

## **A Prospective Study to Compare Open Reduction and Ligament Repair Versus Percutaneous Screw Fixation of the Tibia Fibular Syndesmosis**

David Sanders, MD; A. Walid Hamam, MD; Christina Tieszer, CCRP;

Abdel-Rahman Lawendy, MD;

Western University/London Health Sciences Centre, London, Ontario, Canada

**Background/Purpose:** The outcome of high ankle fractures associated with syndesmotic disruption (Weber-C [OTA 44.C]) is determined by the quality of the reduction. Using fluoroscopic parameters (closed reduction) to gauge reduction has variable results. Open syndesmotic reduction can reduce malreduction rates from 40% to 15%. Current syndesmosis repair techniques include either open or closed reduction, combined with fixation between the distal tibia and fibula. In this study, we compare radiographic and functional outcomes between conventional closed reduction and screw fixation of the syndesmosis with open reduction of the syndesmosis, direct repair of the anterior inferior tibiofibular ligament (AiTFL) and screw fixation. The AiTFL is the first lateral ligamentous stabilizing structure compromised in rotational syndesmotic injury and is accessible for repair during open reduction. We hypothesize that restoration of the AiTFL combined with open reduction is more likely to provide an anatomic repair, and therefore a better outcome, compared to closed reduction and screw fixation.

**Methods:** 29 patients (19 male; average age, 37 years) with high ankle fractures and syndesmotic disruption were enrolled in this IRB-approved cohort study. Following fibular and/or malleolar fixation, a syndesmosis stress test was performed. Unstable ankles were treated with either an open or closed reduction and fixation of the syndesmosis. The anatomic repair technique (AR) involved direct reduction of the syndesmosis, repair of the AiTFL ligament using suture anchors, and placement of syndesmosis screws. The closed reduction technique (CR) included fluoroscopic assessment of reduction with the syndesmosis clamped, followed by placement of syndesmosis screws. 14 patients were treated by AR, 15 by CR. Rehabilitation was identical between the groups. Functional outcomes included the AOFAS (American Orthopaedic Foot & Ankle Society) Ankle-Hindfoot Score, Maryland Foot Score, and FAOS (Foot and Ankle Outcome Score). Radiographic reduction was measured from bilateral ankle CT scans performed 3 months following surgery; fibular translation and syndesmosis diastasis were compared between injured and noninjured ankles.

**Results:** *Radiographic:* The average difference in ankle translation and diastasis between injured and noninjured ankles was  $0.47 \pm 0.38$  mm in the AR group (mean  $\pm$  standard deviation), compared with  $1.09 \pm 0.69$  mm in the CR group ( $P < 0.03$ ). 73% of the CR group and 11% of the AR group had 1 mm or greater side-to-side difference. 11% of the CR group and none of the AR group had 2-mm incongruity or diastasis. *Functional:* The Maryland pain subscore showed a statistically significant ( $P < 0.05$ ) improvement in the AR group compared to the CR group. Improved functional outcome scores were noted using the AR technique compared with the CR technique, but did not reach statistical significance. To date, 5 patients required removal of hardware for irritation (4 CR; 1 AR). One in the CR group had failed reduction requiring revision.

- The FDA has not cleared this drug and/or medical device for the use described in this presentation (i.e., the drug or medical device is being discussed for an "off label" use). For full information, refer to page 600.

**Conclusion:** We have shown that an open anatomic repair of the syndesmosis results in better radiographic outcomes compared with percutaneous screw fixation. Pain at 6 months was significantly reduced in the AR group. Based on these results, 20 subjects per group would be required to demonstrate statistical significance in functional outcome scores. Efforts to achieve and maintain an anatomic syndesmosis reduction are important to improve patients' outcomes. Further study of the anatomic repair technique is warranted.