A Biomechanical Comparison of Three Methods to Repair Pectoralis Major Ruptures

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Background:
Pectoralis major ruptures are closely associated with weight lifting and participation in sports. The anatomy of the pectoralis major tendon is unique with an elongated thin footprint requiring multiple points of fixation to restore the native anatomy. Multiple options exist for tendon repairs, however the strongest construct has yet to be identified.

Purpose:
The intent of this study was to compare the load to failure of bone trough, cortical button, and suture anchor repairs of the pectoralis major tendon in the extended and abducted position

Methods:
Thirty fresh frozen cadaveric shoulders were divided equally into three groups based on the repair technique to be performed for each shoulder. Bone mineral density of the surgical neck of the proximal humerus was assessed prior to repair in order to assess the influence of osseous integrity on each technique. Bone trough, suture anchor, and cortical button repairs were performed after isolation and release of the pectoralis major tendon as dictated by computerized randomization. Finally, load to failure was performed on each specimen while observing the mode with which failure occurred.

Results:
The majority of failures occurred through the No. 2 fiberwire suture utilized for tendon repair. All failures in the cortical button and 9/10 failures for the bone trough group failed in this fashion. One specimen in the bone trough group failed via fracture of the proximal humerus. The suture anchor group failed evenly at the implant (5/9) and through the suture (4/9). Load to failure was greatest in bone trough repairs at 596 N, followed by cortical button at 494 N, and finally suture anchor repairs with 383 N. A statistically significant increase in load to failure was demonstrated in the bone trough group when compared to suture anchor repairs (p = 0.007). Bone mineral density was not shown to effect the load to failure of each construct.

Conclusions:
In this study, a superior load to failure was demonstrated when performing pectoralis major tendon repairs using a bone trough method over suture anchors for repair. The increased load to failure in the bone trough group may be due to a larger area of force transmission when compared to the cortical button and suture anchor repairs. Still, with the dissection required for adequate exposure to create a bone trough as well as the risk of fracture of the proximal humerus further studies are required to determine the clinical significance of these findings.