



Retrospective study of 50 patients for comparing the efficacy of Conservative versus surgical management for tibial shaft fractures

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ABSTRACT

Background: To compare surgical fixation and closed reduction and casting (CRC) of these fractures to assess treatment outcomes and determine predictors of failure.

Methods: We retrospectively reviewed all patients aged 20 to 50 who presented with a displaced tibial shaft fracture that required reduction over 2-year period. Fractures were initially treated based on surgeon preference either with CRC or with immediate intramedullary nailing. Fifty patients met inclusion criteria: 20 were initially managed with CRC and 30 with operative fixation. Radiographic healing was defined as bridging of 3 cortices and adequacy of final alignment was defined as <5 degrees of angular deformity in both planes and <1.0 cm of shortening.

Results: Significant proportion patients who underwent CRC failed closed treatment and ultimately underwent surgery. Multivariate analysis of patient and fracture characteristics revealed fracture displacement of >20% and the presence of a fibula fracture as predictors of closed treatment failure.

Conclusions: Treatment outcomes between initial operative fixation and closed reduction of displaced tibia fractures in age group between 20 to 50 are similar.

Key words: Tibial shaft, Fracture

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INTRODUCTION

The knowledge of the methods of treatment of tibial shaft fractures is important, as this is the most common fracture of the long bones, affecting mainly young men; complications such as reoperation, non-consolidation and poor consolidation are also relatively common. Tibial shaft fractures are the most common cause of compartment syndrome and, without correct and timely diagnosis that leads to an early treatment, can cause irreparable sequelae.¹⁻³

Although less commonly practiced, closed treatment is a potentially viable option, and typically involves reduction and casting followed transition to functional bracing. Operative treatment can be performed with several different implants. Intramedullary nailing with a huge biomechanical stability seems to be the implant of choice. Only rare indications for plate osteosynthesis can be found. The use of external fixation has declined even though external fixation is still the implant of choice in first line treatment of multiple trauma according to the damage control

principles. Open fractures with precarious blood supply and weak soft tissue covering are vulnerable to complications and remain a challenge for every treating surgeon. Reconstruction of axis, length and rotation is essential for a good outcome.⁴⁻⁷ Hence; under the light of above-mentioned data, the present study was undertaken for comparing the efficacy of surgical fixation and closed reduction and casting (CRC) of tibial shaft fractures.

MATERIALS & METHODS

The present study was undertaken for comparing the efficacy of surgical fixation and closed reduction and casting (CRC) of tibial shaft fractures. We retrospectively reviewed all patients aged 20 to 50 who presented with a displaced tibial shaft fracture that required reduction over 2-year period. Exclusion criteria included pt. age less than 20, open fractures and lack of follow-up to radiographic union or to 6 months from the index procedure, pathologic fractures and pts with metabolic disorders. Complete demographic and clinical details of all the patients was obtained. Pre-treatment radiographic findings were separately

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analysed. Fractures were initially treated based on surgeon preference either with CRC or with immediate intramedullary nailing. 50 patients met inclusion criteria: 20 were initially managed with CRC and 30 with operative fixation. Radiographic healing was defined as bridging of 3 cortices and adequacy of final alignment was defined as <5 degrees of angular deformity in both planes and <1.0 cm of shortening.

RESULTS

Although all fractures in both groups achieved bony healing, significant proportion of patients who underwent CRC failed closed treatment and ultimately underwent surgery. Multivariate analysis of patient and fracture characteristics revealed fracture displacement of >20% and the presence of a fibula fracture as predictors of closed treatment failure. Patients ultimately managed with intramedullary nailing trended toward increased adequacy of final alignment.

DISCUSSION

Tibial shaft fractures are associated with significant short- and long-term morbidities, ranging from acute compartment syndrome to chronic leg and knee pain. Furthermore, tibial shaft fractures in working-age adults have been shown to have a significant financial impact, both in terms of direct medical costs and lost productivity. As with other orthopaedic injuries, several studies have characterized patients with tibial shaft injuries in terms of age, gender, mechanism of injury (MOI) and fracture type. In the orthopaedic trauma assessment, it is helpful to know the likelihood of associated injuries in order to optimize evaluations and ensure appropriate management. For example, in the setting of a calcaneus fracture, the strong association with vertebral column injury is often considered. Similarly, with open clavicle fractures, pulmonary and cranial injuries are important to suspect and recognize early. Although a few studies have examined injuries associated with tibial shaft fractures such as ankle, posterior malleolus, and ligamentous injuries, no previous study has characterized overall bony and internal organ injuries that are associated with tibial shaft fractures.⁷⁻¹⁰ Hence; under the light of above-mentioned data, the present study was undertaken for comparing the efficacy of surgical fixation and closed reduction and casting (CRC) of tibial shaft fractures.

Although all fractures in both groups achieved bony healing, significant proportion of patients who underwent CRC failed closed treatment and ultimately underwent surgery. Multivariate analysis of patient and fracture characteristics revealed fracture displacement of >20% and the presence of

a fibula fracture as predictors of closed treatment failure. Patients ultimately managed with intramedullary nailing trended toward increased adequacy of final alignment. Shah RA et al, in a previous study, compared surgical fixation and closed reduction and casting (CRC) of these fractures to assess treatment outcomes and determine predictors of failure. retrospectively reviewed all patients aged 12 to 18 who presented with a displaced tibial shaft fracture that required reduction over an 8-year period. Exclusion criteria included open fractures and lack of follow-up to radiographic union or to 6 months from the index procedure. Fractures were initially treated based on surgeon preference either with CRC or with immediate intramedullary nailing. Seventy-four patients met inclusion criteria: 57 were initially managed with CRC and 17 with operative fixation. Although all fractures in both groups achieved bony healing, 23 of the 57 patients who underwent CRC failed closed treatment and ultimately required surgery (40.3%). Multivariate analysis of patient and fracture characteristics revealed fracture displacement of >20% (odds ratio=7.8, $P<0.05$) and the presence of a fibula fracture (odds ratio=5.06, $P=0.05$) as predictors of closed treatment failure. Patients ultimately managed with intramedullary nailing trended toward increased adequacy of final alignment (92.5% vs. 72.4%, $P=0.10$) but required longer hospitalization (5.4 vs. 1.9 d, $P<0.001$) and had a higher incidence of anterior knee pain (20% vs. 0%, $P<0.01$). There was no significant difference between groups with respect to time to healing. Treatment outcomes between initial operative fixation and closed reduction of displaced tibia fractures in adolescents are similar, but patients must be counseled about the high failure rates with CRC.¹¹

Vallier HA et al analysed one hundred four skeletally mature patients with extra-articular distal tibia shaft fractures with a mean age of 38 years (range, 18-95 years) and mean Injury Severity Score of 13.5 (range, 9-50). Patients were randomized to a reamed intramedullary nail ($n = 56$) or a large fragment medial plate ($n = 48$). Forty fractures (39%) were open. Twenty-eight (27%) had concomitant fibula fractures that were stabilized. The two treatment groups were evenly matched with respect to age, gender, Injury Severity Score, fracture pattern, and presence of open fracture. Six patients (5.8%) developed deep infection with equal numbers in the two groups. Eighty-three percent of infections occurred after open fracture ($P < 0.001$). Four patients (7.1%) developed nonunion after nailing versus two (4.2%) after plating ($P = 0.25$) with a trend for nonunion in patients who had distal fibula fixation (12% versus 4.1%, $P = 0.09$). All nonunions



occurred after open fracture ($P = 0.0007$); the primary union rate for closed fractures was 100%. Primary angular malalignment of 5° or greater occurred in 13 patients with nails (23% of all nails) and four with plates (8.3% of all plates; $P = 0.02$ for plates versus nails). Six additional patients experienced malalignment after immediate weightbearing against medical advice. Valgus was the most common deformity ($n = 16$). Malunion was more common after open fracture (55%, $P = 0.04$). Eighty-five percent of patients with malalignment after nailing did not have fibula fixation. Eleven patients underwent 15 secondary procedures after plating, five of which were for prominent implant removal. This was not significantly different from patients treated with nailing: 10 patients had 14 procedures and five for prominent implant removal. High primary union rates were noted after surgical treatment of distal tibia shaft fractures with both nonlocked plates and reamed intramedullary nails.¹²

CONCLUSION

Treatment outcomes between initial operative fixation and closed reduction of displaced tibia fractures in age group between 20 to 50 are similar.

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