Rare disease

Salmonella meningitis in a paediatric patient caused by *Salmonella enterica* serotype HoutenaeAmal Rashad Nimir,¹ Rosni Ibrahim,² Ibrahim Abdel Aziz Ibrahim³¹Cyberjaya University College of Medical Sciences, Cyberjaya, Malaysia;²Microbiology Department, Cyberjaya University College of Medical Sciences, Cyberjaya, Selangor, Malaysia;³Pharmacology Department, Faculty of Medicine, Shah Alam, Selangor, Malaysia**Correspondence to** Dr Amal Rashad Nimir, aralmadi@yahoo.com**Summary**

The authors report a case of a 6-week-old baby girl who was admitted to the paediatric ward due to a high fever for 2 days. The patient experienced three fits which took place while in the ward. A brain sonogram showed subdural heterogeneous collection consistent with focal empyema; however, no hydrocephalus or infarction was detected. An urgent Burr hole procedure was performed to remove the collected pus. Both blood and cerebrospinal fluid (CSF) culture grew *Salmonella* species which remain sensitive to some antibiotics. This strain was sent to the institute of medical research (IMR) for serotyping. The patient was treated with intravenous combination of ceftriaxone and ciprofloxacin for 3 weeks. One week later, IMR sent results that identified the strain as *Salmonella enterica* serotype Houtenae. Following antibiotic treatment, repeat ultrasound illustrated an improvement of the subdural empyema, and the gram stain of the CSF specimen failed to isolate bacteria.

BACKGROUND

Clinicians should be alerted on the existence and progression of different pathogens which can cause meningitis. This should be done in order to implement early control measures. These control measures can then be applied to prevent any further complications. Even after an apparently satisfactory clinical response to antibiotics; staff and parents should be aware that there is still an ongoing need to remain vigilante due to the possibility of relapse.

CASE PRESENTATION

A 6-week-old Indonesian girl was admitted to the Paediatric Emergency Department of Kuala Lumpur General Hospital with symptoms of poor feeding, grunting respiration, weight loss and fever which had gone on for 2 days. She was born at term, by spontaneous vaginal delivery with a birth weight of 1.8 kg without antenatal, intranatal or postnatal complications. The patient stayed at the paediatric ward 3 days postdelivery due to low birthweight and then discharged having been immunised with the BCG and first dose hepatitis B. However, 2 days prior to admission, her grandmother noticed that the baby was feeding poorly and had a raised body temperature. There was no history of diarrhoea, vomiting, altered consciousness, or convulsion. According to her grandmother, the child's mother who was Venereal Disease Research Laboratory (VDRL) positive suffered puerperal psychosis and either died or committed suicide at home few days after delivery.

On examination, the patient was febrile (39.1°C), her respiratory rate was 30/min with shallow respiration and heart rate of 160 beats/min. The patient was lethargic, but no pallor, cyanosis, clubbing, icterus or lymphadenopathy was detected. Examination of the skull revealed normal (non-bulging) anterior fontanelle. The rest of the systemic examination was unremarkable.

INVESTIGATIONS

While in the ward the child had three episodes of fits and urgent brain ultrasound was performed to show subdural heterogeneous collection consistent with focal empyema, but no evidence of hydrocephalus or infarction were detected (figure 1). Urgent burr-hole procedure was performed to remove the collected pus.

A diagnosis of neonatal sepsis was made, and she was administered empirically with intravenous benzylpenicillin and gentamicin. The C reactive protein was high, the initial peripheral white cell count was within the normal range (differential count showed 83% neutrophils, 15% lymphocytes and 2% eosinophils), elevated platelet count and a low haemoglobin level (table 1). Serum and cerebral spinal fluid (CSF) VDRL tests were negative.

Lumbar puncture revealed a cloudy-bloodstained CSF and Gram-negative rods were observed under Gram's stain (table 1).

TREATMENT

Blood culture and CSF grew *Salmonella* species which remained sensitive to ampicillin, chloramphenicol, ciprofloxacin, tetracycline, ceftriaxone and co-trimoxazole. Stool culture was negative. The strain was sent to IMR for serotyping. On the basis of blood and CSF culture results, the patient was treated with intravenous ceftriaxone 75 mg/kg/day as a single injection and intravenous ciprofloxacin infusion 30 mg/kg/day, this medication regimen was given for 21 days. One week later, serotyping results revealed *S enterica* serotype Houtenae.

OUTCOME AND FOLLOW-UP

The patient completed the antibiotics medication regimen and repeat ultrasound illustrated marked improvement of

Figure 1 Sonogram at 6 weeks of age shows a complex heterogeneous collection consistent with focal empyema.

the subdural empyema. Another CSF analyses performed before discharge revealed a clear CSF. The white cell count in the CSF decreased to 0.079×10^9 cells/l, with 87% lymphocytes. The protein and glucose levels were 275 mg/dl and 33 mg/dl, respectively. The gram stain of that CSF specimen failed to reveal bacteria. She has been scheduled for follow-up visits to monitor her milestone and neurodevelopment assessment.

DISCUSSION

A case control study showed that breast-feeding decreases the risk of sporadic salmonellosis in infants.¹ On the other hand, *S enterica* serotype Kottbus, was initially thought to have a specific predilection for colonising within human mammary glands.² In the following years, several reports showed that other serotypes, including *S enterica* serotype Typhimurium,³ *Salmonella enterica* serotype Senftenberg,⁴ *S enterica* serotype Typhimurium definite type 104 (DT104),⁵ and *S enterica* serotype Panama⁶ can also be transmitted via breast milk. Our report extended the list of salmonellae that might be transmitted via this vesicle. There is, in existence, a strange phenomena which suggests that there might be a relationship between keeping reptiles as pets and *Salmonella meningitis* in children, two fatal cases have been reported in UK.⁷

S meningitis is uncommon in developed countries; however, it is quite common in the form of gram-negative bacterial meningitis in Africa, Brazil and Thailand.⁸ Non-typhoid *Salmonella* is the commonest cause of bacterial gastroenteritis among children in urban areas of Malaysia.⁹

The first human report of bacteraemia due to *S enterica* serotype Houtenae in Brazil was observed in a HIV-infected patient. Between 1996 and 2000, less than 1%

Table 1 Laboratory investigations result

Test	Results	Units	Range
Full blood count			
White cell count	16	$\times 10^9$ cells/l	5–21
Haemoglobin	10.3	g/dl	15.2–19.8
Platelet count	598	$\times 10^9$ cells/l	150–400
C reactive protein	2.3	mg/l	0.0–0.5
Renal profile			
Sodium	138	mmol/l	135–150
Potassium	3.7	mmol/l	3.5–5.0
Urea	4.4	mmol/l	2.5–6.4
Creatinine	79	μ mol/l	62–106
Liver function test			
Albumin	43	g/l	35–50
Total protein	83	g/l	67–88
Bilirubin total	21	μ mol/l	<23
ALT	23	U/l	<44
ALP	73	U/l	32–104
Cerebrospinal fluid			
Appearance	Cloudy		Clear
WCC	3.07	$\times 10^9$ cells/l	0.7
Lymphocytes	<60%	$\times 10^9$ cells/l	80–90%
Glucose	Undetectable	mg/dl	40–80
Protein	533	mg/dl	4–40
RBC	0.680	$\times 10^9$ cells/l	Nil

ALP, Alkaline phosphatase; ALT, alanine transaminase; RBC, red blood cell; WCC, white cell count.

of 4581 *Salmonella* strains were isolated from non-human sources belonged to *S enterica* serotype Houtenae.¹⁰

Between 1973 and 1997, Department of Paediatrics at the University of Malaya Medical Centre in Kuala Lumpur conducted a study of bacterial meningitis along with the complications it produced in infants. In the past *Salmonella* has not been a common aetiological agent of bacterial

meningitis in urban Malaysia in comparison to *Haemophilus influenzae* and *Streptococcus pneumoniae*.⁹ However, researchers have managed to isolate 13 (approximately 5%) *Salmonella* species from samples of CSF. All patients were infants below 1 year of age and fever was the main presenting symptom in all cases. Other presenting features included; subdural effusion (four cases), hydrocephalus (five cases), empyema (three cases), ventriculitis (two cases) and one case developed a cerebral abscess.

Learning points

- ▶ Meningitis can be caused by pathogens that are primarily infecting the gastrointestinal tract.
- ▶ Meningitis in infants can lead to serious sequelae, so early detection and proper treatment is mandatory.
- ▶ The Possibility of relapse after apparent recovery should be considered.

Acknowledgements The authors would like to thank the director of Hospital Kuala Lumpur for his permission to publish this case.

Competing interests None.

Patient consent Obtained.

REFERENCES

1. **Rowe SY**, Rocourt JR, Shiferaw B, *et al*. Breast-feeding decreases the risk of sporadic salmonellosis among infants in FoodNet sites. *Clin Infect Dis* 2004;**38**(Suppl 3):S262–70.
2. **Ryder RW**, Crosby-Ritchie A, McDonough B, *et al*. Human milk contaminated with *Salmonella* Kottbus: a cause of nosocomial illness in infants. *JAMA* 1977;**238**:1533–4.
3. **Drhová A**, Dobiášová V, Stefkovicová M. Mother's milk—unusual factor of infection transmission in a salmonellosis epidemic on a newborn ward. *J Hyg Epidemiol Microbiol Immunol* 1990;**34**:353–5.
4. **Revathi G**, Mahajan R, Faridi MM, *et al*. Transmission of lethal *Salmonella senftenberg* from mother's breast-milk to her baby. *Ann Trop Paediatr* 1995;**15**:159–61.
5. **Qutaishat SS**, Stemper ME, Spencer SK, *et al*. Transmission of *Salmonella enterica* serotype typhimurium DT104 to infants through mother's breast milk. *Pediatrics* 2003;**111**:1442–6.
6. **Te-Li C**, Peck-Foong T, Shu-Chin L, Chang-Phone F, Siu LK. First report of *Salmonella enterica* Serotype Panama meningitis associated with consumption of contaminated breast milk by a neonate. *J Clin Microb* 2005;**43**:5400–2.
7. Anonymous. Baby dies of *Salmonella* Poona infection linked to pet reptiles. *Communicable Disease Report CDR Weekly Report* 2000;**10**:161.
8. **Bryan JP**, Da Silv HR, Taveres A, *et al*. Etiology of and mortality from bacterial meningitis in northeastern Brazil. *Rev Infect Dis* 1990;**12**:128–35.
9. **Lee WS**, Puthucheary SD, Omar A. *Salmonella meningitis* and its complications in infants. *J Paediatr Child Health* 1999;**35**:379–82.
10. **Tavechio AT**, Ghilardi AC, Peresi JT, *et al*. *Salmonella* serotypes isolated from nonhuman sources in São Paulo, Brazil, from 1996 through 2000. *J Food Prot* 2002;**65**:1041–4.

This pdf has been created automatically from the final edited text and images.

Copyright 2011 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit

<http://group.bmj.com/group/rights-licensing/permissions>.

BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Please cite this article as follows (you will need to access the article online to obtain the date of publication).

Nimir AR, Ibrahim R, Ibrahim IAA. *Salmonella meningitis* in a paediatric patient caused by *Salmonella enterica* serotype Houtenae. *BMJ Case Reports* 2011; 10.1136/bcr.04.2011.4096, date of publication

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow