

# Refractory chronic osteomyelitis of femur: A case report

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## Abstract

**Purpose:** The purpose of this paper is to introduce a case of refractory chronic osteomyelitis of the femoral shaft.

**Case Report:** A 51 year old male suffered from chronic osteomyelitis of the femoral shaft for about 40 years. In the first stage, thorough debridement, extensive lesion resection, antibiotic bone cement spacer and external fixator were applied; in the second stage, the external fixator and bone cement column were changed to femoral bone marrow internal nail combined with femoral locking plate and autologous bone implantation at the broken end under the premise of complete control of inflammation and good health. Finally, the patient was cured and very satisfied with the current state.

**Conclusion:** We report a case of refractory chronic osteomyelitis, which is very rare to have a long history of disease, a large number of fractures, and deformity degree of lower limbs.

## Introduction

It is difficult to treat chronic osteomyelitis of femoral shaft, which often leads to deformity and seriously affects limb function, which brings serious burden to patients' life and economy. The history of chronic osteomyelitis is generally long and it is easy to have repeated attacks. If there is dead cavity, dead bone or scar tissue without blood supply in the lesion, antibiotics can not achieve its efficacy. At the same time, due to the influence of purulent secretion of wound surface, antibiotics are easy to be diluted, and even some drugs are difficult to pass through the pus to act on tissues, long-term use of antibiotics will lead to drug resistance. If there is no thorough debridement of osteomyelitis lesions, only simple debridement and anti-inflammatory treatment often can not achieve the goal of cure, and miss the best opportunity for early complete cure of osteomyelitis, eventually, the early infection will progress to chronic osteomyelitis [1-2]. Therefore, reasonable and correct treatment plan is very important for patients with osteomyelitis. Surgery is the mainstay of treatment for osteomyelitis patients, including local irrigation and debridement, extensive lesion resection or amputation [1,3-5]. The purpose of this paper is to introduce a case of refractory chronic osteomyelitis of the femoral shaft. In the first stage, thorough debridement, extensive lesion resection, antibiotic bone cement spacer and external fixator were applied; in the second stage, the external fixator and bone cement column were changed to femoral bone marrow internal nail combined with femoral locking plate and autologous bone implantation at the broken end under the premise of complete control of inflammation and good health.

## Case report

A 51 year old male patient had no history of hypertension and diabetes mellitus, no smoking and drinking habits. He complained of soft tissue swelling around the right knee joint due to sprain when he was 8 years old, there was no fracture at that time, after a month of rest and massage, the lateral skin of the knee joint was broken with fluid exudation, during this period, the body temperature was on the high side (about 39°C). At that time, the fever symptoms were

improved after anti-inflammatory treatment and wound cleaning and dressing change, but the skin intermittent exudation was not cured. Three years later, the symptoms of swelling, ulceration and purulent fluid exudation of the lateral skin of the middle and lower femur were obvious, and he went to the local hospital for treatment, diagnosis: osteomyelitis of femoral shaft. The first operation was performed, soft tissue debridement, femoral shaft slotting and gentamicin was added to the femoral medullary cavity flushing solution for continuous flushing. The patient was stable for the next 10 years, no swelling, heat, pain and ulceration were found in the skin of the affected limb. Ten years after surgery, when the patient was about 20 years old, pain symptoms of the affected limb recurred, the patient could not bear the pain and went to the local hospital for treatment, Physical examination showed that the skin was intact and no ulcerative fluid was found, recurrence of osteomyelitis was considered according to imaging findings, The patient was treated again with irrigation and drainage of intramedullary tube. During the operation, a large amount of purulent fluid flowed out of the medullary cavity, and the symptoms of swelling and pain of the affected limbs were obviously improved after the operation, however, the skin sinus of the middle and lower femur was formed, which was not cured. When the patient was about 30 years old, he suffered an accidental fracture of the right femoral shaft. At that time, the patient's history of chronic osteomyelitis and limited medical level were considered, the patient received plaster external fixation. Unfortunately, over the next 20 years, the patient experienced six fractures in the same area, the interval between each fracture was 4-5 years, because plaster external fixation can not completely fix both ends of fracture, in the process

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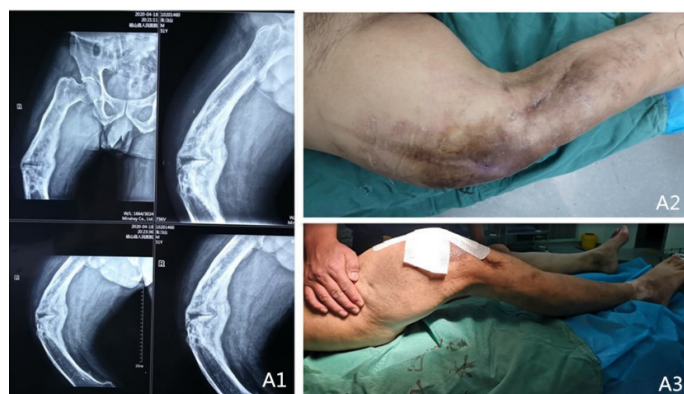
**Key words:** chronic osteomyelitis, debridement, intramedullary fixation, external fixation

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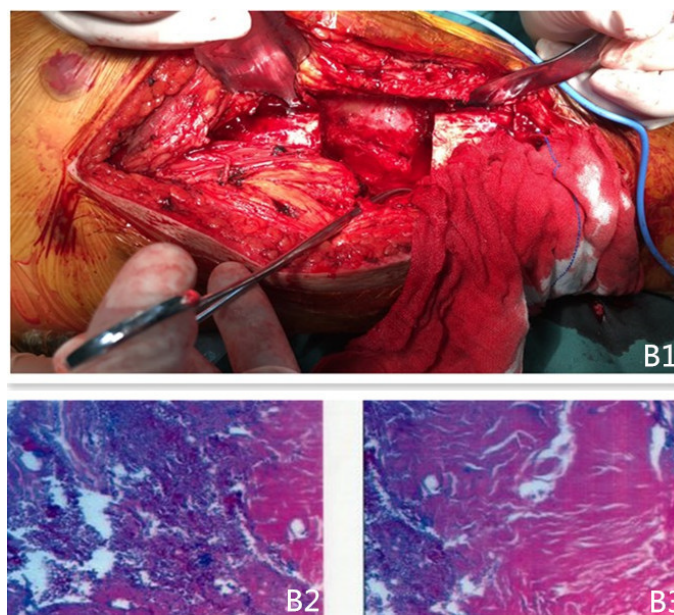
of fracture healing, the angle of femoral shaft forward angulation is gradually increasing, as a result, the patient's right lower limb could not walk upright, in addition, plaster external fixation after multiple fractures resulted in complete stiffness of the affected knee joint and loss of function (Figure 1 A2-3).

On April 21, 2020, The patient developed right thigh pain after sprain three days ago, He went to our hospital for further treatment for the first time. The X-ray examination showed that: the right femoral shaft is curved, angulation in front, the outline of the middle femur became thicker, irregular shape, hyperplasia, thickening and sclerosis of bone cortex, irregular medullary cavity, a lot of sclerotic bone and dead bone were formed, the continuous interruption of the bone cortex in front of the femoral shaft showed the sign of pathological fracture, the medullary cavity was completely occluded, a large number of envelope was formed around the dead bone, there were sinus holes formed by pus erosion on the surface of envelope (Figure 1 A1). Pyogenic fluid exudates from the skin sinus formed in the middle and lower femur. The results of laboratory tests showed that erythrocyte sedimentation rate (ESR): 53.0 mm/h, high sensitivity C-reactive protein (hs-CRP): 62.04 mg/L, serum procalcitonin (pct-q): 0.23 ug/L. The bacterial culture and drug sensitivity of secretion suggested that *Staphylococcus aureus* infection was sensitive to glycopeptide antibiotics and aminoglycoside antibiotics.

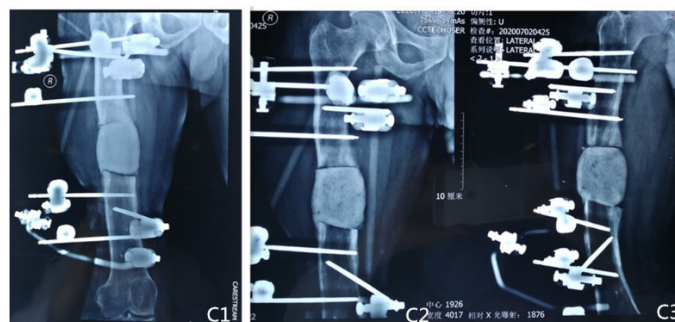
On April 28, 2020, the patient was brought into the operating room for thorough debridement, microbial culture and pathological examination. During the operation, the lesions were completely removed and the middle femur was removed about 7 cm (Figure 2 B1) and then sent for pathological examination (Figure 2 B2-3). After thorough removal of dead bone in medullary cavity, 40g acrylic resin bone cement (1\* 40 g, blomet France SARL) mixed with 2.0g vancomycin (0.5 g, Zhejiang Haizheng) was implanted in the femoral defect, and negative pressure irrigation tube was implanted in the side of femur, the combined external fixator (WGJIV, alder Technology) was used to stabilize the distal and proximal femur, the postoperative X-ray film of the affected limb is shown in the figure (Figure 3 C1). Intraoperative microbial culture indicated *Staphylococcus aureus* infection, after 6 weeks of intravenous infusion of vancomycin, rifampicin (150mg Shanghai Hengshan) was given orally for 4 weeks. Gentamicin was added to the washing solution for 2 weeks, during this period, several times of bacterial culture indicated that no bacterial growth was observed, and then the flushing tube was pulled out. During the treatment, the wound around the original skin sinus was not well healed, and it was completely healed after local debridement



**Figure 1.** A1. the X-ray film of right femoral shaft before admission; A2-3. appearance of right lower limb before operation



**Figure 2.** B1. photos of femoral defect after resection of intraoperative lesions; B2-3. after resection of the femoral lesions, the lesions were observed under a microscope

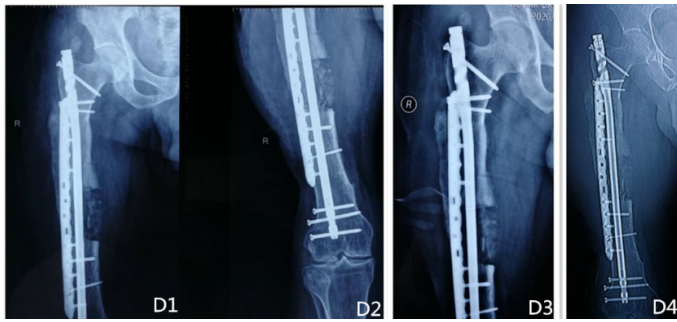


**Figure 3.** C1. the X-ray films were reexamined after debridement; C2-3. the X-ray film of the right femur was reexamined 8 weeks after debridement

in the operating room again. The X-ray film of the right femur was reexamined 8 weeks after operation as shown in the figure (Figure 3 C2-3), The results of laboratory tests showed that ESR: 30 mm/h, hs-CRP: 14.18 mg/L, pct-q: 0.11 ug/L.

On July 6, 2020, the patient returned to the operating room again to remove all external fixators and bone cement mixed with antibiotics. The blood fluid in the medullary cavity was cultured, the subsequent results indicated that no bacterial growth was observed. Then, 11\*380 mm metal interlocking intramedullary nail (A-UFN-02, Xiamen Dabo Technology) was implanted after reaming the proximal and distal femur, the ipsilateral iliac bone was cut into 10\*5\*5 mm bone strips, mixed with 2.0g vancomycin, and implanted into the femoral defect, considering the large defect of femur, the metal locking plate (LCLP01-14hole, Xiamen Dabo Technology) was implanted in the lateral femur to play the role of eccentric fixation (Figure 4 D1-2). The patient was given vancomycin intravenously, and rifampicin was given orally one week later, laboratory tests showed that ESR: 64 mm/h, hs-CRP: 27.61 mg/L, pct-q: 0.09 ug/L. During the whole treatment, the body temperature fluctuated within the normal range. One month after operation, the X-ray film of femur was reexamined as shown in Figure (Figure 4 D3-4) and the wound healed well (Figure 5 E1-2). Reexamination of inflammatory indicators showed that: ESR: 50





**Figure 4.** D1-2, the X-ray films of femur were reexamined after replacement of internal fixation materials; D3-4, the X-ray films of femur were reexamined after 4 weeks of replacement of internal fixation materials



**Figure 5.** E1-2, appearance of right lower limb after operation

mm/h, hs-CRP: 16.55 mg/L, pct-q: 0.07 ug/L. The patients were very satisfied with the current situation.

## Discussion

Osteomyelitis is a well-known disease, most common in adults, staphylococcus aureus is the most common pathogen of osteomyelitis [3,4]. Usually associated with open fractures or soft tissue infection after a long period of infection through blood transmission [6,7]. To analyze the patient with osteomyelitis, the main pathogenic factors are improper treatment of early soft tissue injury, long-term failure to recover after infection, and blood borne transmission of pathogenic bacteria, postoperative pathology showed that a large number of inflammatory cells infiltrated into the nutrient canal of bone tissue, the vascular channels around bone tissue were infiltrated and occluded by inflammatory cells [3,7], the resulting weak bone and diseased bone hinder the healing ability of bone tissue and increase the risk of fixation failure. Thein, *et al.* [6] pointed out that two patients with pathological fractures underwent five surgical interventions before they were cured in their cases. Debridement is the most important method for the successful treatment of chronic osteomyelitis. Complete removal of the lesion is the main means to prevent the recurrence of chronic osteomyelitis [8], the long-term recurrence rate of osteomyelitis patients can be reduced to 20% after thorough debridement [1,4,5,9].

In the process of osteomyelitis treatment, dead cavity, dead bone or scar tissue with lack of blood supply must be eliminated and the internal fixation materials were applied until there was evidence that the inflammation was completely controlled [10]. This also shows that the cure of chronic osteomyelitis needs a long process of diagnosis and treatment, can not rush for a while. Kanakaris, *et al.* [11,12] suggested that patients with chronic osteomyelitis should be treated in stages, because there is a risk of reinfection caused by residual pathogenic bacteria in soft tissue after debridement, early internal fixation is not allowed in patients with osteomyelitis. In our case, thorough debridement, catheter irrigation and external fixator will be carried out in the early stage of treatment, the next stage of treatment will be carried out when there is evidence that the infection is completely controlled. At present, an antibiotic impregnated cement interlocking nail [13] or rod [14,15] has been used to treat patients with infection after femoral or tibial fractures, however, the service life of interlocking nail or rod and cement must be considered. Capanna, *et al.* [16] during a 4.5-year follow-up of 76 patients with distal femoral or proximal tibial tumors treated with interlocking nail and bone cement spacer, they found that 12 cases (16%) failed (i.e., broken, bent or displaced rods) and bone tissue could not grow in polymethylmethacrylate (PMMA), they suggested that the cement interlocking nail or rod should be removed 2 months after operation. According to the patient's condition, we removed the bone cement filled with the broken end and replaced it with autologous bone 9 weeks after the first-stage debridement, at the same time, we replaced the external fixator with femoral interlocking nail combined with metal locking plate to stabilize the broken end of femur. We hope that in the future, under the premise of good bone healing, knee orthopedic surgery will restore knee joint function.

## Conclusion

We report a case of refractory chronic osteomyelitis, which is very rare to have a long history of disease, a large number of fractures, and deformity degree of lower limbs. We adhere to the most basic treatment principles of osteomyelitis, and constantly adjust and improve the treatment plan, and finally achieve the goal of cure. The patient is very satisfied with the current state.

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## Conflicts of interest statement

None of the authors have relevant conflicts of interest to declare.

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