CASE REPORTS

CAMPYLOBACTER FETUS SUBSPECIES FETUS SEPSIS IN A NEONATE: CASE REPORT AND REVIEW OF THE LITERATURE

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Abstract

Campylobacter fetus subspecies fetus is an uncommon cause of neonatal sepsis. Perinatal infection is severe, often resulting in spontaneous abortion, prematurity, septic shock, pneumonia, meningitis and postnatal death. Diagnosis is difficult as signs and symptoms of infection are not specific. We present a case of C. fetus subsp. fetus bacteremia in a premature newborn of a substance abusing mother with chorioamnionitis. Specific identification and antimicrobial susceptibilities resulted in successful treatment of the patient.

Introduction

Campylobacter fetus subspecies fetus causes septic abortions in cattle, goats and sheep due to marked tropism for placental tissue. In humans C. fetus subsp. fetus rarely causes invasive disease except in immunocompromised patients including pregnant women and neonates. Neonatal infection causes prematurity, sepsis, pneumonia, meningitis, and is frequently fatal. We describe a case of sepsis due to C. fetus subsp. fetus in the newborn of a homeless mother with substance abuse and viral hepatitis.

Case Report

A two hours old male baby arrived by ambulance to the hospital after birth in a parking lot. Paramedics cut the umbilical cord and noted blood in the amniotic fluid. The mother's history was remarkable for homelessness, cocaine use, treated syphilis, psychiatric illness, and six prior pregnancies resulting in five live births and one elective abortion. Examination of mother revealed apparent intoxication, elevated blood pressure, and a firm fundus. Laboratory studies of mother included an elevated white blood cell count of 15,900 cell/mm3 with 81% neutrophils, RPR of 1:4, consistent with previously treated syphilis, positive hepatitis C antibody and hepatitis B surface antigen after prior negative results, negative rapid HIV test, and positive urine toxicology screen for cocaine. She received treatment for pre-eclampsia and chorioamnionitis. After 72 hours she was discharged without a clear causal diagnosis.

The newborn was in respiratory distress requiring intubation and mechanical ventilation. He received ampicillin (100 mg/kg/day) and gentamicin (4.5 mg/kg/every 36 hours) for presumed sepsis with prophylactic immunization and immunoglobulin for hepatitis B exposure. Examination revealed birth weight of 1742 grams, estimated gestational age of 30 weeks and a systolic murmur at the left upper sternal border consistent with patent ductus arteriosus. Laboratories showed white blood cell count of 42,400 cells/mm3 with 45% neutrophils, 37% lymphocytes and 10-24% band forms, elevated C-reactive protein of 142.8 mg/L, urine toxicology screen positive for cocaine, and non-reactive RPR. Cerebrospinal fluid yielded 3 white and 1070 red blood cells/mm3, 25 mg/dL glucose, 143 mg/dL protein, negative bacterial culture and VDRL. Chest radiograph showed bilateral hazy opacities. Blood culture yielded a curved gram-negative rod at twelve hours of incubation that was later fully identified at the local Public Health laboratory as C. fetus subsp. fetus. Antimicrobial coverage was narrowed to gentamicin. Subsequent blood cultures were sterile.

Placental pathology showed chorioamnionitis, meconium staining, chronic villitis, and fibrinoid necrosis. Intravenous azithromycin (10 mg/kg/day) was added after susceptibility was demonstrated by Kirby Bauer. The baby improved clinically and was extubated after one week, completing seven days of gentamicin and five days of azithromycin. After meeting feeding and growth requirements, he was discharged to foster care at one month of age.

Discussion

The mother's amnionitis, premature labor, coupled with her baby's sepsis suggest that she had systemic infection with C. fetus subsp. fetus. Pregnancy, viral hepatitis, drug use and unsanitary living situation likely contributed to the development of infection. The route of transmission to the baby is unclear. Unhygienic conditions surrounding delivery favor ascension of bacteria from the perineum, while evidence of sepsis on presentation suggests transplacental transmission. The causative organism, C. fetus subsp. fetus, was not suspected until it grew in blood culture. Inclusion of gentamicin in the initial empiric regiment was fortunate, preventing progression to more severe disease or death.

Campylobacter are curved gram-negative bacilli capable of causing disease in humans and animals. They live in the gastrointestinal tract of sheep, cattle, goats, antelope, pigs, chickens and turkeys. Human infection usually results from ingestion of contaminated food or water. C. fetus subsp. fetus is a known cause of sporadic abortions in cattle and sheep, but a rare cause of disease in humans. It differs from other Campylobacter species in its ability to cause bacteremia by resisting complement-mediated bactericidal activity in human serum. This is accomplished through a unique virulence mechanism whereby surface layer proteins prevent the binding of complement C3b and inactivate the membrane attack complex, blocking opsonization and causing impaired phagocytosis.(1)

In immunocompromised hosts, C. fetus subsp. fetus causes mycotic aneurysms, prosthetic valve endocarditis, and prosthetic joint infections due to a predilection for vascular endothelium and medical devices.(2,3) Pregnant women are at increased risk for invasive infection. C. fetus subsp. fetus grows preferentially in placental tissue. Pregnant women experience fevers, chills, diarrhea, chorioamnionitis and spontaneous abortions.(2) Neonates develop fever, cough, respiratory distress, vomiting, diarrhea, cyanosis, seizures, and jaundice, often progressing to rapidly fatal meningitis.(1)

The probable mode of transmission to the fetus is development of maternal bacteremia with transplacental passage.(4) Infection of neonates without membrane

rupture supports this route.(5) However, vaginal carriage may result in ascending infection.(6) In causing systemic infection simultaneously in mother and baby the pathogenesis resembles that of Listeria monocytogenes.(5) Perinatal infection is rare with fewer than 25 published cases.(4,6,7) In 1947, the first reported case involved a pregnant woman with bacteremia and a spontaneous abortion at six months gestation.(8) In a 2006 review of the 14 cases documented in the English literature by Fujihara (7) five pregnancies resulted in spontaneous abortion and one infant was stillborn. Of the live births six infants were premature and four subsequently died from complications of infection and prematurity. Sepsis was the most common presentation, while one child had meningitis and one had pneumonia.(7) Our patient had sepsis and pneumonia. Reported mortality is as high as 80%.(4)

Specific diagnosis relies on positive culture. Campylobacter grow on standard blood culture media, but require prolonged incubation of up to two weeks. A microaerophilic environment with selective media is preferable.(2) As C. fetus subsp. fetus has been isolated from the placenta of most reported patients, placental cultures and histological examination should be obtained. As in our patient, placental pathology typically shows necrosis and chorioamnionitis. (4,6,7)

Early appropriate treatment of C. fetus subsp. fetus is critical as morbidity and mortality are high, especially in meningitis. Campylobacter species are susceptible to aminoglycosides, tetracycline, chloramphenicol, and trimethoprim/sulfamethamezole. Susceptibility to penicillins, cephalosporins, macrolides, and fluoroquinolones is variable.(1) Talsma (9) noted 16.5% resistance to ofloxacin in 1,315 Dutch children with positive fecal culture for campylobacter, attributed to the use of fluoroquinolones in animal feeds. Low level erythromycin resistance (<2% of isolates) was also noted.(9) Given the broad use of macrolides in the United States, greater resistance is likely and susceptibility should be confirmed before use as a single agent in neonatal infection. Imipenem was associated with better outcome in a case series of adults with C. fetus subsp. fetus bacteremia.(10) A recent neonatal case report demonstrated successful treatment with the carbapenem panipenem/betamipron. While gentamicin is the first line treatment in infants,(1) carbapenems should be used empirically in severely ill patients.(7)

This patient illustrates the clinical presentation of C. fetus subsp. fetus neonatal sepsis. Without prompt appropriate treatment, infection results in high morbidity and mortality. C. fetus subsp. fetus infection should be considered in newborns with sepsis especially with maternal history of chorioamnionitis or previous miscarriage. Curved gram negative bacilli in blood or CSF culture suggest Campylobacter species. This case emphasizes the importance of thorough bacteriologic investigation in newborns with sepsis. As in this case, uncommon organisms, resistant to commonly used antibacterials, sometimes cause severe disease. Inclusion of gentamicin in empiric therapy of neonatal sepsis is advantageous as it may cover unexpected beta-lactam resistant pathogens.

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