**Immediate Improvement in Physical Function After Symptomatic Syndesmotic Screw Removal**

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**Purpose:** The purpose of this study was to investigate the immediate impact of syndesmotic screw removal on PROMIS (Patient-Reported Outcome Measurement Information System) outcomes and ankle range of motion (ROM) in patients who had previously undergone ankle fracture open reduction and internal fixation (ORIF) and syndesmotic fixation with symptomatic syndesmotic screws and decreased function.

**Methods:** A total of 58 ankle fractures with syndesmotic injury that required ORIF with syndesmotic fixation and subsequent syndesmotic screw removal met criteria for inclusion from February 2015 to May 2018. We analyzed PROMIS scores collected just prior to syndesmotic screw removal and at the first postoperative visit. A retrospective chart review was performed to collect demographic and ankle ROM data. Cohort data were collected for 71 patients who underwent ORIF with syndesmotic fixation, but without screw removal during the same study period.

**Results:** The PROMIS physical function (PF) T-score was 35.2 at an average of 106 days after ORIF just prior to syndesmotic screw removal at a mean 184 days after ORIF. There was a statistically significant improvement in the PF T-score to 44.5 (P <0.01) in the immediate postoperative period after screw removal, which met minimal clinically important difference (MCID). There was a statistically significant improvement in ankle ROM after screw removal (P <0.01). In a cohort comparison group of 71 patients during the same time period who did not undergo syndesmotic screw removal, the PF T-score was 41.6 at a mean 150 days after surgery, similar to the PF T-score (44.5) for patients after syndesmotic screw removal (P = 0.06) (Table 1).

**Conclusion:** In our study, there was an immediate clinically meaningful improvement in physical function outcomes and ankle ROM after symptomatic syndesmotic screw removal for patients who underwent ankle fracture ORIF with syndesmotic fixation, similar to asymptomatic patients who did not require syndesmotic screw removal within the same postoperative time frame.

**Table 1: Demographic and PROMIS Data for Patients Undergoing Ankle Open Reduction and Internal Fixation (ORIF) with Syndesmotic Fixation**

| Syndesmosis Screw Removal Group (N=58) | Mean (S.D) [Range] |
|---|---|
| Mean Age at ORIF (Years) | 42.6 (17.0) [14,69] years |
| Gender | Male: 31/Female: 29 |
| Mean Days Between ORIF & Screw Removal (Days) | 183.8 (134.3) [50,381] days |
| Mean Days Between ORIF & Evaluation (Days) | 105.9 (43.9) [16,198] days |
| Mean Days Between Screw Removal & Evaluation (Days) | 48.3 (39.9) [8 ,200] days |
| Pre-Screw Removal Mean PROMIS PF T-Score | 35.2 (8.0) [19.3,61.7] |
| Pre-Screw Removal Mean PROMIS PI T-Score | 56.5 (9.6) [32.2,73.7] |
| Pre-Screw Removal Mean PROMIS Depression T-Score | 46.2 (9.6) [31.9,65.7] |
| Pre-Screw Removal Mean Dorsiflexion | 1.5° (4.7°) [-5,18] |
| Pre-Screw Removal Mean Plantarflexion | 23.2° (12°) [5,50] |
| Pre-Screw Removal Mean Total Arc of Motion | 25.4° (15°) [5,66] |
| Post-Screw Removal Mean PROMIS PF T-Score | 44.5* (7.7) [26.9,61.7] |
| Post-Screw Removal Mean PROMIS PI T-Score | 54.1* (9.2) [32.2,71.6] |
| Post-Screw Removal Mean PROMIS Depression T-Score | 43.4* (10.1) [31.9,67.8] |
| Post-Screw Removal Mean Dorsiflexion | 10.3°[4.4°) [0,25] |
| Post-Screw Removal Mean Plantarflexion | 31.0°* (12.4°) [10,55] |
| Post-Screw Removal Mean Total Arc of Motion | 41.8°* (14.1°) [20,70] |
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| **Control Group (N=71)** | |
| Mean Age at ORIF (Years) | 44.4 (18.3) [16,88] years |
| Gender | Male: 41/Female: 30 |
| Mean Days Between ORIF & Evaluation (Days) | 149.6 (17.8) [120,180] days |
| Post-Op Mean PROMIS PF T-Score | 41.6** (8.9) [21.3,67.3] |
| Post-Op Mean PROMIS PI T-Score | 55.1 (9.6) [38.7,83.8] |
| Post-Op Mean PROMIS Depression T-Score | 47.1** (10.8) [34.2,78.1] |

ORIF: open reduction, internal fixation; PF: physical function; PI: pain interference
*p<0.05 in Wilcoxon-Signed Rank test for pre- and post-screw removal
**p<0.05 in Wilcoxon Rank Sum test between screw removal group after syndesmotic screw removal and control group