

Evaluation of Functional Outcomes for Distal Tibial Fractures Stabilized With a Distal Tibial Locking Plate

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Conflict of interest: Nil

Abstract:

Background: The present study is an attempt to evaluate the results of locking compression plate for distal tibia in lower tibial fractures using open reduction internal fixation and minimally invasive plate osteosynthesis technique. Various modality of surgical treatment such as closed intramedullary nailing, Open Reduction and Internal Fixation with conventional plate osteosynthesis and external fixation has been tried so far.

Methods: The patients attending the OPD/Emergency OPD in AIIMS, Patna. during July 2018 to August 2020 with distal tibial fractures. The patients treated with locking compression plates using MIPO or ORIF are reviewed for inclusion and exclusion criteria's. Patients fitting into inclusion criteria has formed the study group.

Results: Out of 52 patients, 48.4% patients undergo open reduction internal fixation had excellent results and 28.6% patients undergo MIPPO technique had excellent results. p value is 0.352 which is not significant. Overall 40.4% patients had excellent results.

Conclusion: We observed excellent/ good functional outcome in 65.3% of patients.

Keywords: Functional outcome, MIPPO, Tibia.

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Introduction

The tibia is the second largest long bone of the skeleton after femur. [1] Shaft of tibia is triangular in section and has expanded ends: a strong medial malleolus projects distally from the smaller distal end. The tibia is currently the most commonly fractured long bone in the body. [2] Distal fractures of tibia are severe injuries and are often described as tibial plafond/pilon fractures. Annual incidence of tibial fracture is 2 per 1000 per year. Average age is approximately 37 years with male preponderance. [2] Lower tibial fractures comprise 7 to 10% of all tibial fractures and less than 1% of lower extremity fractures. [3] Various modality of surgical treatment such as closed intramedullary nailing, Open Reduction and Internal Fixation with conventional plate osteosynthesis and external fixation has been tried so far. But none of them have good functional outcome but had high complication rate. Conservative treatment by cast application lead to ankle and knee stiffness affecting quality of life of the patient. Closed intramedullary interlocking nailing of distal tibia fracture can be a good option, but the hourglass shape of the distal tibia does not allow anatomical reduction resulting in rotational and angular malalignment. External fixation is indicated in severe soft tissue injury or as a temporary stabilizing device. Pin tract infection, malreduction and joint stiffness are the drawbacks of external fixation [4] In Department

of Orthopaedic at AIIMS Patna. all types of lower tibial fractures are managed. These patients are assessed clinically and radiologically and managed with different methods of fixation including locking compression plate. It is worthwhile to perform the evaluation of functional outcome of operative management of lower tibial fracture patients treated with locking compression plate so that we can prepare guidelines for operative management of patient. Thus the present study is an attempt to evaluate the results of locking compression plate for distal tibia in lower tibial fractures using open reduction internal fixation and minimally invasive plate osteosynthesis technique.

Materials and Methods

28 patients undergoing fixation of distal tibial fractures with locked compression plates using minimally invasive plate osteosynthesis (MIPO) technique or open reduction internal fixation (ORIF) All India Institute of Medical Sciences, Patna Bihar. From July 2018 to August 2020 has formed the prospective group and subjected to detailed history, clinical and radiological examination as per proforma 1 and 2. 24 patients operated before September 2018 has been taken as retrospective cases. Their records has been traced from Medical Record Department and these patients called up for follow

up in OPD. Necessary requisite information is gathered from case sheets, X-rays. Data of these patients are evaluated clinically, radiologically and recorded on proforma and has been followed up as per proforma 1 and 2.

Additional information if not included in the records is gathered from patients directly by personal questionnaire at follow up.

The patients attending the OPD/Emergency OPD in AIIMS Patna. during July 2018 to August 2020 with distal tibial fractures. The patients treated with locking compression plates using MIPO or ORIF are reviewed for inclusion and exclusion criteria's. Patients fitting into inclusion criteria has formed the study group.

Type of Study: Prospective and Retrospective study.

Inclusion Criteria

1. Patients above 14 years.
2. Simple lower third tibial fractures.
3. Intraarticular / Periarticular lower third fractures.
4. Gustillo Anderson Grade I, II & upto IIIA open fractures.

Exclusion Criteria

1. Patient less than 14 years.
2. Gustillo Anderson Grade IIIB and above open fractures.
3. Associated vascular injuries.
4. Pathological fractures.

1. Tibial fractures associated with Ankle dislocation and Talus fractures
2. Associated tibial condyle fracture of same side

The patients of prospective group are examined clinically and radiologically as per proforma 1. All patients has undergone X-ray leg with ankle joint antero-posterior and lateral views.

Patients are investigated for complete haemogram, fasting blood sugar, renal function tests like urea, creatinine, blood group with Rh factor, electrocardiogram. Preoperative treatment has been given in form of above or below knee slab for splintage. Limb elevation is done on two pillows or Böhler Braun splint. Movements of the toes, quadriceps exercises has been advised to patients for 15 minutes per hour when awake. Blisters if any formed are either aspirated or left intact. Oral antibiotics are given to patients if blisters rupture. Prior to surgery, patients and his attendants has been explained in detail about surgery, its limitations, peroperative and postoperative complications especially infections, skin necrosis, implant exposure, implant failure, anaesthesia complications and stiffness.

Informed fresh consent for surgery has been taken from the patient and his/her relative. Patients found fit are subjected to surgery. Patients are evaluated during preoperative, and postoperative period.

All the fractures will be classified as per : AO/OTA and Ruedi-Allgower classification.

Results

52 patients were taken for study. 28 patients were in prospective group and 24 patients operated were taken as retrospective group. During the study following observations were made.

Table 1: Distribution of patients according to Age and Sex

Age	Prospective		Retrospective	
	Male	Female	Male	Female
15-25	1(9.09%)	0(0.00%)	0(0.00%)	2(14.29%)
26-35	2(18.18%)	4(23.53%)	4(40.00%)	3(21.43%)
36-45	2(18.18%)	5(29.41%)	4(40.00%)	3(21.43%)
46-55	3(27.27%)	7(41.18%)	1(10.00%)	4(28.57%)
56-65	2(18.18%)	1(5.88%)	1(10.00%)	1(7.14%)
66-75	1(9.09%)	0(0.00%)	0(0.00%)	1(7.14%)
Total	11	17	10	14

Out of total 52 patients, majority of patients were in age group 26-55 years (80.7 %). The youngest patient was 25 years old and the oldest was 75 years. Female patients predominated and comprised 59.7% of the total number of patients. Male to female ratio was 2:3.

Table 2: Distribution of patients based on Gustillo Anderson classification

Fracture Type	Patients
Type I	4(7.7%)
Type 3A	8(15.4%)
closed	40(75.0%)
Total	52(100.0%)

In our study, out of 52 patients, 12 patients having open fractures. Patients with open fractures were further classified according to Gustillo Anderson classification. 8 out of 12 cases were having type 3A injury which was mainly

attributed to comminution of the fracture.

Table 3: Distribution of patients according to used operative technique

Operative technique	Patients		Total
	Prospective group	Retrospective group	
Open	15(53.57%)	16(66.67%)	31(59.62%)
MIPPO	13(46.43%)	8(33.33%)	21(40.38%)
Total	28	24	52(100.0%)

There were 31 cases of open reduction and internal fixation and 21 cases of minimally invasive plate osteosynthesis technique.

Table 4: Distribution of patients according to used technique and outcome based on Tenny Wiss scoring

Operative technique	Excellent	Good	Fair	Total
Open Reduction	15(48.4%)	7(22.6%)	9(29.0%)	31
MIPPO	6(28.6%)	6(28.6%)	9(42.9%)	21
Total	21	13	18	52

MIPPO-Minimally invasive percutaneous plate osteosynthesis Out of 52 patients, 48.4% patients undergo open reduction internal fixation had excellent results and 28.6% patients undergo MIPPO technique had excellent results. p value is 0.352 which is not significant. Overall 40.4% patients had excellent results.

Table 5: Distribution of patients according to functional outcome as per Tenny Wiss scoring in prospective and retrospective group

	Excellent	Good	Fair	Total
Prospective	7(25.0%)	8(28.6%)	13(46.4%)	28
Retrospective	14(58.3%)	5(20.8%)	5(20.8%)	24
Total	21(40.4%)	13(25.0%)	18(34.6%)	52

In our study, 58% of retrospective and 25% of prospective patients had excellent scoring and 25% patients had good results in both groups. p value is 0.043 which is significant.

Discussion

Present study was conducted in Department of Orthopaedic AIIMS, Patna, which included 52 patients of distal tibia fractures. 28 patients were in prospective group and 24 patients were in retrospective group operated Fracture of the distal tibia pose a treatment dilemma for an Orthopaedic surgeon. The task of obtaining and maintaining an anatomic reduction of the joint surface must be performed while simultaneously preserving the integrity of the soft tissue envelope. If these fractures result from low-energy injuries that do not cause significant damage to the soft tissue envelope of the lower leg. Alternatively of high-speed trauma such as history of fall or roadside accident result in significant soft tissue damage. In our study we had achieved excellent/ good functional outcome in 65.3% patients. Study by A. Kapukaya et al [5] had achieved excellent or good clinical results in 58%, fair in 21% and poor in 21% of patients. R.B.Bourne et al [6] in a series of 42 patients of distal tibia fractures observed good or fair results in 86% of Reudi All gower type 1 fracture pattern and and 80% and 44% in type2 and type 3 pilon fractures respectively treated with open reduction and internal fixation to achieve anatomical reduction.

The study has clearly demonstrated that type 1 and 2

fractures are amenable to anatomic open reduction, stable internal fixation, and early movement, resulting in satisfactory results in more than 80% of patients whereas type 3 fractures are amenable to poor results due to intra articular involvement and comminution of fracture fragments.

Conclusion

We observed excellent/ good functional outcome in 65.3% of patients.

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