

# Relapse Multifocal Osteomyelitis Secondary to Septicemia: A Case Study

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## Abstract

Osteomyelitis is an inexorable and debilitating infection of bones. Mostly, it is a stubborn recurrent infection and follows a long aggressive medical and surgical treatment. The present patient (54 year old female) is a case of chronic osteomyelitis with open trauma following septicemia as a result of accident. The patient got an open fracture of proximal right tibia, and surgical intervention along with pharmacological treatment was performed. A couple of days later, it was noted that there was swelling of the patient right leg, and pus discharge was evident. This infection was due to *Enterobacter* species as identified by laboratory results. Surgery was repeated for a complete debridement of wound. The case is of unusual interest because of its relentless nature, as even after, more than 38 months of treatment, the patient still suffers from the same discomfort of osteomyelitis and pus discharge is frequently being observed. Prolonged use of various antibiotics (ciprofloxacin, penicillin, fusidic acid, and cloxacillin) was found to control pus discharge to some extent controlled by the usage of pus discharge.

**Keywords:** Chronic osteomyelitis, septicemia, tibia, treatment

## INTRODUCTION

Osteomyelitis is a severe infection of bone which is rare but is a serious condition that may persist for longer periods of time, and a relapse is often faced even after completion of appropriate antibiotic therapy. Normally, bone is resistant to bacterial colonization; it has been seen in more than 80% of cases that osteomyelitis occurs due to presence of foreign bodies or prostheses which leads to severity of bone integrity and onset of bone infection. Osteomyelitis can also occur after hematogenous spread following bacteremia. It has been found in literature that almost 20% of osteomyelitis adult cases are hematogenous, which is more frequent in males as compared to females for unidentified reasons.<sup>[1]</sup> Neuropathy and vascular insufficiency are other major causes for osteomyelitis reported to date with more probability of occurrence in people with diabetes.<sup>[2]</sup> *Staphylococcus aureus* remains the common responsible pathogen in more than 50% of cases. Gram-positive and Gram-negative bacteria, mycobacteria, anaerobes, and even fungi are among other causative agents.<sup>[3]</sup>

In osteomyelitis, early and defined treatment is recommended and also singling out of the causative agents is important for

antibiotic therapy.<sup>[4]</sup> Being a recurrent and painful condition, treatment aim for the chronic osteomyelitis patient is complete resolution of infection, eliminating the chance of recurrence, and maximizing the quality of life; however, till now, this disease has not shown significantly good prognosis in terms of complete resolution. The mainstay of the treatment remains the use of antibiotics (medical therapy) along with surgical interventions (surgical therapy). It has been known that an ideal antibiotic regimen should be effective with a low risk of adverse reactions.<sup>[5]</sup>

Antibiotic treatment should be based on the identification of pathogens from bone cultures at the time of bone biopsy or debridement.<sup>[1,4]</sup> Empirical therapy is initiated at first to cover number of involved pathogens; however, treatment may be

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modified once the organism is identified.<sup>[6]</sup> Traditionally, antibiotic treatment of osteomyelitis comprised a 4–6 week course.<sup>[1]</sup> Suppressive antibiotic therapy should also be directed by bone culture and is given orally when surgery is contraindicated.<sup>[1]</sup> While concerning treatment, some important factors are good bioavailability, low toxicity, and adequate bone penetration.

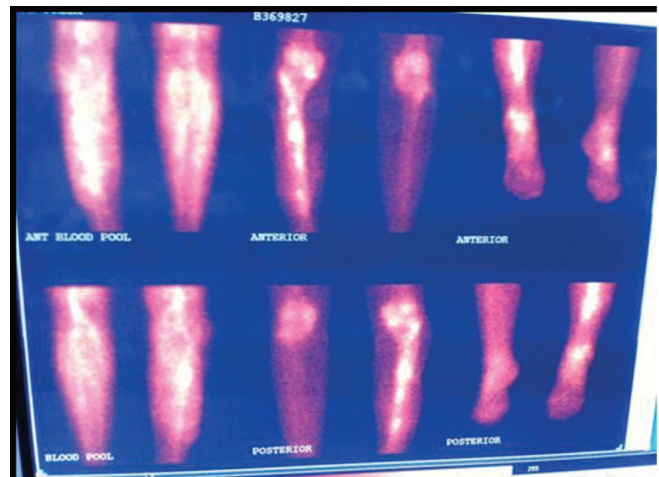
Surgical therapy may include removing bone, adequately draining pus from a wound or abscess, extensive debridement of the necrotic tissue, management of dead space, adequate soft-tissue coverage, removing and replacing a joint replacement if it was the cause of infection and restoration of the blood supply.<sup>[1]</sup> Inadequate debridement is among the top causes of failure of antibiotic therapy in most of the chronic osteomyelitis cases. Besides the above-described treatment, limitation of movement, rest, and regular examination of both treatment and complications is recommended. Furthermore, adjunctive hyperbaric oxygen (HBO) therapy can promote collagen production, angiogenesis, and healing in an ischemic or infected wound.<sup>[1]</sup>

## CASE REPORT

The patient was a 54-year-old married, diabetic female who was received in emergency as a result of a road accident. The patient suffered an open fracture Type 3A of proximal right tibia. Medical history reveals that the patient has been suffering from two comorbid conditions: A history of diabetes mellitus (Type 2) for the past 12 years and hypertension, both of which were well controlled until last prior to accident. She has been taking metformin maximum dose and was switched to insulin due to uncontrolled blood glucose levels confirmed by hemoglobin A1c levels of above 7.5. The patient is also on beta-blockers for the management of hypertension and has shown medication compliance till date.

Physical examination on admission revealed fracture of fibula at the neck and common peroneal nerve palsy. After the admission, the patient underwent operation, debridement of wound, and interjection of buttress plate at right upper tibia. A couple of days later, it was noted that there was swelling of the patient right leg and pus was discharged from leg wound [Figure 1].

Laboratory results included higher levels of erythrocyte sedimentation rate (ESR) and C-reactive protein, but complete blood count was normal with almost normal leukocyte count, indicating a chronic infection while other laboratory values such as creatinine clearance and electrolyte balance were normal rendering the patient hemodynamically stable. Culture taken from the wound was tested for sensitivity. *Enterobacter* species is the pathogen responsible for the infection as identified from results. ESR was 98. For complete debridement of wounds, surgery was repeated. Following week, the patient underwent plastic surgery regarding skin defect with distant flap.

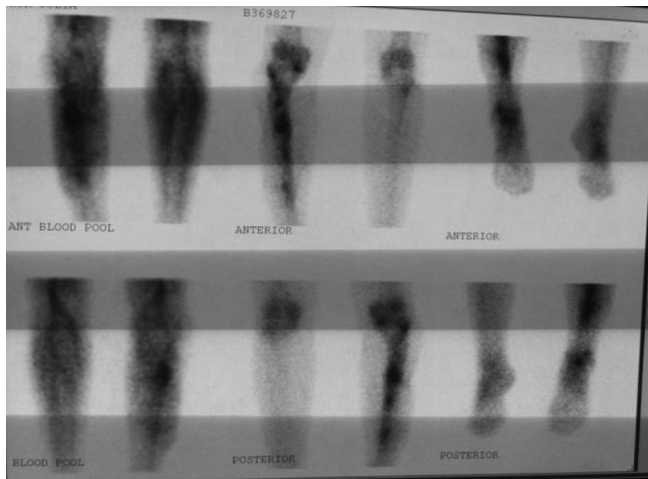


**Figure 1:** Bone scan reflecting swelling of right leg

On July 2014, the patient underwent another surgery regarding removal of buttress plate. X-rays [Figure 2] reported osteomyelitis (proximal right tibia) and was treated with antibiotic (fusidic acid plus cloxacillin) and chlorhexidine. With 2 weeks interval, the patient wound got infected and came back to the hospital. ESR was found 68 with pus discharge. Wound debridement as well as sequestrectomy was planned. *Pseudomonas aeruginosa* and *Pseudomonas faecalis* were found based on culture and sensitivity test. Chronic osteomyelitis of right tibia was established and antibiotics (ciprofloxacin, fusidic acid, penicillin, and cloxacillin) were prescribed for 2 weeks. The patient still complains of discharge of pus from lower leg (right) even though antibiotic course was completed. After 3 days, third generation of cephalosporin (IV ceftazidime) and amoxicillin plus clavulanate was initiated for 1 week and the patient was improved with 4 weeks follow up.

## DISCUSSION

Chronic osteomyelitis is the condition when bone infection persists for months. Chronic osteomyelitis is one of the most resisting infectious conditions in the world which has high rate of recurrence even after adequate medical and surgical therapy. It is an osseous infection which may be polymicrobial that leaves bone necrotized and sequestrum formation occurs. Although all bones are prone to infection, the lower limb is most frequently involved.<sup>[4,7]</sup> Radiographic tools clearly indicate the presence of dead bone due to chronic necrosis. The presence of dead cell debris (necrotic tissue), low immunity, and a vascularization, as seen in bonny tissue, provides an ideal environment for pathogenic growth of microorganisms, which leads to the development of local infection. In the development of osteomyelitis, bacteria may have some factors which played an important role such as *S. aureus* being the cause of bacterial adherence, proteolytic activity, and resistance to host defense mechanism.<sup>[8]</sup> Posttraumatic osteomyelitis more commonly affects adults and typically occurs in the tibia, as seen in the



**Figure 2:** Osteomyelitis at proximal right tibia

current patient as well. The vascularity of local soft tissue may be compromised leading interference in healing. Posttraumatic infection as compared to hematogenous infection originates outside the bony cortex and succeeds toward the medullary canal. The risk of recurrence is more with loss of soft tissue damage, bone stability, and necrosis.<sup>[1,9]</sup> In acute osteomyelitis, leukocytosis is common before therapy but rarely exceeds 15,000/ $\mu$ L but in chronic osteomyelitis it is usually normal. It has been seen that blood cultures in only 50% of cases of osteomyelitis are positive.<sup>[9]</sup> Due to improper blood supply of bones, antibiotics cannot reach the infected site for which debridement is done for complete removal of dead bone. In the present case, during previous surgeries, the patient was subjected to multiple wound debridement and prescribed course of antibiotics. Regardless of optimum medical and surgical treatment, the infection persistently recurred after a specific period, which presented in the form of swelling and local pain. The patient is unable to control her blood glucose level for the past 6 months, which is another considerable risk factor for the development of infection. On physical examination, it was revealed that the patient was suffering from wound breakdown even though she had her two previous reconstructive surgeries treated with chlorhexidine.

According to the staging system of Cierny *et al.*,<sup>[10]</sup> the current patient suffers from Stage 3 disease, which is considered as an advanced local infection of bone and soft tissue that is a result of polymicrobial infestation. It is known that Stage 3 osteomyelitis shows well response to limited surgical intervention that preserves bony stability. The Ger classification is used to address the physiology of the wound in osteomyelitis, which is categorized as simple sinus, multiple skin-lined sinuses, chronic superficial ulcer, or multiple sinuses.<sup>[11,12]</sup> Bone infection persists if appropriate wound management is not undertaken. It is important to cover open tibial fractures with soft tissue early in the disease to prevent infection and ulceration.<sup>[12]</sup> After antibiotic, debridement, and other treatment options failure, muscle flap coverage technique was introduced in

the current patient. One study demonstrates that muscle flap coverage technique is better option as compared to other therapies.<sup>[13]</sup> To arrest infection, it is necessary to provide adequate soft-tissue coverage.<sup>[1]</sup> However, even after this intervention, the patient was unable to present with a disease-free condition as per signs and symptoms such as continuous pus drainage, local pain, and discomfort along with a high ESR. HBO therapy is another therapy being practiced as an adjunct with debridement and antibiotics in osteomyelitis that has remained refractory to standard therapy, which can develop collagen production, healing in an ischemic or infected wound, and angiogenesis.<sup>[1,14]</sup> Multiple clinical series demonstrates substantial success with HBO in patients with the same disease in whom standard treatment regimens failed;<sup>[15-17]</sup> however, health professionals were unable to implement this technique on the current patient. Because of a vascularity of bone, to achieve complete eradication of disease, chronic osteomyelitis is curable only with radical resection or amputation. In contrast to amputation, other options remain debridement followed by parenteral and oral antimicrobial therapy which may only suppress the disease for the time being. Many other techniques such as Ilizarov method<sup>[18]</sup> or local antibiotic therapy with gentamicin-impregnated Septopal beads and other antibiotic cements used in the hollow space left after debridement may decrease the complication rate but their use is still controversial.<sup>[19,20]</sup> Since the past 3 years, regardless of multiple treatment protocols, patient's complete recovery is unable. Potential reasons for treatment failure may include surgical wound infection, incomplete wound debridement, decreased bioavailability of antibiotics due to the presence of dead bone, and a vascularization. Furthermore, patient's noncompliance for antibiotics<sup>[21]</sup> and uncontrolled noninsulin-dependent diabetes mellitus may add further to the explanation of the unrelenting infection.

Antibiotics use and surgical technologies are considered as highly valuable aspects of care in major surgical procedures.<sup>[22]</sup>

## CONCLUSION

Chronic osteomyelitis is an uncommon disease, yet poses a high potential for increased morbidity as well as mortality. Surgical procedure as well as pharmacological treatment is a decisive option, but inadequate therapy may lead to relapsing infection and progression to interminable chronic condition.

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## Conflicts of interest

There are no conflicts of interest.

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