The Trajectory of Short- and Long-Term Functional Recovery of Tibial Shaft Fractures Following Intramedullary Nail Fixation

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Background/Purpose: Tibia shaft fractures are the most common long bone fracture. Intramedullary nail fixation (IMN) of displaced tibial shaft fractures is a well-studied operation performed frequently in community hospitals and tertiary trauma centers. Multiple studies have demonstrated that IMN results in superior functional outcomes when compared with other fixation methods. Typically, this injury is seen in relatively young patients; the course of postoperative recovery thus deserves thorough investigation. There are many studies that separately describe both the short- and long-term outcomes of these injuries. However, studies describing the trajectory of recovery, or the relative functional change between multiple time points, are lacking in the literature. This information is very important for prognosticating function and planning return to work and activity. The purpose of this study is to describe the trajectory of recovery between specified time points (0-6 months, 6-12 months, and 1-5 years) after tibial shaft fracture treated with IMN.

Methods: 132 patients with tibial shaft fracture (OTA 42-A,B,C) treated with IMN were enrolled at a Level I trauma center between 2005 and 2010. Functional recovery (Short Form [SF]-36 Physical Composite Score and Short Musculoskeletal Function Assessment [SMFA] Functional Composite Score) at baseline, 6 months, 1 year, and 5 years were prospectively collected. The proportion of patients that achieved MCID (minimal clinically important difference) between time points was calculated. Statistical significance was set at a P value <0.05.

Results: Mean SF-36 scores improved between 6-12 months ($P = 0.0008$) and between 1-5 years ($P = 0.0029$). Similiarly, mean SMFA scores improved between 6-12 months ($P = 0.0254$) and between 1-5 years ($P = 0.0106$). In both scores, the slope of this improvement is flatter between 1-5 years than it is between 6-12 months. Furthermore, SF-36 and SMFA scores did not reach baseline at 5 years. SF-36 detected a greater proportion of patients achieving MCID than the SMFA at all time points, including 52% of patients still achieving MCID change in the 1-5 year interval.

Conclusion: This study demonstrates that the trajectory of functional recovery after tibial shaft fracture is characterized by an initial decline in function, followed by improvement between 6-12 months. There is still further improvement beyond 1 year, but this is of flatter trajectory. Regardless, the data show that function does not yet improve to baseline by 5 years. The SF-36 was found to be a more sensitive test for detecting functional recovery.

See pages 49 - 106 for financial disclosure information.