Neonatal Meningitis: a Diagnostic Dilemma

Abstract:

Sir

Meningitis causes substantial morbidity and mortality in neonates. However, diagnosis is often difficult as maternal or neonatal antibiotic therapy may have preceded the lumbar puncture (LP). Therefore cerebrospinal fluid (CSF) culture alone may exclude infants with meningitis resulting in partial treatment. In addition, there is controversy about the CSF parameters indicating meningitis in neonates. Neonatal meningitis can occur in the presence of normal CSF white cell count, glucose, and protein levels. The CSF culture is critical to establishing the diagnosis of neonatal meningitis but may not be available due to the large number of samples unsuitable for analysis. CSF cultures can become negative after hours of antibiotic cover. Lumbar puncture can be difficult in neonates and may not be diagnostic so we aimed to study the number of CSF samples suitable for analysis.

We evaluated 500 lumbar puncture results from neonates admitted to the Neonatal Intensive Care Unit of a tertiary referral maternity and neonatal centre between January 2001 and March 2008. Twenty samples (5.3%) had a positive CSF culture and three culture positive samples were considered contaminants with skin flora. 143 (28.6%) lumbar punctures were bloodstained and had at least one sample unsuitable for cell count and 121 CSF samples (24.2%) could not be analysed at all due to bloodstaining or clots. Only 2 of these lumbar punctures were repeated within the following 24 hours to establish a diagnosis. However, there were three positive CSF cultures in the samples that were unsuitable for white cell counts. Due to the retrospective nature of this study, we were not able to evaluate the number of failed lumbar puncture attempts or the number of infants already on antibiotics at the time of LP.

Traumatic LPs are common in paediatric practice, occurring in 15% to 20% of LP attempts which is comparable with our findings. Although culture-negative neonatal sepsis is recognised, there is no definition of culture-negative meningitis. In infants with neutropenia there is a theoretical risk that meningitis will be missed if the sample is unsuitable for culture or antibiotics have already been initiated as their CSF may also be leukopenic. Even in a traumatic LP, the chance of meningitis can be calculated using several different scoring systems using RCC and WCC ratios in the CSF in older patients and future study of these predictors in neonates warrants further study. In addition, LP technique may require formal certification and re-education to optimise the number of suitable CSF samples. Newer PCR techniques and inflammatory markers such as C-reactive protein, Interleukin-6 and 8 in the CSF may aid diagnosis in the future.

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References