The Effect on Ankle and Great Toe Range of Motion Depends on Surgical Approach Utilized: A Retrospective Cohort Study with Patient Reported Outcomes

Jonathan McKeeman, Ryan Yimeng Lee, Coleman Richard Cush, James Robert Lachman[1]
[1]Orthopaedics and Sports Medicine, St. Luke's University Health Network

INTRODUCTION:

Trimalleolar ankle fractures are common orthopaedic injuries. There has been a trend in recent orthopaedic trauma and foot and ankle literature towards aggressive surgical management of posterior malleolus fractures, regardless of the size of the fragment. Rotational stability of the mortise has been cited as the motivation for this trend. Multiple surgical methods have been described to reduce and stabilize the posterior malleolus fracture but two strategies are the most common; an Anterior to Posterior screw to “reverse”-lag the fragment and a direct reduction and fixation using a posterolateral approach. Some authors have cautioned surgical approaches through the posterior ankle and cite concerns of negative effects on ankle and great toe range of motion, likely due to scaring of the flexor hallucis longus (FHL) and posterior tissues. In this study, we compare ankle and FHL range of motion between trimalleolar fracture treated with direct reduction and fixation of the posterior malleolus, indirect reduction using an anterior to posterior screw, and a control group of those whose posterior malleolus were treated closed without fixation.

METHODS:

Prospectively collected data was retrospectively reviewed on all patients who underwent open reduction and internal fixation of trimalleolar ankle fractures during a 10 year period at a single institution in this IRB approved study. Patient demographics and clinical data, radiographic outcomes, and patient reported outcomes were collected on all patients. Additionally, goniometer measurements of ankle and great toe range of motion were obtained on all patients included in the study. Patients with posterior malleolus fractures not part of a trimalleolar fracture pattern, patients without a minimum of 2 years follow-up, and patients unable to return to clinic for goniometer measurements were all excluded. One-way ANOVA was used to compare the means across the three groups. All statistical analysis was performed by someone with an expertise in biostatistics.

RESULTS:

Two-hundred and eight-three patients (56.5% male, avg. age 53) met inclusion criteria for the study. Please refer to Table I for a summary of demographic and clinical information for the cohort. Ankle range of motion was better in both the Closed Reduction Internal Fixation (CRIF) and Closed Reduction No Fixation (CRNF) groups when compared to the ORIF group. Great toe range of motion was better for the CRNF group than for the CRIF and ORIF groups. No differences were seen across any groups in PROMIS Pain interference, PROMIS Depression, or PROMIS Physical function with regards to time during the study. Please see Table 2 for a complete summary of the results of this study.

DISCUSSION AND CONCLUSION:

Surgical technique/approach has measurable effects on both ankle and great toe range of motion as it relates to posterior malleolus fractures in trimalleolar ankle fracture fixation. These differences, though statistically significant, did not correlate with worsened patient reported outcomes or lead to more disability. The findings in this study demonstrate that even though a posterolateral approach to the ankle leads to decreased ankle and toe range of motion, patient reported outcomes are similar regardless of the approach used.