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Original research article

Clinical profile of patients with distal tibial fracture admitted at tertiary hospital

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Abstract

Depending upon the foot position at the time of impact the characteristic fracture patterns are produced. When the foot in dorsiflexion, axial compression impact resulting anterior plafond comminution, when the foot in plantar flexion, axial compression impact resulting in posterior plafond comminution, when the foot is in neutral position, it results in central comminution. Patients fitting into inclusion criteria, followed for required period would form the study group. Based on confidence interval approach, at 5% level of significance taking pre-valance of cases in hospital as 2.85 with an allowable absolute error of 6% calculated sample size is 30. In our study, 22 cases (73.3%) were closed fractures, cases (16.7%) were type 1 open fractures and 3 cases (10%) were type 2 open fractures according to Gustillo Anderson classification.

Keywords: Distal tibial fracture, Gustillo Anderson classification, RTA

Introduction

The distal end of the tibia has anterior, medial, posterior, lateral and distal surfaces, and projects inferomedially as the medial malleolus. It is laterally rotated relative to the proximal tibia (tibial torsion). The smooth anterior surface bulges slightly and ends distal to the distal surface. The medial surface is smooth and subcutaneous. It is continuous with the shaft proximally and the medial malleolus distally. The posterior surface is smooth and is separated from the medial surface by a prominent ridge that passes inferomedially to the posterior aspect of the medial malleolus. The lateral surface is the triangular fibular notch, which is roughened proximally but smooth distally, where it is sometimes covered by articular cartilage [1].

The distal surface articulates with the talus and is wider anteriorly than posteriorly. It is concave sagittally and slightly convex transversely and continues medially into the malleolar articular surface. The medial malleolus is short and thick and has a smooth lateral surface with a crescentic facet that articulates with the medial surface of the talar body. The distal end of the fibula or lateral malleolus projects distally and posteriorly relative to the medial malleolus [2].

Extraarticular fractures are result of RTA and Fall from height. Intraarticular fractures are result of two main mechanism of injury, one is low energy rotational violence and another one is high velocity axial compression violence. Most of the intraarticular complex comminuted fractures are result from axial compression violence, it is otherwise called Explosion fracture. Due to the viscoelastic nature of the bone, it absorb huge amount of energy before the fracture. When the absorbing capacity of bone exceed to its limit, produce explosive fracture [3].

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Fractures of distal tibia that occur within 5 cm of the ankle joint. Pilon fractures involve the articular weight bearing portion of the distal tibia. Usually results from high energy axial load as in RTA, fall from height and rarely from low-energy rotation/torsion. Extra-articular fractures commonly present with transverse, oblique, spiral or comminuted fracture pattern [4].

Methodology

The patients treated with locking compression plates using Minimally Invasive Percutaneous Plate Osteosynthesis (MIPPO) would be reviewed for inclusion and exclusion criterias. The patients will be followed minimum for 6 months, 9 months, upto 12 months. Patients fitting into inclusion criteria,

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followed for required period would form the study group. Based on confidence interval approach, at 5% level of significance taking prevalence of cases in hospital as 2.85 with an allowable absolute error of 6% calculated sample size is 30.

Inclusion criteria

1) Patients above 18 years.
2) Fractures coming under AO Classification distal tibia fractures-A1, A2, A3.

Exclusion criteria

1) Patient less than 18 years.
2) Fractures coming under Gustillo Anderson III open fractures.
3) Associated vascular injuries.
4) Pathological fractures.
5) Compartment syndrome.
6) Intraarticular fractures.

On admission of the patient, a careful history was elicited to reveal the mechanism of injury and the severity of the trauma. The patients were then assessed clinically to evaluate their general condition and the local injury. General condition was assessed with the vital signs and systemic examination. Methodical examination was done to rule out fractures at other sites.

Results

In our study, the youngest patient was 29 years and the oldest patient was 72 years of age. Most of the patients were between 41-50 years. Mean Age was 49.7 years with standard deviation of 12.6.

Table 1: Age distribution

Age	No. of Patients	Percentage
21-30	1	3
31-40	8	26
41-50	9	30
51-60	4	13
61-70	7	25
71-80	1	3
Total	30	100

Our study included 20 males (66%) and 10 females (34%).

Table 2: Sex distribution

Sex	Frequency	Percentage
Male	20	66.7
Female	10	33.3
Total	30	100.0

Right sided fractures were common in our study which included 19 cases (64%) compared to left side which included 11 cases (36%).

Table 3: Side affected

Side Affected	Frequency	Percentage
Left	11	36.7
Right	19	63.3
Total	30	100.0

In our study, 19 (63.3%) of patients sustained injury following road traffic accidents is 11 (36.7%) patient sustained injury following fall.

Table 4: Mode of Injury

Mode of Injury	Frequency	Percentage
RTA	19	63.3
Self-fall	11	36.7
Total	30	100.0

In our study, 22 cases (73.3%) were closed fractures, cases (16.7%) were type 1 open fractures and 3 cases (10%) were type 2 open fractures according to Gustillo Anderson classification.

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Table 5: Fracture Type-Gustillo Anderson classification

Gustillo Anderson classification	Frequency	Percentage
Closed	22	73.3
Type 1 open	5	16.7
Type 2 Open	3	10.0
Total	30	100.0

The fracture pattern was classified according to AO/OTA classification. 9 cases (30%) were A1 fracture type, 14 cases (46.7%) were A2 fracture type and 7 cases (23.3%) were A3 fracture type.

Table 6: Fracture pattern-AO/OTA classification

AO/OTA classification	Frequency	Percentage
A1	9	30.0
A2	14	46.7
A3	7	23.3
Total	30	100.0

Discussion

Our study revealed the average age of patients with such injuries to be 49 years (29-72). It is comparable with a study on similar fractures conducted by below authors.

Table 7: Comparison of Age

Study	Min Age	Max Age	Average
Cory Collinge *et al.* [4]	17	62	43
Heather A Vallier *et al.* [5]	16	77	39.1
Present study	29	72	49

In our study, the male patients were high compared to females and it is comparable with the study by Cory Collinge *et al.* [4], which was possibly due to the fact of male dominance over the female in traveling, occupational injures etc., in India.

Table 8: Comparison of Gender

Study	Male Percentage	Female Percentage
Cory Collinge *et al.* [4]	77	23
Andrew Grose *et al.* [6]	67	33
Heather A Vallier *et al.* [5]	69	31
Present study	67	33

Our study had 27% open injuries. This was comparable on the studies conducted by Heather A Vallier *et al.* [5] who has 30% open fractures, Hazarika *et al.* [7] who has 40% open fractures.

Table 9: Comparison of fracture

Study	Open fracture Percentage	Closed Percentage
Heather A Vallier *et al.* [5]	30	70
Hazarika *et al.* [7]	40	60
Present study	27	73

Our study included only extra articular distal tibial fractures. We compared our study with study conducted by Cory collinge *et al.* [4].

Table 10: Comparison of fracture pattern

Study	Al	A2	A3	Bl	B2	B3	CI	C2	C3
Cory collinge *et al.* [4]	9	9	10	-	-	-	16	32	24
Andrew Grose *et al.* [6]	5	5	7	2	4	6	6	12	64
Heather A Vallier *et al.* [5]	31			21	-	-	44	-	-
Present study	9	14	7	-	-	-	-	-	-

63% of our cases sustained injury secondary to road traffic accidents considered as high energy fractures, which was comparable with the study conducted by Andrew Grose *et al.* [6], and along with that Heather A. Vallier *et al.* [5], who contributed 51% of high energy fractures.

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Table 11: Comparison of mode of injury

Study	Mode of injury	
	High Energy (RTA, Fall from height)	**Low Energy (Assault, Simple Fall, sporting injuries etc.)**
Andrew Grose *et al*. [6]	58%	42%
Heather A Vallier *et al*. [5]	51%	49%
Present study	63%	37%

Conclusion

- The age of the patient in this study, ranged from 29 years to 72 years average being 49 years.
- There were 20 male patients as compared to 10 female patients in this study.
- 19 patients had fracture of right tibia and 11 patients had fracture of left tibia.
- 22 fractures were closed and 8 were open fractures.
- 19 cases sustained fracture following road traffic accident and 11 cases sustained fall.

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