Inferior Hill-Sachs Extension Associated with Recurrent Instability Following Arthroscopic Bankart Repair

AANA ePoster 21

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Disclosures

No relevant conflicts

Problem

1 out of 4 primary arthroscopic stabilizations fail.

Arthroscopy. 2023 Mar;39(3):682-688. doi: 10.1016/j.arthro.2022.10.012. Epub 2022 Dec 7.

Increased Failure Rates After Arthroscopic Bankart Repair After Second Dislocation Compared to Primary Dislocation With Comparable Clinical Outcomes

Michael A Fox [1], Nicholas P Drain [2], Ajinkya Rai [2], Aaron Zheng [3], Noel B Carlos [3], Rafael Serrano Riera [2], Soheil Sabzevari [2], Jonathan D Hughes [2], Adam Popchak [4], Mark W Rodosky [2], Bryson P Lesniak [2], Albert Lin [2]

Fix after 1st dislocation = 14.2% fail

Fix after 2nd dislocation = **42.8% fail**

Solution

Open capsular shift?

J Shoulder Elbow Surg. 2022 Feb;31(2):359-366. doi: 10.1016/j.jse.2021.07.021. Epub 2021 Aug 25.

Long-term outcomes of open modified inferior capsular shift for traumatic anterior shoulder instability: over 20 years of follow-up

Naoki Takatori [1], Yoshiyasu Uchiyama [2], Takeshi Imai [2], Masahiko Watanabe [2]

10.5% recurrence

88.4% RTS

Remplissage?

Comparative Study J Arthroscopy. 2021 Feb;37(2):706-717. doi: 10.1016/j.arthro.2020.08.033. Epub 2020 Sep 7.

Arthroscopic Bankart Repair With Remplissage in Comparison to Bone Block Augmentation for Anterior Shoulder Instability With Bipolar Bone Loss: A Systematic Review

Kyle Gouveia [1], Syed Kumail Abidi [2], Saif Shamshoon [3], Chetan Gohal [4], Kim Madden [4], Ryan M Degen [5], Timothy Leroux [6], Bashar Alolabi [4], Moin Khan [7]

0-15% recurrence

How do we stratify?

Table IV. Instability severity index score is based on a pre-operative questionnaire, clinical examination, and radiographs

Prognostic factors	Points
Age at surgery (yrs)	
≤ 20	2
> 20	0
Degree of sport participation (pre-operative)	
Competitive	2
Recreational or none	0
Type of sport (pre-operative)	
Contact or forced overhead	1
Other	0
Shoulder hyperlaxity	
Shoulder hyperlaxity (anterior or inferior)	1
Normal laxity	0
Hill-Sachs on AP* radiograph	
Visible in external rotation	2
Not visible in external rotation	0
Glenoid loss of contour on AP radiograph	
Loss of contour	2
No lesion	0
Total (points)	10

* AP, anteroposterior

F. BALG, P. BOILEAU

J Bone Joint Surg [Br] 2007;89-B:1470-7.
Received 27 November 2006; Accepted after revision 22 May 2007

Table 2. Non-bone Loss Factors Were the Same in ISIS and GTIMS

GTIMS Prognostic Factors	Score
Age at surgery (years)	
≤ 20	2
> 20	0
Type of sport	
Contact or forced overhead	1
Other	0
Level of competition in sport	
Competitive	2
Recreational or none	0
Shoulder hyperlaxity	
Confirmed anterior or inferior hyperlaxity	1
Normal laxity	0
Evaluation of bone loss on 3D CT	
"On-Track"	0
"Off-Track"	4
Total GTIMS	10

NOTE.Bone loss was evaluated on 3D reconstructed shoulder CT scans and categorized as "on-track" or "off-track" in GTIMS.
3D, Three-dimensional; CT, computed tomography; GTIMS, Glenoid Track Instability Management Score.

0749-8063/18639/$36.00
https://doi.org/10.1016/j.arthro.2019.07.020

No one seem to use these…

We think there are 2 solutions.

Think **simple** → look again at bone loss

Think **complex** → Machine learning

Think **Simple**: bone loss is **bipolar**

We should pay as much attention to **humeral bone loss** as we do glenoid.

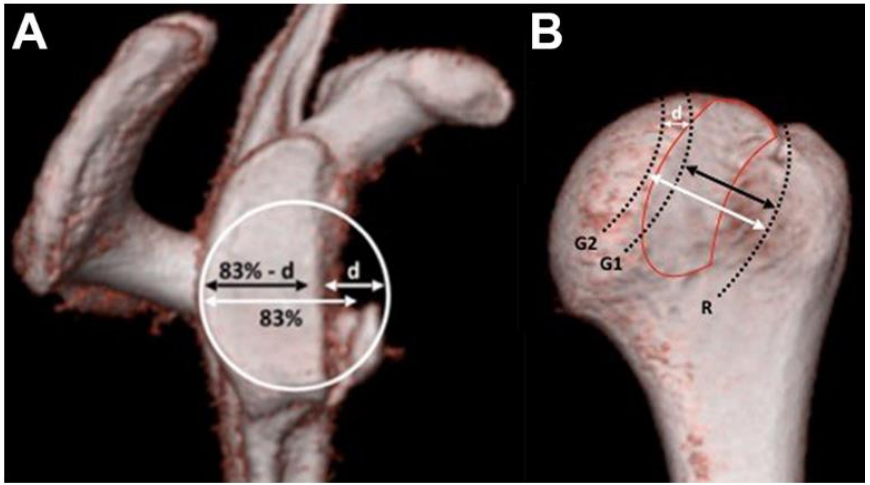
(Hill-Sachs)

Problem with track concept

Glenoid bone loss is 1 dimensional.

But humeral bone loss is 2 dimensional.

Glenoid track concept is 1 dimensional…



(Di Giacomo, 2014)

What about the vertical dimension of a Hill Sachs?

Hypothesis

Inferior extension of a Hill-Sachs lesion is higher risk for recurrence

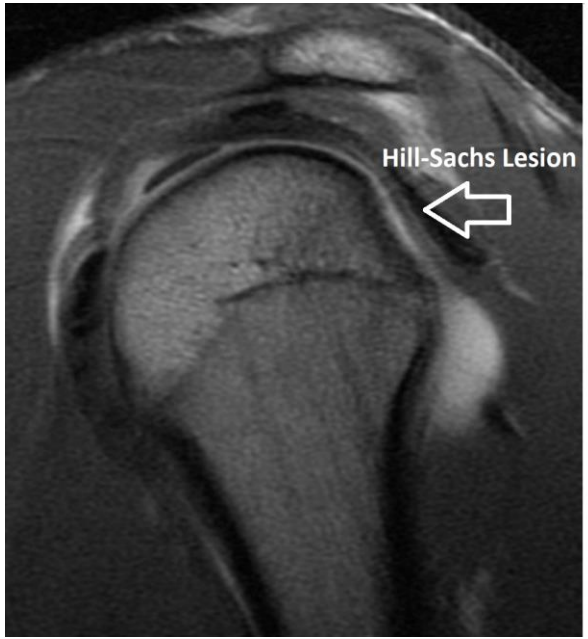
- due to risk for engagement in functional range of motion (lower degrees of abduction)

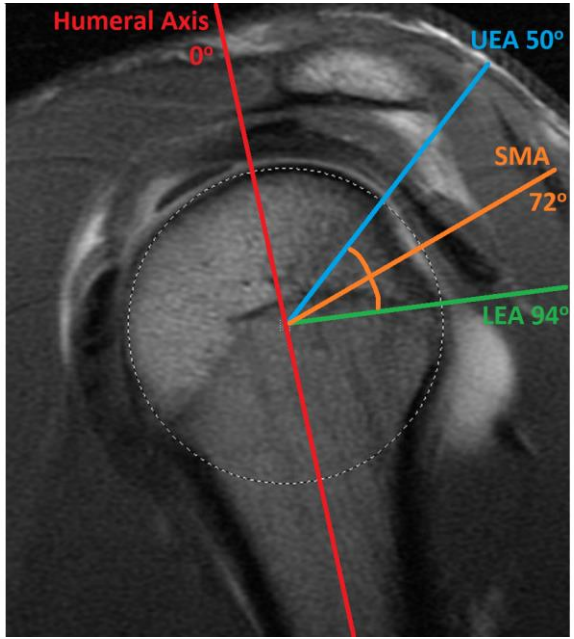
Methods

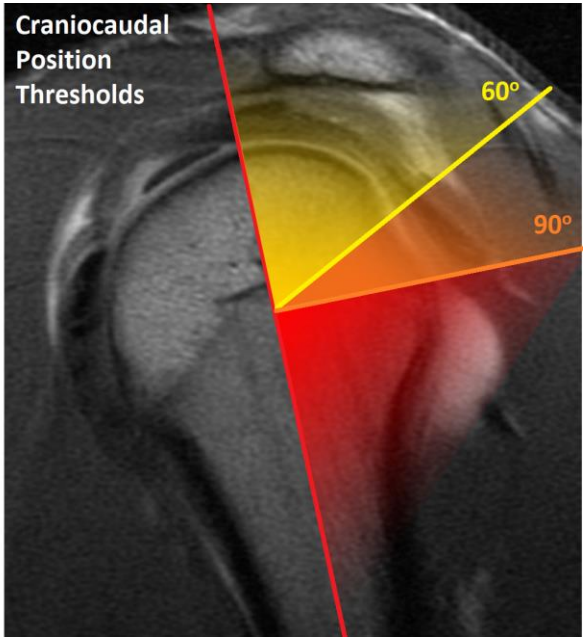
Retrospective cohort study

- Primary arthroscopic Bankart repair (without remplissage), min 2 yr f/u
- **On-track** lesions only
- Anterior instability only
- Correlate inferior HS extension with recurrence

Methods – craniocaudal HS measurement







SMA and LEA both measure Hill-Sachs inferior extension

Results

176 patients met criteria

- Mean age 20.6, f/u 5.9 years
- 69.3% contact sport participation
- **42 (23.9%) experienced recurrent instability** (subluxation OR dislocation).

Results - Univariate

Univariate predictors of recurrence:

- Age (OR 0.85, 95%CI 0.76-0.95, p=0.004)
- Multiple dislocations (OR 2.4, 95%CI 1.06-5.42, p=0.035)
- Glenoid bone loss (OR 1.16, 95%CI 1.09-1.24, p<0.001)
- Distance to dislocation (OR 0.92, 95%CI 0.86-0.98, p=0.008)
- **Hill Sachs Interval** (OR 1.08, 95%CI 1.01-1.16, p=0.031)
- **SMA >60deg** (OR 2.39, 95%CI 1.03-5.54, p=0.042)
- LEA >90deg (OR 2.22, 95%CI 0.89-5.58, p=0.089)**

Results – Multivariate

Hill-Sachs Interval and Distance-to-Dislocation both **collinear** with SMA and LEA

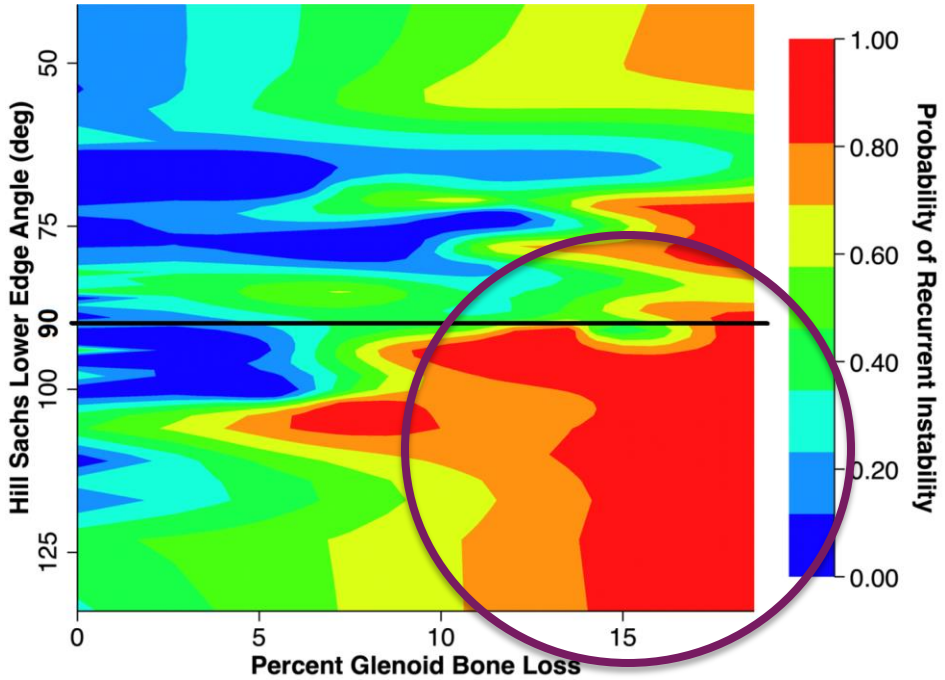
After controlling for confounders, risk for recurrent instability (subluxation OR dislocation):

- SMA >60deg (OR 2.22, 95%CI 0.99-4.98, p=0.052)**
- **LEA >90deg** (OR 3.29, 95%CI 1.19-9.07, p=0.022)

Sub-analysis for ***recurrent dislocation only***:

- **LEA >90deg** (**OR 4.8**, 95%CI 1.68-13.66, p=0.03)

Results – LEA + glenoid bone loss = powerful depiction of bipolar bone loss



Summary – Think **Simple**

Hill Sachs lesions that extend below equator = BAD

- Collinear with Hill-Sachs Interval and Distance-to-Dislocation

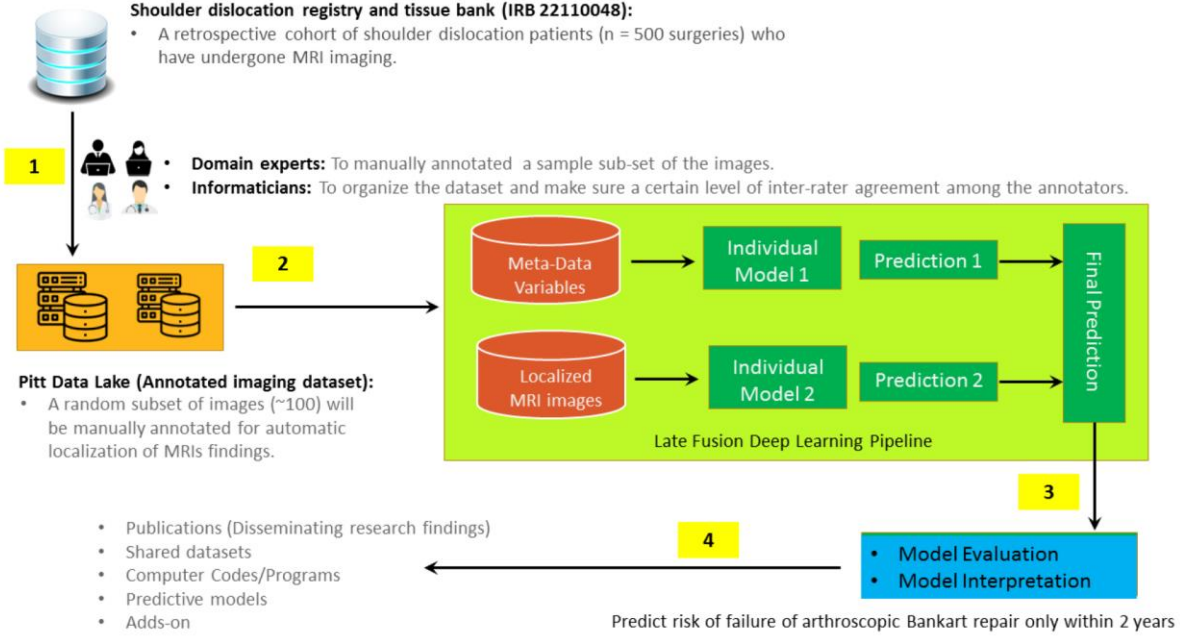
Easy to identify

- Scroll through sagittal MRI – look for crossing equator

Help stratify for remplissage/open capsular shift?

- Need **validation**

Think **Complex** – how to really stratify



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Hex$_{ai}$

Stay Tuned….

Thank you!