A BIOMECHANICAL COMPARISON OF REPAIR TECHNIQUES FOR TYPE II SLAP LESIONS

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Introduction: The treatment for superior labral anterior posterior (SLAP) lesions, particularly those involving complete detachment of the superior labrum and biceps tendon origin (Type II lesions), has continued to evolve. Though these lesions are often repaired using either suture anchors or bioabsorbable tissue tacks, no biomechanical comparisons have been reported. The purpose of this study was to determine if the initial strength of repair of Type II SLAP lesions is influenced by: (i) the orientation of suture placement through the labrum. (ii) the use of bioabsorbable tissue tacks to repair the lesion.

Materials and Methods: Twenty-one fresh frozen shoulder specimens (mean age 60 years, range 37-81 years) were stripped of all tissue excluding the long head of the biceps tendon and glenoid labrum. Identical type II SLAP lesions were created in all specimens. Specimens were randomized to three groups based on repair technique: Group 1: Simple Suture, two 3.5mm Corkscrew anchors (Arthrex, Naples, FL) were utilized, each threaded with a single #2 braided polyester suture. A single strand of suture was passed through the labrum and tied using half-hitch sliding knots to the second suture strand over a bridge of labral tissue. Group 2: Mattress Suture, two suture anchors, identical to those placed in group 1, were utilized. Both suture strands were passed through the labrum and tied with half-hitch sliding knots. A 5mm tissue bridge was maintained between suture strands in all specimens. Group 3: Tissue Tacks, two Suretac II tissue tacks (Acufex Microsurgical, Mansfield, MA) were utilized to perform the repair.

Each specimen was mounted on a servo hydraulic testing machine (MTS Corp, MN). Cyclic longitudinal traction was applied to the biceps tendon in 10N increments at an angle 90º perpendicular to the glenoid surface. The loading procedure was compiled when soft tissue or implant failure occurred or when a peak load of 200N was obtained. During loading glenolabral separation was measured with an infrared optical measurement system that recorded the 3-dimensional relationship of markers placed on the superior labrum, biceps tendon, and glenoid surface respectively (Figure 1). The stiffness of all individual specimens was measured during the loading cycle in order to determine if there were significant differences in tissue quality between the three tests groups.

Results: The average stiffness of all repairs was 75±5N/mm (range 34-124N/mm). There was no significant difference between the stiffness of the three groups of repairs (p > 0.05). Repair failure, defined by 2mm permanent glenolabral separation, occurred at an average load of 111±8N (range 45-129N) at (Figure 2). The average tensile load of the simple suture group was 11% greater than the mattress suture group (p = 0.65). The average tensile load of the tissue tack group was 12% less than the simple suture group (p = 0.17) and 17% less than the mattress suture group (p = 0.34). In all specimens tested, repair failure was localized under the origin of the biceps tendon, between the suture anchors or tissue tacks (Figure 3).

Discussion and Conclusions: The present study is the first biomechanical comparison between repair techniques for Type II SLAP lesions. No statistically significant differences were observed between the three groups with regards to the tensile load at repair failure or ultimate failure. Based on their average repair and ultimate failure loads, Type II SLAP lesions repaired with any of these three techniques would be able to tolerate low to moderate levels of biceps loading in the initial postoperative period. With optimal placement, the suture anchors and tissue tacks utilized in this study withstood tensile loads in excess of those estimated to maximally occur at the biceps origin without dislodging from the glenoid.

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48th Annual Meeting of the Orthopaedic Research Society
Poster No: 0834