a semicomatose condition, rolled his head on the pillow, and could scarcely be roused. The abdomen was retracted, no eruption could be discovered, and the bowels according to the mother's statement had not been moved for several days.

Twitching of the upper extremities was observed. The eyes were kept fixed upwards, vacantly staring towards the ceiling. Tache Cérébrale

was easily produced. On the 3rd November the pupils were unequal - the right being strongly contracted - and were unresponsive to light. There was rigidity of the left upper extremity and the power of swallowing was lost. No squinting was observed.

On the 4th November at 12 noon, the patient died.

The temperatures were :-

	morning	evening
Oct 29th		99°.6.
" 30th	99°.	99°.2.
" 31st	99°.6.	99°.4.
Nov. 1st	99°.8.	99°.8.
" 2nd	98°.8	100°.6.
" 3rd	102°.6.	104°.4.
" 4th	105°.	

Post mortem Examination :-

Straw coloured fluid was found at the base of the brain. The structures at the base were glued together with inflammatory exudation which extended up the fissures of Sylvius. The ventricles were distended with fluid, the

right more so than the left Tubercles about the size of millet seeds were present in abundance at the base and in the choroid plexus. The heart was normal. Both lungs at the apices were bound to the thoracic parietes by old adhesions. The lungs from base to apex were studded with miliary tubercles. and the bronchial glands were enlarged and cheesy. The abdominal organs were normal.

Case III

Mrs B. aet 28. was admitted on the 6th October 1883. Her illness began five days before admission with severe headache vomiting, and diarrhoea. On admission the patient was extremely emaciated, the tongue furred, the pulse 110 per minute, and the temperature 102°. The abdomen was retracted. No abdominal tenderness could be detected nor any eruption. Patient remained in a restless state for some days. The bowels after admission were very constipated. Tache Cérébrale was early noted. The uneasy

restless condition of the patient was so extreme that on the 11th October it was necessary to employ the slapping sheet to keep her in bed. To procure sleep draughts of Chloral Hydrate were administered. When persistently spoken to she seemed to awake as if from a dream, and replied to questions in a stupid manner. So far as could be made out she seemed to suffer from frontal headache. On the 13th October low muttering delirium became established. Patient lay muttering to herself, occasionally clutching at the bed-clothes or whatever was within reach. She did not recognize her friends, and could not be roused sufficiently to answer questions. Squinting was observed. The pupils were unequal, and irresponsive to light. No pulmonary lesion could be detected.

On the 16th October at 9 p.m. the patient died.

The record of temperatures was lost.

Post Mortem Examination. At the base of the

brain there was a small quantity of straw coloured fluid. The structures here and in the fissures were glued together with inflammatory exudation. Tubercles were present in abundance. The left lateral ventricle was greatly distended with fluid. The lungs, liver, spleen and kidneys were studded with miliary tubercles.

Case IV

Wm C. aet 20 was admitted on the 13th February 1884. The only history obtainable was that less than a week before his removal to Hospital, he had been at work (locomotive-engine cleaning). On admission patient was so restless that in order to keep him in bed it was necessary to apply the strapping sheet. Although restless and talking constantly to himself it was extremely difficult to rouse him to answer questions. After succeeding he almost immediately lapsed again into his former condition. The face had a dusky appearance, the eyes were suffused, the tongue was dry, and the whole aspect that of one

suffering from Typhus Fever. So far as could be made out he seemed to have headache and pain in the side. No eruption could be discovered: The abdomen was natural.

The condition of the patient remained un-altered till the 17th February, when he became semi comatose. The pulse was slow, the pupils were dilated. No squinting was observed Tache Cérébrale was absent, but there was well marked carphology. Patient passed his urine in bed. The bowels were constipated, and enemata were employed without giving any relief to the head Symptoms.
A careful examination was made for any evidence of Syphilitic disease. None was found, but in view of such a possibility antisyphilitic remedies were administered.

On the evening of the 18th February. the nurse observed that the patient became very excited when the ward gas was lighted.

On the 19th February, there was distinct difficulty of swallowing. This arose not from mere disinclination to take nourishment,

but from partial inability to perform the act.

Paralysis of the left side of the face was observed on the 20th February. and the partial inability of swallowing had become complete.

Patient died at 3 a.m on the 22nd February.

The temperatures were:-

		morning	evening
February.	13th		102°.
"	14th	102°.	102°.8.
"	15th	102°	102°.
"	16th	99°.	100°.
"	17th	99°	100°.
"	18th	99°	100°.
"	19th	98°.	100°.8.
"	20th	98°.4	101°.
"	21st	98°.	99°.

Post Mortem Examination:-

Straw coloured fluid was found at the base of the brain. The structures at the base were matted together with inflammatory exudation. which extended up to the vertex on both sides. The left lateral ventricle was greatly distended with fluid: the right to a

less extent. The thoracic and abdominal organs were normal.

Case V

C. M'M. aet 24. was admitted on the 30th January 1886. The only history that could be got was that the patient had been ill for 14 days.

On admission he was in a state of extreme collapse, with a pulse so small as to be almost imperceptible Hot applications and warm brandy in small quantities revived him. In the evening the pulse was of fair quality & numbered 120 per minute. Patient was very restless. No rash could be discovered. The tongue was dry, and the abdomen quite natural. On the 31st January patient had a sudden attack of syncope, followed in a short interval by general convulsions. The urine was free from albumen. Next day there was distinct paralysis of the left side of the face, and the power of the right hand was diminished. We learned afterwards

that the Dr who sent him to Hospital had observed the latter condition. Patient could easily be roused, tho' he lay quiet if left to himself and would do what he was asked.

The pupils were strongly contracted, though equal No squinting was noticed & Tache Cérébrale could not be produced. The breathing was rapid a phenomenon unexplained by any physical signs in the chest. The bowels were constipated.

On the 2nd February. the power of the ~~left~~ right arm and leg was lost The breathing was sighing

At 2 p.m patient died.

The temperatures were!-

		morning	evening
January	30th		105°.8.
"	31st	103°.	103°.4.
February	1st	103°.	103°.2.
"	2nd	105°.	

Post Mortem Examination!-

The membranes were congested, straw coloured fluid was found at the base. The structures

in this situation were matted together with exudation which extended on both sides up to the very vertex. Tubercles were visible to the naked eye in abundance. The ventricles were natural. Heart:- the left ventricle was hypertrophied. The valves were competent. Lungs:- old adhesions bound the left lung at the apex to the thoracic parietes. Embedded in the substance of the left apex a chalky mass about the size of a marble was found. The Spleen and liver were enlarged Kidneys:- the capsule was adherent.

Case VI

Mrs P. aet 36. was admitted on the 14 March 1884. The history given by this woman is husband was, that she had been ill for "some weeks" and during that time had several epileptic seizures. She had not during her former life been liable to such attacks. Patient had been for some time of intemperate habits

On admission she could not answer questions and lay perfectly quiet apparently taking no

notice of anything that went on around her.
Over the frontal region there was a large recent burn, caused by a fall she had into the fire during one of the epileptiform attacks.
The abdomen was natural: no eruption could be discovered, nor could any tenderness be made out. The tongue was moist and free from fur. Rigidity of the right arm was present. the pupils were natural.
No alteration took place in the patient's condition until the 25th March. when it was observed that the left arm as well as the right was rigid. The legs were unaffected, and could be moved at will. Patient was still conscious, though indifferent to her surroundings. When asked to put out her tongue she did so slowly and with apparent difficulty. The act of swallowing seemed to be performed with difficulty. The pupils were contracted, but responded to light. Tache Cérébrale was absent.
On the 28th March patient had lapsed into a state of complete insensibility, and

could not be roused at all The pupils were unequal - the right contracted - and irresponsive to light. The bowels were constipated and had periodically to be relieved by enemata. A blister was applied to the head. On the 3rd April the contraction of the pupils remained unaltered but whereas formerly they were irresponsive to light, now they responded freely. The tongue was thickly furred. The veins of the right parietal region were dilated. On the 4th April patient lay with her legs firmly flexed. and shewed signs of pain when attempts were made to straighten them.

Patient died at 9 p.m on the 5th April.

The temperatures were:-

	mornq	evenq		mornq	evenq
March 12th	103°	103°	March 19th	100°	100°
" 13th	100°6.	100°4.	" 20th	99°	99°
" 16th	101°	101°	" 21st	98°4.	98°4.
" 17th	100°	100°	" 22nd	98°4	102°
" 18th	99°	99°	" 23rd	100°	103°4.

	morn^g	even^g		morn^g	even^g
March 24th	99°	100°	March 30th	98°.4.	99°.4.
" 25th	98°.4.	100°	" 31st	98°.4.	100°
" 26th	98°.4.	98°.4	April 1st	98°.4	100°.8.
" 27th	102°	100°	" 2nd	98°.4.	100°
" 28th	98°	100°	" 3rd	98°.4.	101°.4.
" 29th	101°.4.	101°	" 4th	98°.4.	103°

Post Mortem Examination :-

The head alone was examined.

Underneath the muscles of the scalp growing apparently from the periosteum an encapsuled fatty Growth was found. It was about the size of a filbert Microscopic examination shews it to be of a fatty nature. The dura mater was adherent, and deeply congested. Straw coloured fluid was found at the base of the brain. Inflammatory exudation united together the structures at the base, and extended up the fissures. The right ventricle was greatly distended with fluid. The left was also distended but to a less extent.

Case VII

A. H. aet 7 was admitted on the 28th December 1883. Her illness began 13 days previous to admission with sickness and diarrhoea. On admission the child was very much emaciated. Large strumous cicatrices were noted in the neck. The abdomen was slightly tympanitic, and there was gurgling in the right iliac fossa. No eruption could be discovered. The motions were frequent and of a dark colour. The tongue was glazed, the pulse 140 per minute, and the temperature 102°.6. The child was restless, cried a great deal, and appeared in a stupid state. On the 2nd January there was a discharge from the right ear. The patient was so restless and tried so frequently to get out of bed, that to prevent her injuring herself, the strapping sheet was employed. Distinct hydrocephalic cries were heard at this date for the first time. On the 10th January when closely interrogated, she complained of headache.

The pupils were dilated and unequal – the left larger – and the tongue was protruded to the right side. Tache Cérébrale was absent. The pulse had become soft and compressible and numbered 112 per minute.

The inequality of the pupils was only observed for two days. The dilatation, however, remained well marked. The child steadily emaciated though all through her illness she took nourishment well. The bowels had now become obstinately constipated, requiring Castor oil regularly to relieve them.

No further alteration was noted in the patients condition until the beginning of March when the hydrocephalic cry previously a distressingly constant phenomenon disappeared. The pupils responded readily to light: the tongue was protruded naturally: and the patient could be roused to answer questions. She also began to ask for bulls eyes. At this date the abdomen was distended.

The improvement in the patients condition only lasted a week and a half. She again

lapsed into a semi-comatose state. and again uttered the hydrocephalic cry as frequently as at first. She steadily sank and died at 8 a.m on the 21st March.

The temperatures were!-

		morng	even^g
December	28th		102·6
"	29th	102·4.	103°.
"	30th	103°.	103·2.
"	31st	101·6.	103°.
January	1st	102°.	104·2.
"	2nd	102°.	102·8.
"	3rd	101·8.	102·6.
"	4th	101°.	104·2.
"	5th	99°.	99·4.
"	6th	99°.	100°.
"	7th	103°.	100·4.
"	8th	100°.	100°.
"	9th	99°.	100°.
"	10th	99°.	99·4.
"	11th	99°.	99°.
"	12th	98·6	99°.
"	13th	99°.	101°.

		morng	even^g
January	14th	100·4.	99°.
"	15th	100°.	100·4.
"	16th	99·2.	99·4.
"	17th	99°2	99·4
"	18th	99·4.	99·8.
"	19th	99°.	100°.
"	20th	99°.	100·2.
"	21st	99°2.	99°.
"	22nd	99°.	99°.
"	23rd	98·4	99°.
"	24th	98·6	99·2.

{ normal from this date

Post Mortem Examination :-

Permission was granted to examine the head alone.

On removing the Calvarium, and making an incision through the dura mater about a pint of clear fluid escaped. The surface of the brain was anaemic. and had a sodden appearance. At the vertex on the right side a slight amount of exudation about the size of a shilling was found. The structures at the base were absolutely free from exudation. The ventricles were perfectly natural. No tubercles could be discovered. The bones of the skull were healthy.

Such briefly are the histories of the seven cases. It may be interesting now to go into them more in detail. Six were evidently cases of tubercular meningitis: the seventh appears to me to have been one of External Hydrocephalus.

In contrasting the cases I shall consider

(I) the age and sex of the patients.
(II) the duration of the disease.
(III) the invasion of the disease.
(IV) the symptoms and progress of each case.

(I) <u>The Age and Sex.</u>

Of the seven cases four were females and three males; four adults and three children.

Case I	female	aged	4 years.
" II	male	"	9 "
" III	female	"	28 "
" IV	male	"	20. "
" V	male	"	24 "
" VI	female	"	36 "
" VII	female	"	7 ".

Tubercular meningitis may occur at all ages, but it is much more frequently seen in children than in adults. It is interesting therefore to note that of the seven attached four were over 20 and, if we leave Case VIII out of account, the proportion becomes still higher.

(II) The Duration

Case I. 10. days.
" II. 11. "
" III. 14. "
" IV. 3. weeks.
" V. 17 days.
" VI. 5 weeks (?)
" VII. (should be excluded) 3 Months.

Most authors give the duration of tuberculous meningitis as one to three weeks. Leaving out of account case VII. the first five fulfilled this rule. The history in Case VI. was to a certain extent untrustworthy. The time in Hospital was twenty two days and the period before admission - stated at "some weeks" is rather indefinite.

(III) The Invasion

Case I. The invasion was marked by rigors, severe frontal headach and diarrhoea. Sickness was not present.

Case II. Sickness, vomiting and headache.
Case III. Vomiting, headache and diarrhoea.
Case IV. No history
Case V. No history.
Case VI. Epileptiform seizures, Maniacal excitement
Case VII Sickness vomiting and diarrhoea. There was no headache complained of.

No history could be obtained of the early stages in two of the cases. Of the other five four complained of headache. In one (case VI.) seizures indistinguishable, so far as the description went, from true epileptic attacks occurred. And these lasted for "some weeks" prior to admission to Hospital. During early life there was no evidence of such attacks ever having taken place. The case in which no headache was complained of was an anomalous one. Sickness was present in four of the five during the early stages. In three there was diarrhoea. It is to be remembered however that one (case I) was complicated with Enteric Fever.

IV. The Symptoms and Progress

Most writers divide the course of this disease into three stages (a) the invasion marked by fever (b) the stage of diminished fever and commencing paralysis. (y) The stage of coma and convulsions.

I do not propose to follow this method in each case. but shall class under various heads the symptoms found in each individual case.

Case I

(1) Rolling of the head on the pillow
(2) Constant crying, and screaming, but no hydrocephalic cry.
(3) Squinting: Equality of the pupils, responsive to light
(4) Absence of Jack Cérébrale.
(5) No rigidity of the muscles, and no paralysis
(6) Diarrhoea.
(7) Abdominal distension.
(8) No carphology.
(9) Temperatures high up till death with distinct evening exacerbations.

Case II

(1) Rolling of the head on the pillow.
(2) Perfect consciousness at first, later semi coma
no hydrocephalic cry.
(3) Rolling up of the eyes: no squinting unequal
pupils irresponsive to light.
(4) Tache Cérébrale.
(5) Twitching of both upper extremities. Later
rigidity of left. Inability to swallow.
(6) Constipation
(7) Retracted abdomen.
(8) No cephalocele.
(9) Temperature at first slightly febrile, rising
the day before death.

Case III.

(1). Great restlessness.
(2). Low muttering delirium: Coma: No
hydrocephalic cry
(3) Squinting: Unequal pupils irresponsive to light
(4) Tache Cérébrale.
(5) No rigidity: No paralysis.
(6) Constipation.

(7) Retracted abdomen
(8) Carphology.
(9) —

Case IV

(1) Restlessness
(2) Semicoma : later Coma. No hydrocephalic cry.
(3). No squinting : Pupils unequal : inactive to light.
(4). Absence of Tache Cérébrale.
(5) Paralysis of the left side of the face. Inability to swallow.
(6) Constipation.
(7) Abdomen natural.
(8) Carphology.
(9) Temperature irregular, falling to normal before death.

Case V.

(1) Restlessness.
(2) Semicoma : General convulsions No hydrocephalic cry.

(3) No squinting: Pupils equal, strongly contracted.
(4) Absence of Tache Cérébrale.
(5) Paralysis of the muscles of the left side of the face. Diminished power of the Right Hand: Paralysis of the right arm and leg.
(6) Constipation.
(7) Abdomen natural.
(8) No Carphology.
(9) Temperature very high.

Case VI.

(1) Quietness.
(2) Semicoma: Coma: Hydrocephalic cry.
(3) Pupils contracted: Unequal: Insensible to light.
(4) Absence of Tache Cérébrale
(5) Rigidity of both arms and legs. Difficulty of swallowing.
(6) Constipation.
(7) Abdomen natural

(8). No Carphology.
(9). Temperatures very irregular rising to 103° before death.

Case VII

(1). Restlessness.
(2). Semi-coma: Consciousness: Coma Hydrocephalic cry.
(3). Squinting: Pupils at first dilated unequal and irresponsive to light; Afterwards dilated and equal: Later natural.
(4). Absence of Tache Cérébrale.
(5) Paralysis of the muscles of the tongue.
(6) Diarrhoea: Later Constipation.
(7) Tympanitic Abdomen.
(8) No carphology.
(9) Temperatures irregular.

It is to be noticed that in six of the cases there was great restlessness: in six

semicoma. and in two an interval after admission of consciousness. In only one was the hydrocephalic cry heard.

Squinting was present in only three of the seven cases. In one only were the pupils unaffected (case I) though it was one of the three, in which squinting was noticed.

Tache Cérébrale could be produced in two and though looked for daily in the others was never observed. Trousseau held that it was one of the most constant signs of Tubercular meningitis.

Two cases developed rigidity of the limbs In three there was paralysis. Rigidity did not occur in any case, when paralysis was afterwards observed.

Difficulty of swallowing was a symptom noted in three cases. In two it amounted almost to complete inability.

Constipation was present in five cases. while diarrhoea twice occurred. In one of the cases, where diarrhoea was noted there was enteric Fever; in the other

(case VII) diarrhoea manifested itself only for a brief period, and was followed by persistent constipation.

In two cases the abdomen was retracted: in two distended (one the case of Enteric); and in three natural.

Carphology was present in two cases.

The temperature was high in four before death. In two it was normal. The temperature record of the seventh case is wanting.

With regard to Case VI. I would note that Trousseau and Murchison both quote cases of Tubercular Meningitis complicating Enteric Fever. In Murchison case the starting point of the secondary disease was caries of the Temporal bone. (Treatise on Continued Fevers II Edition pg 560)

In case VI, there was no evidence of such a cause seen at the post mortem examination. No ear affection was ob-

-served during life.

Case VII. seems to have been one of the com-paratively rare affection known as Hydroceph-alus Externus.

West (Diseases of Children 5th Edition page 130) describes such a condition, but explains its origin in three ways, none of which throw any light on the case now under consider-ation. He says it arises (1) from the yielding of the commissures and the escape of fluid from the ventricles. (2) from the effusion of fluid to compensate for an atrophied condition of the brain-the result generally of ultra uterine arrested development. (3) from an old hemorrhage.

Wilks & Moxon (Pathological Anatomy page 203) doubt the existence of such a condition as those described.

It seems to me that the fluid was

not derived from the lateral ventricles. as they were perfectly natural. And shewed no signs of having been distended with fluid.

The brain was not atrophied. and the child prior to her illness had, according to the mothers statement been in no wise deficient in intelligence.

Had the fluid been derived from a former hoemorhage. surely some evidence of this would have been discovered at the post mortem examination.

It is possible its origin may have been some low form of inflammation. There was, as I have before mentioned, a small patch of inflammatory exudation at the vertex.

Pathological Appearances

In six of the above cases the appearances were typical of Tubercular Meningitis.

It is interesting to note that in two

(cases IV and V) not only was the base of the brain involved but the exudation was found at the very vertex.

This shews how difficult it is to lay down hard and fast rules to distinguish between simple and Tubercular Meningitis.

In three of the cases (II, III, and V) tubercular manifestations were found in other organs.

In case III. the brain disease was only a part of a General tuberculosis.