

## Penicillin-Resistant *Streptococcus Pneumoniae* (Pneumococcus) Osteomyelitis in a Premature Infant

Salwa Al Noaimi, MD, ABP\* Manal D. Shihadeh, MD, FAAP, Diplomate of ABP\*\*

**We present an extremely rare occurrence of penicillin-resistant *Streptococcus pneumoniae* osteomyelitis infection in a four-month-old premature infant. The baby presented with swelling of the thigh and low-grade fever.**

**The X-ray of the leg was suggestive of fracture of the femur, while the ultrasonography revealed a periosteal reaction suggestive of osteomyelitis of the bone. Aspiration of the pus confirmed the presence of penicillin-resistant streptococcus pneumoniae. The infection was managed with intravenous Cefepime for three weeks followed by another three weeks of oral Augmentin; the infant had good clinical and radiographic recovery.**

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Osteomyelitis is an inflammation of the bones; the infection starts in the metaphysis<sup>1,2</sup>. The most common offending organism that causes osteomyelitis in children is *Staphylococcus aureus*<sup>3-6</sup>. Methicillin-resistant *Staphylococcus aureus* has been playing a major role in osteomyelitis, in the last decade<sup>3-6</sup>. *Streptococcus pneumoniae* (pneumococcus) is a very common organism causing pneumonia, otitis media, bacteremia and meningitis in children<sup>7</sup>. Nevertheless, pneumococcus does not cause osteomyelitis in children except in few reported cases in the literature<sup>8</sup>. In this report, we present a rare invasive infection in a premature infant where the pneumococcal organism was implicated and it was the penicillin-resistant type.

The aim of this report is to alert the physicians of the possibility that pneumococcus could result in osteomyelitis in premature infants.

### THE CASE

The infant is a premature Bahraini male, who was born at 26-weeks gestation. The mother had no risk factors for premature delivery and had no prenatal infection. The infant remained in the Neonatal Intensive Care Unit (NICU) for three months. He had respiratory distress syndrome and was mechanically ventilated. He had received several courses of antibiotics for suspected sepsis, which was never proved. Three weeks prior to his illness, the infant was admitted to the hospital with bronchiolitis and did not receive antibiotics. At presentation, the infant was four-months-old, but his corrected age for prematurity was two weeks. The infant had a five-day history of left thigh firm swelling with limited movement of the leg. He also had low-grade fever for a few days and was inactive and irritable. There was no noticeable redness of the skin or lesions overlying the swollen thigh. The white blood cell count was normal at 10.5<sup>9</sup>/L with 60% polymorphonucleocytes, 21%

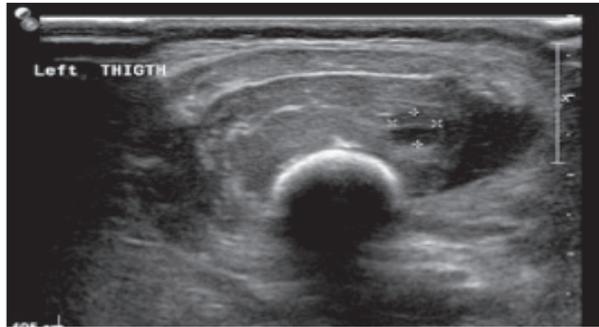
lymphocytes and 17% monocytes. The C-reactive protein was high at 49 mg/L (normal <3mg/L). The electrolytes and the liver function test were normal. X-ray of the leg was suggestive of a fracture of the femur; however, ultrasonography revealed periosteal reaction in the lower left femoral metaphysis with an associated large sized collection with an intramuscular extension, see figures 1 A and B. The collection was aspirated and the pus culture revealed penicillin-resistant *Streptococcus pneumoniae*. The baby received antibiotic therapy with intravenous Cefepime for three weeks followed by another three weeks of oral Augmentin. He had good clinical and radiographic recovery.



**Figure 1 (A): Left Femoral X-Ray in a 4-Month Old Premature Infant Showing Periosteal Reaction Suggestive of Either Femoral Fracture or Osteomyelitis**

\* Consultant Pediatrics and Pediatric Infectious Disease  
Acting Chairman

\*\* Consultant Pediatrics  
Pediatric Department  
Salmaniya Medical Complex  
P.O. Box 12, Manama  
The Kingdom of Bahrain  
Email: SNoaimi@health.gov.bh



**Figure 1 (B):** Ultrasonographic Study Revealed Periosteal Reaction in the Lower Left Femoral Metaphysis Associated with a Large Size Heterogenous Collection in the Antral Part of the Left Femoral Metaphysis

## DISCUSSION

Streptococcal pneumonia disease is a worldwide health problem<sup>7,9</sup>. In 2000, it caused an estimated 14.5 million episodes of serious infections globally<sup>9</sup>. Pneumococcal infections have resulted in the death of 826,000 children between the ages of one month and five years<sup>9</sup>. It is a common pathogen that affects children. It is the main cause for pneumonia infection, otitis media, sinusitis, bacteremia and meningitis. However, it is a very uncommon cause of osteomyelitis in children<sup>7,9</sup>.

Osteomyelitis is a rare infection in children<sup>10</sup>. The annual incidence of acute childhood osteomyelitis in Norway is 8 per 100,000<sup>11</sup>. The most common causative organism is *Staphylococcus aureus*, followed by *Streptococcus pyogenes* and *Kingella kingae*. Methicillin-resistant *Staphylococcus aureus* has been emerging as a leading cause of osteomyelitis in the recent years<sup>3,6,12</sup>. Ratnayake et al reviewed the data in pediatric osteomyelitis diagnosed from 2003 to 2012 post-pneumococcal vaccine; the study revealed that methicillin-sensitive *Staphylococcus aureus* is the most common causative organism, followed by methicillin-resistant *Staphylococcus aureus* (MRSA)<sup>3</sup>. In 2008, Huang et al reported one case of penicillin-resistant Pneumococcal osteomyelitis in 7-month-old infant; our case is another one of such a rare invasive infection<sup>8</sup>.

Pneumococcal disease has significantly been affected by Pneumococcal immunization<sup>13</sup>. In the United States, the widespread use of the Polyvalent Pneumococcal vaccine has significantly impacted the drop in the incidence of invasive Pneumococcal disease. It is estimated that the incidence of invasive Pneumococcal disease has declined from 24.3 cases per 100,000 in the pre-vaccine era to 17.3 per 100,000 post-vaccine<sup>13</sup>. The emergence of penicillin-resistant Pneumococcal Invasive disease is another concern. The Tigecycline Evaluation Surveillance Trial (TEST) has shown that serotypes 19A, 19F, 35B, 6A, 6B, 23A, 9V, 15A, and 14 are commonly associated with penicillin-resistance<sup>14</sup>.

The World Health Organization urges all countries to use the Pneumococcal vaccine in an attempt to prevent serious Pneumococcal disease and reduce the mortality rate from such disease<sup>9</sup>.

## CONCLUSION

**Pneumococcal osteomyelitis is a very rare invasive disease in children and the emergence of penicillin-resistant *Streptococcus pneumoniae* adds to the seriousness of the issue.**

**We must be aware that resistant Pneumococcal serotypes could cause osteomyelitis in infants and in premature babies.**

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