Association Between Time to Weightbearing and Union Rates After Intramedullary Nailing of Distal Tibial Shaft Fractures

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Purpose: Early weightbearing following intramedullary nailing has been shown to improve union rates for all tibial shaft fractures, but few studies have investigated its impact on distal shaft fractures. The purpose of this study was to determine the association between time to initiation of weightbearing (IWB) and fracture nonunion, delayed union, and malunion for distal tibial shaft fractures.

Methods: A multicenter retrospective case-control study was completed at 2 Level I trauma centers over a 12-year period. Patients were included for tibial shaft fractures distal to the isthmus treated with intramedullary nailing. Minimum follow-up was 6 months or to clinical and radiographic union. Time to IWB was the primary independent variable. Primary outcome was nonunion, defined as need for surgical intervention to achieve union. Secondary outcomes included delayed union, defined as lack of clinical and radiographic union by 6 months, and malunion in either the coronal or sagittal plane.

Results: 486 tibia fractures met inclusion criteria. Mean age was 45 years. 288 patients (59%) were male. 215 patients (44%) were tobacco users. 293 patients (60%) sustained a high-energy fracture mechanism. 63 fractures (13%) were classified as AO/OTA 42-C and 203 (42%) were open. Nonunion rate was 17% (80/486). Mean time to IWB was 8 weeks in the union group and 12.5 weeks in the nonunion group ($P < 0.001$). Binary logistic regression demonstrated time to IWB as an independent predictor of nonunion with an odds ratio of 1.05 per week delay (95% confidence interval 1.01-1.09, $P = 0.02$). Time to IWB was also associated with delayed union (9.6 weeks delayed vs 7.7 weeks early union, $P = 0.001$). There was no association between time to IWB and malunion (8.5 weeks malunion vs 8.8 weeks no malunion, $P = 0.672$).

Conclusion: Earlier time to IWB is associated with decreased rates nonunion and delayed union in distal tibial shaft fractures without increased risk of malunion. Providers may consider earlier weightbearing even in distal tibial shaft fractures to accelerate fracture healing with low risk of loss of fracture alignment.