Case Report

Compartment Syndrome Complicating Acute Osteomyelitis of the Radius in a Neonate: A Case Report

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ABSTRACT
BACKGROUND: Acute osteomyelitis in neonates is uncommon and compartment syndrome complicating this condition is rare.
METHOD: The evaluation of a 4-week old female neonate who presented with compartment syndrome of the right forearm following an acute osteomyelitis of the right radius is presented.
RESULT: The patient had a full recovery with emergency fasciotomy and antibiotics therapy.
CONCLUSION: A high index of suscipion is needed to recognize this limb and life-threatening complication, especially in neonates and infants. Prompt surgical intervention is necessary for the best clinical outcome.
KEYWORDS: Compartment syndrome, acute osteomyelitis, neonates.

Date Accepted for Publication: 15th February, 2012
NigerJMed 2012: 256-258

INTRODUCTION

Acute compartment syndrome of the limb is life threatening and requires prompt surgical intervention.
Acute limb compartment syndrome is a condition in which persistent raised pressure within a closed fascial space reduces capillary perfusion below a level necessary for tissue viability[1].

It was first recognized in 1881 by Richard Von Volkmann who first described the resultant contracture that is a common sequel of the syndrome. Neonatal osteomyelitis is rare, with an incidence of 1 in 5000 to 15,000 life births.[2,3]

It may present insidiously with local swelling and immobility in an apparently healthy child or with systemic manifestations of sepsis.[4, 5] Early diagnosis is vital for the successful treatment of this condition.

Compartment syndrome in the newborn has been reported only in relation to mechanical compression from combined effects of fetal posture, oligohydramios amniotic band constriction or direct birth trauma[6], and distal tibial physeal fracture[7].

To our knowledge, perhaps in this part of the world, acute compartment syndrome in neonates has not been described in association with acute haematogenous osteomyelitis.

This case report further underscores the need for a high index of suspicion in making the diagnosis of acute compartment syndrome. This is more so because of the difficulty in diagnosing this condition in neonates who can neither give history nor cooperate with physical examination. Besides, pain which is an important diagnostic index in adults may not be demonstrated in this age group.

CASE REPORT

S.A. was a 4-week old baby girl who presented to the Emergency Paediatric Unit of Federal Medical Centre Makurdi with a 5 days history of swelling of the right forearm. She was first seen and managed by the Paediatricians before she was transferred to the orthopaedic unit 2 days later.

The mother noticed swelling of the proximal aspect of the right forearm while bathing the baby. It was tender and progressively involved the entire forearm and consequently reduction of movement of the fingers of the affected limb.

There was no preceding history of trauma and anteceding insect bite could not be ascertained. No other swelling was observed and there was no family history of sickle cell disease. Patient did not have any fever, cough or any change in bowel habit, but she suckled poorly at the breast.

There was no associated skin sepsis, nasal or ear discharge. The umbilical stump was clean. The progressive swelling of the forearm made the patient irritable and unable to move the affected limb. There was no feature suggestive of Haemophilia.

The initial treatment by the Paediatricians consisted of IV Ceftriaxone 70mg/kg and IV Genticin 5mg/kg for 72hours, syrup Paracetamol and limb elevation. Pregnancy was uneventful and carried to term. The labour was spontaneous and delivery was vertex.

She cried immediately after birth and the birth weight was not measured (no weighing scale at the health centre).She had received only one dose of oral Polio vaccine and was being fed with only breast milk. There was no history of neonatal jaundice.

There was no family history of sickle cell anaemia. Examination revealed an irritable well-nourished child who was mildly pale, afebrile, anicteric, acyanosed and well hydrated weighing 4kg.

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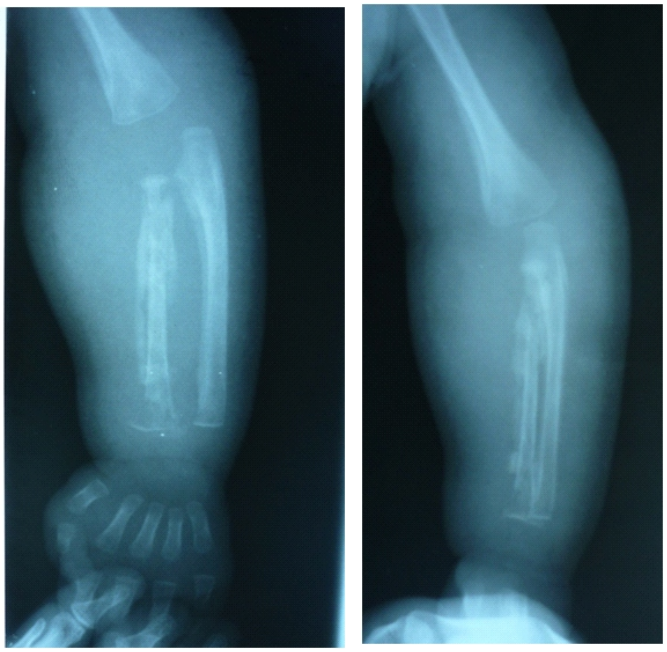
The pulse rate was 140 beats/min and the respiratory rate was 40 cycles/min. The right forearm was grossly swollen and tense. The hand was dusky and the radial pulse was not palpable. There was tenderness on passive extension of the fingers and wrist joint. The elbow joint was freely mobile. The haemoglobin genotype was HbAA. The packed cell volume (PCV) was 25%. The White cell count was $12x10^9$/L with the differential counts as: Neutrophils = 62%, Lymphocytes = 35%, Monocytes = 2% and Eosinophils = 1%. The erythrocyte sedimentation rate (ESR) was 5mm/1sthr.

The blood film showed normocytic, normochromic erythrocytes, toxic granulations of neutrophils and mild thrombocytopenia (130,000/mm^3 of cells). Radiograph of the right forearm showed soft tissue swelling and periosteal reaction of the radius (figure 1). An assessment of acute osteomyelitis of the right radius with compartment syndrome of the right forearm was made. Emergency fasciotomy and drainage of the flexor compartment was done using a 5cm long anterolateral incision.

An estimated 60ml of frank pus under tension was drained. There was a dramatic improvement in the colour of the hand and return of the radial pulse. The culture of the pus yielded Pseudomonas aeruginosa which was sensitive to Clavulated Amoxicillin (Augmentin) and Ciprofloxacin. The patient received parenteral Augmentin for another 72hrs before Augmentin suspension was given for 4 weeks. The fasciotomy wound healed by secondary intention.

Review at 6 weeks showed a healed fasciotomy wound, complete resolution of the infection with no functional impairment of the limb.

Figure 1: Plain radiograph of the right forearm



DISCUSSION

Osteomyelitis is an inflammation of the bone and marrow caused by an infecting organism. Neonatal osteomyelitis was initially regarded as a rare diagnosis. However, the number of case of osteomyelitis in the neonatal period which has been reported shows that this disease should no longer be considered a rare one. It appears that the lowered mortality from neonatal septicemia has been responsible for the corresponding increase in the cases of neonatal acute osteomyelitis encountered in clinical practice.[8]

The predisposing factors for neonatal osteomyelitis include prematurity, skin or umbilical sepsis, Caesarean section delivery, significant jaundice and systemic infections such as pneumonia or meningitis. Our patient did not have any identified predisposing factors.

In our report, the causative organism was found to Pseudomonas aeruginosa. This is in contrast to the reports by other authors who identified Staphylococcus aureus[2,4,5,8] and group B Streptococcus[9] as the predominant organisms in neonatal osteomyelitis. Greengard was the first to recognize two distinct clinical syndromes in neonatal osteomyelitis. He identified a 'benign' form (group I) where the child is septicemic and the osteomyelitis is an incident in the disease process.[4]
Group I patients are not acutely ill, apyrexial and usually present late.

The group II patients are acutely ill, septicemic and present early. In the severely ill newborn, there is often delay in diagnosis as the attention of the doctor is usually not focused on the osteomyelitis. Our patient had a benign form of the disease and presented with swelling and pseudo-paralysis which are the commonest clinical presentation.[8]

The commonest sites of infection are the proximal femur, the tibia and proximal humerus.[8, 10] Infection of the radius as occurred in our patient is uncommon. The laboratory findings include a raised leucocytes count; elevated erythrocyte sedimentation rate (ESR) and C - reactive protein. Radiographic abnormalities include metaphyseal rarefaction and periosteal reaction which were present in our patient.

Our patient had raised leucocyte count and ESR with extensive periosteal reaction. Massive bone necrosis and sequestration are uncommon and the most common complication is supportive arthritis in the adjacent joints. In our patient, the adjacent joints were spared and no sequestration occurred.

The pathogenesis of compartment syndrome in neonatal osteomyelitis is not very clear but an explanation was suggested by Green[11].

He observed that the infection usually begins in the metaphysis which in the newborn contains very little cortical bone. The cancellous bone is soon penetrated with consequent escape of pus into the subperiosteal area. The periosteum is easily stripped from the bone, so that early decompression prevents bone necrosis. Furthermore, there is relatively easy penetration of the periosteum allowing escape of pus into the adjacent soft tissue.

The result of these processes is to minimize the effect of the infection on the cortex and increased pressure within the adjacent soft tissue. As noted, our patient was very irritable with clinical features of raised pressure in flexor compartment pressure of affected forearm. There was no quantitative measurement of the flexor compartment pressure because the facilities were not available.

She had emergency fasciotomy and 60ml of pus was drained under tension. The fasciotomy served a dual purpose of decompressing the flexor compartment as well as drainage of the accumulated pus. Subsequently, the dramatic improvement in the circulation of the hand further confirmed our suspicion of acute compartment syndrome. The patient received parenteral antibiotics for 6 days and oral antibiotics for 4 weeks. The fasciotomy wound healed completely by secondary intention after 10 days. The complete recovery in this patient is noteworthy and underscores the fact that infants have a greater physiologic ability to recover in comparison with adults.

CONCLUSION

Acute compartment syndrome is a rare complication of neonatal osteomyelitis. A high index of suspicion is very essential to detect it. Early detection, prompt surgical decompression and adequate antibiotic treatment are important to avoid the potential threat to life and limb.

CONSENT: The patient's parents gave an informed consent for this publication.

COMPETING INTEREST: The authors declare that they have no competing interests.

AUTHORS' CONTRIBUTION: Both authors contributed meaningfully to this manuscript.

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