Impact of timing of weight-bearing on complications and union following fixation of tibial shaft fractures with intra-articular extension

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INTRODUCTION:
Tibial shaft fractures represent nearly a third of long bone fractures and are frequently associated with distal intra-articular extension. The primary treatment modality for most tibial shaft fractures is intramedullary nailing, which allows for immediate or early weight-bearing as tolerated (WBAT). However, it is unclear if early or immediate WBAT is safe for tibial shaft fractures with distal intra-articular involvement. Therefore, the primary aim of the present study was to investigate the effect of timing of weight-bearing on union, intra-articular displacement, and reoperation in tibial shaft fractures with distal intra-articular involvement treated with intramedullary nailing.
METHODS:
All adult patients with a tibial shaft fracture with intra-articular involvement treated with intramedullary nailing between 2010 and 2022 at one of three Level 1 trauma centers in a major metropolitan area were identified from an institutional database. Patients with less than 6 months clinical or radiological follow-up were excluded. The primary outcomes were tibial shaft healing at final follow-up, secondary intra-articular displacement, and reoperation (separately for: infection, nonunion, and hardware discomfort). Tibial shaft healing was categorized as nonunion, progressive healing, and union. Outcomes were compared between groups based on time to WBAT: immediately following surgery vs. early (2-6 weeks postoperatively) vs. delayed (>6 weeks postoperatively). Descriptive statistics are described using medians with interquartile ranges (IQR) for continuous variables and as frequencies with percentages for categorical variables. Differences in outcomes between groups based on weight-bearing status were calculated non-parametrically.
RESULTS:
One-hundred and fourteen patients were included. The median age was 49 (interquartile range [IQR]: 39 – 57) and 55 (48%) were women. WBAT was immediate in 17 patients (15%), early in 19 patients (17%), and delayed in 78 patients (68%). The intra-articular fragment was surgically fixed in 29% of the immediate, 58% of the early, and 67% of the delayed WBAT patients ($p = 0.017$). There were two nonunions at final follow-up in the delayed WBAT group, with none in the immediate or early WBAT group ($p = 0.903$). There were no differences in rates of overall reoperation ($p > 0.999$), reoperation for nonunion and/or infection ($p > 0.999$), or hardware removal for discomfort ($p = 0.709$) between groups. There were no cases of intra-articular displacement.
DISCUSSION AND CONCLUSION:
In our cohort of patients with tibial shaft fractures with distal intra-articular extension treated with intramedullary nailing, early weight-bearing was not associated with increased complication rates. Future prospective studies with larger sample sizes are needed to refine the indications for early weight-bearing in these patients.