

# Chronic Osteomyelitis of Proximal Tibia Due To A Retained Glove Piece: A Case Report

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## Abstract

**Introduction:** The classic presentation of chronic osteomyelitis is characterized clinically by the presence of a draining sinus, and radiologically by sequestrum. Despite adequate treatment when the sinus fails to heal, one has to evaluate for its persistence. The presence of sequestrum and foreign body is one of the common causes for failure of the treatment. Except for one report, there are no described cases in the literature, where the surgeon's glove piece has been left inside a bone and caused osteomyelitis. We are reporting a case of chronic osteomyelitis of tibia due to a retained glove piece following surgical management of proximal tibia fracture.

**Case Report:** A 36-year-old male, with nil pre-morbid conditions, presented with complaints of discharging sinus from the anterior aspect of the proximal part of the left leg since for 2.5 years. He had undergone implant removal for sinus discharge following healed proximal tibial fracture which was managed with open reduction and internal fixation. Radiological evaluation revealed a cavity with sequestrum. During planned debridement and sequestrectomy, one surgical glove piece was as well retrieved from the cavity. *Pseudomonas aeruginosa* was isolated and he received appropriate antibiotic therapy. The patient after the procedure improved and during the last past one year of follow-up, there is no recurrence of discharge and sinus has healed.

**Conclusion:** Chronic osteomyelitis is a debilitating condition. All precautions are to be taken to prevent osteomyelitis while performing orthopaedic surgeries, more so while dealing with closed fractures. A high index of suspicion of foreign body retention is suggested while evaluating these cases. While performing procedures that involve instrumentation with sharp objects, one must regularly inspect and if the need be, replace the gloves regularly.

**Keywords:** Chronic osteomyelitis, Foreign body, Glove perforation, Fracture complication, Non-healing sinus, Infection.

## Introduction

Chronic osteomyelitis is commonly seen following open fractures and sometimes, following surgical management of closed fractures. It can also happen as a sequela to acute osteomyelitis. The classic presentation of chronic osteomyelitis is characterized clinically by the presence of a draining sinus, and radiologically by sequestrum [1,2]. With adequate surgical debridement, sequestrectomy and antimicrobial therapy, the disease can be

controlled and is evident clinically with the healing of sinuses [3,4]. However, when the sinus fails to heal, one has to evaluate its persistence [5,6]. The presence of a foreign body, presence of a sequestrum, tuberculosis, malignancy, epithelialization of the sinus tract, and uncontrolled systemic comorbid conditions are common causes which need to be evaluated.

Foreign bodies are lodged into the soft tissues, body cavities, and the bone mostly by penetrating injuries and rarely by iatrogenic causes. Thorn, wooden splinters, ballistic splinters, plastic items, rubber of the shoes, rubber bands, broken needles, glass pieces, cotton swabs, sponges, metal plates,

and tooth picks all have been described in the literature, which have caused the chronic osteomyelitis [7, 8, 9, 10, 11, 12, 13, 14, 15, 16]. Except for one report, there are no described cases in the literature, where a surgeon's glove piece has been left inside a bone and caused osteomyelitis [17]. We are reporting a case of chronic osteomyelitis of tibia due to a retained glove piece following surgical management of proximal tibia fracture.

## Case Report

A 36-year-old male, with nil premorbid conditions, presented to the outpatient department with complaints of discharging sinus from the anterior aspect of the proximal part of the left leg for 2.5 years. He had undergone

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**Figure 1:** Plain radiograph showing anteroposterior and lateral views of joint with cavity and sclerotic bone.



**Figure 2:** Computed tomography scan showing extent of cavity and multiple sequestra.

open reduction and internal fixation for a closed tibial plateau fracture elsewhere 6 months before the onset of discharging sinus. Following the onset of infection, he underwent implant removal and surgical debridement at the same place as the primary surgery. Wound swabs and intraoperative infective tissues sent for microbial culture during implant removal had revealed no growth. The patient, however, had received close to 6 months of oral antimicrobial therapy, despite which the sinus persisted.

On examination, a sinus measuring 0.5 × 0.5 cm was situated on the anteromedial aspect of the proximal part of the leg, overlying the medial tibial condyle. The margins were rounded and smooth. There was active seropurulent discharge noted from the mouth of the sinus. The surrounding skin was discolored and shiny. There were no distal neurovascular deficits. The knee joint had a flexion deformity of 20 degrees with further flexion upto 90 degrees.



**Figure 3:** Retrieved glove piece stained with seropurulent discharge.

Plain radiographs revealed malunited lateral condyle fracture with the destruction of the articular surface and a cavity in the anterior aspect of the medial condyle. Corticocancellous differentiation was lost. The cavity was surrounded by dense, sclerotic bone (Fig. 1). A computed tomography (CT) scan was done to have a better understanding of the fracture union and the cavity. CT scan revealed a cavity opening up anteromedially with multiple sequestra (Fig. 2).

All other pre-operative investigations, including total leukocyte count, ESR, and CRP, were normal. Wound swab from the sinus tract and blood culture was both sterile.

The patient was taken up for sequestrectomy and debridement. The sinus tract was excised. The cavity was approached through a medial incision to avoid problems with skin closure. While debriding the cavity, a piece of surgical glove covered with the seropurulent discharge was found within the cavity (Fig. 3).

The glove piece was removed, cavity debrided, sequestra removed, and deadspace filled with antibiotic mixed bone-graft substitute. Infected tissue from deep inside the cavity was sent for histopathological and microbiological investigations. Biopsy report was consistent with chronic osteomyelitis and bacterial culture showed scanty growth of multidrug-resistant

*Pseudomonas aeruginosa*. The patient received appropriate antibiotics for 6 weeks and he improved subsequently. There is no recurrence of discharge in the past 1 year of follow-up.

### Discussion

Osteomyelitis literally means inflammation of bone and bone marrow which usually follows an infection [2]. Endogenous/hematogenous or exogenous are the two modalities which are used in the clinical practice [3]. In the recent industrial era, hematogenous or endogenous form has decreased due to the easy availability of medical care, early intervention, and effective antibiotic regime. On the other hand, the exogenous form is on the rise because of the increased incidence of high-energy injuries and increased number of surgical procedures [1]. The earliest case of a probable foreign body-induced osteomyelitis was described by González-Reimers in calcaneum belonging to an adult prehispanic man, with estimated antiquity of ≈ 1000 years BP [18].

Hence, chronic osteomyelitis due to the presence of a foreign body is not uncommon. However, most often that foreign body is the surgical implant [19,20]. Moreover, it is likely that the infection will subside with the removal of the foreign body, adequate surgical debridement, and deadspace management [1,3]. Retained foreign

bodies have been known to cause chronic osteomyelitis, as described by Surovet al. [15]. Schneider has reported a case of development of chronic osteomyelitis and subsequently angiosarcoma in a 46 years old World War II wound which had a 7mm metal fragment [21].

In our case, despite removing the implant and surgically debriding the cavity, the infection persisted with the continuation of discharging sinus. A repeat debridement revealed the presence of another foreign body which was the glove piece. Sadat-Ali has described one case of femoral osteomyelitis due to retained piece of latex glove while doing Kuntscher intramedullary nailing of the femur fracture [17].

Chong et al. reported eight cases of rubber foreign body in the prick injuries of the foot in persons using rubber-soled shoes [11]. He noted 3/8 cases had of metatarsal osteomyelitis. Culture in these cases revealed Gram-negative bacilli (Pseudomonas and Klebsiella) akin to our case. Aggarwal et al. have described rubber band syndrome, in which rubber band gradually cuts through the soft tissues of the extremities and causes chronic non-healing wound and discharge [22]. Aggarwal has described a case of chronic osteomyelitis as well in one such case [7].

Due to the nature of the work, there is a

high incidence of macro- and micro-perforation of gloves in orthopedic and trauma surgery [23, 24, 25]. Glove perforation itself increases the chance of SSI significantly [25, 26]. Lakomkin et al. investigated the risk of glove perforation during orthopedic trauma surgeries and identified techniques such as cleaning drill flutes by hand, catching gloves along a guide wire while inserting a cannulated instrument, and palpating the end of a flexible intramedullary nail cut with a standard wire cutter pose a high risk of glove perforation [24]. They also concluded that only 14.3% of these perforations were identified at surgery as most were microperforations.

It is difficult to identify radiolucent foreign bodies using routine radiographs and CT scan which was the case in our patient [10, 12]. USG has been suggested as better investigating modality, but it works in soft tissues. MRI can give a variable picture depending on the nature of the foreign body [11]. A bone scan can suggest ongoing inflammation but cannot identify the foreign body [9, 27]. Liaw described a case of septic arthritis and osteomyelitis of the metacarpophalangeal joint of the thumb in a diabetic neuropathic patient due to a foreign body, suggesting careful assessment is the key in the management of these cases [8]. Other differential diagnoses for foreign body granuloma

which need to be considered are osteoid osteoma, chronic/acute osteomyelitis, tuberculosis, metallosis, aneurysmal/simple bone cyst, fibrous cortical defect, and secondaries [28, 29]. It is imperative to follow techniques with the least risk of glove perforations and to inspect the gloves regularly for any macroperforations or missing the part of gloves. When they do occur and go unnoticed, they pose an increased risk of infection at the surgical site. The surgical personnel are also at risk of being exposed to pathogens. Retained foreign body iatrogenically can be a valid reason for litigation [14].

### Conclusion

Chronic osteomyelitis is a debilitating condition. All precautions are to be taken to prevent osteomyelitis while performing orthopedic surgeries, more so while dealing with closed fractures. A high index of suspicion of foreign body retention is suggested while evaluating these cases, while performing procedures that involve instrumentation with sharp objects, one must regularly inspect and if the need be, replace the gloves regularly.

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