Capsuloligamentous laxity is a significant independent risk factor for failure after arthroscopic Bankart repair, and hyperlaxity may increase the failure risk in younger patients with a small distance to dislocation.  

Data:  
INTRODUCTION Recurrent anterior shoulder instability after arthroscopic Bankart repair presents a challenging clinical problem, with the primary stabi- 

lization procedure often portending the best chance for clinical success. The purpose of the 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 pa- 

tients who underwent primary arthroscopic Bankart repair for recurrent anterior glenohumeral instability with at least 2-year follow-up at a single institution between 2007-2019 were retrospectively reviewed. Patients with glenoid bone loss > 20%, off-track lesions, concomitant remplissage, or rotator cuff tear were excluded. Capsuloligamentous laxity, or hyperlaxity, was defined as external rotation >85 degrees and/or grade 2+ or greater load-and-shift in two or more planes. RESULTS 173 consecutive patients with mean age of 20.5 years and mean DTD of 16.2 were included for analysis. 16.8% sustained a recurrent dislocation and 6.4% had recurrent subluxations (defined as any subjective complaint of recurrent instability without frank dislocation), with an overall recurrent insta- 

bility rate of 23.1%. The rate of revision stabilization was 15.6%. Mean time to follow-up was 7.4 years. Independent predictors of recurrent instability were younger age (p = 0.001), smaller DTD (p = 0.021), >1 instability episode pre-op (p = 0.001), and presence of hyperlaxity on EUA (p = 0.013). Among patients with near-track lesions, those with hyperlaxity had a recurrent instability rate almost double those without hyperlaxity (OR 34.1, p = 0.036). The increased rate of failure and recurrent dislocation in the near-track hyperlaxity cohort remained elevated, even in patients with no bone loss. DISCUSSION Capsu- 

loligamentous laxity is a strong independent risk factor for failure after arthroscopic Bankart repair alone and is an even greater risk factor in patients with a small DTD. As our understanding of the glenoid track continues to evolve, sur- 

geons may need to consider the track concept as a continuum and consider surgical algorithms other than an arthroscopic Bankart alone in patients with near-track lesions and hyperlaxity at time of surgery.  

Category: Shoulder - Instability  
Remplissage Reduces Recurrent Instability In High-Risk Patients With “On-Track” Hill-Sachs Lesions  
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Summary:  
There is benefit in performing remplissage for patients with ‘near-track’ lesions and all contact athletes with Hill-Sachs lesions.  
Data:  
Introduction: Recent studies have shown that “on-track” shoulders with a small distance to dislocation (DTD) have high rates of recurrent instability following arthroscopic labral repair (ALR). The purpose of this study was to compare recurrent instability rates and patient reported outcomes (PROs) between pa- 

tients with “on-track” Hill-Sachs lesions who underwent ALR alone versus pa- 

tients who had received ALR with remplissage (ALR + R). Our hypothesis was that performing a remplissage in addition to ALR would decrease the rate of recurrent instability, especially among high-risk subjects such as contact athletes. Methods: We performed a retrospective analysis of patients age 12-40 years old with “on-track” shoulders who underwent ALR + R between Jan 2014 and Dec 2019 at a single institution, with minimum 2-year follow-up. Exclusion criteria included: prior ipsilateral shoulder surgery, >20% glenoid bone loss (GBL), “off- 

track” Hill-Sachs lesion, concomitant rotator cuff repair, and connective-tissue disorder. We then identified a cohort of patients meeting the same inclusion and exclusion criteria who had undergone ALR alone. Patient age, gender, follow-up time, first-time dislocation vs. multiple dislocations, and contact sport partici- 

pation were recorded. GBL, Hills-Sachs Interval (SHI), glenoid track (GT), and DTD were measured from pre-operative MRIs. Western Ontario Shoulder Insta- 

bility Index (WOSI), Single Assessment Numeric Evaluation (SANE) scores, and recurrent dislocation/revision surgery status was also collected. Subgroup an- 

alysis was performed on “high-risk” patients (DTD <10mm and contact sport participation) from each cohort. Results: The ALR + R cohort had 17 subjects and the ALR cohort had 51 subjects. There were no differences in demographic variables or GBL between cohorts (P > 0.05). The ALR + R subjects had larger HSI (14.7mm ± 2.4 vs 5.7mm ± 5.0, P < 0.001) and smaller DTD (8.2mm ± 3.2 vs 16.2mm ± 5.7, P < 0.001). There were no difference in WOSI (304.2 ± 213 vs 302.4mm ± 344.2; P = 0.98) or SANE (84.3 ± 16.6 vs 87.3 ± 8.9, P = 0.94) scores between groups. Only 1 (5.9%) subject in the ALR + R cohort had a recurrent subluxation, and there were no dislocations or revision surgeries. The ALR cohort had 7 (13.7%) recurrent dislocations, 3 (5.8%) recurrent subluxations, and 6 (11.8%) revision surgeries. Univariate analysis showed that smaller DTD was predictive of recurrent instability (OR 0.88; 95% CI (0.77 – 0.99); P = 0.037). Multivariate analysis indicated that smaller DTD (OR: 0.71; 95% CI (0.56 – 0.87); P = 0.001) and contact sport participation (OR 8.67; 95% CI (1.19 – 63.35); P = 0.033) were associated with increased risk of recurrent instability. After adjusting for contact sport participation and DTD value, the ALR + R cohort had a 98.8% lower risk of recurrent instability compared to the ALR cohort (OR 0.012; 95% CI (0.0001 – 0.22); P = 0.003). Among “high-risk” subjects, there was only 1 (11.1%) instability event in the ALR + R group and 4 (80%) in the ALR alone group (P = 0.023). Conclusion: DTD calculations can be used as an independent predictor of recurrent shoulder dislocation following ALR for treatment of anterior shoulder instability. For patients with “on-track” shoulder lesions, but small DTD measurements (“near-track” lesions), remplissage is protective against recurrent instability events and need for revision surgery. This may be especially true for “high-risk” patients, such as those who participate in contact sports.  

Category: Shoulder - Instability  
The Natural History of Nonoperative Treatment of Posterior Instability In A High Demand Population  
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Summary:  
In patients that underwent a minimum of 6-months of nonoperative management for isolated posterior glenohumeral instability, failure occurred approximately 47% of the time and was associated with a greater posterior humeral head subluxation, less posterior acromial coverage, greater posterior acromial height, and greater amounts of glenoid retroversion on index MRI than those who did not fail.  
Data:  
Background: Nonoperative management of posterior shoulder instability is common, however there is limited data available to assess the pathomorphologic factors associated with failure of nonoperative treatment. Having a better un- 

derstanding of the natural history of posterior glenohumeral instability as well as insight into specific morphology that is associated with poor survivorship of nonoperative management can play a key role in patient counseling and guide management. Purpose: The purpose of this study is to determine what, if any, glenohumeral pathomorphology may predispose patients to fail nonoperative management. Study Design: Retrospective Cohort Study Methods: We conducted a retrospective review of a consecutive series of patient with isolated posterior shoulder instability, defined as isolated posterior labral tear on MRI with cor- 

responding physical exam findings (Kim and Jerk tests), had undergone nonop- 

erative management for a period of 6 months and did not have any past surgical history with respect to the affected shoulder. Our primary outcome was risk factors for failure of non-operative management including posterior glenoid bone
loss (gGBL), glenoid version, acromial morphology and posterior humeral head subluxation. Cox proportional hazard analysis was used to evaluate risk factors for failure. Results: 42/90 (46.7%) patients failed a 6-month trial of nonoperative management and went onto receive an arthroscopic stabilization procedure. The failure group demonstrated a significantly greater humeral head subluxation ratio than the cohort of patients who survived nonoperative management (0.65 +/- 0.2 vs 0.62 +/- 0.2; p = 0.0375). Cox proportional hazard analysis identified glenoid bone loss, greater posterior acromial height, less posterior acromial coverage, and posterior humeral subluxation as significant risk factors for failure of nonoperative management. Of those who failed nonoperative management 17 had repeat MRI’s for comparison, demonstrating a statistically significant progression of gGBL (index MRI 2.68% +/- 1.71 verses after nonoperative treatment 6.54% +/- 1.59; p= 0.00274). Conclusion: In patients that underwent 6-months of nonoperative management for isolated posterior glenohumeral instability, failure occurred approximately 47% of the time and was associated with a greater posterior humeral head subluxation, less posterior acromial coverage, greater posterior acromial height, and greater amounts of glenoid retroversion on index MRI than those who did not fail. Additionally, those who had repeat MRI on average 1.3 years later demonstrated greater glenoid bone loss when compared to the index MRI. The findings of this study suggest that a trial of nonoperative management as first line treatment for all isolated posterior instability patients might not be as conservative or risk free as once thought.

Category: Shoulders - Instability

Glenoid Concavity Affects Anterior Shoulder Stability In A Biomechanical Model Including Soft Tissue and The Rotator Cuff’s Compressing Forces

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Summary: In our biomechanical shoulder model, including soft tissue and muscle forces, the glenoid concavity correlated with shoulder stability and with that should be considered in the individualized therapy of glenoid defects.

Data: The therapy of anterior shoulder instability in the presence of bony glenoid defects usually depends on the defect size, which is considered the main indicator of instability. Recent studies, based on computed tomography and simplified bony biomechanical models, revealed the glenoid concavity to be relevant for shoulder stability as well. However, the concavity’s effect in the presence of soft tissue and muscular forces, which are included in this study, is still unknown. We hypothesized, that the glenoid concavity would have a major impact on stability in a shoulder model including soft tissue surroundings and glenohumeral compression forces, exerted by the rotator cuff. In n = 8 human shoulder specimens, glenoid depth and concavity was measured and individual coordinate systems were calculated based on anatomical landmarks. Static load was applied to the rotator cuff’s tendons, the deltoid muscle and the biceps long head tendon. In a robotic test setup, an anteriorly directed force was applied to the humeral head until its translation of 5 mm. This was performed in native joints, as well as in joints with Bankart lesions and glenoid bone defects of 10% and 20%. Depending on their concavity, the specimens were divided into two subgroups (low vs. high concavity with n=4, respectively). A high correlation between native glenoid concavity and stability could be shown (R²=0.79). For each level of defect, we found a significantly higher stability in joints with high concavity compared to the low concavity subgroup (p=0.027). In bony defects of 20% the loss of stability correlated with the initial concavity (R²=0.89), as we could see a higher loss of stability in initially high concavity joints compared to lower concavity (p=0.004). In a test setup including soft tissue and muscle forces, the glenoid concavity correlates with shoulder stability. In bony defects, loss of concavity has a severe impact on instability. Thus, glenoid concavity should be considered in a differentiated, individualized therapy of bony glenoid defects.