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Original Research Article

Evaluation of Functional Outcome of Distal Tibial Fractures Stabilized With Distal Tibial Locking Plate at SKMCH, Muzaffarpur, Bihar

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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.

Methods: Prospective and retrospective study was conduct on patients attending the outpatient department (OPD)/Emergency OPD in Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar during March 2019 to February 2020 with distal tibial fractures. The patients treated with locking compression plates using minimally invasive plate osteosynthesis (MIPO) or open reduction internal fixation (ORIF) are reviewed for inclusion and exclusion criteria. All data were collected and analyzed by Epi-info software.

Results: Out of 52 patients, 48.4% patients undergo open reduction internal fixation had excellent results and 28.6% patients undergo surgery by MIPPO technique had excellent results. p value is 0.352 which is not significant. Overall, 40.4% patients had excellent results. In our study, 32.6% patients having AO/OTA type A fractures had excellent score while type B and C had 1.9% excellent score. This is attributed to more comminution and involvement of ankle joint. Overall, 40.4% patients had excellent score. P value is 0.863 which is insignificant.

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

Keywords: Functional outcome, MIPO, Tibia.

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.1The 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. Average age is approximately 37 years with male preponderance. [2] Lower tibial fractures comprise 7 to10 % 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 (ORIF) 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 leads 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, mal-reduction and joint stiffness are the drawbacks of external fixation. [4]

In Department of Orthopaedic, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar all types of lower tibial fractures is managed. These patients are assessed clinically and radiologically and managed with different methods of fixation including locking compression plate.

Thus, the present study is an attempt to evaluate the functional outcome using Tenny Wiss scoring using locking compression plate in lower tibial fractures using open reduction internal fixation and minimally invasive plate osteosynthesis techniques.

Material and Methods

Source of data: 28 patients has undergone fixation of distal tibial fractures with locked compression plates using minimally invasive plate osteosynthesis (MIPO) technique or open reduction internal fixation (ORIF) in SKMCH, Muzaffarpur during March 2019 to February 2020 has formed the prospective group and subjected to detailed history, clinical and radiological examination.

24 patients operated before March 2019 has been taken as retrospective cases. Their records have been traced from Medical Record Department and these patients called up for follow up in outpatient department (OPD). Necessary requisite information is gathered from case sheets, X-rays. Data of these patients are evaluated clinically and radiologically.

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

Method of collection of data: The patients attending the OPD/Emergency OPD in SKMCH, Muzaffarpur, Bihar during March 2019 to February 2020 with distal tibial fractures. The patients treated with locking compression plates using MIPO or ORIF are reviewed for inclusion and exclusion criteria. Patients fitting into inclusion criteria have formed the study group.

Inclusion Criteria

Patients above 18 years, simple lower third tibial fractures, intraarticular/periarticular lower third fractures and gustillo Anderson grade I, II and upto IIIA open fractures.

Exclusion Criteria: Patient less than 18 years, gustillo anderson grade IIIB and above open fractures, associated vascular injuries, pathological fractures, tibial fractures associated with ankle dislocation and talus fractures and associated tibial condyle fracture of same side. All patients had 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 (ECG). Pre-operative treatment has been given in form of above 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, per-operative and post-operative complications especially infections, skin necrosis, implant exposure, implant failure, anesthesia 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 pre-operative and post-operative period.

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

Results

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.

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 rather than the skin condition. 31 cases have been operated by open reduction and internal fixation and 21 cases by minimally invasive plate osteosynthesis technique.

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

Table 1: Distribution of patients according to age and sex

Age (in years)	Prospective		Retrospective	
	Male N (%)	Female N (%)	Male N (%)	Female N (%)
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	4

Table 2: Distribution of patients based on Gustillo Anderson classification having open fractures

Fracture type		Patients (%)
Open Fractures		12
	Type 1	4(7.7%)
	Type 2	0(0.00)
	Type 3	8(15.4%)
Closed (others)		40(75.0%)
	Total	52(100.0%)

Table 3: Distribution of patients according to operative technique used

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

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

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

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

	Excellent N(%)	Good N(%)	Fair N(%)	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

Table 6: Distribution of patients according to AO/OTA classification and Tenny Wiss scoring

Fracture type AO/OTA	Excellent N(%)	Good N(%)	Fair N(%)	Total
A1	9(42.9%)	4(30.8%)	5(27.8%)	18(34.6%)
A2	2(9.5%)	2(15.4%)	3(16.7%)	7(13.5%)
A3	6(28.6%)	5(38.5%)	4(22.2%)	15(28.8%)
B1	0(0%)	0(0%)	0(0%)	0(0%)
B2	1(4.8%)	1(7.7%)	2(11.1%)	4(7.7%)
B3	1(4.8%)	0(0%)	2(11.1%)	3(5.8%)
C2	1(4.8%)	0(0%)	2(11.1%)	3(5.8%)
C3	1(4.8%)	1(7.7%)	0(0%)	2(3.8%)
Total	21	13	18	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. In our study, 32.6% having AO/OTA type A fractures had excellent score while type B and C had 1.9% excellent score. This is attributed to more comminution and involvement of ankle joint. Overall, 40.4% patients had excellent score. P value is 0.863 which is insignificant.

Discussion

Distal tibial fractures at metaphysis- diaphysis junction with or without intra-articular extension are one of the difficult fractures to manage. Distal tibia has got circular cross-sectional area with thinner cortex as compared to triangular diaphysis with thicker cortex. [5] Open reduction internal fixation with conventional plates not an ideal option because it involves stripping of periosteum and since tibia is subcutaneous in that region around 2/3rd of blood supply is from periosteum. Nonunion, delayed union and infection are reported with the range of 8.3 to 35% and 8.3 to 25% respectively with ORIF with plating. [6,7] With the development of technique of MIPO with LCP, which preserve extra osseous blood supply, respect osteogenic fracture hematoma, biologically friendly and stable fixation method is available for distal diametaphyseal tibia fracture. Fracture of the distal tibia poses a treatment dilemma for an orthopedic 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 road-side accidents result in significant soft tissue damage. In our study we had achieved excellent/ good functional outcome in 65.3% patients.

Study by Kapukaya et al had achieved excellent or good clinical results in 58%, fair in 21% and poor in 21% of patients. [8] Bourne et al in a series of 42 patients of distal tibia fractures observed good or fair results in 86% of Reudi Allgower type 1 fracture pattern and 80% and 44% in type 2 and type 3 pilon fractures respectively treated with open reduction and internal fixation to achieve anatomical reduction. [9]

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. Study has also shown that the retrospective group have better functional outcome which directly relates that outcome improves with passage of time.

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