

**CASE REPORT**

## Limb Salvage Surgery in Chronic Osteomyelitis: A Case Report

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### ABSTRAK

*Osteomyelitis merupakan jangkitan tulang yang berlaku akibat keradangan berterusan yang disebabkan oleh mikroorganisma yang menjangkiti tulang. Sebanyak 3 sehingga 50% tulang patah terbuka berisiko mengalami osteomyelitis dengan kadar amputasi yang tinggi. Usaha untuk menyelamatkan anggota badan menjadi satu cabaran dan memerlukan kecekalan. Kami melaporkan satu kes yang melibatkan seorang lelaki Cina berumur 44 tahun menghidap osteomyelitis kronik yang telah berjaya melalui beberapa pembedahan menyelamatkan anggota kakinya. Langkah-langkah ke arah pemulihan osteomyelitis kronik termasuklah merencatkan jangkitan, mengurangkan kesakitan dan menyelamatkan anggota badan beserta fungsinya. Kadar pemulihan dan fungsi untuk kes ini adalah lebih baik berbanding kes amputasi di atas paras lutut.*

*Kata kunci: amputasi, osteomyelitis, penyelamatan anggota, pembedahan, trauma*

### ABSTRACT

Osteomyelitis refers to an infection of the bone characterized by progressive inflammatory destruction caused by infecting microorganism. Open fracture carries the risk of developing osteomyelitis from 3 to 50% with a high amputation rate. Salvage of the limb is always a challenge and needs perseverance. We report the case of a 44-year-old male with chronic osteomyelitis with successful multiple limb salvage surgeries. The curative approach to chronic osteomyelitis has the following goals including arrest of infection, pain reduction and salvage of limb and function. With regard to survival and function, the result obtained in this case is more promising compared to above knee amputation.

Keywords: amputation, limb salvage, osteomyelitis, surgery, trauma

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## INTRODUCTION

Chronic osteomyelitis presents a variety of challenges to the surgeon. The term “osteomyelitis” refers to infection of the bone characterized by progressive inflammatory destruction caused by infecting microorganism (Lew & Waldvogel 1997). The infection can be limited to a single portion of the bone or can involve several regions, such as marrow, cortex, periosteum and the surrounding soft tissue. Chronic osteomyelitis is defined as long standing infection that evolves over months or even years, characterized by the persistence of organisms, low grade inflammation, the presence of dead bone (sequestrum) and fistulous tract. Magnetic Resonance Imaging (MRI) portrays a hyperintense signal indicating a diffused osteomyelitis (Figure 1) (Caputo et al. 1994).

A variety of multiresistant bacteria remains to be the source of concern. The primary means of treatment

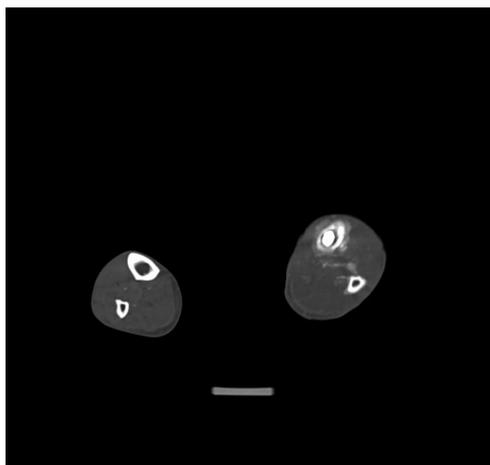


Figure 1: An axial cut of a Magnetic Resonance Imaging (MRI) showing hyperintense signal on the left tibia represent diffuse osteomyelitis.

include aggressive debridement, culture-specific antibiotic, bone grafts, and muscle flap. Third degree open fracture has the risk of developing osteomyelitis from 3 to 50% with a high amputation rate (Gustilo et al. 1990). We report the case of a 44-year-old male with chronic osteomyelitis with successful multiple limb salvage surgeries spanning a period of four years.

## CASE REPORT

A 44-year-old male was involved in a motor-vehicle accident and sustained an open fracture grade 3 mid shaft left tibia and segmental fracture left fibula on 13.3.2010. He had undergone initial wound debridement and external fixation. He presented to us 4 months later with an infected wound at the donor split skin graft site and non-union of mid shaft left tibia with features of osteomyelitis at pin site.



Figure 2: Tibia/fibula X-ray (AP), showing post wound debridement, sequestrectomy and insertion of gentamicin impregnated beads.



Figure 3: Tibia/fibula X-ray (AP), showing intramedullary nail inserted to stabilize the bone with a bridging callus and involucrum.

Removal of the old external fixation and insertion of new external fixation was done with insertion of gentamicin impregnated beads (Figure 2).

Patient presented again 1 month later with Stage 4 Cierny-Mader classification of osteomyelitis and a below knee amputation was discussed as one of the treatment options. However, we opted for an attempt to salvage the limb. Bone tissue was taken from the infected site for culture and appropriate antibiotics were given for at least 6 weeks.

A Computed Tomography Angiography was done and showed normal vascularity of the lower limb with no evidence of stenosis. He underwent a total of 11 wound debridement (including sequestrectomy), Genex bone graft insertion, intramedullary gentamicin cement rod, gentamicin wash, multiple revisions of split skin graft and 5

complete courses of antibiotics in the process of recovery in the next 4 years. With this, we managed to salvage the limb.

## DISCUSSION

Osteomyelitis is difficult to treat and it depends on patient factors that is the age and immune status, and also depends on its features which includes the duration of disease progression, underlying aetiology, pathogenesis, extent of bone involvement. The curative approach to chronic osteomyelitis has the following goals: i) arrest of infection; ii) reduction of pain; iii) salvage of limb and function.

The patient's quality of life must not be reduced by the treatment especially so in older patients who are often unable to compensate for the loss of limb and become dependent on care. Treatment includes radical debridement (sequestrectomy) and drainage of discharge from the wound. After a thorough debridement, treatment continues by managing the dead space, protecting the wound, reconstruction of soft tissue, commencement of culture-directed antibiotics and finally maintaining the bone stability. Eradication of infection by debridement and use of antibiotic cement spacer are done early in management of chronic osteomyelitis. Thereafter, when the soft tissue condition and the infective parameters have normalised, definitive surgery can be commenced (Bajuri & Abdul Razak 2017).

In stages 3 and 4, the patient is treated with a 4-6 weeks of



Figure 4: Lateral 4(a) and anteroposterior 4(b) X-ray showing new bone formation at the diaphyseal region with consolidation.

intravenous antimicrobial therapy dated from the last major debridement (Cierny et. al. 2003). At this point, if adequate debridement not done, it will cause failure of treatment despite prolonged antibiotic use. Dead space management is also essential to halt disease progression apart from maintaining bone's integrity. The objective is to replace dead bone with durable vascularized tissue which in this case was Genexosteoconductive synthetic bone graft.

Antibiotic-impregnated acrylic beads (in this case Gentamicin) or antibiotic-loaded cement may be used temporarily to maintain dead space at the same time, sterilizing it (Kent et. al. 2006).

Chronic osteomyelitis associated with nonunion classically treated through debridement and antibiotic therapy combined with external fixation and followed by definitive internal fixation. In this case, we used antibiotic cement-coated interlocking

intramedullary nails to restore bone stability. In stage 3 and 4 osteomyelitis, treatment involves modalities such as intramedullary reaming with bone grafting and adequate soft tissue coverage after debridement which can be achieved by split skin graft 6-8 days after infection has been arrested. Intramedullary nail is inserted to stabilize the bone with a bridging callus and involucrum (Figure 3). In rare occasion, fat embolism syndrome (FES) may arise as a complication of acute osteomyelitis. If this happens, caution must be excised and supportive therapy is vital to reduce the risk of other complication that may hinder the main management (Bajuri et. al. 2013).

Complex reconstruction of bone and soft tissue with external fixation often required as the bone graft incorporates in order to support the structure. This will help new bone formation to occur at the diaphyseal region and later for consolidation to occur (Figure 4).



Figure 5: Clinical picture of the patient after the successful limb salvage surgery.

Debridement and immediate muscle flaps coverage are the primary surgical strategies to provide effective treatment of chronic osteomyelitis and ultimately successful limb salvage surgery (Figure 5).

## CONCLUSION

Chronic osteomyelitis possesses a challenge in treatment and unfortunately leads to significant morbidity and high expenses. In order to rectify this problem, culture-specific antibiotic therapy, operative debridement of necrotic bone and soft tissue, dead space management, restoration of blood supply and stabilization and adequate soft tissue coverage are the necessary treatments involved. The goals of treatment must be fully understood by the patient, while caregivers should have a clear

understanding of the challenges along the process of a successful recovery.

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