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Original research article

DISTAL TIBIA FRACTURE MANAGED BY EXPERT TIBIA NAIL: POSTOPERATIVE COMPLICATIONS

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Abstract: *Distal tibial fractures present a significant challenge in orthopaedic surgery due to their complex nature and the risk of complications. Expert tibia nails (ETN) have emerged as a potential solution for improving functional outcomes and reducing complications in these fractures.* **Objective:** *To assess the complications and functional consequences of using expert tibia nails (ETN) in patients with distal tibial fractures.* **Methods:** *This prospective study included thirty patients with distal tibial fractures treated using expert tibia nails (ETN). The study was conducted from January 2023 to June 2023 at department of orthopedic surgery, Hayatabad Medical Complex, Peshawar. Functional outcomes were assessed using a standardised scoring system, and complications were monitored. Statistical analysis included descriptive statistics to summarise the data.* **Results:** *The mean age of the patients was 44.80 ± 9.50 years. The functional outcome was excellent in 21 patients (70%), good in 7 patients (23.3%), and fair in 2 patients (6.7%). Complications observed included malunion in 2 patients (6.7%), nonunion in 1 patient (3.3%), and infection in 3 patients (10%).* **Conclusion:** *The use of expert tibia nails (ETN) in treating distal tibial fractures resulted in excellent to good functional outcomes in most patients. The rates of complications such as malunion, nonunion, and infection were relatively low, indicating that ETN is a reliable method for managing distal tibial fractures.*

Keywords: Expert nail tibia, Distal tibial fracture, Functional outcomes, Complications.

Introduction

Fractures that affect the distal tibia occur in the diaphyseal metaphyseal region of the bone. This injury is tough in the field of orthopedics and makes up less than 10% of all fractures in the lower extremity (1). Distal tibia fractures have the second-greatest incidence based on the site of the fracture (2). Distal tibial metaphyseal injuries are fractures that occur about 4 cm away from the tibial plafond. The existence of hinge joints at the knee and ankle does not allow for any modification of rotatory deformity once the fracture has healed (3). Due to the fractures occurring at the weight-bearing surface of the ankle joint, even a small misalignment in the angle of the ankle joint can result in long-term impairment (4).

Various treatment approaches have been proposed for these injuries, such as non-operative medical care, plate fixation, intramedullary nailing, and external fixing. Nevertheless, each of these therapeutic methods possesses specific shortcomings. The goals of treating these fractures are to achieve prompt and optimal healing, minimise functional impairment, and prevent any deformities(5).

Non-operative management of these fractures is typically recommended for patients who are not suitable candidates for surgery due to medical reasons, patients with a significant risk of complications, and fractures that have maintained excellent initial alignment. Surgical intervention enables the correct length and anatomical positioning of the limb, facilitating early movement and ultimately leading to outstanding outcomes. The operative therapy options include plate osteosynthesis, minimally invasive percutaneous plate osteosynthesis, and intra medullary nailing system (6-8).

The use of expert tibia nail is gaining popularity because it offers a wider range of angular locking choices (9). The multi-axial locking system of this device offers greater stability compared to traditional intra medullary tibial nails. It gives 5 proximal locking possibilities and 4 distal locking options. The distal tibiofibular joint, along with the syndesmotic ligaments found in the ankle, play a crucial role in preserving the alignment of the distal tibia during the healing process of fractures (10-12).

To optimize surgical outcomes and patient recovery, it is crucial to have a thorough awareness of the occurrence, various types, and factors that can anticipate issues related to the distal tibia. This is because the distal tibia is anatomically complicated and has specific functional requirements. This research aims to provide comprehensive insights to guide orthopedic surgeons in decision-making, refine surgical techniques, and enhance patient care protocols. The objective of this study is to determine the postoperative complication of distal tibia fracture managed by expert tibia nail.

Methodology

This prospective study was carried out at department of orthopedics from January 2023 to June 2023 at Hayatabad Medical Complex, Peshawar after obtaining ethical approval from the hospital. We selected thirty patients presenting with distal tibial fracture due to various incidents such as road accidents, falling from height and sports injuries. The fractures were classified using AO classification and patients only with type A1 to A3 were included. Our patients had age 30 to 60 years and they were of either gender. We did not include pregnant or diabetic

patients in our study. All the patients were examined clinically and they underwent radiographic examination as well. Knee flexions of 90–100° were used during surgeries on a radiolucent fracture board. Closed-reduction procedures were used to decrease the fractures. On the anterior margin of the tibial plateau, the entrance position was in line with the intramedullary canal. Both the serial reaming and the guide wire have been passed. An ETN of the appropriate size has been assigned, and its length, axis, and rotation have all been restored. Distal locking was achieved via a free-hand method. If a fracture gap existed, the backstroke technique was used to close it. We performed the proximal interlocking using the jig. At least two distal locking and one proximal locking were completed in each patient. Twenty-three people had fibula fractures at the same time. Within five centimeters of the syndesmosis, those with a 3.5-system 1/3rd tubular plate had been bound (four fractures). The tibia was stapled after the distal fibula was repaired. Post-surgery patients were assessed using Karlstrom–Olerud scoring system for functional outcome. Complications such as malunion, nonunion and infection were assessed. Data was analyzed by utilizing SPSS 20.

Results

Thirty patients were selected for this study. Mean age was 44.80±9.50 years. Mean BMI was 24.95±1.34 kg/m^2. Figure 1 presents the gender distribution of our patients which shows that frequency of male patients was higher than female patients. In our study 9 (30%) patients had hypertension. Smoking status revealed that 8 (27.6%) patients were smokers. Regarding the fracture type, twenty three (76.7%) patients had A 1 type fracture, five (16.7%) patients had A 2 type fracture while 2 (6.7%) patients had A 3 type fracture (Table 1). The functional outcome was excellent in 21 (70%) patients, good in 7 (23.3%) and fair in 2 (6.7%) patients (Table 2). Malunion was seen in 2 (6.7%) patients, nonunion in 1 (3.3%) patients while infection accounted for 3 (10%) of the complications (Table 3).

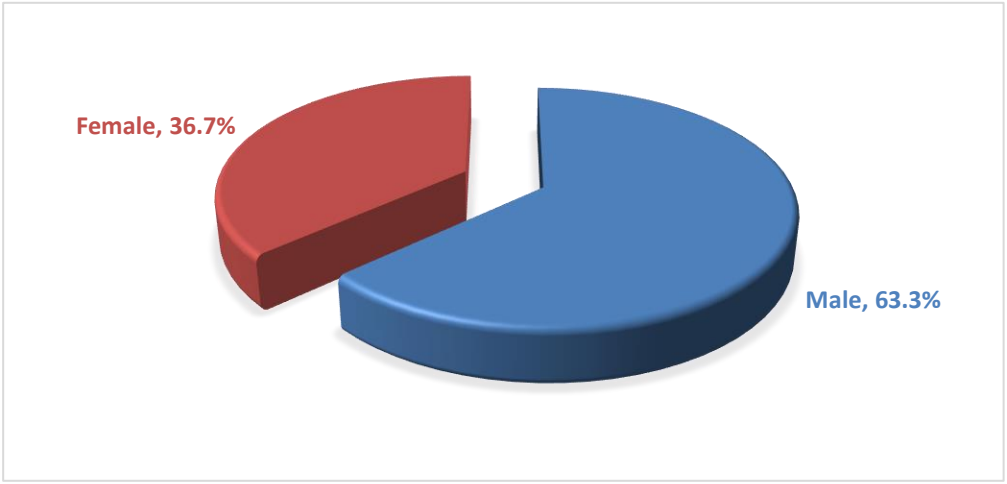

Figure 1 Gender distribution

Table 1 Fracture type

Fracture type	Frequency	Percent
A 1	23	76.7
A 2	5	16.7
A 3	2	6.7
Total	30	100.0

Table 2 Functional outcome

Functional outcome	Frequency	Percent
Excellent	21	70.0
Good	7	23.3
Fair	2	6.7
Total	30	100.0

Table 3 Complications

Complications	Frequency	Percent
Malunion	2	6.7
Nonunion	1	3.3
Infection	3	10.0
No complications	24	80.0
Total	30	100.0

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Discussion

The region of the bone known as the diaphyseometaphyseal is affected when a fracture occurs in the distal tibia. Less than ten percent of all fractures that occur in the lower extremities are caused by this injury, making it one of the most difficult injuries to treat in the field of orthopedics.(13) Even though there are many different treatment approaches that have been offered for these injuries, such as nonoperative therapy, plate fixation, intramedullary nailing, and external fixation, the ideal treatment for unstable distal tibial fractures continues to be a contentious issue. There are, however, some drawbacks associated with each of these therapy methods. In the treatment of these fractures, the goals are to achieve speedy and optimal healing, to minimize the loss of function, and to prevent any deformity from occurring.(14)

When it comes to the treatment of distal tibia fractures, orthopedic surgeons have a variety of viewpoints and solutions. At the distal end of the nail, the expert tibia nail has numerous locking choices available to choose from. However, despite the short distal fragment, these multiple locking options and their in multiple directions alignment ensure more stability. This was demonstrated in a previous study in which they removed one centimeter from the tip of a routine interlocking tibia nail. This allowed for the placement of an increased amount of distal locking screws in the short distal fragment in comparison to the routine tibia nail.(15) The updated locking choices in the expert tibia nail were found to be likely to offer additional plains for fixing screws at both ends of this implant, which resulted in increased stability between the implant and the fracture fragment, according to the findings of a study. Comparable findings were found in the research carried out by Li et al(16).

In the current study, the average age of the patients was 44.80 years, which is equivalent to the average age of the patients in the study conducted by Gupta et al., in which the average age of the patients was 41.35 years(3). This makes it very evident that the middle-aged population that is engaged in outdoor occupations has a higher frequency of tibia fractures. Compared to the number of female patients (36.7%), the authors found that there were a greater number of male patients (63.3%). The male incidence was 81.3%, while the female incidence was 20.7%, which is comparable to the findings of Brown et al., and it was similar to the findings of Hooper et al., who reported that the male incidence was 82% and the female incidence was 18%(17, 18). In addition, this is in agreement with Thanigaimani et al., who found that the male incidence was 69.5%, while the female incidence was 30.46%(19). Possibly as a result of male predominance in activities that take place outside.

Functional outcome in our study was excellent in 21 (70%) patients, good 7 (23.3%) patients, and fair in 2 (6.7%) patients. Similar results have reported by Arora KK et al, they reported excellent results in 88% of their patients.(20) The postoperative complications found in our study were malunion 2 (6.7%), nonunion 1 (3.3%) and infection 3 (10%). The aforementioned study by Arora KK et al found similar rates of complications in their study, they reported malunion 8%, nonunion 4% while they reported superficial infection 12%.(20)

Conclusion

We conclude that expert tibia nail exhibited excellent to good functional outcome in majority of the patients with distal tibial fracture and also exhibited lower complication such as malunion, nonunion and infection.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate.
Approved by the department Concerned.
Consent for publication
Approved
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Not applicable

Conflict of interest

The authors declared an absence of conflict of interest.

Authors Contribution

MUHAMMAD SAEED (Assistant Professor)
Final Approval of version
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Revisiting Critically
SHAFI UL HAQ (Assistant Professor)
Data Analysis
ISRAR AHMAD (Professor)
Drafting & Concept & Design of Study

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