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Fellow Column: Late-Onset GBS Lower Extremity Cellulitis in Premature Neonate with a GBS Negative Mother with Alternative Modes of Transmission: A Case Report

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Abstract

Purpose: To report a case of cellulitis-causing late-onset Group B streptococcus (GBS) GBS in a neonate with a previously negative antenatal tested mother. This report aims to discuss the various transmission modes potentially causing this case of cellulitis, such as contaminated breast milk.

Case Description: A preterm neonate, born via cesarean section (C-section) at 29 weeks gestation to a G1P0 mother with a negative GBS rectovaginal antenatal swab test, subsequently developed late-onset cellulitis in the lower extremity due to GBS 19 days later.

Methods: This is a retrospective case report followed by clinical observation, blood cultures, imaging, and antibiotic interventions.

Results: A neonate with left lower extremity cellulitis was found to be GBS positive from a previously negative antenatal GBS-negative mother.

Discussion: As GBS is a common pathogen of neonatal sepsis and less commonly cellulitis, testing rectovaginal fluids once may not be enough to prevent neonates and preterm infants from protecting against transmission. As there have been rare cases of GBS-contaminated breast milk, culturing and testing of breast milk should also be considered, especially in preterm infants.

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Introduction:

Group B streptococcus (GBS) has been considered a long-standing and common etiology of early-onset neonatal sepsis and meningitis but also has been known to cause cellulitis less frequently. (1) When present, the cellulitis most commonly manifests as inflammation and induration on the face and submandibular area of the infant. We report an interesting case of a premature 29-week gestational age neonate that developed left lower extremity cellulitis 19 days after birth and ten days after beginning expressed breast milk (EBM) feedings. As GBS may cause premature birth despite negative antenatal testing in the mother, GBS may be implicated in the late-onset infection in this case. (2) As the previous testing of rectovaginal fluids was GBS-negative in the mother, this screening potentially points to some unreliability of testing rectovaginal fluids to prevent late-onset GBS infections in neonates and will have to be explored further. As there have also been previous rare cases of GBS-contaminated breast milk reported in the literature, breast milk culture may be a reasonable additional option to aid in the prevention of horizontal transmission of GBS infections in neonates, especially in high-risk preterm infants. (3)

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Case Summary:

The neonate is a preterm infant born at 29 weeks gestational age to an 18-year-old G1P0 Hispanic woman with a blood type of O negative. The mother has a medical history of chlamydia infection a few months prior and a history of marijuana use, with the last urine drug screen negative. Due to a non-reassuring fetal status and fetal decelerations, a cesarean section was performed. The mother received two doses of betamethasone and magnesium sulfate before delivery. The infant initially required respiratory support with PPV, FiO2 of 100% that was gradually decreased to 30%. The baby was placed on RAM cannula with a CPAP of +6 prior to transport to the NICU. APGAR scores were 2, 5, and 9 at 1, 5, and 10 minutes.

On admission, the male infant's temperature was 36.7, heart rate 152, respiratory rate 38, blood pressure 56/32, and mean O_2 saturation of 96%. At 29 weeks gestational age, the birth weight was 1240 g (26-50th percentile), head circumference of 27 cm (26-50th percentile), and length 40 cm (76-90th percentile). Upon physical exam, there was mild nasal flaring with moderate intercostal retractions present. Breath sounds were clear but equally decreased bilaterally. The neonate responded to tactile stimulation, though tone and activity were decreased. The skin was pink and perfused, with no rashes, lesions, or vesicles noted. The infant was made NPO and started on TPN with initial glucose of 64. The baby was given caffeine citrate, placed on PPV, and non-invasive mechanical ventilation with FiO_2 28%, PIP 24 cm H_2O, PEEP 6 cm H_2O, at a rate of 25 breaths per minute. Initial chest

x-ray showed lungs well expanded with haziness bilaterally, consistent with RDS. Sepsis workup, including CBC, CRP, and blood culture, was performed, but IV antibiotics were not started on admission. Initial lab results were within normal limits with values of WBC 10.6 cells x 10^9/L, Hgb 15.1 g/dL, Platelets 198 x 10^9/L, with a normal differential (1% band forms). Blood culture was negative. There were no known maternal risk factors for infection.

Seven days post-admission, the infant began having multiple frequent spells of bradycardia and desaturation with feeding intolerance. CBC and CRP screening were obtained, and IV antibiotics of ampicillin and gentamicin were started. IV vancomycin was added when the left leg was noticed to have an 8 cm erythematous, nondemarcated swelling ten days after EBM feedings were started. WBC was elevated at 28.5 cells x 10^9/L with a CRP of 17.8 mg/dL, and blood cultures were positive for Group B streptococcus. X-ray of the left leg showed no sign of osteomyelitis. Lumbar puncture was negative for meningitis. WBC and CRP trended down, and left leg cellulitis resolved a week later. Vancomycin was discontinued the following day; IV ampicillin and gentamicin were continued for the entire course of 21 days.

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Discussion:

Although essential to prenatal care, the standard rectovaginal swab for GBS does not reveal all details necessary to eliminate suspected sepsis in the neonate. As seen in previous studies, GBS colonization in the pregnant woman can be intermittent, persistent, or transient, with 51% of women clearing the bacteria during their pregnancy and 19% having had the organism at some point in the pregnancy. (4,5) In fact, studies show that if a woman is tested negative antenatally, up to 9% can test positive if swabbed again postpartum. (4) Due to the lack of persistent positive results, a one-time antenatal rectovaginal swab does not empirically eliminate the possibility of a future GBS infection. The prevention of GBS infections becomes even more difficult in preterm babies due to the increased risk of infection, especially with a prolonged rupture of membranes. (2) In fact, maternal GBS colonization itself can directly cause preterm birth before infecting the neonate, whether upon birth or late-onset. (2) As a result, GBS has become a complex and capricious organism to monitor in the mother and neonate.

We present a case of late-onset GBS infection born to a mother with a negative antenatal swab for GBS. The patient's initially normal WBC and afebrile status did not warrant antibiotic use, yet ten days following EBM administration, the WBC and CRP were significantly elevated. The subsequent blood cultures positive for GBS, accompanied by left lower extremity cellulitis, created an unusual presentation, as only 4% of late-onset GBS infections share this characteristic. (1) This aligns with a review of 32 cases of GBS cellulitis-adenitis, in which 91% of patients showed bacteremia as the most common manifestation of GBS infection. (5) In addition, late-onset infections tend to occur within the time frame of 4 to 5 weeks of life, whereas this case presented as cellulitis 19 days after birth and ten days after adding EBM to the patient's diet. (6) These details warrant an investigation into the source of GBS.

The pathophysiology of late-onset GBS remains unclear. One potential source stems from household contacts, including parents, siblings, and other caregivers that may be colonized by GBS. Alternatively, the infection may be hospital-acquired. An essential yet overlooked consideration is the contamination of the mother's breastmilk. EBM is GBS positive in 0.8 to 3.5% of mothers. (3) EBM may test positive despite a negative rectovaginal swab, highlighting its potential as an underlying culprit of late-onset GBS. As EBM is given frequently to the patient, there is also a 35% recurrence rate. (7) However, the origin of GBS in EBM is ambiguous. It may originate from preexisting colonization of the newborn's throat that is then passed to the mother's mammary gland, converting a previously GBS-free mammary gland to a potential source of recurrent infections. On the other hand, the origin may be the mammary gland itself, transmitting the infection to the newborn through EBM feeds. (3,7) Future research is necessary to differentiate between these possibilities and likely include testing EBM before the first feed.

Thus, it may be warranted to introduce breastmilk culture as the standard of care to better control rates of late-onset GBS infections, especially in at-risk premature infants. A study aiming to identify GBS infection sources with 160 mother-baby pairs discovered colonization of GBS in neonates after leaving the hospital, even with exposure to intrapartum antibiotics and with GBS-negative mothers upon hospital discharge. (8) Although some studies claim culturing breast milk is costly and purposeless due to EBM's multibacterial contamination, the process may still be beneficial in preterm babies who are already more susceptible to infection. (9) The existence of GBS in breast milk should not be a contraindication to breastfeeding. An alternative option may be antibiotic prophylaxis while breastfeeding GBS-positive EBM. (9) Breast milk does have a wide variety of nutritional and immunologic benefits for the baby. However, it can be a source of life-threatening GBS bacteremia, meningitis, or other local infections for the preterm neonate. Culturing EBM and accounting for its GBS status can be a critical piece of information for the immunodeficient neonate and prevent systemic infections.

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Conclusion:

A late-onset GBS infection manifesting as cellulitis in a premature

neonate, born to a mother considered GBS-negative per rectovaginal swab as presented in this case report, provides the opportunity to discuss possible etiologies and solutions to prevent late-onset infections in the future. The literature has shown that the standard of care with a one-time rectovaginal swab for GBS during pregnancy has exhibited inconsistencies, including false negatives, leading to premature birth and subsequence neonatal sepsis. This unique case of late-onset GBS in a patient at less than three weeks of life and who began receiving breastmilk ten days before initial signs of infection suggests that breastmilk, a commonly overlooked source of infection, warrants further investigation. Breastmilk benefits are numerous and well-established, but investigating breastmilk through culturing to ensure its safety before adding it to a premature neonate's diet is often argued against in communities promoting breastfeeding. However, this simple step could be added to care standards to promote early antibiotic prophylaxis and detect potential threats to an already immunocompromised patient. Culturing breast milk should empower patients' mothers, families, and providers to know that all steps are being taken to ensure their premature babies' safety and prevent or lessen the burden of late-onset infection while benefiting from a breastmilk diet.

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