

The functional outcomes of tibia fractures treated with intramedullary tibia nail: A retrospective study

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Abstract

Background: The tibia nailing system is a type of implant used to stabilize a broken tibia bone. It is intended for long bone fracture fixation of tibia fractures, which include transverse, oblique, spiral, segmental, comminuted fractures, open and closed fractures etc. There is different nailing system available each with its own advantages and limitation. The type of system that is used will depends on the severity of the fracture, location of the fracture and the patient individual anatomy. In this study the Tibia Nail was to treat the fracture.

Materials and Methods: Total 14 patients having age ranging from 26-57 years were treated by Tibia nails. Retrospective analysis of patients who underwent Tibia nail fixation having tibial shaft fractures was performed. Clinical evaluation was done for all patients with a mean follow-up of 1.5 years. Radiological images taken at the follow up after surgery were utilised to assess the outcome. VAS Score was used for analysis.

Results: The patients that are included in the current study were available for evaluation after a mean of 12 months of follow-up. Radiological union in all patients were achieved in 6.1-7.2 weeks. Apart from this, the patients stay in clinical hospital for the 12.2 days of mean duration. The result reveals that overall, VAS Score at the final follow up was satisfactory. In addition, the full weight-bearing with low level of pain was reported after 9-12 month of surgery.

Conclusion: The tibia nail is an effective treatment of fractures of the tibia bone.

Keywords: Tibia Bone fracture; Tibia nail; Stainless Steel; Intramedullary nail; Functional outcome.

1. Introduction

Tibia bone fractures are among the most common orthopedic injuries, significantly impacting patient mobility and quality of life. The tibia, or shinbone, is the larger of the two bones in the lower leg, essential for weight-bearing and movement. Fractures of the tibia can arise from various causes, including trauma, falls, sports injuries, and underlying health conditions that affect bone density, such as osteoporosis. The complexity of tibial fractures varies, ranging from simple, non-displaced fractures to complex, multi-fragmentary injuries that may require surgical intervention [1,2]. The unique challenges presented by these fractures necessitate effective and reliable treatment options to ensure optimal healing and restoration of function. The implications of tibial fractures extend beyond immediate injury; they can lead to long-term complications such as nonunion, malunion, and post-traumatic osteoarthritis. Understanding the underlying mechanisms, risk factors, and advancements in treatment options is crucial for optimizing patient outcomes [3,4].

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The treatment of the fracture of tibia bone has observe the development from casting and functional bracing to intramedullary nailing and plating, as developed by kuntscher in the 1940s [5,6]. By examining recent advancements in surgical techniques and rehabilitation protocols, this research seeks to provide a comprehensive overview of tibial fractures and their management, ultimately contributing to improved patient outcomes and a deeper understanding of orthopedic challenges in this area.

The new advancement in nail provides multidirectional locked intramedullary system that involves multiple locking options in different planes at the proximal and distal ends. The nail has an angular stability locking system that enhances the lateral and axial stability of the fracture fragments [7]. In treating both proximal and distal tibial fractures, the novel device offers benefits over the conventional tibial intramedullary nail due to its altered design. Additionally, this innovative tibial intramedullary nail offers four sophisticated distal locking options. The configuration had two mediolateral locking choices, one anteroposterior locking option for improved stabilisation of the distal fragment, and one oblique locking option positioned extremely distally, which allowed for optimal bone purchase and avoided soft tissue injury. These design changes guarantee the preservation of angular stability, and angle-stable locking suggests the possibility of preserving fixation stability for fractures of the distal tibia [8]. All of these design changes enable improved metaphyseal tibial segment attachment by placing several interlocking holes near each nail end [9].

This paper aims to compare the performance of stainless-steel tibia nail in the management of bone fractures, focusing on clinical outcomes.

2. Material and Method

Retrospective analysis of patients who underwent Tibia nail fixation having tibial shaft fractures was analyzed. The evaluation study was carried out at orthopedic Boheza centre Hospital, Lebanon between June 2023 to December 2023. In the current study, we reviewed total 14 patients. Full clinical evaluation was done for all patients with a mean follow-up of 1.5 years. In this study, the Stainless-Steel tibia nail manufactured by Auxein, India. were used. An X-ray taken one month after surgery was utilised to assess the outcome. We investigated complications for superficial/pin site infection, deep infection, non-union, mal-alignment, implant failure, delayed union in the current investigation.

2.1. Inclusion Criteria

The Patients who completed the minimum continuous follow up of 6 Months were included in the analysis. The patients age between 26-57 were considered in the study.

2.2. Exclusion Criteria

Subject suffering from chronic disease which would result in unsatisfactory. Those patients who have been treated the tibial fracture using bone plates and screws were excluded from the study.

2.3. Clinical data for statistical analysis

The mean, standard deviation, median, minimum, and maximum for the major outcomes were calculated using the 95% significance level. The Visual Analog Scale was calculated from the baseline to each visit of patient.

3. Results

The demography data as shown in (Table 1). Cause of injuries with corresponding number of patients is shown in Table 2. Clinical evaluation for pain, was rated by patients on a VAS score (maximum score, 10 points) at the final follow-up (Table 4). The mean VAS score (maximum score, 10 points) at the final follow-up is shown in Table 4. The follow-up of patients was taken at 1, 3, 6, and 12 months in a year showed good clinical results.

Table 1 Demography data

	Tibia Nail	
Gender	Male	Female
Number	09	05

Table 2 Cause of fracture with corresponding number of patients (n=14)

Cause of Injury	Number with percentage
Road vehicle accident	6 (42.85)
Sports & due to running injuries	5 (35.71)
Fall from height	3 (21.42)

Table 3 Patient satisfaction data

Evaluation Parameters	Number with Percentage
Superficial /site infection	01 (7.14%)
Deep infection	0
Non union	0
Mal-alignment	0
Implant Failure	0
Delayed union	0

Table 4 VAS score (12 months of clinical follow up)

	Follow up time			
	1 Month	3 Months	6 Months	12 Months
For shaft fracture (n=14)				
VAS Score	33	20	9	2

4. Discussion

The management of tibial fractures has evolved significantly, with intramedullary nailing emerging as a preferred method due to its minimal invasiveness and ability to achieve stable fixation. The results from this study, emphasizing the efficacy, complications, and performance of the stainless-steel nail used for treating tibia bone fracture.

5. Conclusion

The study observed if there is any issue related to safety and performance of the Stainless-Steel Tibia Nail used for treating the tibia bone fracture. After the completion of the analysis, it was found that there is no any issue related to Nail and is safe and effective method for treating tibial fractures. In conclusion, patients with tibial fracture fixed with tibia nail recovered quickly and effectively with minimal or no complications.

Declarations

Disclosure of conflict of interest

The authors declare no conflict of interest

Statement of ethical approval

No ethical approval is required.

Author contribution

All authors whose names appear on the submission equally contributed to this work.

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