

ASSESSMENT OF FUNCTIONAL AND RADIOLOGICAL OUTCOME OF INFECTED NON UNION OF FEMUR MANAGED WITH ILIZAROV FIXATOR IN A RURAL BASED TERTIARY CARE HOSPITAL - A CASE SERIES

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Abstract

Background: Infected nonunion of femur is a rare condition treated by orthopaedic surgeon. Management of infected non-union of femur is a tough challenge to orthopaedic surgeon. The Ilizarov method is an effective modality in managing infected nonunion of femur. This case series aims to assess the outcome of management of infected nonunion of femur with Ilizarov ring fixator, Using bone and functional results as per association for the study and application of methods of Ilizarov (ASAMI) scoring system **Materials and Methods:** We prospectively analyzed four patients (4 Male, Mean age 41.25 years) with Ilizarov technique for infected non-union of femur between May-21 and April -24. They were followed up for an average of 7.7 months after removal of fixator. They were assessed for functional and bone (Radiological) outcome using the association for the study and application of methods of Ilizarov (ASAMI) scoring system. **Result:** All four limbs were salvaged and union achieved. None required any additional skeletal stabilisation or immobilization after frame removal. Meantime of union was 11.7 months. As per ASAMI score bone result was excellent in 3 patients (75%), good in one patient (25%), functional result was excellent in 2 patients (50%). None of our study participants needed amputation. **Conclusion:** The Ilizarov technique proved highly effective in managing infected nonunion femur fractures, offering favorable outcomes in terms of union, infection control, pain relief, and functional recovery with less deformity.

INTRODUCTION

Treating infected nonunion of fracture femur is a challenging task for an orthopaedic surgeon. Problems faced by orthopaedic surgeon are infection, nonunion, fracture site gap, poor vascularity of bone and soft tissue, deformity, contracture of nearby joints, shortening of limb, disuse osteoporosis.^[1,2] One of the Technique which could overcome all these problems is Ilizarov fixator. When applied to nonunion, the Ilizarov principles consist of removal of nonviable or infected tissue, removal of all foreign bodies or hardware, application of a constructed small-wire fixation frame and union through distraction osteogenesis, deangulation and compression.^[3]

The most important principle and distinct advantage of ilizarov method is the active usage of the limb which improves the physiological function of the limb which consequently minimize the development of disuse osteoporosis and disuse atrophy of soft tissue.^[4,5] Reconstruction of complex nonunions may take as long as 6 months and during this time the fixation supports the extremity and simultaneously allows the patient to work and be active.

We have taken 4 cases of Infected nonunion of Femur treated with Ilizarov fixator System and analysed their functional and radiological outcome with ASAMI scoring system.

CASE REPORT 1

A 26yr male who had RTA 6 months back and sustained compound Gr III B fracture shaft of femur Right side for which he underwent wound debridement and skeletal stabilization with A-O external fixator, which was removed, after 5 months of primary surgery which was done elsewhere. He was diagnosed as infected non union of femur, for which we have done debridement of fracture site until punctate bleeding points were noticed in both fracture ends, bone gap after debridement found to be 1.5 cm and fracture stabilized with Ilizarov fixator and acute docking done at non union site.

Patient was allowed for partial weight bearing with support from 3rd post operative day. Patient discharged on 13th post operative day after suture removal. Patient was followed once in four weeks for clinical and radiological assessment. By 13 months post OP as Patient had radiological union we have dynamized the Ilizarov frame and frame was removed one month after dynamization. [Figure 1] Patient was reassessed 6 Months after frame removal for functional & Radiological (Bone) outcomes as per ASAMI Scoring system. Functional outcome found to be Excellent. And bone (Radiological) outcome found to be excellent, he went back to his Original job. [Table 4,5]

CASE REPORT 2

A 45 year Male Patient who had RTA 5 months back and sustained compound Gr IIIB fracture of femur (R) for which he underwent wound debridement and fracture stabilization with AO External fixator elsewhere. He presented to our OPD with infected nonunion of Shaft of femur right side with active discharging sinus, loosened out AO fixator. We have removed the AO fixator in OPD. We proceeded with fracture site debridement, fracture stabilization with Ilizarov fixator. Patient was allowed for partial weight bearing with support from 3rd post operative day. Patient was discharged on 15th Post operative day and followed up once in four weeks for Radiological & Clinical assessment. As patient clinical & Radiological union was satisfactory by 6 months post OP we have dynamized the Ilizarov frame. By 7 months post OP as fracture union was satisfactory in Clinical & Radiological assessment, Frame was removed. [Figure 2].

6 months after frame removal patient was reassessed for functional & Radiological outcome as per ASAMI scoring system, Functional outcome found to be Excellent and bone result found to be good. Patient went back to his Original job. [Table 4,5]

CASE REPORT 3

A 40 year Male Patient came with infected non union of femur with intramedullary femur nail and distal femur locking compression plate in situ with active

discharge for which we have done procedure 1: locking plate removal and wound debridement, as the infection was not settled we have done procedure 2: nail removal wound debridement LRS application, as there was no evidence for progressive union and sequestrum formation we revised with procedure 3: LRS removal Ilizarov fixation to stabilize the fracture site and debridement of fracture site up to bleeding edges. There was 9cm bone gap. In procedure 4: we have done corticotomy of femur at distal metaphysis for this patient we have included knee joint into the frame to provide adequate stability.

Corticotomy distraction done from 10th POD at the rate of 0.25mm once in 6 hrs. As the patient was a chronic smoker we have advised him to stop smoking, as the smoking will have negative impact on new bone formation. Pin revision for pin site infection was done on 3rd post OP month. Bone found to be united by 13.5 months Post operative. Dynamized the frame and removed the frame by 14.5 months post OP. 6 months after frame removal functional & Radiological outcome assessed with ASAMI scoring system and found, good functional result and excellent bone result. Patient needs job modification. [Table 4,5]

CASE REPORT 4

CASE :1



Pre OP

Post OP

After union

CASE :2



Pre OP

Post OP

After union

CASE :3



Pre OP

Post OP- with corticotomy

Bone transport

After union

CASE :4



A 55 year male patient came with deformity of Right Thigh with active discharge at fracture site. On evaluation found to have infected non union of femur with bent intramedullary nail in situ (Sagittal plan angulation of 30°)

We have removed the bent nail, fracture ends freshening done and fracture site bone gap found to be 1.6 cm hence acute docking of fracture site was done and fracture stabilized with Ilizarov fixator, we have not included knee joint into the frame. By 10 months post OP clinical & Radiological union found to be good, hence we have dynamized the frame and permitted full weight bearing. By 11 months post op frame was removed. Patient was reassessed 6 months, after frame removal as per ASAMI scoring system, Functional result found to be good, Radiological (Bone) result found to be excellent. Patient needs job modification. [Table 4,5]

Table 1: Details of treatment result.

1	Mean hospital stay in days	25 days
2	Mean bone gap after debridement	3.3 cm (1.3 cm to 9 cm)
3	Average Time taken for union	11.7 months
4	Average residual shortening of limb	1.1 cm (0 cm – 1.6 cm)
5	Bone regeneration index	1.7

ASAMI Scoring System

Table 2: Bone results (ASAMI scoring system).

Bone Results	Description	Score
Excellent	Union, no infection, deformity < 7o, limb length discrepancy < 2.5 cm	10
Good	Union + any two of the following: absence of infection, < 7o deformity and limb length inequality of < 2.5 cm	5
Fair	Union + only one of the following: absence of infection, deformity < 7o and limb length inequality < 2.5 cm	2
Poor	Non-union/ Refracture / union + infection + deformity > 7o + limb length inequality > 2.5 cm	1

Table 3: Functional results (ASAMI scoring system).

Functional	Description	Score
Excellent	Active, no limp, minimum stiffness (loss of < 15o knee extension/ < 15o dorsiflexion of ankle), no reflex sympathetic dystrophy (RSD), insignificant pain	7
Good	Active, with one or two of the following: limp, stiffness, RSD, significant pain	6
Fair	Active, with three or all of the following: limp, stiffness, RSD, significant pain	3
Poor	Inactive (unemployment or inability to perform daily activities because of injury)	1
Failures	Amputation	1

Table 4: Bone results (ASAMI scoring system).

Patient	Age	Bone result
1	26 /M	Excellent
2	45/ M	Good
3	40/ M	Excellent
4	55 /M	Excellent

Table 5: Functional results (ASAMI scoring system).

Patient	Age	Fuctional
1	26 /M	Excellent
2	45/ M	Excellent
3	40/ M	Good
4	55 /M	Good

DISCUSSION

In our Series the mean bone gap after debridement is 3.3 cm ranging from 1.3 cm to 9 cm. we have done distraction osteogenesis for one patient for whom post debridement bone gap is 9 cm as stated in the study of jain et al.^[6]

In our Series mean limb length discrepancy is 1.1 cm ranging from (0-1.6cm) which is comparable to the study of A.L.L BLUM et.al.^[7]

Mean time for union in our study was 11.7 months which is comparable to that of the Study done by patil in their study the mean union time was 14.1 months.^[5] [Table 1]

In our case series we had 50% Excellent functional result and 75 % Excellent Bone result as per ASAMI scoring system which is comparable to the study by Rohilla R et al,^[4] in their study functional result was excellent in 40% and Bone result was Excellent in 54.3 %.

In Our Series the union rate is 100 % which is comparable to the study done by Lalit. Maini et al in their study the union rate is 100 % and in the study done by Pande H et al the union rate is 94.4 %.^[8-11]

In our Series all the patients were completely recovered from infection and persistent infection rate is 0% which is comparable to that the study done by Krishnah et.al 8 in their study persistent infection rate is 5%.

In our series most common complication is pin site infection, we encountered pin site infection in 2 patients with pin site infection rate of 50% which is comparable to that of pin site infection rate of 45% (femur) in the study of MatsBue.et.al.

CONCLUSION

Infected non union of femur poses a challenge to both surgeon and patient. Ilizarov has been successfully employed in the management of infected non union of femur.

Treating infected non union of femur fracture is a challenging task for an orthopaedic surgeon. Often it needs meticulous planning and execution of complex time consuming surgical procedure. The option for infected non union of femur is thorough debridement along with skeletal stabilization which may be done with antibiotic coated nail , (or) antibiotic cemented beads with nail / plate. Ilizarov technique is an effective alternative. Ilizarov technique has been applied as a successful modality of treatment for infected non union of femur. As per ASAMI scoring system we had excellent bone result in 75% of cases and good result in 25% cases. We have achieved infection control in all cases.

Excellent functional result in 50% cases and good functional result in 50% cases in our case series. Bone radiological results were better than the functional results in our study. This indicates that excellent bone result does not guarantee a good functional result. Two patients who had excellent functional result went back to the original occupation

and two patients who had good functional result needed job modification.

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