

## **Chronic Osteomyelitis and its variegated exhibitions in Orthopaedics: A Case Series**

**DR. SACHIN T G, DR. VEJAY KUMAR**

**The Department of Orthopaedics,  
Vinayaka Mission's Medical College, Karaikal, Pondicherry.**

### **ABSTRACT:**

Despite the rapid advances in the treatment modalities for Orthopedics, Chronic Osteomyelitis is one of the most challenging conditions to treat by surgeons, and needs great commitment. The causes of chronic osteomyelitis can be implant related or due to hematogenous spread of infection to bone following trauma. Here we report 3 different cases who presented with chronic osteomyelitis and were treated successfully, with thorough wound debridement of necrotized tissue, commencement of culture sensitive antibiotics for the duration of six weeks, and skeletal stabilization with internal fixation. This multidisciplinary approach of chronic osteomyelitis helped in better improvement of function of limb and decreased the morbidity of patients. For better functional outcome, a period of almost six months is needed for recovery.

### **INTRODUCTION:**

Osteomyelitis was first defined by the French surgeon Chassaignac in 1852, as an infection localized to bone.[1] Despite rapid advances in Orthopedics, Chronic Osteomyelitis has always been one of the most challenging conditions. It is an inflammation of bone and bone marrow caused by either fungi or by pyogenic bacteria.[2]

Osteomyelitis leads to formation of sequestra (termed by Hunter[2] in 1764, describing pockets of dead cortical bone with abscess) and involucrum, or new bone formed in response to the sequestra around it by Totenlade (coffin) in German. Multiple openings in the involucrum are formed, called as "cloaca", through which pus and sequestrum come out of the bone, largely because of the avascular nature of sequestra.

The most common causes of osteomyelitis are hematogenous spread, by recently post traumatic cause or implant related chronic osteomyelitis is on trend. Hematogenous osteomyelitis is more common in children than in adults. [3,4,5]

Osteomyelitis staging system was first described by Waldvogel in 1970. He distinguished three etiologic routes: hematogenous, contiguous focus, and osteomyelitis associated with vascular insufficiency.[6] Bacteremia is caused by distant foci of infection which may lead to osteomyelitis without clinical signs of sepsis

The Cierny and Mader anatomic types of adult osteomyelitis include[4]:

(a) Type 1 is intramedullary osteomyelitis, where the nidus is endosteal.

- (b) Type 2 indicates superficial osteomyelitis, which is limited to the surface of the bone.
- (c) Type 3 is termed localized osteomyelitis, in which the full thickness of the cortex of the bone is involved. This type of osteomyelitis often requires complex dead space management and osseous stabilization after debridement.
- (d) Type 4 is diffuse osteomyelitis involving the entire circumference of the bone. These lesions are mechanically unstable and require complex reconstruction.

Osteomyelitis is difficult to treat and can be associated with a high morbidity and possible mortality for the patient. This may result in emotional and financial burden on patients especially in developing countries. Recurrence of infection is most common problem faced in chronic osteomyelitis. Therefore, multidisciplinary approach is needed for successful management of osteomyelitis.

## **CASE PRESENTATION**

### **CASE 1:**

A 26-year-old male presented with pain and discharging sinus over the right lateral proximal fibula for 6 months. History dates back to 5 years back when he met with an accident and sustained an injury to his right leg for which he underwent native treatment. The wound never healed completely and serous discharge kept on continuously coming from the wound. The patient had a history of on-and-off fever. Around 6 months before presenting to us, the patient started developing pain and swelling over the lower lateral aspect of the involved leg. The pain was acute in onset. The pain was sharp and piercing. This was followed by the appearance of swelling over the lateral aspect of the leg. With the appearance of swelling, the intensity of the pain further increased.

On examination, the swelling was tense and shiny. A discharging sinus with frank pus coming out from it was present. Bony tenderness was present on deep palpation. In the upper one-third, the fibula appeared to be irregular on palpation. A radiograph of the involved extremity was obtained which showed features suggestive of chronic osteomyelitis (Figure 1). Routine investigations were sent which showed as Hb: 10.2 gm %, TLC: 12000/ cumm, ESR: 60 after one hour, and CRP was 40 mg/l.

A decision was made to operate on the patient. After getting consent and pre-aesthetic clearance, the fibula was opened through a lateral approach (Figure 2, 3) and the free-lying dead piece of bone was removed (Figure 4) along with debridement and excision of the sinus tract. All dead and debrided tissue was sent for culture sensitivity. After a thorough wash, the wound was closed in layers. The bony specimen was sent for histopathological examination. Culture sensitivity came out negative for any bacterial growth and histopathological examination revealed chronic inflammatory cells surrounding the necrotic bone which proves it to be chronic osteomyelitis.

Postoperatively (figure 5), the patient was put on intravenous Cefotaxim and Metronidazole for 5 days along with Amikacin for 3 days. At 12 months follow-up, the patient is having no relapse of symptoms and he is ambulating with full weight bearing on the affected leg.

Although a small suspicious focus is noted in the upper one-third fibula (figure 3(c)), the patient is clinically asymptomatic. So the patient has been kept under strict observation and was told to do regular follow-ups.



*Figure 1*

**FIGURE 1 - PRE-OP RADIOGRAPH RIGHT LEG WITH PROXIMAL FIBULA OSTEOMYELITIC CHANGES**

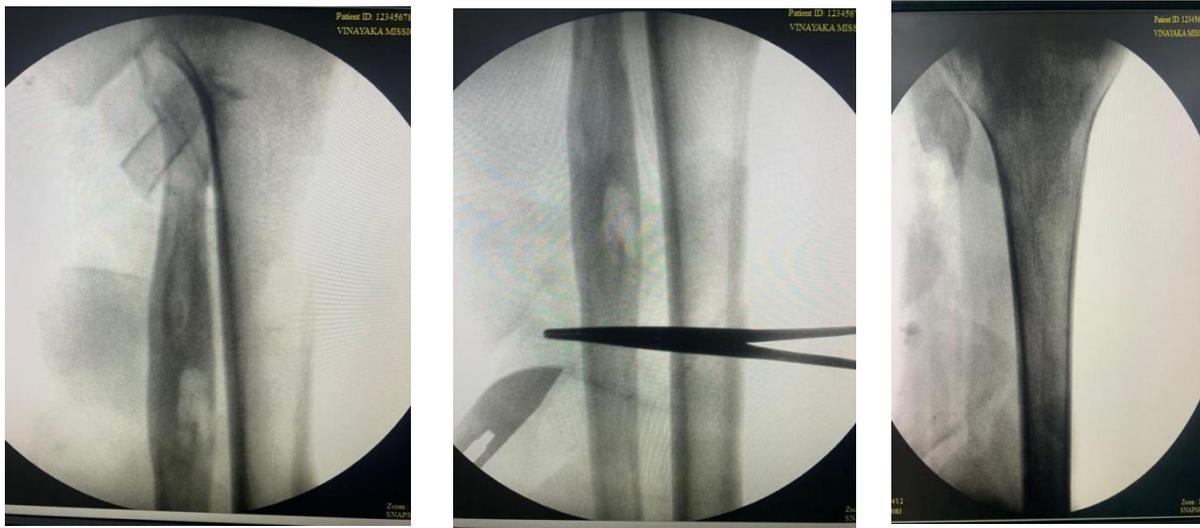


*Figure 2(a)*

*Figure 3(b)*

*Figure 2(c)*

**FIGURE 2 (a), (b), (c) - INTRAOPERATIVE IMAGES**



**FIGURE 3 (a), (b), (c) - C- ARM IMAGES**



*Figure 6(a)*



*Figure 5(b)*



*Figure 4(c)*

**FIGURE 4 (a), (b), (c) - RESECTED SPECIMEN**



*Figure 5(a)*



*Figure 5(b)*

**FIGURE 5 (a)- POST OPERATIVE RADIOGRAPH OF RIGHT LEG, (b)- CLINICAL PICTURE POST OPERATIVE DAY 7**

## **CASE 2**

A 19-year-old male presented with complaints of fever and discharge from his right thigh for 4 weeks. On detailed history, the patient had a fracture of the shaft of the femur 1.5 years ago due to a road traffic accident and was treated at that time at some private hospital with an intramedullary nail. Recently for 4 weeks, the patient has had complaints of discharge from the right thigh which is insidious in onset and associated with fever.

On investigation, culture and sensitivity of discharge were positive for staphylococcus aureus. Intravenous antibiotics were started and an X-ray right femur AP and lateral view (Figure 6) revealed implant in-situ and features of osteomyelitis along with signs of cortical thickening and irregularity.

After getting anesthesia fit patient was planned for implant removal. After extracting the nail, in the same sitting, an incision was made over the fracture site and sequestrectomy and saucerization were done along with filling of the bone defect with cement spacer (Figure 7). At 1 year follow-up, the patient's x-ray was showing consolidation of dead space. (Figure 8)



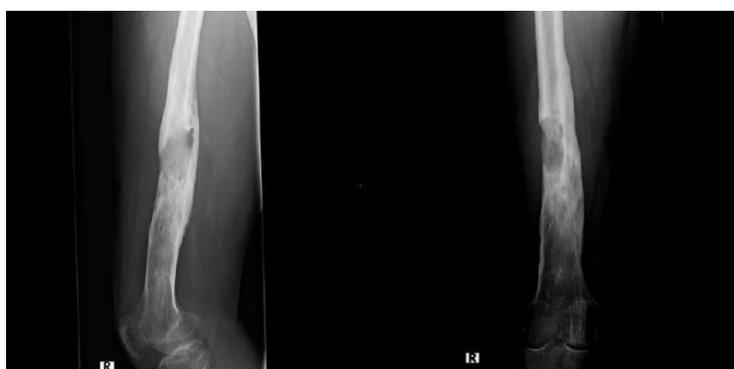
*Figure 6*

**FIGURE 6 - PRE- OP RADIOGRAPH POST TRAUMATIC IMPLANT RELATED CHRONIC OSTEOMYELITIS**



*Figure 7*

**FIGURE 7 -POST OP RADIOGRAPH AFTER IMPLANT EXIT AND CEMENT SPACER APPLICATION WITHIN BONE DEFECT**



*Figure 8*

**FIGURE 8 - CONSOLIDATING DEAD SPACE AT 1 YEAR FOLLOWU****CASE 3:**

A 50-year-old male presented with pain and discharge from his right thigh for 3 weeks. On detailed history, the patient reported that he had self-fall from a two-wheeler 2 years ago, following which he was admitted and treated for a fracture of the distal femur with ORIF and plating at some private hospital. Later he developed pain and sinus discharge besides the surgical scar. He is a known case of hypertension and is on irregular medication. Clinical examination is within normal limits.

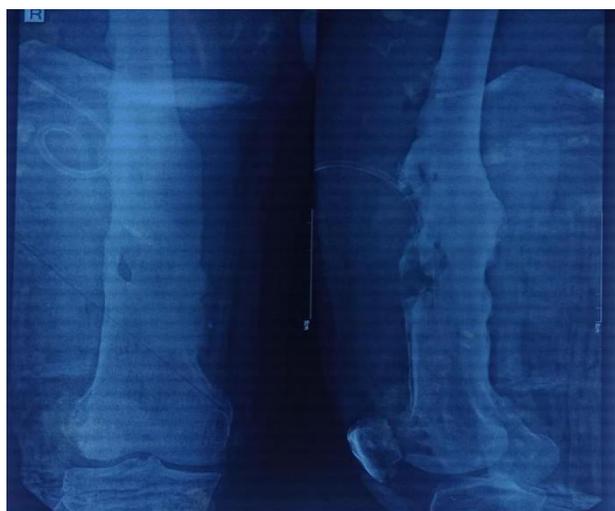
On local examination of the right femur, there is a previously healed scar on the lateral aspect of the distal femur, pus draining sinus over the lateral aspect of mid-thigh, and no tenderness present. There is no swelling and no local rise in temperature. The range of movements is full range and pain-free, the distal pulse is felt and active movements are present.

X-ray AP and lateral view (Figure 9) of the right femur showed an implant in situ and osteomyelitic changes. The implant was removed under spinal anesthesia in the supine position, the incision was made over the surgical scar and the plate and screws were removed (Figure 10), following which the sequestrum was sent for culture sensitivity and biopsy. Histopathology report revealed a granulomatous lesion composed of occasional loose clusters of epithelioid cells with areas of necrotic debris and Langhans-type giant cells. There is abundant dense inflammatory cell infiltrate composed of neutrophils, plasma cells, and lymphocytes. A moderate zone is observed with areas of hemorrhage suggestive of chronic granulomatous lesion most probably tuberculosis. After the diagnosis is made the patient was referred to chest and TB department where he was asked for sputum AFB test and CBNAAT following which ATT drugs were started. On review after 1 month the patient was asymptomatic. Clinically, the surgical scar was healed with no signs of discharge and inflammation. Radiographs also showed signs of healing. (Figure 11)



Figure 9

**FIGURE 9 - PRE OP RADIOGRAPH**



*Figure 10*

**FIGURE 10- IMMEDIATE POST OP XRAY**



*Figure 11*

**FIGURE 11 - POST OP 1 MONTH**

### **DISCUSSION:**

Chronic osteomyelitis and infected non-unions are very disabling to patients and there will be long standing morbidity. The consequences of the condition and surgical management is for long term duration. Changes in plain radiographs can include scalloping of the cortex and periosteal reaction soft-tissue swelling, osteopenia, CT scanning be helpful in the identification of sequestra while MRI is more useful for soft-tissue assessment and revealing early bony oedema.[7]

Treatment of Chronic Osteomyelitis include antibiotics. Mader et al.[4,8], recommend regimens based on their staging system. Type 1 osteomyelitis is treated with 4 weeks of parenteral antibiotics. Type 2 often resolves after 2 weeks of antibiotics after debridement. Types 3 and 4 each require 4 weeks of parenteral antibiotics from the last debridement. Some centres use 2 weeks of parenteral antibiotics followed by 4 weeks of oral antibiotics.

Surgical management of osteomyelitis consists of two basic steps; debridement and obliteration of the subsequent dead space by soft tissue.[9] Adequate surgical debridement removes dead necrotic tissues, decreases the bacterial load, and gives a chance for the host immune system and antibiotics to arrest infection. Adequate debridement may leave a large bony defect, or dead space All sequestra must be removed and resection of scarred and infected bone and soft tissue is indicated.[9,10] Periosteal stripping should be avoided because it may result in a vascularity and the involucrum surrounding the infection can be left in place.[11] Debridement of the bone is performed until the 'paprika sign' is seen; a pin-point bleeding noted on the viable bone.[12]

Numerous surgical options can be used to treat bone defects such as primary shortening, cancellous bone graft in one stage, cancellous bone graft in two stages (after induced membrane technique), pedicle bone transfer, periosteal free flap transfer, or bone morphogenetic protein. Although non-vascularized bone grafting is effective in small bone defect with well-perfused soft tissues, they are less reliable when the gap defect is greater than 6 cm and when soft tissue vascularization is poor.[13]

We in our case did sequestrectomy along with removal of dead necrotic bone without any reconstructive methods as tibia is not involved and distal end of fibula is not involved. Intraoperatively, the dead necrotic abnormal tissue bone wood like pieces mimicked neoplastic lesion Fungal Osteomyelitis Granulomatous infection but after biopsy it was diagnosed Chronic Osteomyelitis. With adequate debridement curettage and with proper antibiotic coverage result was satisfactory. The functional outcome is better at around 6 months post op.

## **CONCLUSION:**

Chronic osteomyelitis must be diagnosed and treated as early as possible to prevent the spread of infection causing serious complications. Aggressive surgical debridement followed by appropriate antibiotic therapy based on culture reports are the mainstay of treatment. Further studies have to be done to find out the reinfection rates and functional outcomes.

## **REFERENCES:**

1. Chassaignac E. De l'osteo-myelite. Bull Mem Soc Chir. 1852;3:431–436.
2. Hunter J. A Treatise on the Blood, Inflammation and Gun-shot Wounds. London: George Nicol; 1764. pp. 521–567.
3. Holtom PD, Smith AM. Introduction to adult posttraumatic osteomyelitis of tibia. Clin Orthop Relat Res. 1999;360:6–13.

4. Cierny G, Mader JT, Pennick H. A clinical staging system of adult osteomyelitis. *Contemp Orthop*. 1985;10:17–37.
5. Cierny G. Surgical Treatment of Osteomyelitis: *Plast Reconstr Surg*. 2011 Jan;127:190S-204S.3.
6. Waldvogel FA, Medoff G, Swartz MM. Osteomyelitis: A review of clinical features, therapeutic considerations, and unusual aspects. *N Engl J Med* 1970;282:198–206, 260–6, 316–22
7. Lazzarini L, Mader JT, Calhoun JH. Osteomyelitis in long bones. *J Bone Joint Surg Am*. 2004;86-A(10):2305–2318.
8. Forsberg JA, Potter BK, Cierny G, 3rd, Webb L. Diagnosis and management of chronic infection. *J Am Acad Orthop Surg*. 2011;19(Suppl 1):S8–S19.
9. Haidar R, Der Boghossian A, Atiyeh B. Duration of post-surgical antibiotics in chronic osteomyelitis: Empiric or evidence-based? *Int J Infect Dis*. 2010;14(9):e752–e758.
10. Eckardt JJ, Wirganowicz PZ, Mar T. An aggressive surgical approach to the management of chronic osteomyelitis. *Clin Orthop Relat Res*. 1994;298:229–239.
11. Waldvogel FA, Papageorgiou PS. Osteomyelitis: The past decade. *N Engl J Med*. 1980;303(7):360–370.
12. Parsons B, Strauss E. Surgical management of chronic osteomyelitis. *Am J Surg*. 2004;188(1A Suppl):57–66.
13. Calhoun JH, Manring MM. Adult osteomyelitis. *Infect Dis Clin North Am*. 2005;19(4):765–86.