Arthroscopic Bankart Repair Alone is Associated with High Rates of Recurrent Instability in Patients with Hyperlaxity and On-Track Lesions

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INTRODUCTION:
Recurrent anterior shoulder instability after arthroscopic Bankart repair presents a challenging clinical problem, with the primary stabilization procedure often portending the best chance for clinical success. While the glenoid track concept continues to evolve, a limitation of the glenoid track is that it relies on bony anatomy without specific considerations for capsuloligamentous integrity or the effect that capsular laxity may have on the glenohumeral contact points throughout shoulder range of motion. The purpose of our study was to determine if capsuloligamentous laxity has a modifying effect on the glenoid track, specifically for on-track lesions with a small distance to dislocation (DTD) from being an off-track lesion, or the so-called "near-track" lesion. This may explain why some on-track lesions are at an increased risk of recurrent instability. We hypothesized that patients with ligamentous laxity and "near track" lesions would be at increased risk of recurrent instability following arthroscopic Bankart repair.
METHODS:
Consecutive patients with on-track Hill-Sachs lesions who underwent primary arthroscopic Bankart repair without remplissage for recurrent anterior glenohumeral instability between January 2007 and December 2015 at a single institution were retrospectively reviewed. Patients with glenoid bone loss > 20%, off-track lesions, concomitant remplissage, concomitant rotator cuff tear, or atraumatic instability were excluded. Determination of shoulder laxity was based on exam under anesthesia (EUA), including anterior load and shift, posterior load and shift, and sulcus testing at the time of surgery before arthroscopy. Capsuloligamentous shoulder hyperlaxity was defined as external rotation of >85^{o} and/or grade 2+ or greater load and shift in two or more planes. Measurements of glenoid bone loss, Hill-Sachs interval (HSI), and glenoid track (GT) were performed based on prior described methods. DTD was calculated (DTD=GT-HSI, with DTD$\geq$8 classified as on-track lesions and DTD<8 as near-track lesions). Failure was defined as recurrent dislocation and/or subluxation.
RESULTS:
A total of 173 patients were initially identified, of which 146 met inclusion criteria and were included for analysis. Mean age was 19.9 ± 5.7 years and mean DTD was 15.5 ± 5.7mm. 73.6% of patients were males, 71.4% were contact athletes, and 57.9% had multiple preoperative instability events. Patients were divided into two groups based on shoulder laxity; group 1 consisted of 21 patients with hyperlaxity, and group 2 consisted of 125 patients without hyperlaxity. Overall, 26 patients (17.8%) sustained a recurrent dislocation and 15 patients (10.3%) experienced recurrent subluxations, combining for an overall failure rate of 28.1%. Multivariate analysis revealed independent predictors of recurrent instability to be age < 20 years (p=0.033), smaller DTD (p=0.041), greater than 1 instability episode preoperatively (p=0.016), and capsuloligamentous hyperlaxity (p<0.001), *Table 1*. Compared to patients without hyperlaxity, patients who met shoulder hyperlaxity criteria had a recurrent instability rate roughly five-times greater (HR: 4.65, 95%CI: 2.04 – 10.6, p < 0.001), *Figure 1,* with more frequent instability episodes (*incidence rate*: 0.50 per person-years) than patients without hyperlaxity (*incidence rate*: 0.13 per person-years). Young patients with near-track lesions and hyperlaxity had higher failure rates than those without hyperlaxity, although this did not reach statistical significance (66.7% vs 0.0%, p=0.14).
DISCUSSION AND CONCLUSION:
Capsuloligamentous shoulder laxity is a significant independent risk factor for failure after arthroscopic Bankart repair alone. While the modifying effect of hyperlaxity on the glenoid track did not reach statistical significance, this is likely due to a small number of near-track lesions found in our study population, and our results suggest that hyperlaxity may increase the risk of failure in younger patients with a small DTD (near-track lesion). As our understanding of the glenoid track continues to evolve, surgeons may need to consider the track concept as a continuum with evolving surgical algorithms other than an arthroscopic Bankart alone in younger patients with near track lesions and hyperlaxity.

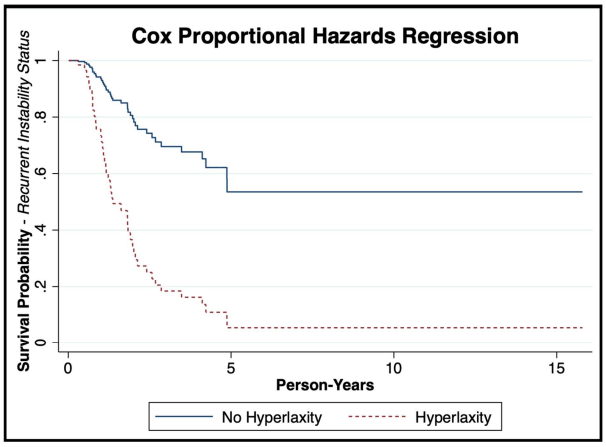

Figure 1 - Illustrates the survival function curve across person-years, derived from cox proportional hazards regression according to Capsuloligamentous hyperlaxity status. Failure was defined as recurrent episodes of shoulder dislocation and/or subluxation.

Table 1 – Multivariate Predictors of Failure After Arthroscopic Bankart Repair

Predictor Variables	**Hazard Ratio**	**95% CI**	**P Value**
Age (yrs)	0.90	(0.81 – 0.99)	0.033
DTD, per millimeter	0.95	(0.90 – 0.99)	0.04
Multiple Prior Instability Episodes	2.96	(1.22 – 7.19)	0.016
Capsuloligamentous Hyperlaxity	4.66	(2.04 – 10.62)	<0.001