Open Tibia Fractures Treated with Intramedullary Nailing: Effects of Provisional Plate Stabilization

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Purpose: This study is designed to analyze the risk of complications in open tibia shaft fractures treated with intramedullary nailing and small or mini-plate provisional fixation. Our hypothesis is that the use of a provisional plate fixation prior to nailing will not increase the risk of complications.

Methods: This study was approved by the local hospital IRB. A list of patients was compiled from the surgical billing database, using ICD-9 and CPT codes. Records met inclusion criteria if patients were (1) 18 years of age or older; (2) admitted to our Level I trauma center between January 1, 2005 and June 30, 2013; (3) diagnosed with an open fracture of the tibia; and (4) operatively treated with intramedullary nailing, with or without provisional plate fixation. A review of hospital medical records was conducted to collect demographic data including age, sex, and history of diabetes and smoking. Mechanism of injury, side of injury, Gustilo and AO/OTA classifications, and secondary procedures were also extracted from the records. Operative reports were reviewed to determine the utilization of provisional plating. Postoperative complications were tracked and included infection (superficial or deep), delayed or nonunion, compartment syndrome and death. Descriptive statistics, univariate, and multivariate logistic regression was conducted using SPSS (Version 18, IBM), with α= .05 significance level.

Results: There were 143 patients diagnosed with an open tibia fracture during the study period. Seven patients were excluded for age, four patients died, one underwent acute amputation, and 27 patients had insufficient follow-up leaving 104 patients in the study group. Four patients had bilateral tibia fractures. Patients in this study averaged 37 years of age (±12.92 SD), 75% were male, and 67.3% were related to motor vehicle collisions. 44% of injured extremities were classified as a Gustilo type 3 fractures and mean follow-up was 10 months. Overall use of a provisional plate occurred in 32.4% of extremities (n = 35), of which 57.1% were kept on permanently and 42.9% were removed. In this study, 27.8% of patients developed a complication, of which 16.7% had a superficial or deep infection (4.6% wound breakdown) and 11.1% had other types of complications (delayed union, nonunion, hardware failure). Age, Gustilo classification (type 3 vs. 1 and 2), and AO/OTA classification were considered confounding variables with provisional plate use and complication. After controlling for these variables, provisional plate use had slightly higher odds for infection (adjusted odds ratio [AOR] = 1.64, 95% confidence interval [CI] = 0.51, 5.32) but did not significantly increase the odds for any type of complication (AOR = 1.24, 95% CI = 0.46, 3.35). When assessing only the patients who had the provisional plate (n = 35), removing the plate decreased one's odds for infection (AOR = 0.43, 95% CI = 0.07, 2.69), and any complication (AOR = 0.55, 95% CI = 0.12, 2.46), compared to patients in whom the provisional implant was retained.

See pages 99 - 147 for financial disclosure information.

Conclusion: Provisional plate stabilization used to maintain fracture alignment in open tibia fractures undergoing intramedullary nailing should be used with caution in the setting of concern for infection. Although the local wound complication rate is low, removal of the plate after nailing should be considered in order to decrease the likelihood of developing an infection or other orthopaedic complication.