Salmonella Typhi Meningitis
A Case Report And Family Investigations.

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Meningitis due to *Salmonella typhi* is a rare but serious complication of typhoid fever. Huckstep (1962) in his series of 240 cases of typhoid fever in Kenya recorded evidence of meningitis in only 3 patients, diagnosed on the basis of positive blood cultures, and raised cell and protein counts in the cerebrospinal fluid; the latter was sterile during life, although is one patient *S. typhi* was subsequently cultured from the CSF obtained at post-mortem. Experience and management is based on the infrequent individual case reports (Gordon-Smith and Marsden, 1951; Ripy, 1956, Wagenhals and Tannenberg, 1960) and not on any series. This article reports another case of typhoid meningitis and the results of the epidemiological investigations.

CASE REPORT

History: The patient, a 17 year old Malay boy, was brought to the hospital by his younger brother who gave a history of one week of fever and one day of delirium.

Physical Examination: The patient was delirious. The axillary temperature was 103.6°F, the blood pressure 120/80 mm Hg and the pulse 144/min. The heart and lungs were normal. The abdomen was tense but not tender with the liver palpable 6 cm below the costal margin and the spleen was just palpable. No rashes or joint swellings were found but there was marked neck stiffness and Kernig's sign was positive.

Laboratory Investigations: Haemoglobin 11 gm%, TWDC 5,900/mm, neutrophils 66%, lymphocytes 26%, monocytes 3%, eosinophils 5%. Blood film for malaria parasites - negative. Cerebrospinal fluid - clear yellow with 111 cells/mm, mainly neutrophils, no organisms on smears, sugar 11 mg%, proteins 96 mg%

Clinical Course: 200 mg of chloroquine and 2 ml of metamizol (Bonpyrin) were administered intramuscularly immediately. After lumbar puncture the treatment was continued with ampicillin 250 mg and sulphadiazine 1 gm, given every 6 hours intramuscularly. The patient was able to take fluids by mouth.

On the 2nd day the patient's abdomen was more tense and there was generalised and rebound tenderness. X-ray of the abdomen showed no free gas under the diaphragm. The patient was started on intravenous fluids, nasogastric suction, and a third chemotherapeutic agent, chloramphenicol 250 mg intramuscularly every 6 hours. He also developed acute urinary retention and an indwelling catheter was inserted. The urinary output was good and the blood area was 36 mg%.

By the 4th day *S.typhi* ('Vi' phage type E_2) was cultured from the cerebrospinal fluid; but no pathogenic organisms were isolated from the blood or faeces. The Widal tests were T(O) 1: 125, T(H) 1: 5,000, A(H) O, B(H) Chloramphenicol was increased to 500 mg every 6 hours and sulphadiazine was discontinued.

The delirium ceased on the 3rd day. There was no abdominal tenderness from the 7th day and nasogastric suction was stopped. The patient was able to micturate normally by the 2nd week and was afebrile from the 9th day. The subsequent course was uneventful. The dosage of chloramphenicol was halved at defeverscence and was discontinued on the 21st day while ampicillin was stopped on the 25th day. Lumbar puncture was repeated on the 18th day (CSF clear, 72 cells/mm^3, neutrophils 10%, lymphocytes 90% sugar 44 mg%, protein 30 mg%) and at 4 weeks (CSF clear, 7 cells/mm^3, neutrophils 30%, lymphocytes 70%, sugar 51 mg%, proteins 24 mg%). No organisms were cultured from these CSF samples and the patient was discharged a week later.

FAMILY STUDIES

His 15 year old sister fell sick at about the same time as the patient. She, too, became delirious and died at home on the same day as the patient was admitted.

The other members of the family were investigated (Table 1). Blood was taken for Widal testing and stools for culture. *S.typhi* ('Vi' phage type E_2) was isolated from the faeces of E, G and L. E and L subsequently developed fever while G remained asymptomatic. The Widal T(O) and T(H) for these 3 siblings were: E, T(O) O and T(H) 1:50, rising to T(O) 1:50 and T(H) 1:5000 after 16 days; G, T(O) 1:125 and T(H) 1:5000; and L, T(O) O and T(H) O. All three were admitted to hospital and treated with a 2 week course of ampicillin and chloramphenicol. L developed fever 19 days after completing the first course of treatment. *S.typhi* ('Vi' phage type E_2) was again isolated from the faeces and his Widal T(O) and T(H) were O and 1:50 respectively. He was given another 2 weeks course of ampicillin and chloramphenicol. A month later L was febrile again but on this occasion *S.typhi* was not cultured from the blood or stools. The Widal T(O) and T(H) increased from 1:50 and O respectively to 1:125 and 1:500 over 30 days. Another 2 weeks course of ampicillin and chloramphenicol was instituted and no further relapse occurred.

D suffered from an unexplained fever a month before the patient fell ill. He had been treated by a general practitioner with chloramphenicol and on recovery he developed alopecia. His Widal T(O) and T(H) were 1:125 and 1:5000 respectively.

COMMENTS

It is most probable that D was the index came in this outbreak of typhoid fever: he was ill a month earlier, had alopecia on recovery and the Widal tests were consistent with recent *S.typhi* infection. E and L had typhoid fever and the latter suffered 2 relapses while G was an asymptomatic carrier. The sister who died was probably another case of typhoid fever though it was not possible to ascertain whether the delirium was due to high fever or meningitis.

Typhoid fever was not suspected until abdominal signs developed on the 2nd day. Our patient confirms the previous observation of Huckstep (1962) that typhoid fever can present as acute pyogenic meningitis without preceding intestinal manifestations. Therefore, *S.typhi* needs to be considered as a rarer cause of meningitis, especially in endemic areas.

There are a number of possible explanations for the peritonitis experienced by this patient. It could have been due to an intestinal perforation, but this was not confirmed radiologically. However, small leaks may occur through the intestinal wall and cause peritonitis without x-ray evidence of perforation. Spread from a deep though apparently intact ulcer or the rapture of a softened mesenteric lymph node will also result in peritonitis (Huckstep, 1962).

The patient also developed acute urinary retention, another complication of typhoid fever noted by Gadenholt and Madsen (1963), who reported 10 such instances.

There is little guidance in the literature regarding the treatment of typhoid meningitis. Recorded experience with Salmonella meningitis over the past 25 years has been limited to isolated case reports and the review of these cases (Henderson, 1948; Beene, *et al*, 1951; Rabinowitz, *et al*, 1972). No large series of *S.typhi* meningitis has been reported and text books make only passing reference

to it and its management. The 3 cases of typhoid meningitis reported by Huckstep (1962) were treated with high doses of chloramphenicol and there was one fatality. Wagenhals and Tannenberg (1960) successfully treated a case with chloramphenicol and penicillin. Our patient was also treated successfully with a combination of ampicillin and chloramphenicol in high dosage.

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TABLE 1. RESULTS OF FAMILY INVESTIGATIONS

FAMILY MEMBER	SEX	ORGANISM	"Vi" PHAGE TYPE	ISOLATED FROM	WIDAL TEST T(O)	T(H)	A(H)	B(H)
A0 44 yrs	M	-ve	–	–	0	0	0	0
B) 38 yrs	F	-ve	–	–	0	1/50	0	0
C) 22 yrs	M	-ve	–	–	0	0	1/50	0
D) 21 yrs	M	-ve	–	–	1/125	1/5000	0	0
E) 19 yrs	M	Salm. typhi	E_2	Faeces	(i) 0	1/50	0	0
					(ii) 1/50	1/5000	0	0
F) 17 yrs	M	Salm. typhi	E_2	CSF	1/125	1/5000	0	0
G) 16 yrs	F	Salm. typhi	E_2	Faeces	1/125	1/5000	0	0
H) 15 yrs	F		DECEASED					
I) 13 yrs	M	Salm. lexington	–	Faeces	0	0	0	0
J) 12 yrs	M	-ve	–	–	0	0	0	0
K) 10 yrs	M	-ve	–	–	0	0	0	0
L) 7yrs	M	1) Salm. typhi	E_2	Faeces	(i) 0	0	0	0
					(ii) 0	0	0	0
		2) Salm. typhi	E_2	Faeces	(i) 0	1/50	0	0
					(ii) 1/125	0	0	0
		3) -ve	–	–	(i) 1/50	0	0	0
					(ii) 1/50	1/500	0	0
					(iii) 1/125	1/500	0	0
M) 4yrs	F	-ve	–	–	0	0	0	0
N) 11 mths	F	-ve	–	–	No permission to take blood			

Family member L was admitted on 3 occasion as indicated in the table. Where there are two or more entries under the Widal Test, they indicate the values obtained on separate blood specimen.