Δ Tightrope versus Screw Fixation of the Tibiofibular Syndesmosis: A Long-Term CT Evaluation of Maintenance of Reduction

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Purpose: Flexible fixation techniques combined with anatomic (open) syndesmosis reduction have demonstrated improved functional outcomes and rates of malreduction. Suture-button devices allow physiologic motion of the syndesmosis without need for implant removal, which may lower the risk of recurrent syndesmotic diastasis. There is limited longer-term assessment of the maintenance of reduction between static and flexible syndesmotic fixation using bilateral ankle CT evaluation.

Methods: This is an a priori planned subgroup analysis of a multicenter, randomized clinical trial comparing static syndesmosis fixation (two 3.5-mm screws, Group S) with flexible fixation (single knotless Tightrope, Group T) for patients with AO-OTA 44-C injuries. Patients who completed bilateral ankle CT scans at 3 and 12- month follow-up were included. The primary outcome measure was syndesmotic malreduction based on bilateral ankle CT scans, using the uninjured, contralateral ankle as a control. Anterior (ASD), middle (MSD), and posterior (PSD) syndesmosis distance were calculated to measure syndesmosis reduction. Secondary outcomes included reoperation, adverse events, and functional outcomes including the EuroQol 5 Dimensions (EQ-5D), Olerud-Molander Ankle Score (OM), Foot and Ankle Disability Index (FADI), and Work Productivity Activity Impairment Questionnaire (WPAI). Paired samples t-tests were used to compare injured to control ankles (R, v 3.5.1).

Results: 42 patients (24 Group S, 18 Group T) were included. ASD for Group T was 5.22 mm (95% confidence interval [CI] 4.69-5.77) at 3 months compared to 4.26 mm (95%CI 3.82-4.71; P = 0.007) in controls and 5.38 mm (95% CI 4.72-6.04) at 12 months compared to 4.44 mm (95%CI 3.73-5.16; P = 0.048) in controls. ASD for Group S was 4.63 mm (95% CI 4.17-5.10) at 3 months compared to 4.67 mm (95% CI 4.24-5.10; P = 0.61) in controls, but significantly increased to 5.73 mm (95% CI 4.81-6.66) at 12 months compared to 4.65 mm (95% CI 4.15-5.15; P = 0.04) in controls. MSD results were similar; Group T had a larger MSD than control ankles at 3 months (P = 0.03) and 12 months (P = 0.01), while the MSD in Group S was not different at 3 months (P = 0.80) but increased at 12 months (P <0.01). 88% (21/24) of Group S had broken or removed screws by 12 months. Unplanned reoperation was 15% in Group S and 4% in Group T (P = 0.02), with an overall reoperation rate of 30% in Group S. There was no significant difference between treatment groups for EQ-5D, OM, FADI, or WPAI at 3 or 12-month follow-up.

Conclusion: Tightrope fixation resulted in greater diastasis of the ASD and MSD compared to contralateral, uninjured ankles at 3 and 12 months post-fixation. Group S initially had syndesmotic reduction similar to control ankles, but between 3 and 12 months post-fixation, there was significantly increased syndesmosis diastasis compared to controls. The majority of Group S (88%) had either broken screws or scheduled screw removal, which may explain the increased tibiofibular diastasis seen at 12 months.

Δ OTA Grant