CASE REPORT

THE RAVAGING NATURE OF CHRONIC OSTEOMYELITIS; TOTAL DESTRUCTION OF THE RIGHT TIBIA IN A 2-YEAR-OLD

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ABSTRACT

A 2-year-old female child had a swollen right leg after a fall and the mother took her to a patent drug dealer for treatment. During the course of treatment, she developed multiple pus-discharging ulcers in the affected leg, limb pains and was feverish. At the University of Calabar Teaching Hospital, after being referred from a missionary Hospital, a series of radiological examinations revealed that she had (stage IV Osteomyelitis) Chronic osteomyelitis with soft tissue abscess and the gradual destruction of the right tibial bone as time went by was shown until the entire bone was obliterated. Such extensive destruction of a bone following chronic osteomyelitis is a rarity.

Presently she cannot walk on her own but the plan is to manage the condition conservatively until she is 10 years old when Tibialization of the fibular will be done.

Key words – Chronic osteomyelitis, Sequestrum, Inflammation.

INTRODUCTION

Osteomyelitis is an inflammatory process that affects the bone and its marrow. This inflammation is commonly caused by an infective micro-organism which can be limited to a single portion of the bone or can involve several regions as well as the surrounding soft tissue. [1]

Osteomyelitis may arise due to local spread from a contiguous contaminated source of infection following trauma, bone surgery, diabetes mellitus, insertion of a joint prosthesis or distant focus of infection within the body via the blood. [1, 2] Acute osteomyelitis evolves over several days or weeks, as opposed to chronic osteomyelitis which evolves over months or years. Chronic osteomyelitis predisposes to avascular necrosis which consequently produces sequestration of affected bone cortices and bone loss. [1,2] Complete elimination of the infectious agents is still a challenge and depends on several variables such as the anatomo-pathological aspects of the disease and the host type. [2] The key to a successful management of osteomyelitis is early diagnosis, adequate microbiological analysis and an expedient antimicrobial therapy. [1]

This is a case of chronic osteomyelitis that completely destroyed an entire bone in a toddler.

CASE REPORT

A 2-year-old female was transferred from a Missionary medical center in Akwa Ibom state to the University of Calabar Teaching Hospital, Calabar, Nigeria, with complaints of swelling of the right lower limb, limb pain and multiple ulcers of 2 months duration and fever of 3 weeks duration.

The patient is the 2nd child of a 17 years old mother with first school leaving certificate as her highest educational level, unemployed and a widow. The mother noticed that the child, who was apparently well, had an abnormal gait after a fall. She immediately took the child to a patent medicine dealer who on noticing that the right leg was swollen applied hot balm which subsequently led to multiple blister formation days later. When the blisters ruptured ulcers developed. The limb pain was severe in intensity but intermittent in nature.

The fever that she had was described as insidious in onset and of high grade continuously. Paracetamol tablet (1/2 tab) produced temporary relief whenever it was administered for the fever and the limb pains.

On examination, the patient appeared acutely ill looking, febrile (38.6^0c), dehydrated and moderately pale. Scarification and discolouration of the skin of the entire right lower leg with multiple ulcers at the right knee joint, medial malleolus and dorsum of the foot were all noted. Necrotic tissues with slough discharging purulent material were present in all the ulcers. There was loss of movement across the knee joint and limited movement at the tender ankle joint.

Blood culture yielded staphylococcus aureus which was sensitive to clavanox. Hemoglobin was low (6.8gm/dl) and the white cell count was elevated. The patient's genotype was noted to be AA.

The first radiograph of the lower leg (figure 1) was taken with a POP back slab on. There was a Salter Harris type i, iii & v fracture of the superior tibial epiphysis with two thin fracture lines noted which extended from the superior surface towards the base of the epiphysis with an oval shaped loose body (bone fragment) noticed about to emerge out of the epiphysis and there was a total obliteration of the growth plate with the epiphysis displaced or slipped posteriorly. A dislocation of the proximal tibio-fibular joint was also noticed. There was an elevation of the periosteum at the posterior surface of the upper half of the tibia with a lamellated configuration. Soft tissue loss was seen anteriorly.

An impression of Chronic Osteomyelitis was made following the presentation of this radiograph and a tibio–fibular synostosis procedure was done for the patient due to correct the dislocated proximal tibio-fibular joint. She was commenced on cloxacillin, metronidazole, tetanus toxoid injection, syrup astyfer and daily wound dressing with magnesium sulphate.

Two months later a second radiograph (figure 2) demonstrated the destruction of the right tibia, with a loss of about three-quarter of the entire bone shaft while the remaining tibia had a moth-eaten appearance. There was also a fracture of the distal third of the right fibular bone.

6 months later (figure 3), another radiograph was taken over a scotch cast. The tibial bone had undergone complete lytic destruction except for fragments at the proximal and distal ends. The fibular bone had healed but it appeared mildly bowed anteriorly and medially.

Ultrasound scan done (figure 4) demonstrated a fairly well defined round shaped thick-walled area of mixed echogenicity (low level to medium level echo contents) with an echogenic strand nearly traversing the diameter of the lesion within the soft tissue. It measured 2.8 x 2.5 cm. This was an abscess cavity that was close to the ankle joint which was tender.

The patient presently comes to the hospital weekly for wound dressing and review. She was on syrup augmentin and vitamin C, and had a scotch cast on the right lower leg. The Orthopaedic surgeons plan to move the right fibular to a more medial location (Tibialization of the fibular) when the patient becomes 10 years of age.

Figure 1: Lateral radiograph of the right lower leg taken with a POP back slab shows a Salter Harris type i, iii & v fracture of the superior tibia epiphysis with two thin fracture lines noted which extends from the surface towards the base of the epiphysis with an oval shaped loose body about to emerge out of the epiphysis (red arrow) and there is a total obliteration of the growth plate with the epiphysis displaced or slipped posteriorly.

A dislocation of the proximal tibio-fibular joint is noted. There is an elevation of the periosteum at the posterior surface of the upper half of the tibia with a lamellated configuration. The loss of soft tissue is seen anteriorly.

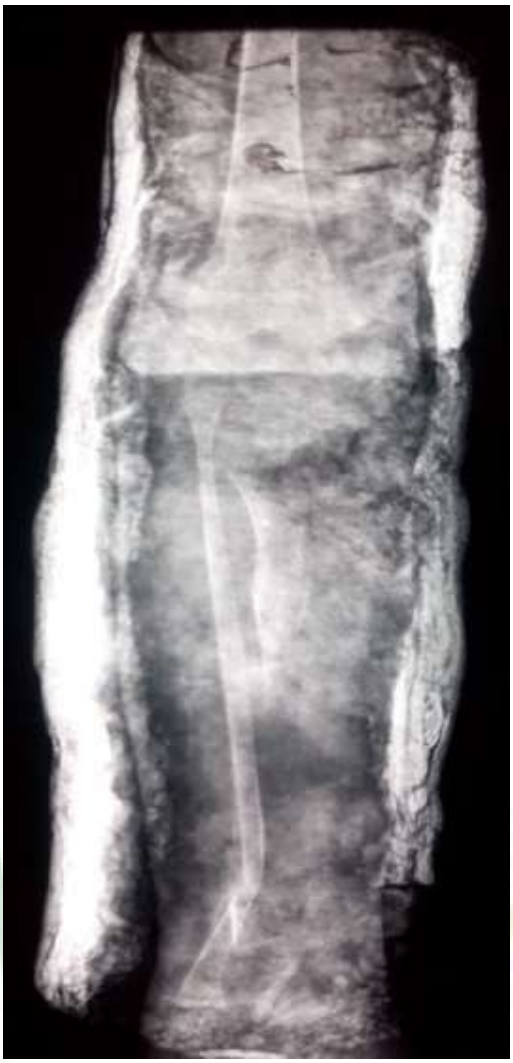

Figure 2: Anterio-posterior radiograph of the right lower leg taken over a backslab, shows the destruction of the right tibia, with a loss of about three-quarter of the entire bone shaft. The remaining tibia has a moth-eaten appearance. There is also a fracture of the distal third of the right fibular bone (blue arrow).

Figure 3: (a). Lateral radiograph of the right lower leg taken over a scotch cast shows a complete lytic destruction of the tibia except for fragments at the proximal and distal ends. The fibular bone is mildly bowed anteriorly and medially**.**

Figure 3: (b) Anterio-posterior radiograph of the right lower leg over a scotch cast shows a complete lytic destruction of the tibia except for fragments at the proximal and distal ends. The fibular bone is mildly bowed anteriorly and medially.

Figure 4: Longitudinal ultrasound scan of the right lower leg demonstrates a fairly well defined round shaped thick-walled area of mixed echogenicity (low level to medium level echo contents) with an echogenic strand nearly traversing the diameter of the lesion (red arrow), within the soft tissue. It measures 2.8 x 2.5cm. It is an abscess cavity.

DISCUSSION

The hall mark of Chronic Osteomyelitis is the presence of dead bone (sequestrum). Involucrum (reactive bony encasement), local bone loss and persistent drainage from a sinus tract may also be present. [1,2] Chronic osteomyelitis resulting from acute osteomyelitis is often caused by staphylococcus aureus, however, following a fracture it is likely to be polymicrobial.[3,4,5] In the index patient, the tibial bone was affected and the blood culture yielded staphylococcus aureus which indicates that an untreated or exacerbated acute osteomyelitis preceded the bone destruction, which is pathognomonic of Chronic osteomyelitis.

Cierny and Mader developed a detailed classification of osteomyelitis.

STAGE I - Osteomyelitis confined to the medullary cavity of the bone.

STAGE II - Osteomyelitis confined only to the cortical bone.

STAGE III - Osteomyelitis involving both the medullary cavity and the cortex of bone.

STAGE IV -Diffuse osteomyelitis involving the entire thickness of bone with loss of stability and the overlying soft tissue. [5,7]

In the index case an extensive involvement of the entire shaft of the tibial cortices was noticed with associated loss of the overlying soft tissue anteriorly. Moreover, disability was noted with difficulty to ambulate. These features make the index case to be graded a stage IV Osteomyelitis.

Most cases of chronic osteomyelitis occur in one bone and are commonly limited to one site.[6] The entire shaft of a long bone rarely sequestrates. [5] This occurrence represents a major source of disability and decreased quality of life for the affected.[4] In the case presented this rarity was manifested as a near complete lytic destruction of the right tibia was seen.

Approximately half of pediatric cases of osteomyelitis occur in children below 5 years of age, and boys are twice likely to be affected as girls. The risk factors include: diabetes mellitus, hemoglobinopathy, rheumatoid arthritis, chronic renal disease, immunocompromised states and malnutrition. [6] The child was malnourished and is below 5 years but is a female in contrast to the gender predilection.

Suppurative inflammation produced by the proliferating micro-organism track along haversian and Volkmann canals out of the intramedullary cavity to the cortex where vascular channels are consequently compressed and obliterated with the resulting ischemia contributing to bone necrosis. Segments of bone devoid of blood supply dislodge to form sequestra which continue to harbour bacteria despite antibiotic therapy and the sequestra extrude as purulent material but if the sinus is blocked a localized abscess is formed.[1,5,7] In the index case there were multiple purulent discharging sinuses emerging from the skin surface and a localized abscess was sonographically demonstrated.

Other clinical features include chronic limb pain and fever which is usually of low grade. The skin of the affected limb is thickened and

thinned in patches with scarred muscle that produce contractures. [5] The patient had severe limb pain, fever and combination of limb swelling and scarred muscle which were all in keeping with the condition.

The earliest stage of chronic osteomyelitis as seen in conventional radiograph, is elevation of the periosteum by subperiosteal laminations of new bone, which becomes progressively thicker and dense. Sequestrum that is formed moves into the intramedullary region while more bone loss continues. [5,7] In the index case these radiographic features were obvious.

Ultrasonography demonstrates soft tissue abscess like it was seen in this case. [8] CT scan excellently detects intra-osseous gas (if gas forming organisms predominate), periosteal reaction, soft tissue abscess and sequestrum. [1,5,6] Magnetic resonance imaging will also localize abscess cavities as hyperintense lesions or heterogeneously intense lesions. [1,5]

The general surgical management of chronic osteomyelitis involves the removal of sequestra, resection of the scarred and infected soft tissue, antibiotic administration and limb stabilization using a cast. [9] All these were in the treatment plan of the patient presented.

However, the specific surgical techniques to treat tibia bone defects are: [3,10]

-Papineau's Technique
-Use of allograft
-Bone transport
-Free vascularized fibular graft
-Tibio–Fibular synostosis
-Medial transport of the fibular (Tibialization of the fibular)

The last procedure, (Tibialization of the fibular), will be done on the patient when she becomes 10 years old.

CONCLUSION

A 2-year-old female with a malignant chronic osteomyelitis of the right tibia is presented. Serial radiographs demonstrated the progressive total lytic destruction of the right tibia bone and ultrasound showed the presence of a soft tissue abscess. Patient is still undergoing treatment, can not walk on her own but is in a fair general health condition. She awaits the definitive surgical treatment.

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