

Case Report

Acute haematogenous osteomyelitis of femur in a neonate with ‘bone within bone’ appearance: a case report

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ABSTRACT

Acute osteomyelitis in infants, which was known for high mortality and morbidity in the pre-antibiotic era can be managed conservatively by intravenous antibiotics and supportive therapy if the condition is detected and treatment started early in the course of the disease. Infantile osteomyelitis is separate entity from the one seen in older children in terms of vascular anatomy, pathogenesis, radiological changes and natural history. We present a neonate with acute haematogenous osteomyelitis of femur with preceding respiratory tract infection that was managed conservatively without surgical intervention despite severe radiographic changes. The child recovered without any residual deformity and final radiographs did not show any trace of the disease though early radiographs had exuberant involucrum formation and sequestration of entire diaphysis giving it a “bone within bone” appearance. Infants have excellent capacity of re-sorption of sequestrum and remodelling of involucrum such that no trace of disease is left in the adulthood.

Keywords: Acute haematogenous osteomyelitis, Sequestrum, Involucrum, Bone within bone, Periosteal reaction

INTRODUCTION

The term osteomyelitis was probably coined by Nelaton in 1844.¹ Acute osteomyelitis is a suppurative infectious pathology of bone and bone marrow accompanied by oedema, vascular congestion and small vessel thrombosis.² The unpleasant complications and high mortality in the pre-antibiotic era are a rarity but do still occur particularly when the disease is underestimated or goes unrecognized especially in the developing countries.^{1,3} The birth of antibiotics and their use in osteomyelitis has changed the scenario of the disease. Sulphonamides were first reported to be used in osteomyelitis by Mitchell⁴ and Penicillin by Treuta.¹

Acute haematogenous osteomyelitis was divided on the basis of age into three types by Treuta in 1959 namely,

osteomyelitis of infant, child and adult though separation of infantile form from child form was done earlier by Fraser, Paschlau and Green and Shannon.⁵

CASE REPORT

We present a 29 days old male baby, first in birth order, born at full term by normal vaginal delivery with birth weight of 2.8 kilograms that was admitted in the Department of Paediatrics for acute respiratory tract infection and was subsequently referred to us for symptoms of fever and swelling of left thigh. The patient had history of fever with cough which was managed by paediatrics wing with intravenous antibiotics. Respiratory symptoms of the patient subsided, meanwhile he developed swelling in left thigh and fever persisted. On examination, patient had low grade fever with diffuse

swelling, induration and tenderness over distal left thigh. Passive movements of hip and knee joint were free except for limitation of terminal flexion at the knee joint. White blood cell count (WBC) was 9,000 per microlitre, erythrocyte sedimentation rate (ESR) was 20 mm in first hour and C reactive protein (CRP) was elevated (32mg/L). Blood culture did not grow any organism. Initial radiographs of the affected extremity were unremarkable except for the accentuation of soft tissue shadow (Figure 1). Aspiration was negative. After the initial workup, patient was managed conservatively for suspected acute haematogenous osteomyelitis of distal femoral metaphysis with intravenous antibiotics (cefotaxime). The patient started responding to the treatment with decrease in the swelling and constitutional symptoms with commensurate fall in CRP levels within 48 hours of start of treatment with the levels returning to normal within 6 days of the start of treatment. Intravenous antibiotics were continued for one more week (total 2 weeks). Repeat radiographs at the end of 2 weeks showed extensive solid periosteal reaction (Figure 2a) and patient was discharged on oral antibiotics (co-amoxiclav) for 3 weeks.



Figure 1: Radiograph of both thighs showing no abnormality except soft tissue swelling of left thigh.

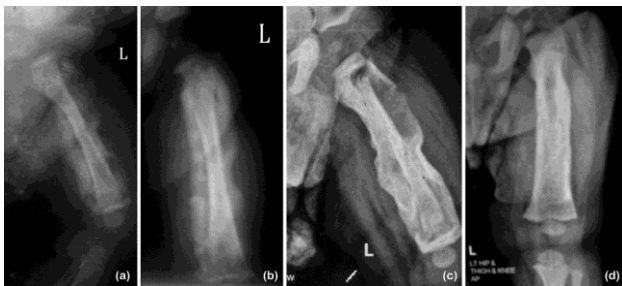


Figure 2: Radiographs of left femur. a) At 2 weeks showing solid periosteal reaction at distal end of femur. b) At 6 weeks showing solid periosteal reaction of entire femoral diaphysis. c) At 10 weeks showing sequestration of whole of femoral diaphysis surrounded by new bone (involucrum) giving it "Bone within Bone" appearance. d) At 16 weeks, partial re-sorption of sequestrum and remodelling of involucrum.

Follow up radiographs at regular intervals showed intensification of the periosteal reaction with formation of involucrum involving the entire femoral diaphysis giving the appearance of "bone within bone" (Figure 2b, Figure 2c). Despite the severity of radiographic findings, baby was doing well clinically. At around 16 weeks the radiographs started showing re-sorption of the sequestrum with remodelling of the bone (Figure 2d).

Final follow up at the age of 15 months did not show any limb length discrepancy or angular deformity and the child was able to bear full weight without support (Figure 3a). Radiographs showed remarkable improvement in the form of near complete resorption of sequestrum and near complete remodelling of entire femoral diaphysis (Figure 3b).

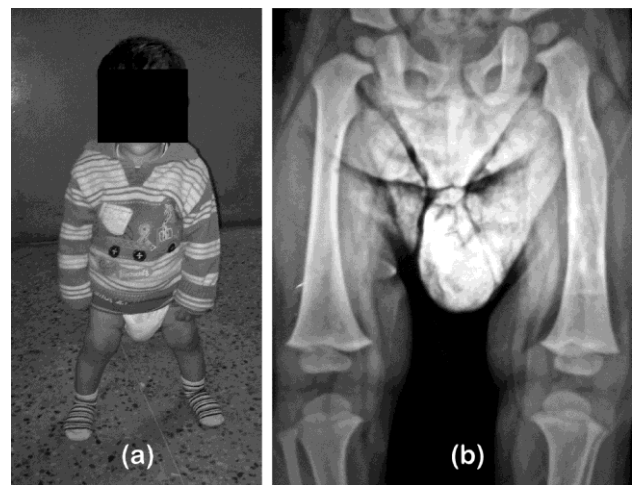


Figure 3: Final followup after 15 months. a) Normal weight bearing with no limb length discrepancy or deformity. b) Radiograph of both femur showing nearly re-sorbed sequestrum and near complete remodelling of left femur leaving no trace of the disease.

DISCUSSION

Literature on osteomyelitis in young infants before 1934 dealt largely with osteomyelitis of the jaw and its probable relationship with mastitis of feeding mothers. It was Fraser who mentioned metastatic osteomyelitis due to umbilical sepsis for the first time in 1924. Later it became established focus can be respiratory tract or skin and Dunham found 10.3% cases of neonatal sepsis developed metastatic osteomyelitis.⁶ Our patient had preceding respiratory tract infection which was the focus for metastasis of the organism to distal femur.

Acute osteomyelitis in infants is a different entity from that in older children due to different vascular anatomy. In late stages of intrauterine life to six months of life, in some epiphysis vascular channels from metaphyseal vessels penetrate the growth plate towards the epiphysis and can carry the organisms from metaphyseal seedling

to epiphysis explaining high frequency of epiphyseal infection adjacent to growth plate and of the adjoining joint in infants. From point of view of vascular anatomy, an infant becomes child at age of around one year when growth plate becomes vascular barrier between metaphysis and adjacent epiphysis. In older children the growth plate serves as a vascular barrier between epiphysis and metaphysis accounting for rarity of involvement of adjacent joint and epiphysis. Involvement of growth plate in infants can manifest as limb length discrepancy and angular deformities due to alteration of growth pattern at the growing end of the bone.^{1,5,7,8} In our case the infection was detected early and treated aggressively by intravenous antibiotics before involvement of the growth plate and adjoining joint resulting in normal growth of the afflicted bone without any shortening, lengthening or angular deformity.

Besides vascular anatomy infantile form differs from child form also in natural history. In infants extreme richness of periosteal blood supply and fertility of the cambium layer of periosteum explains the early exuberant periosteal reaction and subsequent extraordinary remodelling and reabsorption of the sequestrum. Profuse new bone (involucrum) formation along shaft is a transient alteration of which no trace is left behind in the adult life.^{1,5} In older children occlusion of metaphyseal end-arteries and lifting of periosteum from pus formation causes infarction of the inner and outer cortex respectively leading to large cortical sequestra formation which is typical of osteomyelitis in children.^{1,5} In our case exuberant periosteal new bone (involucrum) formation was detected at 2 weeks which progressed to involve entire femoral diaphysis, sparing epiphysis, giving a typical appearance of “bone within bone” at 10 weeks followed by start of resorption of original bone (sequestrum) and remodelling of the newly laid bone (involucrum) around 16 weeks. At the final follow up of 15 months nearly whole of the sequestrum was resorbed and the new laid bone remodelled.

Whether it involves infant or a child careful, meticulous and regular examination and re-examination during treatment of uncomplicated acute osteomyelitis to monitor progress is of paramount importance for favourable outcome.⁹ Our case was also diagnosed early with prompt initiation of treatment and careful monitoring was done clinically during treatment in the hospital as well as after discharge from the hospital.

It is concluded from the current case as well as from the available literature, radiological picture of acute osteomyelitis in infants may be so severe that not only parents but even the treating physician may be misled by the exuberant new bone formation, but it does not warrant surgical intervention if the infant is doing clinically good on conservative treatment. The only concern in such an infant should be careful assessment of the growth plate disturbance and involvement of the adjacent joint while as nature itself takes care of the involved diaphysis due to excellent sequestrum re-absorption and involucrum remodelling capacity in infants.

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