GLENOHUMERAL TRANSLATION FOLLOWING OPEN VERSUS ARTHROSCOPIC BANKART REPAIR: IS CAPSULAR Plication NECESSARY?

INTRODUCTION: Open techniques for repair of the Bankart lesion have yielded excellent results. Recently, arthroscopic fixation has gained popularity but has not produced similar results. A possible explanation is that residual capsular laxity following arthroscopic repair cannot be addressed. The purpose of this study was to use a novel, dynamic shoulder dislocation model to compare glenohumeral translation (GHT) following open (O) versus arthroscopic (A) Bankart repairs.

METHODS:
Cadaveric Specimen and Preparation
Five matched-pairs of cadaveric shoulders were used. Each specimen was 71 years. All soft tissues were removed, except for the capsule, labrum, and tendons of the rotator cuff and the deltoid. The shaft was potted in PVC piping then mounted onto the horizontal abducting mechanism of the dynamic shoulder testing system. For all shoulders, the joint capsule was vented. The glenoid was positioned parallel to the medial border of a custom, aluminum scapula box and fixed. The scapula was then fixed to a six axes load cell (Assurance Technologies, Garner, NC) and the dynamic shoulder testing system. The tendons of the rotator cuff and the deltoid then were clamped to a pulley and cable system used to simulate the action of these muscles. All shoulders were then dislocated in the anterior inferior direction. The dislocation model consistently produced anterior inferior shoulder dislocation for all shoulders. The five shoulder pairs that produced Bankart lesions were then randomly assigned to the open and arthroscopic groups.

Surgical Repairs
The match-paired shoulders were randomly assigned to “open” and “arthroscopic” repair groups. Open repairs- the anterior capsule was “T ed” to midway of the glenoid. The pathology was identified and a Bankart repair was performed using three metal anchors and #2 braided, non-absorbable suture. The anchors were placed at 2, 3:30, and 5 o’clock for a right shoulder and 10, 8:30, and 7 o’clock for a left shoulder. The capsule was then repaired using 0-Ethibond suture without plication of the capsule.

arthroscopic repairs- a 4.5 mm arthroscope was introduced from a standard posterior portal. An 8 mm clear cannula was introduced through an anterior-inferior portal. A standard anterosuperior portal was not used since the rotator interval provided access to the joint. The anchors were introduced through the anteroinferior portal and placed per manufacturer recommendations. One limb of the suture was brought out the anteroinferior portal and stabbed through the labrum. The prolene suture was brought out the interval, the suture limb was placed through the loop of the prolene suture, and brought back out the anteroinferior portal. This suture limb (which went through the labrum) was used as the post. Three half-hitch stitches were placed in the same direction, followed by two locking half-hitch stitches in the opposite direction, and advanced through the cannula with a knot pusher after each stitch. Suture tightening was confirmed arthroscopically after each stitch.

Translation Testing
A joint compressive force of 22 Newtons was applied to center of the humeral head in the center of the glenoid, while the shaft was placed perpendicular to the glenoid surface. Anterior and posterior loads of 10, 20, and 30 Newtons were used to translate the humerus. Five points were marked with elastin dye on the humerus and their positions were recorded with a three-dimensional digitizing device (Microscribe 3DLX, Northampton, MA).

Statistical Analysis
Comparisons were made using ANOVA with a significance level of 0.05.

RESULTS:
Open Group
With a 30 N force, the average anteroposterior displacement in the intact specimen was 13.25 ± 4.64mm. The average anteroposterior displacement after the first, second, and third dislocations were 20.59 ± 4.47mm, 22.44 ± 4.85mm, 23.64 ± 4.68 mm, respectively. There was a statistically significant increase in anteroposterior displacement in the specimen after the third dislocation compared to the intact state (P= 0.05). Although there was a trend towards increases in the average anteroposterior displacement after the first (P= 0.11) and second (P=0.06) dislocation compared to the intact state, there was no statistically significant difference. After the repair, the average anteroposterior displacement was 13.22 ± 3.75mm. There was no statistically significant difference between the intact and the repaired state (P=1.00). The average anteroposterior displacement after redislocation following repair, was 24.48 ± 5.05 mm, which was statistically significant increase in glenohumeral translation compared to the intact state (P=0.03).

Arthroscopic Group (Figure 5)
With a 30 N force, the average anteroposterior displacement in the intact specimen was 18.61 ± 3.55mm. There was no statistically significant difference of the average anteroposterior displacement in the intact specimen between the open and arthroscopic groups (P= 0.39). The average anteroposterior displacement after the first, second, and third dislocations were 25.69 ± 4.89mm, 27.18 ± 5.07mm, 25.89 ± 4.34 mm, respectively. Although there was a trend towards increases in the average anteroposterior displacement after the first (P=0.11) and second (P=0.06) dislocation, there was no statistically significant difference. After the repair, the average anteroposterior displacement was 17.40 ± 3.71mm. There was no statistically significant difference between the intact and the repaired state (P=0.82). The average anteroposterior displacement after redislocation following repair, was 27.85 ± 4.74 mm. There was a statistically significant increase in anteroposterior displacement in the specimen after the third dislocation compared to the intact state (P= 0.05).

DISCUSSION: There was no residual capsular laxity following repair in either group. GHT was restored to the intact state in both groups. This implies that for open repairs, plication of the capsule may over tighten the capsule, leading to loss of motion and possible arthrosis in the long term; while in arthroscopic repairs, capsular plication may not have to be performed.

*+Mirzayan, R; *Tibone, JE; ** Yang, B, *Matzkin, E; ** Lee, TQ
+Kerlan-Jobe Orthopaedic Clinic, Los Angeles, CA
**Orthopaedic Biomechanics Laboratory, VA Healthcare System, Long Beach, CA

49th Annual Meeting of the Orthopaedic Research Society Poster #1175