Cost Effective Management of Open fractures shaft of femur in a Tertiary Care Hospital using Ilizarov fixator.

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ABSTRACT

Objective: To determine the functional and radiological outcomes of Ilizarov fixator in managing open fractures shaft of femur.

Methods: This descriptive study was conducted in Orthopaedic department Aga khan University hospital Karachi from 23rd January 20015 to 25th December 2020.All adults patients of both gender and age with open fracture femur fulfilling the inclusion criteria were operated with Ilizarov fixator. Functional and radiological outcomes were determined by using the Association for the Study and Application of Methods of Ilizarov (ASAMI) scoring system. The bone results and functional results were graded as excellent, good, fair and poor as per ASAMI scoring system.

Results: We operated 32 patients of open fractures femur with Ilizarov fixator. The mean age was 41±7 years. Male patients were 31(96.87%) and female 1(3.12%). Right sided femur shaft fracture was present in 17(53.12%) and left sided in 15(46.87%). The aetiology of fractures was road traffic in 24(75%) and gunshot in 8(25%) patients. Gustilo Anderson type IIIA fractures were present in 22(68.75%) and type IIIB in 10(31.25%) patients. Post operative bone results using ASAMI score were excellent in 16(50%), good in 15(46.87%) and fair in 1(3.12%) patient. Function result using ASAMI score were excellent in 18(56.25%),good in 13(40.62%) and fair in 1(3.12%) patient. The average cost of treatment was 350,000 rupees.

Conclusion: Illizarov fixator is a cost effective option for managing acute open femur fractures. Excellent and good functional and radiological results were achieved in majority of our patients.

Keywords: ASAMI score, Fracture, Femur, Ilizarov, Union

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INTRODUCTION

Fractures shaft of femur have been reported with traumatic bone loss and significant soft tissue loss in approximately 22% of cases.[1] Patients with high-energy open fractures of the femur and massive soft tissue injury are conventionally treated by stage procedures comprising of initial repeated debridement and external fixation and later on definite fixation.[2-3] These staged procedures are lengthy as well as costly. Ilizarov is an external fixator used in the treatment of open upper and lower extremity fractures, is now frequently used as definitive treatment for open femoral shaft fracture. This frame provides stability, compression at the fracture site,correction of deformity and bone loss through bone transport.[4,5] Ilizarov is a circular fixator comprises of essential rings and rods connecting these rings. The stability and strength of the frame is dependent on ring diameter, tension of the wires and distance between the rings.[6] Inspite of excellent radiological and functional results in open femur fractures Ilizarov ring fixator is associated with pin tract infection, joint contracture, mal union and non union.[7-9] Meticulous surgical technique, patient compliance and regular follow up can decrease the frequency and severity of these complications.

We chose Ilizarov to treat open fractures femur because the problems of shortening, angulation, rotation and translation can be addressed simultaneously with this device resulting in

acceptable radiological and functional outcome. We also hypothesized that this technique would be cost effective than other conventional staged procedures. The objective of our study was to determine the functional and radiological outcomes of Ilizarov fixator in managing open fractures shaft of femur.

METHODS

We conducted this descriptive study in Orthopaedic department Aga khan University hospital Karachi from 23rd January 20015 to 25th December 2020.All adults patients of both gender and age with open fracture femur(Gustilo Anderson type IIIA,IIIB) presented within three days were included. Poly trauma patients requiring surgical intervention for other fractures or other systems, pathological fractures, fractures with intra articular extension and fractures previously surgically treated in other centers were excluded. The study was approved by the Ethical Review Board of our hospital. Informed written consent was taken from all patients. In the enrolled patients complete history, physical examination and relevant investigations were carried out.

All patients were operated on the traction table in spinal or general anaesthesia. Ilizarov assembly was constructed using rings for the distal and middle fragments and arches were used for the proximal fragment. Rings were kept parallel to the proximal tibia articular surface. We used 1.8 mm tensioned beaded wires to stabilize middle and distal fragments, whereas 6 mm Schanz screw were used in multiplane fashion to stabilize the proximal fragment. Through debridement was done in each case. Depending upon fracture type primary compression at the fracture site was applied in case of transverse fractures whereas for fractures with bone loss proximal or distal osteotomy was done for bone transport. At 7 to 10 days bone transport was started at the rate of 0.25 mm four times a day. The transport was bifocal in all cases. The knee was spare in cases of proximal and mid shaft fractures while the frame spanned across the knee in cases of distal one third fractures. Wound was either left open or partially closed depending upon the contamination. Delayed primary closure, skin grafting or flap coverage was done as appropriate.

Post operative supervised physiotherapy was started on first post operative day. Patients were regularly followed in OPD monthly till removal of fixator and then at three months interval for a year. In each visit radiographic and clinical outcome was determined using the Association for the Study and Application of Methods of Ilizarov (ASAMI) scoring system. The bone results and functional results were graded as excellent, good, fair and poor as per ASAMI scoring system.[10]

We analysed our data with SPSS version 23.Frequency and percentage was calculated for qualitative variables while mean and standard deviation was calculated for quantitative variables.

RESULTS

In this study 32 patients were included. The mean age of our patients was 41±7 years. Majority (96.87%,n=31) of our patients were male while female patient was only 1(3.12%).Right sided femur shaft fracture was present in 17(53.12%) and left sided in 15(46.87%).The aetiology of fractures was road traffic in 24(75%) and gunshot in 8(25%) patients. Proximal one third fracture was present in 12(37.5%), middle one third in 11(34.37%),and distal one third in 9(28.12%) patients. The fracture was transverse in 14(43.75%) patients, comminuted in 9(28.12%) and bone loss in 9(28.12%) patients. Bone transport was done in 12(37.5%) patients. The average bone transported was 5.2±6 cm. Gustilo Anderson type IIIA fractures were present in 22(68.75%) and type IIIB in 10(31.25%) patients. Split skin grafting was done in 6(18.75%) patients and local grafting in 4(12.5%) patients. Mean follow-up was 19.2±4 months and mean duration of fixator application was 9.1±5 months. Post operative bone results using ASAMI score(table I)11 were excellent in 16(50%), good in 15(46.87%) and fair in 1(3.12%) patient. Function result using ASAMI score were excellent in 18(56.25%),good in 13(40.62%) and fair in 1(3.12%) patient.No poor bone results or poor and failure function results were reported in our series. The average cost of treatment was approximately 250,000 rupees. Pin tract infection was noted in 10(31.25%) and treated with dressing and antibiotics. Non union at the docking site was documented in 2(6.25%) patients and was treated with bone grafting. Knee stiffness was noted in 4(12.5%) patients and were treated with physiotherapy.

Table I: The Association for the Study and Application of the Method of Ilizarov(ASAMI) Scoring System.[10]

Bone Results	**Description**
Excellent	• Bone united without infection. • Deformity < 7° • Discrepancy in length of the limbs< 2.5Cm
Good	Bone united but may have 1 of the following: I. No infection II. Deformity < 7 ° III. Discrepancy in length of the limbs < 2.5cm
Fair	Bone united but may have two of the following: I. No infection, II. Deformity < 7 ° III. Discrepancy in length of limbs is < 2.5cm
Poor	• Non union • Re fracture • Union is achieved with infection • Deformity is >7° • Discrepancy in length of limbs is > 2.5cm
Functional Results	**Description**
Excellent	• Active without limping and with minimal stiffness(loss of < 15° knee Extension or < 15°dorsiflexion of ankle) • No reflex sympathetic dystrophy
Good	• Dystrophy • Non significant pain • Active with either one or two of the following: I. Limping gait II. Joint stiffness III. Reflex sympathetic dystrophy IV. Significant pain.
Fair	Active with three or all four of the following: I. Limping gait, II. joint stiffness III. Reflex sympathetic dystrophy IV. Significant pain
Poor	Inactive (unable to perform routine daily activities)
Failure	Resultant Amputation

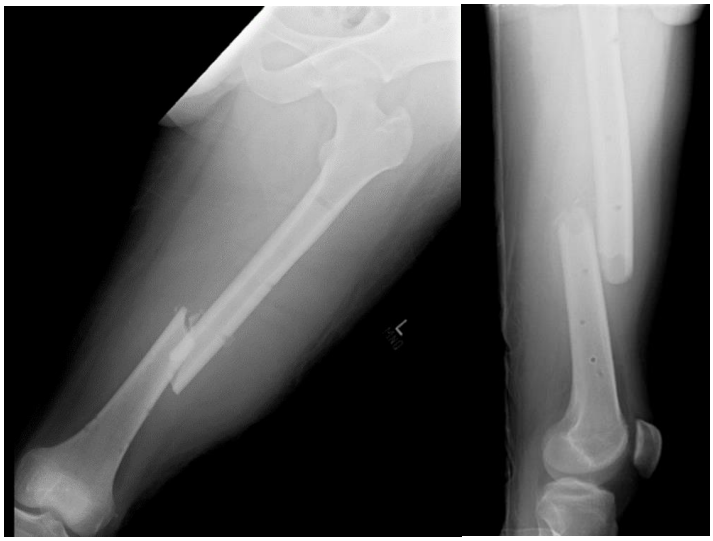

Fig. I: Pre operative radiograph of a 21 year old patient with Gustilo Anderson type IIIA femur fracture

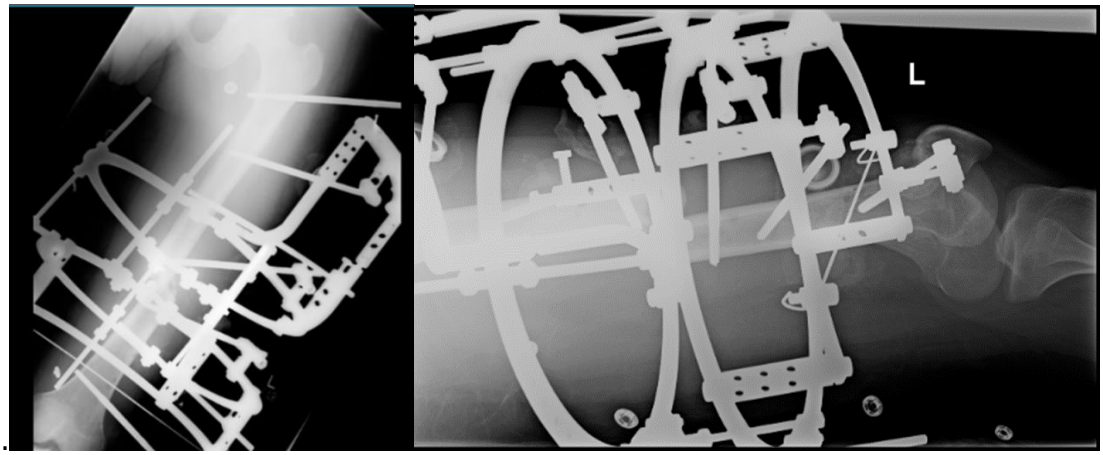

Fig II: Post operative radio graph after Ilizarove fixator.

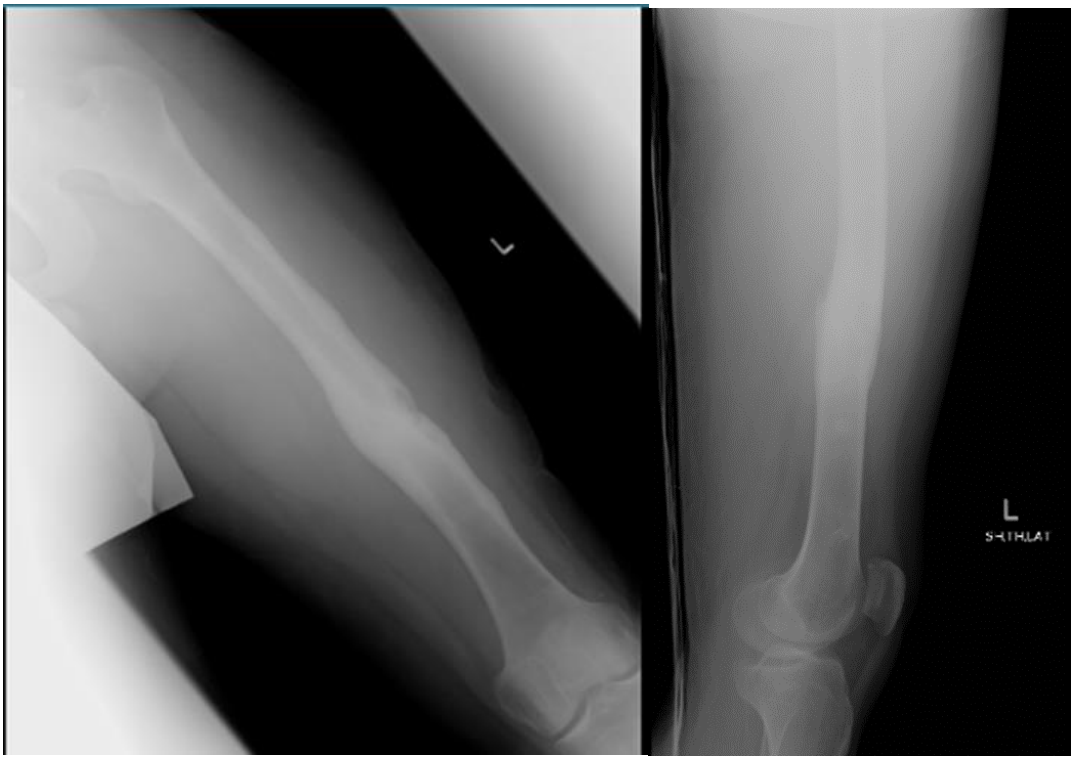

Fig III: Healed femur shaft fracture after removal of Ilizarov

DISCUSSION

In our study 32 open femur fractures were treated with Ilizarov fixator and bone results were excellent in 16 (50%), good in 15(46.87%) and fair in 1(3.12%) patient while function results were excellent in 18(56.25%),good in 13(40.62%) and fair in 1(3.12%) patient. Similar to our study Inam[11] treated 10 open fractures femur with Ilizarov and reported excellent bone results in 51.9%,good in 29.6%,and fair in 18.5%.The functional results were excellent in 29.6%,good in 40.7%,fair in 22.2% and poor in 7.4%. Atesalap[12] treated 31 Gustilo Anderson IIIA femur fractures due to gunshot with Ilizarov and achieved union in all cases. The average bone loss in his series was 3.8cm.He advocated delayed closure of wounds. Hahn and Park[13] treated 35 open fractures of femur and tibia with Ilizarov and achieved union in all cases. Pavolini[14] treated 21 open fractures femur with Ilizarov and noted excellent results in 8(20%),good in 7(17.5%),poor in 4(10%) and bad in 2(5%) patients. Giovanni and Rajesh[15] treated 23 open femur fractures with Ilizarov and achieved excellent results were in

16,good in 6 and fair in 1 patient. The mean Hospital for Special surgery(HSS) knee score was 90.1(range 60-100).One non union was noted in his series.

The design of our study was descriptive and our sample size was small. We recommend further well designed studies with larger sample size to confirm the usefulness of Ilizarove in acute open fractures femur.

CONCLUSION

Illizarov fixator is a cost effective option for managing acute open femur fractures. Excellent and good functional and radiological results were achieved in majority of our patients.

Conflict of Interest: None

Grants/Funding: None

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