Multiple Subcutaneous Abscesses by MSSA Related to Peripherally Inserted Central Catheter Infection in an Extremely Low Birth Weight Infant

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Abstract

Preterm infants are at high risk of developing invasive staphylococcal disease, not only because of immature host defense mechanisms but also secondary to intensive medical treatment required in the first few weeks of life. *Staphylococcus aureus* commonly causes superficial skin abscesses. Most patients with small skin abscesses present with localized pain and erythema; however, in some neonates, a skin abscess can rapidly progress to bacteremia and clinical sepsis. Previous reports have described sepsis or bacteremia causing multiple subcutaneous abscesses in extremely low birth weight (ELBW) infants, mostly due to Gram-negative rods. Ours is the first report to describe the occurrence of multiple staphylococcal pyogenic subcutaneous abscesses secondary to peripherally inserted central catheter-related sepsis in an ELBW infant. We recommend that physicians perform a thorough clinical examination including an inspection of the skin all over the body keeping in mind the possibility of multiple skin abscesses particularly in preterm infants presenting with *S. aureus* sepsis.

Key words
Abscess, catheter, neonate

Case

Our patient was an extremely low birth weight (ELBW) female infant weighing 814 g who was born transvaginally at 24 weeks of gestation with no malformations. The mother did not suffer any complications or premature rupture of membranes during pregnancy. The infant’s Apgar scores were 7 and 9 at the first and fifth minutes, respectively. Because she was an ELBW infant, she was hospitalized in a neonatal intensive care unit. No signs of bacterial infection such as fever, apnea, and leukocytosis were observed. She was intubated because of respiratory distress, and mechanical ventilation was initiated. A peripherally inserted central catheter (PICC) was placed for fluid therapy administration, but it required frequent replacement because of catheter obstruction and extravasation. At 19 days of age, despite stable vital signs on the respirator, frequent apneic episodes occurred with the development of erythema at the site of catheter insertion. Laboratory investigations showed leukocytosis (29,600 cells/mm³, 65% polymorphonuclear leukocytes) and elevated C-reactive protein (CRP) level of 9.4 mg/dL, but immunoglobulins A, G, and M were within normal range. Treatment was initiated with aminobenzoyl penicillin (100 mg/kg/day) and gentamicin (5 mg/kg/day) intravenously after blood cultures were obtained, and the PICC line was replaced. At 22 days of age, subcutaneous masses were observed to have developed at the left supraclavicular fossa, bilateral knee joints, left intercostal space, and the forehead (Figure). Ultrason sound examination showed solitary fluid-filled cysts at each site. Exploratory puncture and drainage of abscesses was performed. Gram staining showed Gram-positive cocci. Blood and abscess cultures revealed methicillin-sensitive *Staphylococcus aureus*; thus, the antibiotics were switched to cefazolin (75 mg/kg/day), and treatment was continued for 21 days. Brain and abdominal ultrasound examinations were re-
peated several times during the course of the antibiotic treatment; however, no abnormal lesions were detected. Following the initiation of antibiotic therapy, her elevated white blood cell count and CRP level gradually returned to the reference range. She was discharged at 95 days of age without any complications. A brain magnetic resonance imaging study performed prior to discharge showed no abnormalities.

Discussion

The present case is of an ELBW female infant who developed multiple abscesses caused by *S. aureus* from a PICC infection.

Staphylococcal infections occurring in early childhood are often associated with severe conditions, especially in premature neonates. Bacteremia in infants may be due to bacterial endocarditis, osteomyelitis, focal infection, inadequate treatment with antibiotics, and an infected central venous catheter\(^1\). Abscesses may form at the port of entry of the infec-

tion or at metastatic foci. However, multiple staphy-
lococcal abscesses in ELBW infants are very rare. Moreover, Mandel et al. reported that cutaneous abscesses in septic infants are mostly Gram-negative rods such as *Escherichia coli*, *Klebsiella pneumonia*, *Serratia marcescens*, *Enterobacter cloacae*, and *Pseudomonas aeruginosa*\(^2\). Because the subcutaneous abscesses in the present case were caused by infection from Gram-positive cocci, i.e. *S. aureus* bacterial sepsis, our case is different from previous reports\(^3\). *S. aureus* commonly causes superficial or subcutaneous abscesses and is known as an important microorganism causing neonatal sepsis\(^4\). PICC placement is associated with the known risk of local infection at the PICC insertion site and sepsis caused by *S. aureus* or *S. epidermidis*\(^5\). The PICC in our patient was frequently replaced due to catheter occlusion and/or local extravasation. Although we chose a different insertion site with thorough sterilization of the equipment with povidone iodide each time the PICC was replaced, repeated PICC replacement within short time intervals likely contributed to microbial invasion at the local site. We believe that local skin infection in our patient led to sepsis and vascular dissemination of *S. aureus* causing the multiple subcutaneous abscesses. *S. aureus* abscess is usually unilateral, with erythema and induration. Occasionally, fever, leukocytosis or bacteremia can occur. Isolation of the pathogen from discharge aids in sepsis management. Local cleansing and incision and discharge are essential components of the management of abscesses\(^2\). Sometimes, small abscesses can be treated without systemic antimicrobial therapy. Exceptions include neonates with skin abscesses, infants with a breast abscess, and older patients with a rapidly progressing number of lesions or with systemic signs such as fever.

Fortunately, this patient did not suffer any neurological complications, although several reports mention the occurrence of bacterial meningitis or brain abscesses as a complication of *S. aureus* sepsis\(^5\). To our knowledge, the occurrence of multiple subcutaneous abscesses has not been reported as a complication of sepsis in an ELBW infant. In preterm infants who can be considered immunocompromised hosts, pathological bacteria can easily invade the bloodstream and disseminate widely to multiple organs. We recommend that physicians perform a thorough clinical examination including an inspection of the skin all over the body while keeping in mind of the possibility of multiple skin abscesses particularly
in preterm infants presenting with *S. aureus* sepsis.

**Conclusion**

When a PICC-related bacterial infection is found, the surface of the skin should be carefully investigated. To our knowledge, this is the first report to describe the occurrence of multiple staphylococcal pyogenic subcutaneous abscesses secondary to PICC-related sepsis in an ELBW infant.

**Conflicts of Interest**

The authors declare no potential conflicts of interest.

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