

Does a Patient's Self-Reported Ability to Weight-Bear Immediately After Injury Predict Stability for Ankle Fractures?

Bonnie Chien, MD¹; Kurt Hofmann, MD²; Mohammad Ghorbanhoseini, MD³; David Zurakowski, PhD⁴; Edward Rodriguez, MD³; Paul Appleton, MD⁵; John Ellington, MD⁶; John Kwon, MD⁵

¹Harvard Combined Orthopaedic Residency Program, Boston, Massachusetts, USA;

²Tufts Medical Center, Boston, Massachusetts, USA;

³Beth Israel Deaconess Medical Center / Harvard Medical School, Boston, Massachusetts, USA;

⁴Children's Hospital Boston, Boston, Massachusetts, USA;

⁵Beth Israel Deaconess Medical Center, Dept of Orthopaedics, Boston, Massachusetts, USA;

⁶OrthoCarolina, Foot and Ankle Institute, Charlotte, North Carolina, USA

Background/Purpose: Determining the stability of ankle fractures, particularly for isolated Weber B fibula fractures, can be challenging. While the ultimate goal remains achieving an anatomic mortise, different techniques to predict ankle stability such as stress and weight-bearing radiographs have been utilized with variable results. History of injury and the ability to walk after sustaining ankle trauma may be predictive of stability. Therefore, this study seeks to determine whether a patient's ability to fully weight-bear immediately after injury is an effective indicator for ankle stability following ankle fracture. We hypothesize that the ability to weight-bear immediately after injury has a high predictive value for a stable mortise whereas the inability to fully weight-bear at the time of injury predicts instability.

Methods: A prospective study was conducted of 121 patients who sustained an isolated unilateral lateral malleolar, bimalleolar, or trimalleolar ankle fracture. Patients' ability to weight-bear after injury was elicited on initial presentation and correlated with ankle radiographs that were deemed stable or unstable based on commonly used indices to assess stability (ie, widening of the medial clear space). Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were determined using standard formulas in order to assess a patient's ability to bear weight as a predictor of ankle fracture stability (sensitivity) and a patient's inability to bear weight as a predictor of instability (specificity).

Results: For the entire cohort, patients who were able to weight-bear immediately after injury were over 8 times more likely to have a stable fracture than those who could not (odds ratio [OR] = 8.7, $P < 0.001$). PPV for being able to fully weight-bear as it relates to stability was 73%. Inability to weight-bear was 85% specific among patients with an unstable fracture. When analyzing patients with radiographic isolated fibula fractures ($n = 67$), PPV = 82%, NPV = 53%, specificity = 79%, while the OR was 5.0 ($P = 0.003$) for those who could weight-bear having a stable fracture. When subanalyzing patients who presented with isolated fibula fractures and an anatomic mortise ($n = 43$), PPV = 74%, NPV = 52%, specificity = 62%, while the OR was 3.6 ($P = 0.07$) for those who could weight-bear having a stable fracture.

Conclusion: Patients ability to weight-bear immediately after injury is a specific and prognostic indicator for stability across a range of ankle fracture subtypes. Patients with an isolated fibula fracture and anatomic mortise were 3.6 times more likely to have a stable fracture if they were able to fully weight-bear at time of injury. While a patient's history does not preclude the need for appropriate imaging studies and clinical judgment, it may aid in the assessment of ankle stability following fracture.