Postgraduate Medical Journal (1987) **63**, 373–375

Clinical Reports

Salmonella intracerebral and subdural abscess – report of two cases

A.K. Mahapatra and R. Bhatia

Department of Neurosurgery, All India Institute of Medical Sciences, New Delhi-110029, India

Summary: Two cases of the rarely encountered *Salmonella typhi* subdural empyema are reported. The first was in an 11 month old infant and the second in a 25 year old adult. Neither of them suffered from typhoid fever. The causative organism was not suspected until the culture report was obtained. Both patients responded satisfactorily to therapy.

Introduction

Salmonella typhi is a recognized cause of intracerebral infection, yet only 8 cases of brain abscess have been reported.[1-5] Most of these cases developed salmonella abscess during the course of infection or even following it.

This paper reports two patients with salmonella subdural empyema, in one of whom there was an associated multiloculated intracerebral abscess. In both, typhoid was not even remotely suspected preoperatively.

Case reports

Case 1

An 11 month old boy was admitted with irregular fever for 3 months and one attack of left focal seizure 2 months before admission. He had progressive enlargement of his head for about one month. Fifteen days earlier he had developed altered sensorium with occasional decerebrate posturing.

Examination revealed an unconscious patient with occasional bilateral decerebration. He was febrile and toxic. The pupils were normal and fundi showed evidence of secondary optic atrophy. He had left hemiparesis. The head circumference was 52 cm, and the anterior fontanelle was tense.

Investigation revealed haemoglobin 8.4 g/dl, total white cell count 8.4×10^9/l, with a normal differential, and an erythrocyte sedimentation rate of 70 mm in the first hour. Blood cultures were sterile and the Widal test was negative. The chest X-ray was unremarkable. Plain radiograph of the skull showed sutural diastasis.

Contrast enhanced computed tomographic (CT) scan revealed a right hemispherical subdural collection and a multiloculated fronto-temporoparietal brain abscess with a marked midline shift. The subdural empyema was aspirated under local anaesthesia by a twist drill hole, and nearly 200 ml of thick foul smelling pus was drained. Following aspiration the patient's sensorium improved and the left hemiparesis partially recovered. Gram stain of the pus smear revealed Gram positive cocci and Gram negative bacilli. Culture confirmed *Salmonella typhi* B and coagulase-positive *Staphylococcus aureus*. Culture for anaerobic organisms was sterile. The patient was treated with crystalline penicillin 1 mega unit intravenously (i.v.) two hourly and chloramphenicol 30 mg/kg body weight intravenously in divided dosage.

CT scan 7 days later showed a residual subdural empyema and large multiloculated intracerebral abscess. Through a right fronto-temporal craniotomy the subdural and intracerebral abscesses were excised. The patient developed hydrocephalus and a ventriculoperitoneal shunt was done 2 weeks later. He improved rapidly following the shunt and was discharged 4 weeks after admission, to the hospital, with a residual left hemiparesis.

He was followed up regularly for 2 years and except for an occasional seizure has had no problem.

Case 2

A 20 year old male was admitted with intermittent high grade fever, headache and vomiting for 2 months,

Correspondence: A.K. Mahapatra M.S., M.Ch.
Accepted: 3 December 1986

and blurring of vision for 25 days. On examination, the patient was febrile and toxic. Fundi showed bilateral gross papilloedema. There was bilateral 6th nerve paresis and right VII nerve paresis. Except for mild neck stiffness there were no other signs of meningeal irritation. Systemic examination was unremarkable.

Investigation revealed haemoglobin 11 g/dl, total leucocyte count 4.4×10^9/l and normal differential. Erythrocyte sedimentation rate was 28 mm in the first hour. Blood culture did not grow any organism and the Widal test was negative. Plain chest X-ray was normal. Skull radiograph revealed evidence of raised intracranial pressure. Contrast enhanced CT scan revealed left sided loculated subdural empyema with ring enhancement with midline shift to the right side (Figure 1).

Left frontal and parietal drill holes were made and 50 ml of thick pus was evacuated. Two days later left sided frontal and parietal burr holes were made and 100 ml of thick yellowish pus was evacuated and the subdural space was washed with saline containing gentamicin. Pus culture revealed *Salmonella typhi* B. The patient was treated with chloramphenicol 500 mg 4 hourly i.v. and ampicillin 1 g 6 hourly i.v. He was also prescribed diphenylhydantoin sodium. The patient made an uneventful recovery and was discharged 3 weeks later when, except for mild right sided facial paresis, there was no neurological deficit. Follow-up at 3 months revealed no neurological deficit.

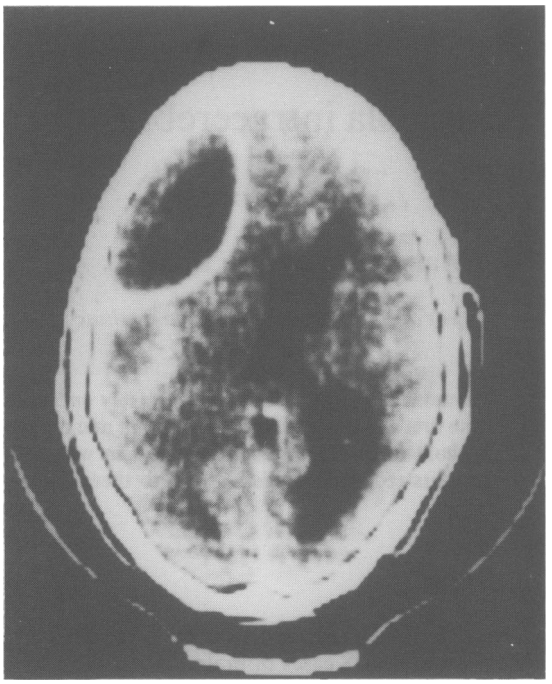

Figure 1 Contrast enhanced CT scan showing left sided loculated subdural empyema with compression of left lateral ventricle and shift of the septum to right side.

Discussion

Salmonella typhi is known to cause focal infection such as cholecystitis, osteomyelitis and pyogenic abscess. However, intracranial infections are rarely encountered.[4–8]

Among the intracranial infections meningitis is relatively more common than intracranial abscess.[6,10–13] Scragg & Applebaum[13] reported 7 cases of meningitis among 1429 children who had suffered typhoid fever (0.5%). Uncommonly, subdural and extradural abscesses have also been reported.[8,14,15]

Keen, in 1898, had collected 4 cases of brain abscess following typhoid fever (quoted by Odoms & Elvidge[2]). However, the organisms in those cases were not mentioned, hence it was difficult to conclude whether they were due to salmonella or another organism. Many autopsy studies in the last part of the 19th century were not bacteriologically proven. Brown[1] reported brain abscess during the course of the typhoid fever, but the organism isolated from the pus was *Staphylococcus aureus*. McClintock[16] in his autopsy study first reported a brain abscess due to salmonella.

The first case of an intracerebral salmonella abscess was reported by Odoms & Elvidge.[2] Salmonella cerebral abscesses, though well documented, are rare and only 8 cases have been reported (Table I). Only 4 cases of salmonella brain abscess have been reported in children,[3–5,7] two of which were in a neonate and an 8 month old infant. Subdural empyema in association with a brain abscess in children caused by salmonella was reported by Dunn *et al.*[5] To date there are only four cases of subdural empyema reported where *Salmonella typhi* was the causative organism (Table I).

Clinical presentations of brain abscess due to salmonella have been divided into 3 groups. In the first, patients develop brain abscess while they have the salmonella infection elsewhere in the body. In the second the patients who had typhoid fever recover and sometime later develop an intracranial abscess.[8,17] Herbert & Ruskin[8] reported an extradural abscess in a patient who had typhoid fever 47 years earlier. In the third category, patients present with brain abscess without any previous history of salmonella infection. Both our cases belong to this third group, where typhoid fever was not even suspected.

Primary excision of the abscess was undertaken in most of the reported cases. In our case 1, as the patient was very sick and there was a large collection of subdural pus, subdural aspiration was performed as an initial procedure. A secondary excision was under-

Table I Published cases of salmonella brain abscess and subdural empyema

Authors	*Year*	*Site*	*Organism-species*	*Outcome*
Odoms & Elvidge[2]	1942	Left temporal	*Bacillus typhosa*	Survived
Saphro & Winter[6]	1957	Brain abscess (not mentioned)	Salmonella (not specified)	Survived
Panikar & George[3]	1965	Right temporal	*Salmonella typhimurium*	Died
Woodhall[18]	1967	Brain abscess (not mentioned)	Salmonella enteritis	Survived
Odeku *et al.*[19]	1967	Subdural empyema	Not specified	Died
Brezezinski *et al.*[7]	1969	Brain abscess	Salmonella enteritis	Survived
Lerner *et al.*[20]	1972	Subdural empyema	*Salmonella Saint Paul*	Survived
Buchanan *et al.*[14]	1973	Subdural empyema	*Salmonella typhimurium*	Survived
Kaufman *et al.*[15]	1975	Subdural empyema	Not specified	Not known
Suzuki *et al.*[17]	1976	Parietal	*Salmonella typhi*	Survived
West *et al.*[4]	1977	Brain abscess (not mentioned)	*Salomonella Worthington*	Survived
Dunn *et al.*[5]	1984	Brain abscess with subdural empyema	*Salmonella typhi*	Survived
Mahapatra & Bhatia (this paper).	1987	Right hemispheric with subdural empyema	*Salmonella typhi (A)* with *Staphylococcus aureus*	Survived

taken when the patient was better and the repeat CT scan showed a residual abscess. In our second case burr hole evaluation was adequate for subdural empyema.

All but one of the 8 cases reported with salmonella infection survived. The single case who died had an associated chronic suppurative ofitis media due to salmonella.[3]

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