

Case Report

Klebsiella Osteomyelitis of the right humerus involving the right shoulder joint in an infant

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Abstract

Osteomyelitis in newborn infants is a rare infection. Lower extremity joints are commonly affected. Most of the cases have a haematogenous spread. Aerobes are the common group of organism involved, of which *Staphylococcus aureus* is the commonest. *Klebsiella* osteomyelitis has been reported as a cause of Osteomyelitis. However, to the best of our knowledge, this is the first case report of *Klebsiella pneumoniae* associated osteomyelitis in an infant from Pakistan.

Introduction

Osteoarticular infections, although uncommon, represent a severe condition in neonates. Infections in newborns are largely of an acute nature, transmitted by haematogenous means.¹ The osteomyelitic focus is usually found in the metaphysis of a long bone, although infection may spread to the contiguous epiphysis and joint in neonates.^{1,2} The intracapsular metaphysis of proximal femur and humerus, results in a high risk of concomitant septic arthritis in these joints.³ The most commonly affected joints are the Hip joints (31%), Knee joints (25%), and Ankle joints (18%).⁴ Affected neonates usually survive, but with permanent skeletal deformities.⁵

Etiologically, the most common organisms affecting the joints in the neonatal period are aerobes. The predominant aerobes causing osteomyelitis in children are *Staphylococcus aureus*, *Haemophilus influenzae* type-b, Gram-negative enteric bacteria, beta-haemolytic *Streptococci*, *Streptococcus pneumoniae*, *Bartonella henselae* and *Borrelia burgdorferi*. Anaerobes have rarely been reported as a cause of these infections in children. Many patients with osteomyelitis due to anaerobic bacteria have evidence of anaerobic infection elsewhere in the body, which is the source of the organisms involved in osteomyelitis.^{6,7}

Case Report

A five week old infant first presented to us in the paediatric outpatient clinic. This infant was born in another hospital by vacuum assisted vaginal delivery. Birth weight was 3.7 Kg. He was treated for ten days at another hospital for *Klebsiella* bacteraemia with IV Meropenem. He was brought

to our clinic because his mother had noticed that the child was having difficulty moving his right upper limb since the last 2 weeks. He was also increasingly irritable. He was given all the routine vaccinations at birth and at 6 weeks of life.

On examination in our clinic, we saw that the infant was active, alert, and had gained adequate weight for his age. There was some movement in the right hand, but movement at the elbow and shoulder joints was minimal. The right shoulder joint looked swollen and felt mildly warm to touch. On palpation of the right shoulder, extreme pain was demonstrated. Rest of the systemic examination was unremarkable.

An X-ray of Right shoulder showed a significant periosteal reaction in the proximal humerus, along with an irregularity at the proximal metaphysis. These findings were consistent with an infectious etiology and hence a diagnosis of osteomyelitis was made, and the child was admitted to the paediatric ward.

In the ward, intravenous Meropenem was started at a dose of 40mg/kg/dose Q8hourly. Orthopaedic and Infectious disease consults were generated.

His blood work showed Leukocytosis, WBC 31.5×10^9 /liter, with 60.6% Neutrophils. The platelet count was 978×10^9 /liter and ESR was 80mm/hr. CRP was 23.8. A Blood culture was positive for corynebacterium species, which was probably a contaminant.

The orthopaedic team decided to operate following



Figure: Appearance of the Right Humeral Head after treatment compared to the Left Side.

clinical assessment, laboratory tests and x-rays. The shoulder joint was aspirated under image intensifier and one ml of pus was aspirated, and sent for culture and sensitivity. The shoulder joint and proximal humerus were exposed through deltopectoral approach. The lytic area in the metaphysis of humerus and shoulder joint was debrided thoroughly and irrigated with saline. Necrotic bone and granulation tissue were removed. The intracapsular biopsy showed synovial tissue with acute and chronic inflammation and microabscess formation. No evidence of malignancy or granuloma formation was seen.

Pus and tissue cultures both grew moderate amounts of *Klebsiella pneumoniae* colonies which were sensitive to several antibiotic including Gentamicin, and Imipenem/Meropenem. Both samples did not grow any anaerobes. Tissue cultures for Acid Fast Baeilli (AFB) and fungi were negative. Hence, it was decided to continue Meropenem at 20mg/kg/dose Q12 h intravenously for 3 weeks.

A repeat X-ray done on 7th day showed a lytic lesion in the proximal metaphysis of the humerus which was now more conspicuous compared to the previous examination and a periosteal reaction was noted in few areas. The infant was discharged on the 7th day to continue home intravenous antibiotic for 3 weeks.

On the follow up visit after 2 weeks of IV antibiotic, a good grasp of the right hand was noted with the baby being able to lift his right forearm. Movements at the shoulder joint were still painful and the joint was still tender. Parents were asked to bring the infant for follow up in the orthopaedic clinic after a week with repeat CRP, ESR and a standard X-ray.

On the 20th day of treatment, the orthopedic team reviewed the lab results (CRP 2.2, ESR 30), and saw the X-ray, which demonstrated that the previously seen multiple cystic areas in the right proximal humerus had now become more confluent with some evidence of sclerosis. On the 26th day, following a CRP of 2.0 and an ESR of 15, it was decided by the orthopaedics team to discontinue intravenous antibiotics and start the infant on oral Amoxicillin clavulanate for 2 weeks, as the organism was sensitive to it.

On follow up visits after 6 weeks the baby had good movements all throughout the right upper limb. There was no joint swelling or tenderness. The baby, according to his mother, was feeding appropriately and weight gain was adequate.

The clinical examination in the final follow up at 7 months showed full range of motion on both sides comparable. The elevation in both flexion and abduction were 180 degree and good internal and external rotations with arm abducted. Although the baby is presently using both hands and arms freely, but he has not started crawling.

On radiologic follow at 7 months age, it was appreciated that although the initial x-rays showed radiolucency in the proximal humeral metaphysis without appearance of humeral head, the last x-rays showed appearance of humeral head but smaller than opposite (normal) side without any residual bone changes like radiolucency or sclerosis (Figure).

Discussion

Klebsiella pneumoniae osteomyelitis was first reported in an infant from Israel in 1969.⁷ The incidence of septic arthritis and osteomyelitis among hospital babies from an Indian Hospital was reported as 1 in 1500. *Klebsiella pneumoniae* and *Staphylococcus aureus* were the commonest isolates.⁸ A more recent article⁹ shows 1% incidence of gram negative organism (excluding *E. Coli*) osteomyelitis in children.

To our knowledge this is the first reported case of *Klebsiella* osteomyelitis from Pakistan.

On literature review only one such study where presenting complaints, natural progression of the disease before intervention, and sequelae after adequate treatment, were more or less similar to the case we have presented here.¹⁰ The study reports on a neonate with osteomyelitis of the right humerus infected with the uncommon pathogen in question, *Klebsiella pneumoniae*. In the absence of any perinatal disease, premature rupture of the membranes was suggested to be the cause of the illness in that case. The infant was initially regarded as having Erb's palsy because of the absence of systemic symptoms and lack of perinatal high-risk factors. Antibiotic administration was delayed for 3 weeks. Luckily, nearly complete recovery was noted after 2 months of follow up with adequate treatment.

In our case, the infant had been delivered through a vacuum extraction but there was no evidence of premature rupture of membranes. The earlier *Klebsiella* bacteraemia was a nosocomial infection acquired after 5th day of life. Also, our surgical intervention through wound debridement, followed by 4 weeks of intravenous Meropenem, and 2 weeks of oral Amoxicillin clavulanate, seemed to be successful. This was supported by the clinical examination in the final follow up at 7 months which showed full range of motion at both shoulder joints. The elevation in both flexion and abduction are 180 degrees and good internal and external rotation.

In a review from 29 USA hospitals of cases of osteomyelitis in children aged 2 months to 17 years, it was reported that treatment of acute osteomyelitis with early transition to oral therapy is not associated with a high risk of treatment failures and avoids the risks of prolonged intravenous therapy through central venous catheters.¹¹ Multi

drug resistance (MDR) Klebsiella have been emerging recently, however, our patient culture were not MDR. As no new antibiotics with novel mechanisms against many of these gram-negative bacilli are expected to be developed in the foreseeable future, careful and conservative use of agents combined with good infection control practices is required.¹²

Conclusion

Although Staphylococcus aureus is still the most common organism causing osteomyelitis in infants, but with the changing epidemiology of microorganism in our community, gram negatives should be considered in differential diagnosis of Osteomyelitis, especially in infants.

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