Early-onset neonatal sepsis: It is not only group B streptococcus

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A male infant was born at 35 weeks' gestational age. A spontaneous rupture of membranes occurred 22 h before delivery. At that time, the mother received three doses of intravenous penicillin. There was no fever during labour. The infant weighed 2.2 kg with an Apgar score of 7 at both 1 min and 5 min. The infant experienced mild respiratory distress at birth and was admitted to the level II neonatal intensive care unit.

On admission, the infant's heart rate and respiratory rate were 185 beats/min and 86 breaths/min, respectively. His oxygen saturation was 94% with 30% oxygen and his temperature was 35.2°C. A complete blood count was performed and blood cultures were drawn. Ampicillin and gentamycin were started intravenously. At 4 h of age, the infant deteriorated, with increasing respiratory distress and poor perfusion followed by a drop in blood pressure. His complete blood count revealed a white blood cell count of 4.2×10^9/L, with 40% neutrophils, 23% bands, 9% metamyelocytes and 4% myelocytes. An arterial blood gas analysis was performed (pH=7.12, PCO_2=66 mmHg, PO_2=58 mmHg, bicarbonate = 20 mmol/L, and base excess = –7). Low lung volumes, hazy opacification of both lung fields and air bronchograms were observed on the chest x-ray. At 6 h of age, the infant was intubated and given surfactant. At 20 h of age, the blood culture grew *Escherichia coli*. On day 2, a lumbar puncture was performed and the cerebrospinal fluid results were the following: three red blood cells, 10 white blood cells and no bacteria seen. Additionally, the cerebrospinal fluid culture revealed no growth. However, the *E coli* in the blood culture was resistant to penicillin and ampicillin, and sensitive to gentamycin. The infant remained ventilated for four days, treated with gentamycin for 14 days and then discharged home. At the six-month neonatal follow-up, the infant was doing well and developing normally.

LEARNING POINTS

- Early-onset neonatal sepsis (EONS) occurs within the first week of life, and usually within the first 48 h of age (1).
- The reported incidence of EONS varies from one to 4.6 cases per 1000 live births (2-4).
- EONS is mainly caused by vertical transmission of organisms from the mother to the infant (2).
  - Risk factors for EONS include maternal chorioamnionitis, maternal colonization with group B streptococcus (GBS), prematurity and prolonged rupture of membranes.
- Neutropenia can be a key indicator of neonatal sepsis during the first week of life (5).
- All clinically unwell infants should be evaluated and treated for neonatal sepsis with broad-spectrum antibiotics (5).
- GBS has traditionally been the most common cause of EONS; however, some centres have reported an increasing incidence of EONS caused by *E coli* (1-4).
  - Recent data from the Canadian Neonatal Network (6) have demonstrated that among preterm infants (younger than 37 weeks' gestational age) admitted to level III neonatal intensive care unit centres, EONS was most commonly caused by *E coli*.
- For more than 15 years, Canadian guidelines have recommended intrapartum antibiotic prophylaxis to prevent EONS from GBS (7).
  - Maternal antibiotic use (most commonly penicillin) in labour is one of the most effective and common ways of preventing EONS caused by GBS (7).
  - EONS resulting from GBS has decreased dramatically with the increased use of intrapartum antibiotic prophylaxis.
- An unintended consequence of widespread use of maternal antibiotics could be a change in the infection pattern of EONS and/or an increase in the number of resistant organisms.
- An increase in the number of Gram-negative bacteria that are resistant to penicillin in very-low-birth-weight infants has been reported in some centres (2,3,8,9), while others (10) have reported no increase in Gram-negative infection or ampicillin-resistant infection among term or very-low-birth-weight infants with EONS.
- Understanding changes in neonatal sepsis patterns is vital to developing appropriate and effective strategies for the prevention, detection and treatment of EONS.
- The Canadian Paediatric Surveillance Program study on EONS and meningitis began in January 2011 to assess the pathogens associated with EONS, to identify the factors that may be contributing to changes in neonatal sepsis patterns and to determine the prevalence of bacterial resistance in this vulnerable population.

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