Interlocking Intramedullary Nailing With and Without Reaming for the Treatment of Closed Tibial Shaft Fractures


In this issue, we examine a study published in 1997 in the Journal of Bone and Joint Surgery, American Volume, that investigated the clinical results of insertion of locking intramedullary nails with or without reaming for the treatment of closed tibial shaft fractures.

This study comprised 72 patients (73 fractures) who were managed with nailing with reaming and 63 patients (64 fractures) who were managed with nailing without reaming, all of whom were available for follow-up 12 months postoperatively.

Inclusion criteria for patient participation in the study were: medically fit for surgery, no concurrent infection, no previous injury with residual deformity or previous local infection, and ability to provide informed consent. Also, the major component of the fracture had to be >4 cm proximal to the ankle.

All patients received antibiotics prophylactically perioperatively. An attempt was made to perform nailing within 24 hours of the sustained injury. In both groups, nailing was performed with the use of a thigh bolster on a fracture table, calcaneal traction, and a Kirschner wire.

For fractures fixed with nailing with reaming, the guidewire was passed down the medullary canal, with an attempt made to center it in both the proximal and the distal fragment. For fractures fixed with nailing without reaming, the guidewire was passed centrally only into the proximal fragment. Reaming was then performed throughout the entire extent of the medullary canal in the former group and only in the proximal 6 to 8 cm of the metaphysis, to accommodate the proximal flare of the nail, in the latter group. In the former group, the reaming was performed to provide good fill of the medullary canal. The canal was overreamed to 1 mm more than the diameter of the nail.

The appropriate length of the nails that were inserted after reaming was determined with use of the guide-rod subtraction method. The appropriate diameter of the nails that were inserted without reaming was determined by passing sounds of increasing diameter into the medullary canal.

Postoperatively, early knee and ankle motion was encouraged. Weight bearing was allowed at 6 weeks depending on the progression of healing and the associated injuries. Patients were evaluated at 6 weeks and then monthly until fracture healing. Follow-up averaged 12 months (range, 3-33 months). The fracture was considered united if the patient was able to bear weight without pain at the fracture site and if radiographs showed callus-bridging at the fracture site or obliteration of the fracture line in patients who had no major formation of callus.

Two intraoperative fractures occurred after nailing with reaming. One early failure of fixation occurred in a patient who had a very proximal fracture. After nailing without reaming, 3 compartment syndromes required emergency fasciotomy, 1 intraoperative fracture occurred with distal locking, and 1 early failure of fixation occurred in a patient who had a very proximal fracture.

The authors of this study concluded that no major advantages exist to nailing without reaming compared to nailing with reaming for the treatment of closed tibial shaft fractures. They reported a higher prevalence of delayed union and breakage of screws after nailing without reaming.
Reaming for intramedullary nail fixation of tibial shaft fractures was controversial in 1997 when Blachut et al published their Level I study comparing reamed versus unreamed nails in closed tibial shaft fractures, and it continues to be controversial today. Historically, proponents for reaming state that it creates local bone graft and allows for a larger nail and locking bolts, creating a biomechanically stronger construct with a lower rate of hardware failure and secondary procedures to obtain bony union. Opponents of reaming are concerned about injury to the tibial endosteal blood supply, including thermal necrosis, leading to a higher rate of nonunion and infection, risk of pulmonary embolism, increased operative time, and blood loss.

In this prospective trial, Blachut et al proved essentially what everyone expected—reaming leads to a decreased risk of hardware failure and secondary procedures to achieve union but takes more operative time. Eleven years later, the SPRINT trial—the largest and most recent trial comparing reamed versus unreamed nailing for tibial shaft fractures—validated most of their conclusions. This Level I multicenter trial evaluated 1226 patients with open and closed tibial shaft fractures that were randomized to either reamed or unreamed intramedullary nailing. No secondary procedures to obtain union could be performed prior to 6 months. The unreamed group had a significantly higher rate of secondary interventions and autodynamization (locking bolts breaking). This, however, was not the case for open fractures. Although there was only 55% compliance with waiting 6 months for reoperation, there was an overall decreased rate of reoperation in all tibial shaft fractures compared to previous studies.

Although no study has shown a statistically significant difference in rates of nonunion, both the SPRINT trial and Blachut et al showed that reamed intramedullary nailing of closed tibial shaft fractures decreases the need for secondary procedures for union and the incidence of autodynamization.

REFERENCES