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Treatment of diaphyseal fractures of tibia with intramedullary interlocking nail

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ABSTRACT

Background: The tibia, or shinbone, is the most commonly fractured long bone in the body. A tibial shaft fracture occurs along the length of the bone, below the knee and above the ankle. It typically takes a major force to cause this type of broken leg. Motor vehicle collisions, for example, are a common cause of tibial shaft fractures. In many tibia fractures, the smaller bone in the lower leg (fibula) is broken as well. The objective was to study fracture healing and union rates with closed intra-medullary interlocking nailing.
Methods: Patients of both sexes belonging to adult age group presenting with fracture tibia to Orthopedic Department, Vydehi Institute of Medical Sciences, of are admitted from January 2015 to December 2015.
Results: In the present study maximum number of patients belongs to 18 to 27 years age group (18 cases) followed by 28 to 37 years age group (15 cases), maximum number of patients sustained tibia fracture due to RTA (38 cases) followed by fall (12 cases), maximum number of patients sustained simple tibia fracture (32 cases), followed by type 2 compound tibia fracture (13 cases) and 36 patients had excellent functional results and 8 patients had good functional outcome, while only 4 patients had fair functional outcome.
Conclusions: IM rods are secured within the bone by screws both above and below the fracture. The metal screws and the rod can be removed if they cause problems, but can also be left in place for life. Tibial rodding provides excellent fixation and alignment of the bones.

Keywords: Tibia, Diaphyseal fractures, Intramedullary interlocking nail

INTRODUCTION

The tibia bone is the usually fractured long bone in our body. A shaft of tibia fracture occurs along the length of the bone, below the knee and above the ankle. It requires a major force to cause this type of fracture. Road traffic accidents are a common cause of tibial bone fractures. Along with tibia fractures, the smaller bone in the lower leg fibula is broken as well.

Depending upon the force, tibia fractures varies, the pieces of bone may line up correctly (stable fracture) or be out of alignment (displaced fracture). The skin around the fracture may be intact (closed fracture) or the bone may puncture the skin (open fracture). In many tibia fractures, the fibula is broken as well.[1]

Tibia fractures are classified depending on: the location of the fracture (the tibial shaft is divided into thirds: distal, middle, and proximal), the pattern of the fracture (for example, the bone can break in different directions, such as crosswise, lengthwise, or in the middle), whether the skin and muscle over the bone is torn by the injury (open fracture).[1]

The most common types of tibial shaft fractures include:

Transverse fracture

In this type of fracture, the break is a straight horizontal line going across the tibial shaft.

Oblique fracture

This type of fracture has an angled line across the shaft.

Spiral fracture

The fracture line encircles the shaft like the stripes on a candy cane. This type of fracture is caused by a twisting force.

Comminuted fracture

In this type of fracture, the bone breaks into three or more pieces.

Open fracture

If a bone breaks in such a way that bone fragments stick out through the skin or a wound penetrates down to the broken bone, the fracture is called an open or compound fracture. Open fractures often involve much more damage to the surrounding muscles, tendons, and ligaments. They have a higher risk for complications—especially infections—and take a longer time to heal.

Tibial shaft fractures are often caused by some type of high-energy collision, such as a motor vehicle or motorcycle crash. In cases like these, the bone can be broken into several pieces (comminuted fracture).

Injuries due to sports, such as a fall while skiing or a collision with another player during soccer, are lower-energy injuries that can cause tibial shaft fractures. These fractures are typically caused by a twisting force and result in an oblique or spiral fracture.[2]

Management of the fractures of the shaft of the tibia remained a controversial subject despite advances in both non-operative and operative care. Sir John Charnley stated that, "we have still a long-way to go before the best method of treating a fracture of the shaft of tibia can be stated with finality" in 1961. Several published series regarding treatment of fractures of the shaft of tibia have shown that closed treatment of fractures can have excellent results. But the draw backs of prolonged healing time, fracture disease, malalignment and non-compliance of the patient has led to the thought of other modalities of treatment, finally resulting in the use of closed interlocking intramedullary nailing which has given excellent results.[3]

Now-a-days the well laid principle of biological osteosynthesis is rightly applied in long bone fracture healing and hence the selection of closed intramedullary interlocking nailing in this study.[4]

The following study highlights the role of closed interlocking nailing used for treating the fractures of the shaft of tibia.

Objective

To study fracture healing and union rates with closed intra-medullary interlocking nailing.

METHODS

Study design: Cross sectional study.

Study place and period

Patients of both sexes belonging to adult age group presenting with fracture tibia to Orthopedic Department, Vydehi institute of Medical Sciences and Research Centre, Bengaluru, of are admitted from January 2015 to December 2015.

Sample size: 30 cases.

Study procedure

All the patients who are more than 18years of age with acute fractures of diaphysis of tibia, Closed fractures and gustillo Anderson type 1 and 2 compound fracture are selected. In order to achieve fracture reduction based on fracture characteristics and required stability (absolute or relative) we used: external fixators, femoral retractor and Shanz screws or percutaneous clamps. Fracture reduction maneuvering or alignment was performed under close image intensifier monitoring.

Ethical approval

Ethical approval has been obtained from institutional ethical committee.

Statistical analysis: SPSS version 16.

RESULTS

In the present study maximum number of patients belongs to 18 to 27 years age group (18 cases) followed by 28 to 37 years age group (15 cases).

Table 1: Age and sex wise distribution of cases.

Age (in years)	Male	Female	Total
18 to 27	11	07	18
28 to 37	08	07	15
38 to 47	05	04	09
48 to 57	03	02	05
>58	03	00	03
Total	30	20	50

Table 2: Distribution of cases based on mode of injury.

Mode of injury	Number of patients
RTA	38
FALL	12
Total	50

In the present study maximum number of patients sustained tibia fracture due to RTA (38 cases) followed by fall (12 cases).

Table 3: Distribution of cases based on type of fracture.

Type of fracture	Number of patients
Simple	31
Compound type 1	06
Compound type 2	13
Total	50

In the present study maximum number of patients sustained simple tibia fracture (32 cases), followed by type 2 compound tibia fracture (13 cases).

Table 4: Distribution of cases based on outcome.

Functional outcome	Number of patients
Excellent	36 cases
Good	08 cases
Fair	04 cases
Poor	02 cases
Total	50

In our study 36 patients had excellent functional results and 8 patients had good functional outcome, while only 4 patients had fair functional outcome.

DISCUSSION

In the present study maximum number of patients belongs to 18 to 27 years age group (18 cases) followed by 28 to 37 years age group (15 cases). According to a study by Bhandari, maximum number of patients were belongs to 30-40 year age group and they showed that plate fixation was associated with a greater incidence of complications when compared with intramedullary nail fixation.[1]

In the present study maximum number of patients sustained tibia fracture due to RTA (38 cases) followed by fall (12 cases), According to a study by Jarmo, 80% patients were sustained injuries due to high energy collisions such as accidents, fall from height and they compared the results of anterior knee pain in two different nail insertion techniques.[2]

In the present study maximum number of patients sustained simple tibia fracture (32 cases), followed by type 2 compound tibia fracture (13 cases) and 36 patients had excellent functional results and 8 patients had good functional outcome, while only 4 patients had fair functional outcome. According to a study by Schmidt, 65% of fractures were simple and 35% of fractures were compound and in the instructional course on treatment of closed tibial fractures summarized that intramedullary nailing is more convenient, and it may provide superior results, but prospective randomized studies need to be done to confirm this. Operative treatment is recommended for open or closed unstable fractures and for fractures that cannot be held in adequate alignment. Intramedullary nail fixation is the treatment of choice for majority of tibial fractures that require stabilization.[3] According to a study by Joshi, proposed that the current trend of management of Gustillo Type-I, II and IIIA open fractures of tibia present to emergency department within 6-8 hours is to perform unreamed intramedullary nailing. Unreamed nailing in experimental studies has been found to cause less reduction in cortical circulation as compared to reaming of medullary canal. Reaming of open fractures had been found to spread the contamination from open wound along the medullary cavity. Reaming has also been reported to slow there vascularization and delay osseous union.[4] Larson studied to determine if any differences exist in healing and complications between reamed and unreamed nailing in patients with tibial shaft fractures, Stabilization of tibial fractures either with a slotted, stainless steel reamed nail or a solid, titanium nail. The average time to fracture healing was 16.7 weeks in the reamed group and 25.7 weeks in the unreamed group. They concluded Unreamed nailing in patients with tibial fractures may be associated with higher rates of secondary operations and malunion compared with reamed nailing. The time to fracture healing was significantly longer with unreamednail.[5] Vaisto stated that anterior knee pain is the most common complication after intramedullary nailing of the tibia. Dissection of patellar tendon and its sheath during trans-tendinous nailing is thought to be a contributing cause of anterior knee pain compared with a transpatellar tendon approach, a para-tendinous approach for nail insertion does not reduce the prevalence of chronic anterior knee pain or functional outcome after intramedullary nailing of tibial shaft fracture. In long term anterior knee pain seems to disappear from many patients.[6]

According to a study by Vala, study included patients of both sex and age group between 15-70 year, admitted in the orthopaedic wards with diaphyseal fracture of tibia. All cases were followed for a period of 5 months to 4 years. Following results were observed in their study; excellent (85%), very good (12%), good (2%) and fair (1%).[7]

According to a study by Naveen, a prospective study of 30 adult males and females age group presenting with tibial shaft fracture to Orthopaedic Department, the results were fair in 6.67%, excellent in 76.67%, good in 30%.[8]

Juan et al proved that osteosynthesis plates are an alternative to intramedullary nailing for diaphyseal tibial fractures and their outcomes can be favorable as long as the management of soft tissues and the proper principle of stability are taken into account.[9]

Byron et al confirms the place of reamed intramedullary nailing for the vast majority of tibial diaphyseal fractures. It provides an optimum outcome and minimizes the need for supplementary bone grafting in aseptic nonunions.[10]

CONCLUSION

A tibial shaft fracture can be treated by several methods depending on the type of fracture and alignment of the bone. Traditionally, most tibia fractures were treated with cast application or braces. However, more recently, the trend has shifted to more invasive treatments with surgical stabilization of the broken bone. The reason surgery is becoming more common is that implants and surgical techniques have improved making the risk of surgery much lower and the benefits of much more predictable healing of the injury. IM rods are secured within the bone by screws both above and below the fracture. The metal screws and the rod can be removed if they cause problems, but can also be left in place for life. Tibial rodding provides excellent fixation and alignment of the bones.

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