

An Unusual Cause of Neonatal Meningitis

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KEY WORDS

Intranasal meningocele, meningitis, developmental skull defects

CASE PRESENTATION

A 10-day-old White male infant was brought to a local emergency department (ED) with a 1-day history of fever (38.0°C), fussiness, rhinorrhea, coughing, and difficulty breathing (i.e., subcostal retractions but no grunting). The parents brought the infant to the ED because they had received standard infant care instructions (i.e., infants younger than 2 months must be evaluated for any rectal temperature above 38°C) and were concerned that he was not feeding well. The infant had been born at term via a repeat cesarean section. Results of the mother's serologic studies and group B streptococcal culture were negative. She

had no history of perinatal or postnatal complications. The infant had received his first hepatitis B vaccine in the newborn nursery. The only abnormal finding of the newborn examination was glandular hypospadias. He had been discharged from the hospital with his mother at 2 days of age. The infant had been feeding well until the day he presented to the ED at 10 days of age.

Family/Social History

The infant lived at home with his parents and one older sibling. No one at home had been ill with fever, respiratory illness, or skin lesions. The infant was not in day care.

Review of Systems

On day 10 of life, the infant presented to the ED with a rectal temperature of 38°C, rhinorrhea, breathing difficulties, cough, and a 1-day history of poor feeding. Family members stated that he had been "congested"

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Conflicts of interest: None to report.

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since birth, but they had not observed anything unusual about the shape of his nose or the appearance of his lips. ED staff members noted the presence of rhinorrhea on the initial examination and attributed it to infant's upper respiratory illness.

Physical Examination

On the initial physical examination, the infant was noted to have three white blisters on his lower lip. A mass was present in the left nostril, and it enlarged when the infant cried. Some erythema and fullness of the nose was noted, along with clear fluid discharge coming from the left nostril. An oval-shaped mass approximately 2 cm in diameter was visible along the left exterior side of the nose. The infant also had discharge from his left eye. His respiratory rate was 36 breaths per minute; no retractions were present. Oxygen saturation on room air was 97%. The infant's anterior and posterior fontanelles were not bulging or depressed. The infant had no skin lesions other than those on the lower lip.

Diagnostic Testing

In the ED, the infant's blood, urine, and cerebrospinal fluid (CSF) were cultured. A complete blood cell count was significant for leukocytosis (white blood cell [WBC] count, 28,200/mm³; normal, 5,000-20,000/mm³) and bandemia (20%). His C-reactive protein level was elevated at 12.5 mg/L (normal, 0-0.5 mg/dl). His erythrocyte sedimentation rate also was elevated at 44 mm/hr (normal, 0-4 mm/hr). The platelet count was elevated at 733³/μL (normal, 252³/μL). The CSF obtained from a lumbar puncture was bloody and contained 12,750 red blood cells/mm³; 32 WBCs/mm³; protein, 63 mg/dl; glucose, 60 mg/dl; neutrophils, 70%; and lymphocytes, 30%, but no organisms on gram stain. Complete CSF studies were performed, and results of a herpes simplex virus (HSV) serology study were negative. The initial bacterial culture was negative. Nasal fluid was tested for glucose, but the results were inconclusive.

Magnetic resonance imaging (MRI) of the head was obtained to evaluate the nasal mass. The MRI demonstrated a soft tissue (fluid) signal intensity mass in the left nasal cavity extending to the nasal vestibule. The lesion was multiloculated with enhancement of the dura anteriorly and peripherally. There was no brain tissue within the mass.

Hospital Admission

The infant was admitted to the pediatric unit for continued evaluation and management. Intravenous (IV) administration of prophylactic ampicillin, gentamicin, and acyclovir was initiated to treat possible sepsis and neonatal bacterial and HSV meningitis. By day 2 of admission, the infant's C-reactive protein had decreased to 0.2 mg/L, the erythrocyte sedimentation

rate had decreased to 18 mm/hr, the WBC count had decreased to 18,200/mm³, and the platelet count had decreased to 684,000/uL.

On day 3 of admission, increased erythema and edema developed over the nasal area, and the infant had persistent fever. A follow-up MRI scan with and without contrast demonstrated enhancement of the meninges. The working diagnosis at this time was meningitis that developed after the initial CSF studies were performed. The patient was transferred to the pediatric intensive care unit (PICU) because of progressive respiratory distress resulting from upper airway obstruction. He was electively intubated. The infant continued to have fever. Culture results from the initial nasal swab were reported as 3+ *Staphylococcus aureus* that was resistant to oxacillin. The pediatric infectious disease service was consulted. The infant's parents elected not to repeat the lumbar puncture, because repeat negative CSF cultures would not have ruled out bacterial meningitis in the presence of ongoing antibiotic therapy. The antibiotic was changed from ampicillin to IV vancomycin to cover for methicillin-resistant *Staphylococcus aureus* (MRSA). Clindamycin was not used initially because it does not adequately diffuse into the CSF ([Drugs.com, 2014](#)). Gentamicin was discontinued, and IV cefotaxime was initiated for better central nervous system penetration. The CSF HSV polymerase chain reaction was negative, and the acyclovir was discontinued. The infant received antibiotics for 3 weeks to treat presumed bacterial meningitis caused by an unknown pathogen.

On day 4, the infant underwent a left fronto-orbital craniotomy with repair and reconstruction of the anterior fossa floor and meningocele reduction. The neurosurgeon elected to use Dandy's traditional craniotomy and intracranial surgical approach ([Dandy, 1926](#)) because endoscopic sinonasal procedures are difficult when the involved anatomy is complicated and difficult to access. Two days later, the infant underwent a flexible laryngoscopy procedure to assess the patency of the left nasal passage. Mucosal edema was present, but the scope could be passed to the nasopharynx without difficulty. A third head MRI scan demonstrated encephalomalacia of the left frontal lobe as a result of recent resection of the meningocele. Computed tomography of the head noted a dehiscence area in the cribriform plate.

One week after surgery, the infant was extubated. When nasopharyngeal cultures confirmed the presence of MRSA that was sensitive to clindamycin, vancomycin was discontinued and treatment with clindamycin was initiated, because the infant was now stable. Treatment with cefotaxime was continued to treat any gram-negative bacteria that may have been present.

The infant was discharged 1 month after admission. He had no postoperative complications. He was meeting age-appropriate developmental milestones at

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