Comparison of Arthroscopic versus Open Suture Anchor Repair of the Lateral Ligament Ankle Complex: A Cadaver Study

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Disclosures

- My disclosure is in the Final AOFAS Program Book.
- I have a potential conflict with this presentation due to:
  - Dr. Eric Giza: Consultant for Arthrex, Zimmer, Inc.
Operative treatment of mechanical ankle instability is indicated for patients with multiple sprains and continued episodes of instability despite bracing and rehabilitation.

Open repair of the lateral ankle ligaments involves exposure of the attenuated ligaments and advancement back to their anatomic insertions on the fibula using bone tunnels or suture implants.

The objective of this study is to compare the biomechanical strength of open fixation to lateral ligament stabilization using a novel arthroscopic surgical technique.
Seven matched pairs of cadaver ankle specimens were used. One specimen from the pair underwent open fixation and the other specimen had arthroscopic lateral ligament stabilization performed.

The calcaneofibular ligament (CFL) and anterior talofibular ligament (ATFL) were detached from each origin on the fibula.

For the open repair technique, a #2 fiberwire suture was placed into the CFL and a separate suture into the ATFL in a running Krackow fashion with a total of two locking loops.

Suture anchors were utilized to reattach the ligaments to their anatomic insertions.¹
Methods

- For the arthroscopic lateral ligament stabilization group, identical suture anchors were used to repair the lateral ligament complex and inferior extensor retinaculum via an arthroscopic technique described by Acevedo and Mangone.²

- The ligaments were tested to failure. Torque to failure, degrees to failure, initial stiffness, and stiffness were measured. A matched pair analysis was performed.

- An a priori power analysis of 0.8 demonstrated that seven pairs needed to show a difference of 30% with a 15% standard error at a significance level of $\alpha=0.05$. 
Results

- The mean torque at failure was 18.3 Nm for the open group and 15.6 Nm for the arthroscopic group (p-value=0.47, Figure 1).

- Degrees to failure in the arthroscopic group was 38.4 degrees compared to 46.6 degrees in the open group (p-value=0.10, Figure 2).

- Initial stiffness in the arthroscopic group was 0.43 Nm/degree as compared to 0.30 Nm/degree in the open group (p-value=0.11, Figure 3).

- Stiffness was 0.57 Nm/degree in the arthroscopic group and 0.50 Nm/degree in the open repair group (p-value=0.71, Figure 4).

- There was no statistically significant difference between the arthroscopic and open repair groups for all measures in this study.
Results

Torque to Failure

- Figure 1. Torque to Failure: 95% Confidence Interval

Degrees to Failure

- Figure 2. Degrees to Failure: 95% Confidence Interval
Results

Figure 3. Initial Stiffness: 95% Confidence Interval

Figure 4. Stiffness: 95% Confidence Interval
Conclusions

- There is no statistical difference in the torque at failure and stiffness of a traditional open repair as compared to an arthroscopic anatomic repair of the lateral ligaments of the ankle.

- These results demonstrate that an arthroscopic technique can be considered for lateral ligament stabilization in patients with mild to moderate mechanical instability.
References

1) Giza, Eric; Lundeen, Gregg; Campanelli, Valentina; Sullivan, Martin. Ankle Instability Ligament Reconstruction With Immediate Weight-bearing. Techniques in Foot & Ankle Surgery. 10(3):100–104, September 2011.