CASE REPORT

Treatment of Closed Comminuted Supracondylar Fracture of Right Femur With Cross Knee Ilizarov External Fixation: A Case Report

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ABSTRACT

The authors present a case of closed comminuted supracondylar fracture of right femur complicated with cellulitis in the pre-operative period which was successfully treated with cross knee Ilizarov external fixator. The main principle of the surgery is to achieve proper alignment of the lower limb. The presence of cellulitis and possibility of deep seated infection in this case presents a unique clinical dilemma of management which could produce the most optimal outcome. This fixation technique with early removal of tibia fixation which enables early mobilization of the knee has resulted in excellent bone union and good knee joint range of motion.

Keywords: Supracondylar, Distal femur, Ilizarov fixator, External fixation, Comminuted fracture

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INTRODUCTION

Cross knee Ilizarov external fixator has been described for open and comminuted shaft of femur and distal metaphyseal femur fractures (1). The primary aim of the surgery is to achieve good reduction and restore limb alignment. In the majority of distal femur fractures, open reduction and internal fixation is preferred. Among all, locking plate has been demonstrated to provide advantages. Retrograde Interlocking Nails, on the other hand, which have the advantage of reduced exposure and less blood loss is also a viable option. However these mentioned techniques might not be suitable in type C2 and C3 base on AO/ASIF classification (2). Both of the implants indicated above can be use in closed fractures, but not in extensively contaminated open fractures of type III or in the presence of poor soft tissue conditions since they increase the isk of infection (3).

Temporary monolateral external fixation of the knee is the best treatment for these condition until the wound or rashes heal, followed by second stage plating. However, if the soft tissue surrounding does not improve, the definitive surgery will be delayed resulting in articular fragments can not be reduced, poor alignment, knee stiffness and displace distal femur bone fragments. The occurrence of skin infection and the requirement for earlier fixation before fibrous union and malalignment are the unique findings of this case. To hold the reduction, Ilizarov tensioned wires over a ring can be applied. Hence, the Ilizarov external fixator can be utilised as a definitive surgery for poor soft tissue condition or skin infection that are not suitable for open reduction and external fixation beside it's advantages of minimal surgical exposure, low blood loss and lack of extra periosteal stripping.

CASE REPORT

A 57-years-old man presented with history of head-on collision with another motorcycle and landed on his right knee. He sustained injury to the right knee and was unable to ambulate. Examination of

his right knee revealed marked swelling over the distal thigh with restricted range of motion. Multiple superficial abrasion wound were seen at the anterior part of the knee. Neurovascular examination distal to fracture site was intact. Radiographs showed severe comminuted fracture supracondylar of right femur with an intact lateral proximal tibia locking plate from the previous trauma 14 years ago (Fig. 1).

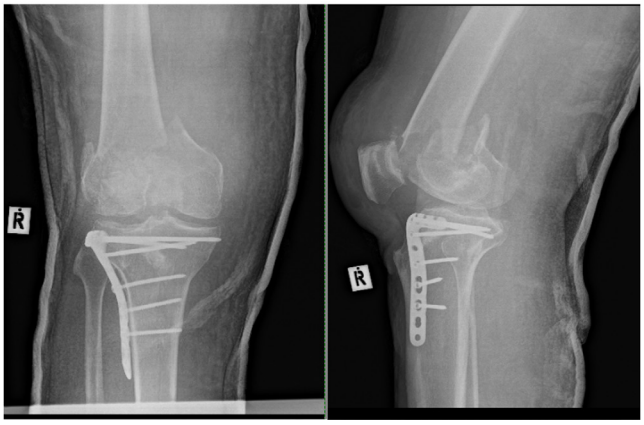

Fig. 1 : Pre-operative radiograph showing comminuted fracture supracondylar of right femur.

The fracture was classified as C3 based on the AO Classification of distal femur fractures. Temporary skin traction of right lower limb was applied and the patient was scheduled for open reduction and plating of supracondylar of right femur. However, patient developed contact dermatitis and cellulitis towards the adhesive tapes. In view of the skin condition and abrasion wounds which are not favourable for internal fixation, we opted for knee bridging Ilizarov external fixator. The operation was successfully done with intraoperative olive wire inserted over the supracondylar of right femur to compress the intercondylar fracture fragments and reduction confirmed with intraoperative image intensifier (Fig. 2). Intravenous antibiotic was given for 2 weeks and the cellulitis was completely resolved 1 week post operative. Using this technique, infections can be successfully controlled and skin infection conditions respond well to theantibiotic used (Fig. 3).

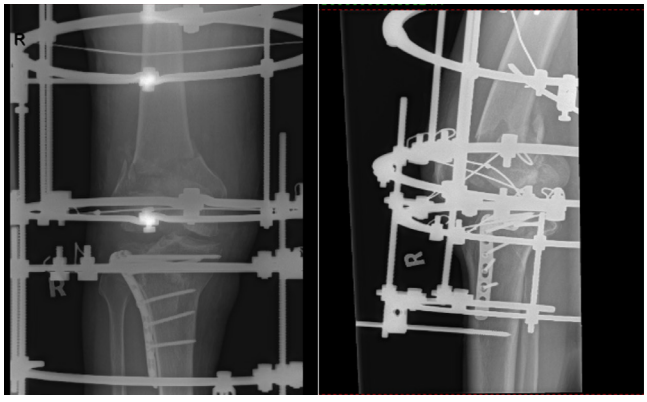

Fig. 2 : Postoperative radiograph of the distal right femur including knee joint and proximal tibia shows the holding olive wire compress the intercondylar fracture fragments.

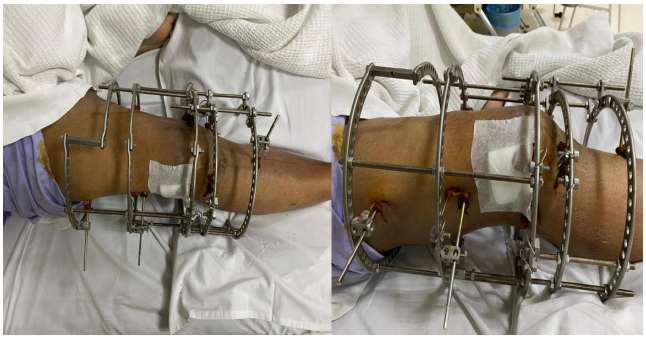

Fig. 3 : Skin condition after the fixation showed the rashes was improved.

The patient was seen at follow up clinic. The two distal rings were removed at 2 month post operation to encourage active mobilization of right knee in order to prevent the knee stiffness. The remaining Ilizarov fixator was removed at 4 months (Fig. 4). Range of motion of right knee had markedly improved to 5 to 110 degree at 6 month post operation. The clinical and functional outcome were further evaluated using the scoring system described by Sanders et al and the result was 32 which correspond to the good outcome.

Fig. 4 : Radiograph at 4 months follow up where the remaining rings were removed.

DISCUSSION

The Ilizarov external fixation spanning the knee joint has been described as definitive fixation for complex distal femur fractures including comminuted fractures (1). In the majority of distal femoral

fractures, internal fixation is preferable. Standard approach to comminuted distal femur fractures of type C2 and C3 involve open exposures especially when addressing reduction of articular comminution and internal fixation using the locking plate. However the approaches are quite extensive in order to tackle the intraarticular fragments. Minimally invasive percutaneous insertion of retrograde nailing can achieve stable fixation but unfavourable anatomical reduction (2,3). Distal femoral fractures on the other hand, had a poor healing rate (86.6 percent vs. 93.7 percent) and a greater re-operation rate (13.4 percent vs. 6.1 percent) than shaft fractures, according to a recent meta-analysis (4). External fixation for femoral fractures is used as a temporary stabiliser for damage control orthopaedics in polytrauma patients and as a definitive fixation in open or comminuted fractures, fractures with bone loss, poor soft tissue coverage and fractures with infection in the wound or in the surrounding soft tissue (1).

The Ilizarov external fixator's stability is determined by bone orientation within the fixator rings and tension of the fixation wires. It was found that the Ilizarov fixators allowed axial motion during loading when compared to other type of implant fixation (5). The olive wires offer good compression effect on the condyles and at the same time increase the shear resistance of the Ilizarov system. Small diameter wires when being tensioned was found to provide adequate stability in osteoporotic bones.

The following are our indications for using a knee spanning Ilizarov external fixator for supracondylar and intercondylar fractures of the distal femur: severe comminutaion which make open reduction and internal fixation ineffective, osteoporotic fractures, open wounds, poor skin or soft tissue conditions, and patients with polytrauma. In our patient, poor soft tissue condition which was skin infection was the indication for illizarof external fixation. Ilizarov technique has been well described in many publications but the use of such technique with presence of skin infection is not widely publicized. A good range of knee flexion of 0 to 110 is necessary to carry out activities of daily living without much strain. Thus, physiotherapy with good mobilisation of the affected limb is essential for successful treatment of the fracture.

CONCLUSION

We demonstrated a knee bridging Ilizarov external fixator as definitive fixation for comminuted high-energy distal femur fracture with advantages of minimal soft tissue manipulation, high versatility of construct and superior mechanical stability by the three dimensional construct. Therefore, the use of an external fixator has a role in the treatment of more difficult distal femoral fractures, particularly those with open wounds, soft tissue damage, rashes surrounding the incision site, bone loss, and severe comminution. Based on the dilemma imposed during the management of this case, we want to emphasize the importance of clinical judgement and the available arsenal when dealing with such clinical issue.

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