An unusual case of neonatal meningococcal meningitis complicated by subdural empyema and hydrocephalus

Y Ramsamy, P Mahabeer, M Archary, R A Bobat, Y M Coovadia

CASE REPORT

Neisseria meningitidis is a leading cause of pyogenic meningitis worldwide, as well as causing large epidemics in parts of Africa. With the dramatic decline in cases of Haemophilus influenzae B, N. meningitidis has emerged as one of the most common causes of acute bacterial meningitis in children and adults in South Africa. However, it remains an uncommon cause of meningitis in the neonatal period. Subdural empyema together with hydrocephalus has been infrequently described as a complication of meningococcal meningitis.

We report a rare case of neonatal meningococcal meningitis, complicated by subdural empyema and hydrocephalus. To the best of our knowledge only a few cases of neonatal meningococcal meningitis have been reported from South Africa, with none of these cases having the complication of subdural empyma.

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Neisseria meningitidis remains an important cause of meningitis in children and adolescents worldwide. Neonatal meningococcal meningitis is uncommon, with a prevalence of only 2/10 000 being reported by the Centers for Disease Control. Subdural empyema development in the course of meningococcal disease in adults is rare, but seems to affect children more frequently. N. meningitidis remains a major health problem despite effective antibiotics and vaccination. A 10-year study at the Chang Gung Children's Hospital, Taipei, reported on the clinical spectrum of meningococcal infection in infants younger than 6 months of age; 7 of the 10 were neonates, and 4 of these had subdural empyema as a complication. There has been 1 documented case of intra-uterine infection caused by N. meningitidis.

Case report

A 3-week-old male infant was admitted with a 2-day history of fever, lethargy and poor feeding. His mother was known to be HIV-infected; her CD4 count was 264 cells/µl, and she had been started on zidovudine during the pregnancy. The baby was born by normal vaginal delivery at term, weighing 3.610 g. The immediate postnatal period was uneventful and he was commenced on nevirapine prophylaxis at birth. The family lived in a small, overcrowded informal dwelling with three other families, including an 8-year-old school-going sibling.

On examination the infant was poorly responsive with decreased tone, pallor and a temperature of 39°C. No skin rashes or petechiae were noted. Central nervous system examination revealed a full fontanelle but no focal neurological signs. Lumbar puncture was performed (Table 1), and other tests on admission included a full blood count, measurement of urea and electrolytes, liver function tests and measurement of C-reactive protein.

The polyclonal bacterial antigen test was positive for N. meningitidis, which was also confirmed on culture and identified as serotype W135 at the National Institute for Communicable Diseases.

The full blood count revealed a white cell count of 3.77×10^9/l (normal 5.5 - 18×10^9/l), a haemoglobin concentration of 7.8 g/dl (normal 11.5 - 16 g/dl) and a platelet count of 163×10^9/l (normal 150 - 400×10^9/l). The C-reactive protein level (295 mg/l) was markedly increased. Urea and electrolyte levels and the results of liver function tests were normal.

The infant was started empirically on intravenous ceftriaxone 500 mg daily, but developed generalised tonic seizures, with no loss of consciousness, 2 days after admission. The seizures were managed with lorazepam and phenobarbitone. A computed tomography (CT) scan of the brain showed dilatation of the ventricles in keeping with hydrocephalus as well as trans-ependymal fluid and rim-enhancing collections in both cerebral hemispheres compatible with empyema. A diagnosis of complicated meningitis with subdural empyema and hydrocephalus was made. On the basis of the cerebrospinal fluid analysis after 10 days of ceftriaxone (Table 1), neurosurgical advice was to continue intravenous ceftriaxone for 28 days and review thereafter.

The patient continued to have seizures, increased tone, scissoring and opisthotonus, and the occipitofrontal circumference increased from 41 cm to 44 cm. A repeat CT scan revealed an active communicating...
hydrocephalus. A ventriculoperitoneal (VP) shunt was inserted, and a CSF specimen was obtained during the procedure (Table 1). The subsequent hospital stay and follow-up to 21 months was uneventful. The patient has delayed motor milestones with inability to walk. The VP shunt is still in place and functional, and the latest CT scan reveals ventriculomegaly but no hydrocephalus. His HIV test has remained negative at 18 months.

**Discussion**

Acute bacterial meningitis is particularly common during the neonatal period and is associated with high mortality and morbidity including long-term neurological sequelae. Neonates are at increased risk of sepsis because of a relative deficiency in humoral and cellular immunity, as well as in phagocytic function. Infants born at less than 32 weeks' gestation receive little of the maternal transferred antibodies to the neonate. The optimal duration of antimicrobial therapy has little impact on outcome, provided it is performed early and allows for complete clearing, clinically overt disease develops. The type of surgical procedure has little impact on outcome, provided it is performed early and allows for complete evacuation of the pus. The optimal duration of antimicrobial therapy for subdural empyema is uncertain. Parenteral antimicrobial therapy is recommended for at least 3 weeks after neurosurgery, followed by 3 weeks of oral therapy.

**Conclusion**

With the dramatic decline in cases of *H. influenzae* B as a direct result of widespread vaccination with the Hib conjugate vaccine, *N. meningitidis* has emerged as one of the most common causes of acute bacterial meningitis in children. However, it remains an unusual cause of acute bacterial meningitis in the neonatal period, probably because of the protective effect of maternal antibodies. Neonatal meningitis is associated with high morbidity and mortality. Subdural empyema together with hydrocephalus as a complication of meningococcal meningitis has been infrequently described in the literature. Despite the use of ceftriaxone in appropriate doses, to which the organism was fully susceptible, our patient deteriorated and developed complications of subdural empyema and hydrocephalus. Establishing the aetiological diagnosis, as demonstrated in our patient, was vital for correct management of the meningitis and the associated rare complication of subdural empyema and hydrocephalus.

**References**


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**Table 1. Cerebrospinal fluid findings on days 1, 10 and 28**

<table>
<thead>
<tr>
<th>CSF</th>
<th>Appearance</th>
<th>Microscopy, Gram stain</th>
<th>RBCs (×10³/l)</th>
<th>Poly (×10³/l)</th>
<th>Lymph (×10³/l)</th>
<th>Culture</th>
<th>Biochemistry</th>
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<tr>
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<td>Globulin</td>
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<td>Protein (g/l)</td>
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<td></td>
<td></td>
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<td>Glucose (mmol/l)</td>
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<td></td>
<td></td>
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<td>CI (mmol/l)</td>
</tr>
<tr>
<td>Admission</td>
<td>Turbid</td>
<td>Pu cells ++</td>
<td>0</td>
<td>266</td>
<td>28</td>
<td><em>N. meningitidis</em></td>
<td>+++</td>
</tr>
<tr>
<td>Day 10</td>
<td>Turbid</td>
<td>Pu cells ++</td>
<td>0</td>
<td>1 270</td>
<td>110</td>
<td>No growth</td>
<td>+++</td>
</tr>
<tr>
<td>Day 28</td>
<td>Fibrin clot</td>
<td>Pu cells +</td>
<td>400</td>
<td>28</td>
<td>80</td>
<td>No growth</td>
<td>+</td>
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</table>

CSF = cerebrospinal fluid; RBCs = red blood cells; Poly = polymorphonuclear leucocytes; Lymph = lymphocytes; Cl = chloride.
CASE REPORT

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