**Clinical Grading of Hill-Sachs Injuries: Association with Glenoid Bone Loss and Clinical Application of the "Glenoid Track" Concept in Terms of Humeral Head Engagement (SS-13)** *Brian Barlow, M.D., MC USN, Paul Metzger, M.D., MC USN, William Peace, M.D., Dominic Leonardelli, M.D., MC USN, Daniel Solomon, M.D., MC USNR, Matthew T. Provencher, M.D., MC USN*

**Introduction:** The purposes of this study were to correlate the amount of glenoid bone loss with the extent of Hill-Sachs injury and clinically verify the "glenoid track" concept. In addition, we sought to investigate correlation across multiple Hill-Sachs grading scores with demographic variables such as time of instability and number of dislocations/instability events, and determine the mean values of Hill-Sachs size across multiple scoring systems.

**Methods:** A total of 205 patients treated for recurrent shoulder instability over a two-year period were reviewed. Of these shoulders 173 (80.8%) had an adequate shoulder MRI/MRA for evaluation. A total of 140 of these patients had a Hill-Sachs lesion and were included in the final radiographic analysis and grading of lesions with a mean age of 27.6 (SD 6.9), mean length of instability of 43.4 months (SD 58.7), and a mean of 7.2 dislocations (SD 16.9). Hill-Sachs lesions were quantified radiographically based on the Rowe Grade, the Flatow percentage of articular cartilage involved, the Franceschi Grade (cartilaginous, bony scuffing, hatchet fracture), the Richards and Hall degrees of lesion involvement on axial cuts, and the percentage of articular cartilage involvement on sagittal oblique images. The "glenoid track" was measured and if the size of the humeral head lesion and glenoid bone loss large enough (84% relative to each other), then the humeral head was said to be outside the "glenoid track" and at high risk for engaging and this number (percent) of patients recorded.

**Results:** The mean Rowe length was 19.1 (SD 3.2) mm and depth was 5.1 mm (SD 2.0); mean Richards arc was 7.1 degrees (SD 4.2); mean Franceschi score was 1.9 (SD 0.8); and mean glenoid bone loss was 7.6%. A total of 22 (15.7%) patients were determined to be outside the "glenoid track" and at higher risk of humeral-glenoid engagement. From regression analysis, patient age and number of dislocations were jointly predictive of being outside the "glenoid track" ($p = 0.015$), number of dislocations was predictive of glenoid bone loss ($p = 0.01$) and number of dislocations was predictive of percentage of articular cartilage involvement on sagittal oblique MRI ($p = 0.015$). More dislocations also correlated with larger Hill-Sachs lesions as well as larger extent of combined glenoid and humeral bone loss ($p<0.015$).

**Conclusion:** Hill-Sachs injuries are common in shoulder instability, and one should look closely at the extent of glenoid bone loss in addition to the size of Hill-Sachs lesion in order to assess more completely the potential for glenohumeral engagement. In this cohort, approximately 15% of the instability patients with a Hill-Sachs injury were felt to be at increased risk of glenohumeral engagement with bone loss outside the "glenoid track". In addition, we determined that there is an association with the "glenoid track" in regards to age and number of dislocations, which indicate that this classification system may have prognostic and therapeutic value. However, no significant association was found between key patient variables such as age, length of instability or number of dislocations and any of the other classification systems.

**Arthroscopic Remplissage with Bankart Repair for the Treatment of Glenohumeral Instability with Hill Sachs Defects (SS-14)** *Min Jung Park, M.D., MMSc, Grant Garcia, B.A., Amit Patel, M.D., Fotios P. Tjoumakaris, M.D., John D. Kelly IV, M.D.*

**Introduction:** The treatment of recurrent anterior glenohumeral instability is complicated when there are bony defects present on either the humeral or glenoid side. Several studies have documented poor outcomes with arthroscopic Bankart repair when sizable defects are encountered at arthroscopy. The following investigation seeks to determine whether Arthroscopic Remplissage with Bankart repair is an effective treatment strategy for patients with both glenoid bone loss and engaging Hill Sachs defects.

**Methods:** Between 2005 and 2008, 23 patients underwent Arthroscopic Bankart Repair with Remplissage for the treatment of recurrent anterior glenohumeral instability and large Hill Sachs defects. At arthroscopy all patients were found to have both erosion of the anterior glenoid and an associated engaging Hill Sachs defect. Patients were followed post-operatively with the Western Ontario Shoulder Instability Score (WOSI), the American Shoulder and Elbow Society Score, and the PENN Shoulder Score. Recurrent subluxation or dislocation was documented.

**Results:** Of 23 patients, 18 were male and 5 were female. The average age of the patients was 24.4 years. The average length of follow-up in this series was 24.4 months. At final follow-up, only 1 patient reported a recurrence of instability and this was documented as a dislocation requiring closed reduction. The average

ASES score was 82.4/100 (Pain 46.4; Function 36.1). The average PENN score was 90.1/100 (Pain 27.3/30; Satisfaction 8.7/10; Function 54.1/60). The average total WOSI score was 514 (75%); physical symptom score was 206.5; work/sports score was 109; lifestyle score was 84; emotional score was 114.5.

**Conclusion:** Arthroscopic Remplissage with Bankart Repair was successful at restoring stability in the majority of patients with recurrent glenohumeral instability with large Hill Sachs lesions. This all arthroscopic technique yielded excellent patient satisfaction and compared favorably to historic results for patients with bone lesions.

**Iliac Crest Allograft for Glenoid Deficiency in Recurrent Shoulder Instability in Athletes (SS-15)** *Randy Mascarenhas, M.D., Eden Raleigh, M.B.B.S., F.R.A.C.S., Sheila McRae, M.Sc., Jeff Leiter, M.Sc., Ph.D., Peter B. MacDonald, M.D., F.R.C.S.C.*

**Introduction:** Performing a labral repair alone in patients with recurrent anterior instability and a large glenoid defect has led to poor outcomes. We present a technique involving the use of iliac crest allograft inserted into the glenoid defect in athletes with recurrent anterior shoulder instability and large bony defects of the glenoid (>25% of glenoid diameter). We hypothesized that restoring a near-normal glenoid structure would prevent further dislocations and that osseous union would be achieved

**Methods:** All athletes with recurrent anterior shoulder instability and a large glenoid defect who underwent open anterior shoulder stabilization and glenoid reconstruction with iliac crest allograft were prospectively followed over a three year period. Pre-operatively, a detailed history and physical exam was obtained along with radiographs, a CT scan, and magnetic resonance imaging of the affected shoulder. All patients also complete the Simple Shoulder Test (SST) and American Shoulder and Elbow Surgeons (ASES) evaluation forms pre- and post-operatively. A CT scan was again obtained 6 months post-operatively to assess osseous union of the graft, and the patient again when through a physical exam in addition to completing the SST, ASES, and Western Ontario Shoulder Instability Index (WOSI) forms.

**Results:** Nine patients (all male) were followed for an average of 16 months (4 – 36 months) and had a mean age of 24.4 years. All patients exhibited a negative apprehension/relocation test and full shoulder strength at final follow-up. Eight of nine patients had achieved osseous union at six months (88.9%). ASES scores improved from 64.3 to 96.7, and SST scores improved from 66.7 to 100. Average post-operative WOSI scores were 94%.

**Conclusion:** The use of iliac crest allograft provides a safe and clinically useful alternative compared to previously described procedures for recurrent shoulder instability in the face of glenoid deficiency.

**Arthroscopic Revision Stabilization for Anterior Instability (SS-16)** *Mark Morishige, M.D., Larry D. Field, M.D., Felix H. Savoie III, M.D., J. Randall Ramsey, M.D., E. Rhett Hobgood, M.D.*

**Introduction:** Anterior instability of the shoulder has historically been treated with open surgical stabilization. Arthroscopic treatment for instability has become increasingly popular. With advances and understanding of the pathology and improved arthroscopic techniques and instrumentation, primary arthroscopic repair of anterior shoulder instability has proven successful. Nevertheless, failures following arthroscopic stabilization do occur. The purpose of this study is to evaluate the effectiveness of arthroscopic techniques for patients requiring revision anterior stabilization.

**Methods:** A retrospective review of 38 consecutive patients with failure of anterior shoulder stabilization was performed. Failure was defined by recurrent dislocations or subluxation following either an open or arthroscopic index surgical procedure. The only exclusion factor was the presence of extensive bone loss on the glenoid. All patients underwent arthroscopic revision stabilization procedures, which included extensive release of the labral ligamentous tissue and superior shift with an average of 4.2 suture anchors (3 to 6) with or without supplemental arthroscopic capsulorrhaphy. Rotator interval closure was also routinely performed. The patient then followed a standardized rehabilitation protocol.

**Results:** Follow-up averaged 36 months (24 to 46 months). Return to previous activity level and rate of failure were evaluated as defined by motion, function, and any recurrent instability episodes. Of the 38 revision stabilizations evaluated, all had significant improvement in their post injury activity level using UCLA and Rowe scores ($p<.05$), but 3 of 38 patients developed recurrent instability after revision surgery for an overall success rate of 92%.

**Conclusion:** This study demonstrates that revision arthroscopic anterior stabilization using modern techniques can yield reliably successful outcomes.

**Arthroscopic Revision Bankart Repair: A Preliminary Report (SS-17)** *Richard K. N. Ryu, M.D., Jessica H. Ryu, A.B.*