

Does Syndesmotic Fixation Technique Impact Complication Rates and Functional Outcomes Measured by PROMIS Scores Following Operative Repair of Ankle Fractures?

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Purpose: It remains unclear whether the syndesmotic fixation technique [Tightrope, InternalBrace (IB), and screw] impacts complication rates and outcomes. This study aims to determine which technique results in the fewest complications and best functional outcomes as measured by Patient Reported Outcomes Measurement Information System (PROMIS) computerized adaptive tests (CATs) of physical function (PF) and pain interference (PI). We hypothesized that Tightrope and IB would reduce complications and improve PROMIS scores compared to screws.

Methods: 782 patients who underwent ankle fracture surgery at a single institution from 2016 to 2021 were reviewed retrospectively. Two foot and ankle fellowship-trained orthopaedic surgeons independently reviewed all radiographs, determined fixation technique, and assessed complications at final follow-up. Multiple extremity injuries, open fractures, and pilon variants were excluded. 328 patients with syndesmotic ruptures were sent postoperative questionnaires. 159 patients with minimum 1-year follow-up were analyzed for complications. 70 patients who completed PROMIS CATs were analyzed for functional outcomes. The Kruskal-Wallis test compared PROMIS scores across repair types. PROMIS scores were modeled by technique using linear regression. This study had 80% power to detect large effect sizes (Cohen's $f = 0.40$) but was underpowered for small and medium effects.

Results: Overall complication rates with screw were 12.9% (8/62): 8.1% (5/62) degenerative joint disease (DJD), 0% end-stage arthritis, 6.5% (4/62) syndesmotic malreduction. Complication rate in Tightrope was 1.7% (1/59): 1.7% (1/59) DJD. IB had no radiographic complications. Mean PF was 50.38 ± 9.39 screw, 53.87 ± 9.70 Tightrope, and 52.18 ± 13.08 IB ($p = 0.71$). Mean PI was 49.28 ± 8.22 screw, 47.91 ± 8.80 Tightrope, and 49.15 ± 10.46 IB ($p = 0.79$). Compared to screws, adjusted models demonstrated mean PF 4.00 points greater for Tightrope ($p = 0.17$) and 2.94 points greater for IB ($p = 0.34$). Adjusted models for PI revealed mean scores 2.05 points less for Tightrope ($p = 0.42$) and 1.23 points less for IB ($p = 0.65$) compared to screws.

Conclusion: Compared to screws, Tightrope and IB resulted in fewer complications and clinically relevant increases in PF, as the modeled PROMIS PF scores reached the lower end range of the minimal clinically important difference for this outcome measure reported in the literature.