



ORIGINAL RESEARCH PAPER

Orthopaedics

CLINICAL AND RADIOLOGICAL OUTCOMES OF ILLIZAROV AND LRS IN GAP NON-UNION OF TIBIA: A COMPARITIVE STUDY.

KEY WORDS: Illizarov, LRS, Non Union, Infection

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ABSTRACT

Introduction: Rampant and easy accessibility of implants in peripheral setting with inadequate sterilization have led to an increase in infection rates and non-union of the fracture. Treatment of gap non union in tibia includes fixation and bone transport. The study was conducted to assess and compare the union rate, the functional outcome and complications associated with illizarov and LRS system. **Material and Methods:** We conducted a prospective study comprising 20 patients from January 2020 to January 2022 at Hi- tech medical college and hospital Bhubaneswar. Patient with infective non union of tibia within age group of 21 years to 60 years were divided into two groups (10 patients each). **Result:** The rate of union was found to be same in both group (90%). Corticotomy was done in 18 cases (9 cases in each group). According to ASAMI classification results were excellent in 70% cases in illizarov and 80% cases in LRS group, Good results were obtained in 20% cases of illizarov group and 10% cases in LRS group, Fair cases were none in both groups and both the groups had 10% of poor case results. **Conclusion:** LRS and illizarov have equal results but LRS has superior results than illizarov, though less significant, in terms of patient compliance and ease of application.

INTRODUCTION

Trauma surgeries include one of the largest shares of orthopaedic procedures around the world. Road traffic accident being one of the commonest cause of fracture^[1]. Rampant and easy accessibility of implants in peripheral setting with inadequate sterilization have led to an increase in infection rates and non-union of the fracture. Other common causes of non union include inadequate fixation, distraction by plates and screws or fixed in traction and segmental and comminuted fractures.

Patients usually undergo multiple operative intervention and present with indolent infection, deformity secondary to soft tissue atrophy, joint stiffness and limb length discrepancy^[2]. Hence it is one of the complex procedure to manage in orthopaedic practice^[3].

Treatment of gap non union in tibia includes fixation and bone transport^[4]. Various devices used for treatment are illizarov ring fixator, limb reconstruction system and transport over intramedullary nail.

The study was conducted to assess and compare the union rate, the functional outcome and complications associated with illizarov and LRS system.

MATERIAL AND METHODS

We conducted a prospective study comprising 20 patients from January 2020 to January 2022 at Hi- tech medical college and hospital Bhubaneswar. Patient with infective non union of tibia within age group of 21 years to 60 years were divided into two groups (10 patients each). The ethical clearance and patient consent were obtained for the study, both the groups were comparable as the principle of distraction osteogenesis is same but with different modality.

Surgical Protocol

After due anaesthesia clearance implant was removed followed by through debridement and excision of nonviable bone until paprika sign was observed. The medullary cavity was reamed open. In case of bone defects less than 2cm acute docking at osteotomy site preferred and in gap >2 cm included additional bone transport procedure.

The technique of illizarov included a combination of plain wire and olive wire through both proximal and distal fragments. Depending upon the fragment length and amount of distraction, a 3 or 4 ring construct was applied sequentially

after low speed drilling of wires. The rings were secured with threaded connecting rods after satisfactory reduction of both fragments.

The LRS system was mounted medially over tibia. The most distal and proximal screws were applied first keeping bone ends in satisfactory reduction followed by application of other pins subsequently.

In 18 cases corticotomy was performed by open method preserving periosteum at single site. The rate of distraction was 1mm/day usually started on post operative day 5.

Patients were put on antibiotics till 02 weeks. Joint movement started on the first day along with non weight bearing mobilization. Patient were discharged on 5th post operative day and follow up was done at 03 weeks, 6 weeks, 3 months and 8 months. Union was confirmed radiologically by x-ray and clinically by local tenderness at corticotomy site and full weight bearing. After removal of frame patient limb was protected by ultra light weight plastazote material PTB brace for 01 month.

RESULTS:

Age Wise Distribution:

Age	Male	Female	Total
21 – 40	6	2	8
41 – 50	5	4	9
51 – 60	2	1	3
	13	7	

Mean Duration of Infective Non Union:

3 – 5 months	8
6 – 8 months	5
9 – 15 months	7

Duration of Treatment:

	Illizarov	LRS
4 – 6 months	1	1
6 – 8 months	7	8
8 – 15 months	2	1

Complication:

	Illizarov	LRS
Pin tract infection & loosening	1	4
Joint stiffness	3	1
Shortening	1	0
Deformity	1	0

Results as Per ASAMI Score:

Out of 20 patients (10 in each group) 13 were males and 07 females. The mean age of patient was 40.5 years, of which mean age of male patients were 39.6% and female were 42.5%. The mean duration of infected non union was 7.55 months. Average duration of illizarov application was 7.8 months and LRS was 7.3 months. The complications included pin tract infection and loosening which was 01 in illizarov group and 02 in LRS group. The joint stiffness was more in illizarov group 3 patients when compared to 01 patient in LRS group. The rate of union was found to be same in both group (90%). Coticotomy was done in 18 cases (9 cases in each group). According to ASAMI classification results were excellent in 70% cases in illizarov and 80% cases in LRS group, Good results were obtained in 20% cases of illizarov group and 10% cases in LRS group, Fair cases were none in both groups and both the groups had 10% of poor case results.

DISCUSSION

The aim of surgery addressing infective nonunion in tibia involves debridement and non-viable bone excision to control infection and simultaneously correct deformity and limb length discrepancy and solid union later to restore pre injury function of lower limb. Traditionally infective nonunion was managed by illizarov ring fixator based on the technique of distraction osteogenesis^[5]. Later the same principle of illizarov inspired the development of monoaxial limb reconstruction system^[6]. The objective of our study is to compare the results of both the devices in infective nonunion tibia.

In our study, 08 patients were in the age group of 21 to 40 years, 09 patient in the age group of 41 to 50 years and 03 patients in the age group of 51 to 60 years. The mean age was 40.5 years. More number of patients in the age group of 41 to 50 years may be secondary to early initiation of osteoporotic changes in bone. The commonest mode of trauma associated was road traffic accident. There were 13 male patients and 07 female patients suggesting a male preponderance. The above findings with regards to age and sex have near similar observations when compared to study by wang et al^[7] and Shukla et al^[8]. Infection was eradicated in 90% cases in our study in comparison to Bhardwaj et al who have shown 91.6% eradication^[9].

18 patients underwent compression distraction osteogenesis and 02 patients underwent acute docking with subsequent lengthening which was started after 02 weeks in cases of gap less than 2cm. Average duration of illizarov frame application was 7.55 months and LRS was 7.3 months.

Most common complications included pin tract infection and pin loosening in LRS group and joint stiffness in illizarov group. The pin tract issues in the LRS group may be due to thick diameter of pins, faulty technique of pin insertion like direct drilling of pins or not following the start stop technique of drilling which reduces the thermal necrosis. The joint stiffness in the illizarov group may be associated with close proximity of wires to the joint line. The rate of union achieved was similar in both the group.

As per ASAMI criteria excellent results were obtained in 70% cases in illizarov and 80% cases in LRS group, Good results were obtained in 20% cases of illizarov group and 10% cases in LRS group, Fair cases were none in both groups and both the groups had 10% of poor case results. We compared our results with observation of various literature and found out almost similar results in all the studies^[10,11,12,13,14].

CONCLUSION

It is observed that limb reconstruction system and illizarov ring fixator are one of the best treatment modalities for infected gap non union. ASAMI comparison of scores

concludes that bone union results and functional results are similar in both the groups. The total duration of treatment is slightly less in the LRS than in illizarov frame. Limb reconstruction system has certain advantages like ease of application, more patient compliance and less bulky whereas the biggest disadvantage is it being prone to pin tract infection and loosening. The disadvantage of illizarov fixator include cumbersome frame, joint stiffness and difficulty in surgery. The biggest advantage of illizarov fixator being ankle and knee joint can be incorporated to the main frame of tibia to simultaneously correct any resultant deformity arising. So we conclude that LRS and illizarov have equal results but LRS has superior results than illizarov, though less significant, in terms of patient compliance and ease of application.



Figure 1: Pre Operative



Figure 2: Immediate Post Operative



Figure 3 Showing Signs Of Union



Figure 4 LRS Frame



Figure 5 Pre Operative For Illizarov



Figure 6 Immediate Post Operative

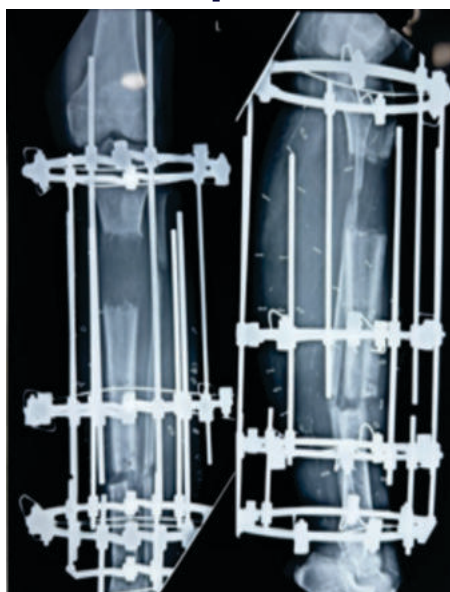


Figure 7 Bone Transport

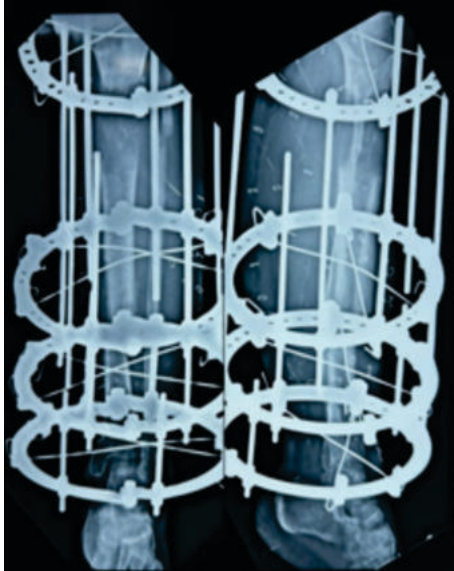


Figure 8 Final Union

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