A Comparative Analysis of Subtalar and Ankle Arthrodesis in Patients With and Without Prior Ipsilateral Fusion

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INTRODUCTION:
Subtalar arthrodesis is a widely performed procedure for managing arthritis, calcaneal fractures, deformities, and instability of the hindfoot. Some studies suggest that prior ankle arthrodesis may negatively impact subtalar fusion due to altered joint biomechanics and vascular supply, but evidence remains limited. The primary objective of this study is to examine subtalar fusion rates in patients with and without previous ipsilateral ankle arthrodesis. A secondary objective of this study is to examine ankle fusion rates in patients with and without previous ipsilateral subtalar arthrodesis.
METHODS:
This retrospective study utilized data from the TriNetX Research Network to identify patients who underwent a subtalar fusion with (ankle-subtalar) and without (subtalar-only) previous ipsilateral ankle arthrodesis (Figure 1). The ankle-subtalar cohort included both patients with a successful (successful ankle-subtalar) and failed (failed ankle-subtalar) prior ankle fusion. A secondary analysis examined those who underwent an ankle fusion with (subtalar-ankle) and without (ankle-only) previous ipsilateral subtalar arthrodesis (Figure 2). The subtalar-ankle cohort included both patients with a successful (successful subtalar-ankle) and failed (failed subtalar-ankle) prior subtalar fusion. Propensity score matching (1:1) controlled for age, sex, BMI, and several comorbidities. Primary outcomes included one-year rates of nonunion and hardware removal.
RESULTS:
Before matching, 265 patients were identified in the ankle-subtalar cohort and 12,635 in the subtalar-only cohort. The ankle-subtalar group had significantly higher hardware removal (20.2% vs. 10.3%, p=0.002) and nonunion rates (30.5% vs. 18.7%, p=0.002). Failed ankle-subtalar patients had a 3-fold greater risk of nonunion than successful cases (RR 3.0, 95% CI 1.79–5.02). In the secondary analysis, 171 patients were identified in the subtalar-ankle group and 6,801 in the ankle-only group. Hardware removal was higher in the subtalar-ankle cohort (17.5% vs. 6.4%, p=0.002), but nonunion rates were similar. However, failed subtalar-ankle patients had a 2.4-fold higher risk of ankle nonunion (RR 2.4, 95% CI 1.30–4.42).
DISCUSSION AND CONCLUSION: In this matched retrospective cohort study, we found significantly higher nonunion and hardware removal rates for the ankle-subtalar cohort, suggesting that preexisting ankle arthrodesis may be associated with higher nonunion rates after subsequent subtalar fusion. A significantly higher risk of nonunion in the failed ankle-subtalar group compared to the successful ankle-subtalar group indicates that the outcome of the initial ankle fusion may play a role in the prognosis of the subsequent subtalar fusion. Additionally, while the nonunion rates were comparable between the subtalar-ankle and ankle-only cohorts, the failed subtalar-ankle group had a significantly higher risk of nonunion than the successful subtalar-ankle group. Therefore, while prior subtalar arthrodesis alone does not affect subsequent ankle fusion, the success or failure of prior subtalar arthrodesis can help risk stratify patients and predict outcomes. These findings introduce a novel concept to the current body of literature that has significant implications on clinical decision-making and patient counseling.

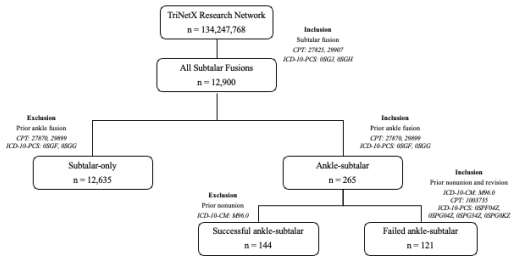

Figure 1: Flowchart depicting cohort design for ankle-subtalar and subtalar-only cohorts

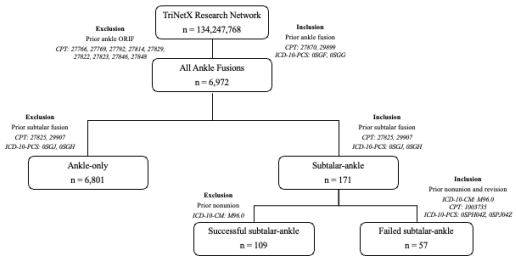

Figure 2: Flowchart depicting cohort design for subtalar-ankle and ankle-only cohorts