Comparison of a Novel FiberWire-Button Construct versus Metallic Screw Fixation in a Syndesmotic Injury Model

Reference:

Scientific Literature Review

Reviewed by: Caroline Gauthier, DPM
Residency Program: Cambridge Health Alliance, Cambridge, MA

Podiatric Relevance:
Recent literature has demonstrated that syndesmotic injuries may occur with fractures involving any level of the fibula even in mechanisms of injury that were thought not to involve the syndesmosis. The adequate repair of a syndesmotic diastasis is imperative for appropriate ankle function and a successful surgical outcome in patients with ankle trauma. Previous studies have demonstrated that the syndesmosis is not static and that less rigid fixation devices may be more desirable. This study evaluates the stability of a FiberWire-button construct (Arthrex, Naples, FL) compared to a metallic screw (Synthes, Paoli, PA) in maintaining syndesmotic reduction following repair.

Methods:
Ten pairs of fresh-frozen below-knee cadaveric specimens underwent an external rotation force of 12.5 Nm resulting in a syndesmotic injury. The pairs were randomized to transsyndesmotic repair of either a FiberWire-button construct or a single four-cortex 4.5-mm screw. A progressive external rotation force (from 2.5 Nm to 25 Nm) was then imposed on the repaired ankles in each group. Between each load, the diastasis interval was measured via Linear Variable Differential Transformer monitors placed 1 cm proximal to the tibial plafond.

Results:
The interval measurements demonstrated that there was a significantly greater widening of the syndesmosis in the FiberWire-button group during all external loading conditions (p < 0.0001). In contrast, the metallic screw group maintained the reduction up to 5 Nm. The investigators noted no implant failure in either group but nine of the ten pairs tested failed through a fibular fracture involving the drill hole. The metallic screw group failed at a slightly lower load than the FiberWire-Button group (15 Nm and 19 Nm, respectively; p =0.0004). This finding was clinically irrelevant since it was in the setting of loss of reduction.

Conclusions:
This cadaveric study showed that the FiberWire implant was unable to maintain syndesmotic reduction under external rotation stresses. For this reason, the authors recommend using screw fixation for syndesmotic repair in order to optimize patient’s recovery and functionality.