

## Operative Versus Conservative Management of Displaced Tibial Shaft Fractures in Adolescents

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**Purpose:** Despite the commonplace nature of displaced tibial shaft fractures in adolescents, there is wide variability in management strategies. The purpose of this study was to assess treatment outcomes and determine predictors of failure in patients treated for displaced tibial shaft fractures.

**Methods:** We retrospectively reviewed all patients aged 12-18 years who presented to one of two Level I trauma centers with a displaced tibial shaft fracture that required reduction. Exclusion criteria included open fractures and lack of follow-up to either radiographic union or to 6 months from the index procedure. Fractures were treated based on surgeon preference with one of two approaches: (1) closed reduction and casting (CRC) under conscious sedation or general anesthesia, or (2) immediate operative fixation with a rigid intramedullary nail or flexible nails. Radiographic healing was defined as bridging of 3 of 4 cortices on radiographs and adequacy of final fracture alignment was defined as less than 5° of angular deformity and less than 1.0 cm of shortening. Outcomes were analyzed both on intent-to-treat principles and by definitive treatment method.

**Results:** 74 patients were included, of which 17 were initially managed with operative fixation and 57 with CRC. While all fractures in both cohorts achieved bony healing, 23 of the 57 patients who underwent initial CRC failed closed treatment and ultimately required operative intervention (40.3%). Multivariate analysis of patient and fracture characteristics revealed initial fracture displacement of >20% of the tibial width (odds ratio [OR] = 7.8, P <0.05) and the presence of a fibula fracture (OR = 5.06, P = 0.05) as independent predictors of closed treatment failure. Patients managed operatively had longer hospital stays (5.4 vs 1.9 days, P <0.001), fewer clinic visits (4.8 vs 5.9, P <0.01), a higher incidence of anterior knee pain at healing (20% vs 0%, P <0.01) and trended towards better final alignment (92.5% adequate vs 72.4%, P = 0.10). There were no differences between cohorts with respect to time to radiographic healing, final range of motion, and return to activity.

**Conclusion:** Treatment outcomes between initial operative fixation and attempted closed reduction of displaced tibia fractures in adolescents are similar, but treatment failure is higher in CRC. Predictors of CRC failure include initial fracture displacement >20% and presence of a fibula fracture. Patients must be counseled about the high failure rates with CRC and the need for active follow-up during treatment, whereas those undergoing surgical management should understand the risk of anterior knee pain and prolonged hospitalization.