

## NEONATAL SALMONELLA TYPHIMURIUM MENINGITIS: REPORT OF A CASE

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Gazi Medical Journal 2001; 12: 137-139

**SUMMARY :** Meningitis due to *Salmonella* is an extremely rare condition. A 10-day-old female premature neonate with *Salmonella typhimurium* meningitis is presented in this report. The clinical features, outcome and antibiotic treatment are discussed. Although it is extremely rare, *Salmonella* meningitis should be considered in the differential diagnosis of neonatal meningitis.

**Key Words:** *Salmonella* Meningitis, Newborn.

### INTRODUCTION

*Salmonella* meningitis (SM) is an extremely rare disease. Usually, *Salmonella* causes clinical disorders of the digestive system, but on occasion, especially in babies under 4 months of age, can cause focalized infections such as meningitis (1). The mortality rate is still high and it is inevitably fatal without treatment (2). Antibiotic therapy should be given at least for four weeks in order to decrease the mortality rate. If the antibiotic therapy is discontinued before the third week of therapy, relapse is observed in 64% of cases (3). We report an unusual case of a premature neonate with meningitis caused by *Salmonella typhimurium*.

### CASE REPORT

A 10-day-old female was referred to the Pediatric Emergency Service with complaints of vomiting, diarrhea and epileptic seizure. She was born by cesarean section to a 27-year-old mother at 34 weeks of gestation. She had been hospitalized in a local hospital and administered

nonspecific antibiotic therapy prior to her reference to our clinic, but did not respond and was transferred to our clinic because of meningitis which had developed during hospitalization. Meningitis was associated with acute gastroenteritis. On physical examination, her birth weight was 2300 g, height 44 cm, head circumference 34 cm. Vital signs including body temperature, heart rate, blood pressure, and respiration rate and pattern were normal. She was hypoactive and the fontanelle was mild bulging. The other systemic findings were found to be normal. The parents were second-degree relatives. Laboratory studies revealed hemoglobin 10.4 g/dl, leukocyte count  $20.4 \times 10^9/L$ , and platelet  $90.8 \times 10^9/L$ . On the peripheral blood smear, neutrophils were 78% and lymphocytes 22%. On cerebrospinal fluid (CSF) examination, cell count was  $900/mm^3$  neutrophils and CSF protein and glucose levels were 210 mg/dl and 10 mg/dl, respectively. Stool, blood and CSF cultures grew *S. typhimurium*. Liver and kidney function tests were within

normal limits. Gruber-Widal agglutination test was negative. Cranial computerized tomography demonstrated mild oedema in the parietal region. Abdominal ultrasonography was normal. There was no finding of infection in the parents and the stool culture was negative for *Salmonella*.

The seizures could be controlled with intravenous diazepam. On lumbar puncture a cloudy liquid, compatible with bacterial meningitis was obtained. Treatment was therefore started immediately with intravenous cefotaxime and ampicillin. *Salmonella* spp isolated from stool, blood and CSF cultures were susceptible to cefotaxime, ceftriaxone, ampicillin, chloramphenicol, trimethoprim-sulfamethoxazole (TMP/SMX) and ciprofloxacin according to the results of culture and susceptibility tests. There was excellent clinical recovery. Cerebrospinal fluid findings showed improvement on the 14<sup>th</sup> day of the treatment. No neurologic sequelae appeared after seven months of follow-up and her development was normal for her age. Stool cultures were performed after the treatment to eradicate the long term carriage. Recurrence of excretion of *S. typhimurium* in the stool occurred after withdrawal of antibiotic therapy and, seven months later, she was not excreting in the stool. The antibiotic treatment was discontinued and the patient was discharged on the 28<sup>th</sup> day of age.

#### DISCUSSION

*Salmonellae* may produce localized infections such as meningitis, endocarditis, arteritis, osteomyelitis, arthritis, splenic abscess, hepatic abscess, and intra-abdominal abscess (4, 5). *Salmonella* meningitis consists of 0.8 to 6% of bacterial meningitis and is usually seen during infancy (1, 3). Although the involvement of the central nervous system is a rare complication of *Salmonella* infections, it forms a serious problem in the newborn and early infancy periods (1, 5). In the survivors of neonatal meningitis with gram negative bacteria, complications such as hydrocephalus, convulsion, abscess formation and subdural empyema are frequently observed (6, 7). Dunn et al. reported 12 cases of subdural empyema, two of them associated with SM (7). Krcmery et al. reported reversible hydrocephalus that responded to intraventricular punctures in two of the 12 cases with SM and in seven

children, no neurologic sequelae appeared after a 2- to 4-year follow-up (8). Hansen et al. reported two cases of SM; one died 6 days after admittance to the hospital and the other recovered without sequelae (9). In our case, there were convulsions and could be controlled with intravenous diazepam. No neurologic sequelae appeared after seven months of follow-up and her development was normal for her age.

*Salmonella* meningitis has been treated with ampicillin and chloramphenicol for the last 20 years and showed high relapse and mortality rates. Third generation cephalosporins such as cefotaxime and ceftriaxone, having a good penetration to CSF, were also effective. Children with septicemia, enteric fever, or metastatic sites of infection should be treated initially with systemically administered cefotaxime and ceftriaxone (1,4). Ciprofloxacin and TMP/SMX are alternative agents in penicillin-allergic patients (8,10). Vazquez-Lopez et al. reported that meningitis due to *Salmonella* in the neonatal period was treated with intravenous cefotaxime and ampicillin (1). Krcmery et al. reported that ten of twelve cases of neonatal and infant nosocomial meningitis treated with ciprofloxacin were cured (8). Our case was given intravenous cefotaxime and ampicillin for 28 days. There was excellent clinical recovery.

In conclusion, SM should be considered in the differential diagnosis of neonatal meningitis and appropriate antibiotic treatment is essential to obtain satisfactory recovery.

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