Anatomic Suture Anchor vs the Broström Technique for Anterior Talofibular Ligament Repair: A Biomechanical Comparison

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Introduction
Suture anchor repair of the lateral ankle ligamentous complex is a technique modification of the original Broström procedure that has gained popularity over the past several years. The technique is simple in nature and well described, with excellent short to midterm patient outcomes now being reported. Despite its increasing popularity as a method for ankle ligament repair, there has been no biomechanical data reported on the use of suture anchors for ATFL repairs at the ankle. The purpose of our study was to perform a biomechanical comparison of the ultimate load to failure and stiffness of the traditional Broström technique using only a suture repair compared to both suture anchor repair of the ATFL. This data was then compared to the intact state to determine the mechanical properties of these repairs.

Methods
Twenty-four fresh-frozen cadaveric ankles were randomly divided into four groups of six specimens each. One group was an intact control group, with the other groups consisting of the traditional Broström and suture anchor modifications of the Broström procedure. The specimens were then loaded to failure to determine the strength and stiffness of each construct.

Results
In load-to-failure testing, the ultimate failure loads of the Broström (68.2 N ± 27.8 N; p = 0.013), suture anchor fibula (79.2 N ± 34.3 N; p = 0.037), and suture anchor talus (75.3 N ± 45.6; p = 0.027) repairs were significantly lower than that of the intact (160.9 N ± 72.2 N) ATFL group. Stiffness of the Broström (6.0 N/mm ± 2.5; p = 0.019), suture anchor fibula (6.8 N/mm ± 2.7 N; p = 0.047), and suture anchor talus (6.6 N/mm ± 4.0; p = 0.037) repairs, were significantly lower than that of the intact (12.4 N/mm ± 4.1 N/mm) ATFL group. The three repair groups were not significantly different from each other.
Conclusion
The use of suture anchors to repair the ATFL produces a repair that can withstand similar loads to failure as the suture only Broström repair. However, all three repair groups were much weaker than the intact, uninjured ATFL. This certainly leaves room for improvement in surgical reinforcement of the repair because it is evident that repairs rely heavily on the healing of the tissues to regain strength. In comparison to the gold standard, the suture anchor repairs produced consistent results while utilizing a simpler procedure. Biomechanically, the results validate using suture anchors as an alternative method to repair the ATFL in patients with lateral ankle instability. Depending on the clinical scenario, such as a fibular or talar avulsion of the ligament, the surgeon can utilize the suture anchor technique with confidence knowing that the repair is as strong as the traditional Broström procedure. Because of the simplicity of the technique, it is our belief that this technique can result in consistent repairs that produce predictable clinical and functional outcomes.