Initial Fibular Displacement as a Predictor of Medial Clear Space Widening in Weber B Ankle Fractures
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Introduction/Purpose: The diagnosis of medial ankle instability in Weber B ankle fractures remains controversial. Manual stress radiographs are considered by many to be the gold standard to assess deltoid ligament integrity (Tornetta 2000). Gravity stress examinations have been shown to be equivalent (Gill 2007, Schock 2007), and also offer the advantage of causing less patient discomfort (Schock 2007). Significant fibular displacement likely serves as a surrogate for the large amount of energy required to tear the deltoid ligament. Therefore, the purpose of this study was to determine the relationship between initial fibular displacement and medial clear space widening on a gravity stress radiograph.

Methods: A retrospective review was conducted of all patients with isolated Weber B ankle fractures with both initial injury radiographs and gravity stress view from August 1st, 2014 through April 1st, 2016. A total of 17 subjects were identified, age 42.6±17 years, time to GSV 4.6±5 days. On the mortise view of injury radiographs, medial clear space (MCS), superior clear space (SCS), lateral fibular displacement (LFDP) and fibular shortening (FS) were measured, and on the lateral view, anterior to posterior fibular gap (A to P FG) was measured. The gravity stress view was used to measure the medial clear space widening (MCS-W). All statistical analysis was performed using Stata (College Station, TX). T-tests were used to calculate mean and standard deviation of each group, correlation and linear regression analyses were run with each displacement variable relative to MCS-W. ROC analysis was used to determine sensitivity and specificity of the displacement variables.

Results: Strong significant correlations with MCS-W were found for LFDP (0.69, p=0.003), and A to P FG (0.72, p=0.001), but not with FS (0.34,p=0.18). Linear regression analysis revealed significant ability to predict MCS-W for both LFDP (coefficient=1.12, R2=0.48, p=0.002) and A to P FG (coefficient=2.57, R2=0.52, p=0.001) but not FS (coefficient=0.67, R2=0.11, p=0.18). When LFDP and A to P FG were combined, they accounted for 65% of the variability in MCS-W (coefficient=0.70, 1.76; R2=0.65, p=0.033, p=0.018). ROC analysis for A to P FG using cutoff values of 0.75mm, 1.0mm, and 1.25mm yielded SN and SP of 100% and 75%, 100% and 100%, and 67% and 100%, respectively for each cut point.

Conclusion: The initial fibular displacement is a strong predictor of medial clear space widening in Weber B ankle fractures. On lateral radiographs, an anterior to posterior fibular gap greater than 1.0mm showed a sensitivity and specificity of 100% in predicting MCS-W=5.0mm. This provides another tool to aid clinicians in determining the integrity of the deltoid ligament and may help prevent the need for further patient discomfort with a stress view.

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