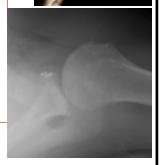
Detroit Regional Sports Medicine Symposium
July 19, 2018

Treatment of Shoulder Instability with Bone Loss



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Photos B. Wolf personal file

Disclosures

- *Educational Grant support:* ConMed, Smith and Nephew, Arthrex
- *Consultant:* ConMed; Sportsmed Innovate
- *Editorial Board:*
  - Orthopaedic Journal of Sports Medicine
- *Committees:*
  - Program Committee: AOSSM
  - Council of Delegates: AOSSM
  - BOS Fellowship Committee : AAOS (Chair)

Acknowledgements

- *Special thanks:*
  - Matt Provencher, MD
    - Vail, CO
  - Jack Kazanjian, DO
    - Philadelphia, PA
  - George Athwal, MD
    - London, Ontario

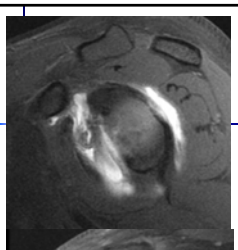
So what's the big deal?

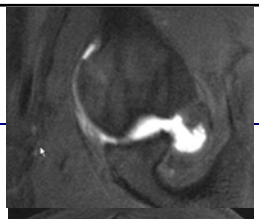
- *47 yo male college professor*
  - Seizure disorder – stable on meds
  - History of shoulder instability
  - Arthroscopic labrum repair 4 years ago
  - Did well until seizure 4 mos ago.
- *Shoulder subluxates every time he sneezes*
- *Shoulder has "slipped" during sleep*
- *Referred in by fellowship trained surgeon*

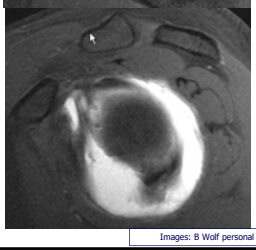
Case example

- *Exam:*
  - +++ apprehension
  - Normal cuff
  - Normal ROM - hesitant

Images: B Wolf personal file







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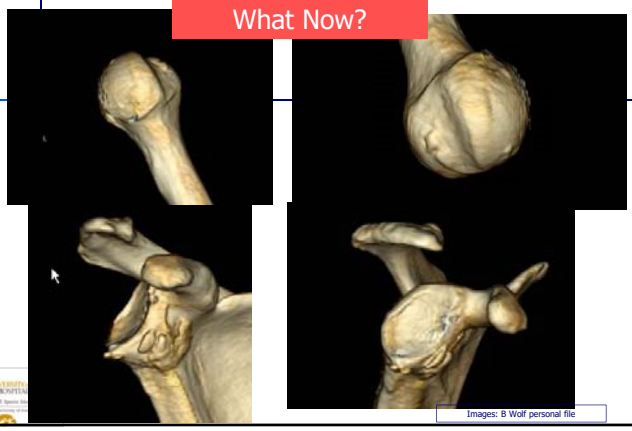
What Now?



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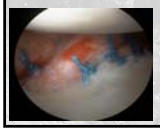
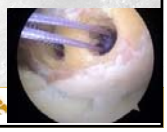
Bone Loss Epidemiology

The Incidence of Glenohumeral Bone and Cartilage Lesions at the Time of Shoulder Instability Surgery: *A Comparison of Primary and Revision Surgery* – *In Press AJSM 2018*

Kyle R. Duchman, MD, Carolyn Hettrich, MD MPH, Natalie Glass, PhD, Robert W. Westermann, MD, MOON Shoulder Instability Group, Brian R. Wolf, MD MS
University of Iowa Hospitals and Clinics





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MOON SHOULDER
Multicenter Orthopaedic Outcomes Network

UI Sports Medicine
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MOON Shoulder Group:

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OREF ORTHOPAEDIC RESEARCH AND EDUCATION FOUNDATION

- Internal funding, University of Iowa
  - Ralph and Marcia Congdon Professorship
  - John and Kim Callaghan Chair in Sports Medicine

Methods

- **MOON Shoulder Instability cohort:**
  - Ages: 12-99
  - Operative treatment of the shoulder capsule and/or labrum
  - Patients with concomitant rotator cuff repair excluded
- **Primary and revision shoulder instability surgery patients compared at t=0**

Methods

- **Defining glenohumeral Bone and Cartilage Lesions (BCL)**
  - Glenoid bone loss >10%
  - Hill-Sachs lesion >20%
  - GLAD lesion
  - Outerbridge grade III or IV CM
  - OCD of the humeral head or glenoid

Images: B Wolf personal file

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Results

- **545 patients available**
  - 461 (87%) primary;
  - 84 (13%) revision
- **Overall demographics**
  - 23.8 years of age
  - 83.7% male
  - Recurrent instability cited as reason for reoperation in 96.6% of revision cases

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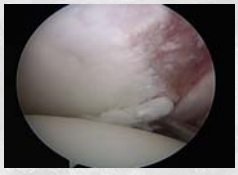
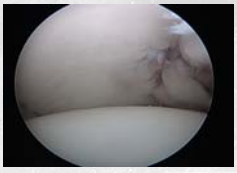
Results

- **Overall incidence 20.8%**
- **Primary vs. Revision BCL**
  - 18.4% vs. 47.6% (p<0.001)





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Arthroscopic Bankart Repair and Capsular Shift for Recurrent Anterior Shoulder Instability

Functional Outcomes and Identification of Risk Factors for Recurrence

Issaq Ahmed, BEng, MRCSEd, Fiona Ashton, MB ChB, and Christopher Michael Robinson, BMedSci, FRCSEd(Orth)

Investigation performed at the Edinburgh Shoulder Clinic, The Royal Infirmary of Edinburgh, Edinburgh, United Kingdom

JBJS The Journal of Bone & Joint Surgery

- 302 patients who had undergone arthroscopic Bankart repair and capsular shift
- **Recurrence rate 13.2%**
- **2 main factors for recurrence were GBL% and Hill-Sachs lesions**

TABLE IV Summary of Recent Published Literature on Results of Arthroscopic Bankart Repair and Capsular Shift with Use of Suture Anchors To Treat Recurrent Anterior Shoulder Instability*

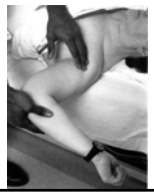
Author	Year	Sample Size	Duration of Follow-up (mo)	Recurrences No.	Recurrences Rate (%)	Predictors of Recurrence
Burkhart and De Beer[3]	2000	194	27	21	10.8	Engaging Hill-Sachs lesion, Bankart lesion
Kim et al.[4]	2003	167	44	7	4.2	Glenoid bone defect
Balg and Boileau[5]†	2007	131	31	19	14.5	Age, contact sports, hyperlaxity, Hill-Sachs lesion, loss of glenoid contour
Porcellini et al.[6]	2009	385	36	31	8.1	Age, male sex, >6 mo between op. and first dislocation
Flinkkilä et al.[7]	2010	174	51	33	19.0	Age, Hill-Sachs lesion, glenoid erosion, duration of follow-up
Voos et al.[8]	2010	73	33	13	18.0	Age, Hill-Sachs lesion, hyperlaxity
Overall		1134	—	124	10.9	

Images: B Wolf personal file

You Can Often Predict Bone Loss From Clinical History and Physical Exam

TABLE I Key Clues from the History and Physical Examination That May Herald the Finding of Glenoid Bone Loss

History	Physical Examination
High-energy mechanism of injury	Deformity is present
Arm was abducted (≥70°) and extended (≥30°) at time of initial dislocation	Shoulder apprehension test is positive in midranges of abduction (30°-90°) and lesser amounts of external rotation
Patient reports that most instability occurs in midrange of motion (20°-60° of abduction)	Anterior translation of humeral head over glenoid rim is reproducible
Patient notes progressive ease of instability	
Prolonged history of instability	



Arthroscopic Stabilization in Patients With an Inverted Pear Glenoid

Results in Patients With Bone Loss of the Anterior Glenoid

Timothy S. Mologne,*† MD, Matthew T. Provencher,†‡ MD, LCDR, MC, USNR, Kyle A. Menzel,† MD, LCDR, MC, USNR, Tyler A. Vachon,† MD, LT, MC, USNR, and Christopher B. Dewing,† MD, LCDR, MC, USNR

*From *The Sports Medicine Center, Appleton, Wisconsin and the †Naval Medical Center San Diego, San Diego, California*

Instability/Apprehension in Mid-Abduction

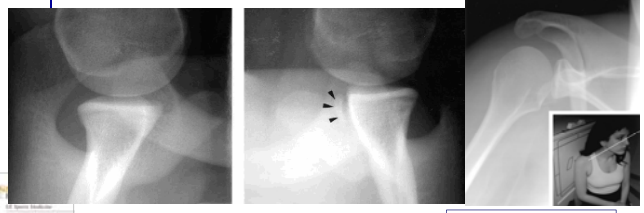
IMAGING – be suspicious

- *Plain Radiographs*
  - A/P, glenoid profile, axillary
    - Look for obvious fracture fragments or disruption of the sclerotic rim

Courtesy Jack Kazanjian DO

IMAGING – be suspicious

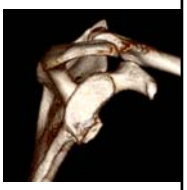
- *Plain Radiographs*
  - West Point and Garth views
    - Variations of the axillary oblique
    - Have the highest sensitivities



Courtesy Jack Kazanjian DO

Concerned about possible bone injury?
Low Threshold for Advanced Imaging

- *Multiple dislocators*
- *Failed prior stabilization procedure*
- *Radiographs (axillary) or MR glenoid bone loss*
- *Instability in midranges of motion*

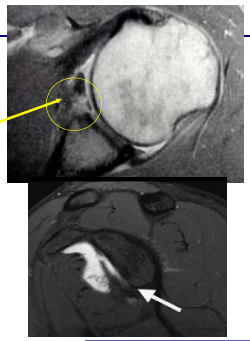


I preferentially obtain ***CT SCAN*** with 3D recons + high quality MRI arthrogram

Images: B Wolf personal file

MRI

- *Gold standard to for soft tissue component*
- *Can show glenoid bony injury*
  - Bony Bankart
  - Erosion
- *Axillary view and most lateral slice of the sagittal oblique*
- *However, large variations in glenoid version, 2-dimensional slices cannot quantify amount of bone loss*



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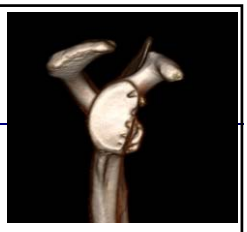
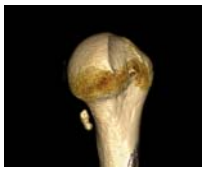
CT Scan with 3D Recons

- *Best modality for assessing bony deficiency*
  - Glenoid
    - Bony Bankart or attritional loss
  - Recurrence after prior surgery
    - Fracture through anchor holes
  - Humerus
    - Hill Sachs



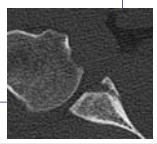


Images: B Wolf personal file

A Regular Axial CT underestimates glenoid bone injury / loss

Bernhardson A, Dewing CB, Provencher MT- JSES 2012

- ***Axial CT scan***
  - **225 CT scans**
  - **Mean loss = 6.4%**
  - ***Underestimated by half***
  - **Worse if higher bone loss (>20%)**
- ***Sagittal 3D Reformat***
  - **225 CT scans**
  - **Mean loss = 12.5%**



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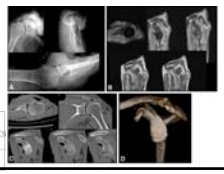
Clin Orthop Relat Res (2013) 471:1253–1256
DOI 10.1007/s11999-012-2607-x

Clinical Orthopaedics and Related Research®

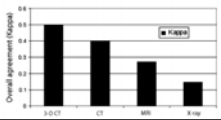
3-D CT is the Most Reliable Imaging Modality When Quantifying Glenoid Bone Loss

Jodie Y. Bishop MD, Grant L. Jones MD, Michael A. Rerko MD, Chris Donaldson MD, MOON Shoulder Group

- *Cadaver specimens*
- *Compare x-ray, MRI, CT, 3D CT for estimating glenoid bone loss*



- *3D CT most accurate way to measure bone loss*
- *Better than regular CT and MRI*
- *3D CT > CT> MRI > x-ray for intra-inter observer reliability*



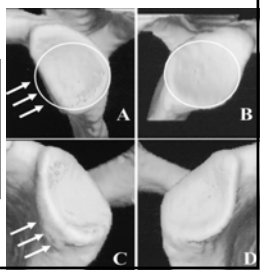
Morphology of glenoid bone injury: Fractures

GLENOID RIM MORPHOLOGY IN RECURRENT ANTERIOR GLENOHUMERAL INSTABILITY

JBJS The Journal of Bone & Joint Surgery

Morphology of the glenoid rim in 100 patients with recurrent anterior shoulder instability

Morphology of Glenoid Rim	Prevalence
Bone fragment	50%
Large fragment (>20%)	1%
Medium fragment (5%-20%)	27%
Small fragment (<5%)	22%
Erosion or compression fracture	40%
Normal	10%



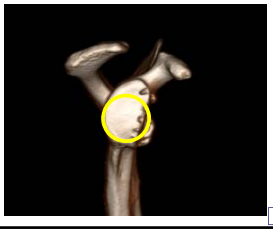
Morphology of Glenoid Bone Loss: Fracture vs. Attrition

Acute Fracture	Bony Loss *Partial* Resorption "Partial Attritional"	Bony Loss *Complete* Resorption "Fully Attritional"
		
-Acute trauma -Prior surgery-fracture thru anchor holes	-Recurrent instability -Old fracture	-Chronic Recurrence -Prior surgery - resorption

Provencher et al. 2014 *AJSM*

QUANTIFICATION

- *Inferior aspect (70%) of the glenoid has shape of a true circle with bare area as the approximate center*
  - Huysmans PE; JSES 2006



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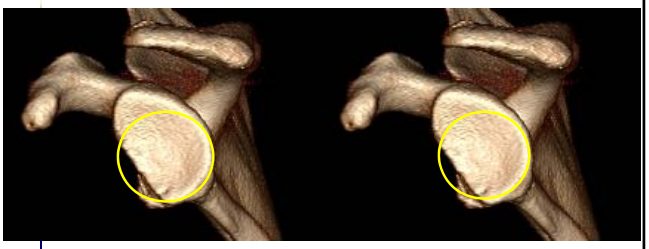
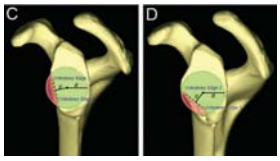
Challenge of estimating GBL



Need to rely on posterior and inferior cortex

Quantification

- *Glenoid Ratio*
  - Measure posterior radius (R)
  - Radius to edge of bone loss (d)
  - Using an equation

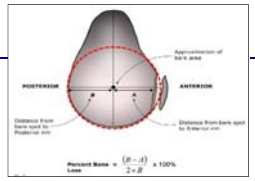


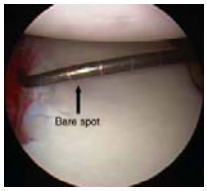
$$PAM_1 = 100 \times MA_1/CA_1 \text{ for Method 1 and } q = \frac{\pi l_c}{\pi R^2} = \frac{1}{\pi}\left(\cos^{-1}\left(\frac{d}{R}\right) - \frac{d}{R}\sqrt{1-\left(\frac{d}{R}\right)^2}\right)$$

QUANTIFICATION

- *Index method: Simplest method is to determine difference in radius from anterior edge to posterior edge*
- *Arthroscopic BARE AREA method: Be careful, bare area is 1.4 mm anterior to true center and can overestimate bone loss*

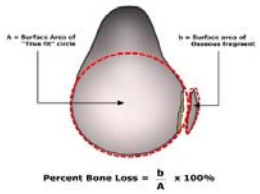
Burkhart SS; Arthroscopy 2002





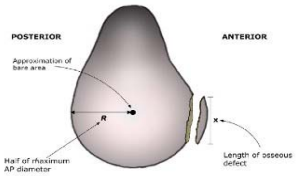
QUANTIFICATION

- *Pico method:*
- *Most precise method is to determine percentage of glenoid bone loss by dividing surface area of osseous defect by the surface area of true circle*

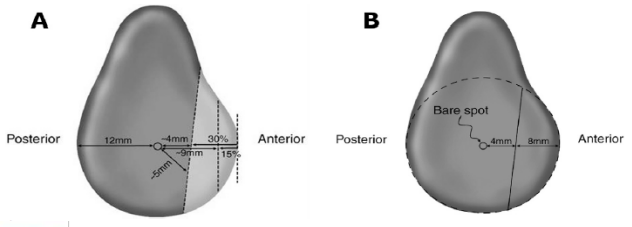


QUANTIFICATION

- *Length of the osseous lesion is also an important marker*
- *If length is greater then half of the radius then there is 70% decrease in resistance to recurrent dislocations*
  - Gerber C; CORR 2002

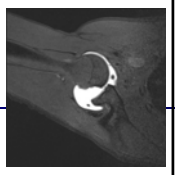


Between 4-6 mm anterior bone loss
Can amount to 20-25% of glenoid



J Am Acad Orthop Surg. 2009;17:482-93.)

Hill Sachs Lesion

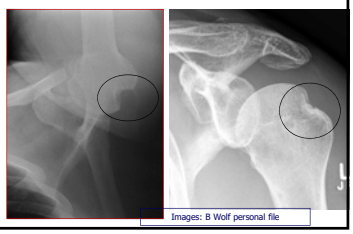


- *Reported as early as 1855*
  - Malgaigne 1855, Flower 1861
- *Radiologists Hill and Sachs – 1940*
- *Palmer and Widen: JBJS 1948*
  - Described engagement of Hill Sachs
- *Present in ~70% of primary dislocations*
  - ~100% of recurrent dislocations

Image B. Wolf personal file

Imaging

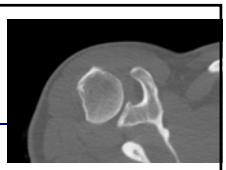
- *Plain films*
  - AP, lateral, axillary
  - Apical Oblique view
    - Arm IR, beam directed 45 deg cephalad and 45 deg internal
  - Craniocaudal view
  - Stryker notch view

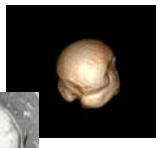


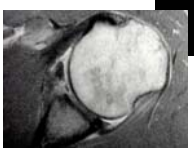
Images B. Wolf personal file

Images: B Wolf personal file

Imaging







- *CT*
  - Axial and saggittal
  - 3D reconstruction
  - Accurate for measurement
- *MRI*
  - Very accurate for dx
  - More difficulty for measurement

Images B. Wolf personal file

Images: B Wolf personal file

Classification

- *Rowe:*
  - Mild: 2 x 0.3 cm
  - Moderate 4 x 0.5 cm
  - Large 4 x 1 cm
- *Flatow*
  - Clinically insignificant < 20% of articular surface
  - Variable significance 20-40%
  - Clinically significant >40%

Image B. Wolf personal file

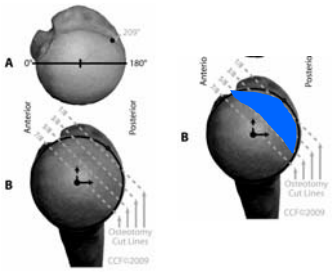
Engaging Hill Sachs Lesion

- *Burkhart and DeBeer 2000*
  - "Engaging Hill Sachs" lesion as risk factor for failure of arthroscopic Bankart repair
  - Medial edge of Hill Sachs engages the edge of the anterior glenoid in 90/90 Abduction external rotation

Image B. Wolf personal file

Hill Sachs size

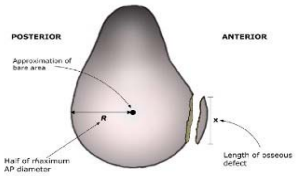
- *Kaar et al*
  - AJSM 09
  - Hill Sachs size of 5/8 HH radius (38% of articular surface was biomechanically significant in lab setting



Picture from Kaar et al 2009

QUANTIFICATION

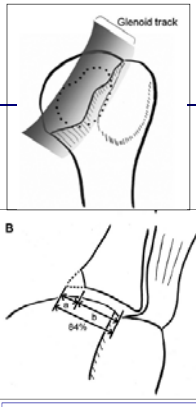
- *Length of the osseous lesion is also an important marker*
- *If length is greater then half of the radius then there is 70% decrease in resistance to recurrent dislocations*
  - Gerber C; CORR 2002



If x > R, dislocation resistance ≤ 70% of that of an intact joint

Glenoid Track – Yamamoto 2007

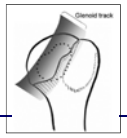
- *Articulation area on humeral head in ABER*
- *If medial edge of HS extends medial to track – risk of engaging*
  - 18.4 +/- 2.5mm from edge of cuff
  - ~16-17 mm from edge of articular cartilage
  - 84% +/- 14% of glenoid width + any glenoid bone loss



Images Yamamoto et al JSES 2007

Predictive Value of Glenoid Track

Tokish et al. (JBJS '16)



- *57 patients arthroscopic repair*
  - 49 "on track"
    - 8% failure
  - 8 "off track"
    - 75% failure
- *Positive predictive value of Glenoid track: 75%*
- *Positive predictive value of only using 20% glenoid bone loss: 44%*

Redefining "Critical" Bone Loss in Shoulder Instability: Functional Outcomes Worsen With "Subcritical" Bone Loss

James S. Shaha, Jay B. Cook, Daniel J. Song, Douglas J. Rowles, Craig R. Bottoni, Steven H. Shaha and John M. Tokish

Am J Sports Med 2015 43: 1719 originally published online April 16, 2015

- 74 shoulders
- Mean age 26.3 (20-42)
- Follow up 30.2 (11-46)

- *"Critical" bone loss lower than 20-25% usually quoted*
- *Identified significant decrease in WOSI score with GBL > 13.4% --- consistent with unacceptable outcome*

Images: B Wolf personal file

THE JOURNAL OF BONE & JOINT SURGERY

The instability severity index score

A SIMPLE PRE-OPERATIVE SCORE TO SELECT PATIENTS FOR ARTHROSCOPIC OR OPEN SHOULDER STABILISATION

F. Balg, P. Boileau

From University of Nice-Sophia Antipolis, Nice, France

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

- *112 pts*
- *6 points or less*
  - <10% recurrence with arthroscopic repair
- *6 points*
  - 70% recurrence
  - Should have Latarjet

Balg F, Boileau P. JBJS Br 2007 89(11):1470-7.
Boileau P, et al. JBJS Am 2006 88(8):1755-63.

How To Deal with Glenoid Bone Injury / Loss

- *Repair bony fractures*
  - Incorporate into repair
- *Determine traumatic / attritional glenoid bone loss*
  - Reconstruct glenoid when necessary
    - >13.5%-20%
    - Must consider Bipolar bone loss

How To Deal with Glenoid Bone Injury / Loss

XR, CT, MRI
Arthroscopy?

0 to 10%	10% to 20%	> 13.5-20%
Primary Repair (Scope or open) •Incorporate Bony Fragment if present •Liberal use of anchors •Consider inferior / posterior repair / plication (contact athletes)	**Primary Repair (Scope or open)** •Best with bony fragment that is incorporated **Open procedures ± bone augmentation** •+/- address Hill Sachs	**OPEN bone Augmentation Procedures** • +/- address Hill Sachs • LTJ, DTA, ICBG

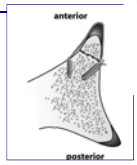
LESS THAN 10%
Arthroscopic Stabilization

- *Incorporate bone fragment if present*
  - With compression
- *Re-tension soft tissue anatomically*
- *Address Hill Sachs lesion if necessary*

Photos B. Wolf personal file

Arthroscopic repair of bony Bankart

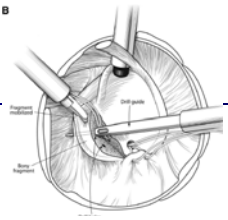
- *Bony Bankart bridge – Millett et al*
  - Two row compression
    - Anchor medial neck of glenoid
    - Sutures draped around fragment
    - Second row anchor(s) at intact glenoid

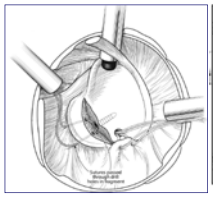


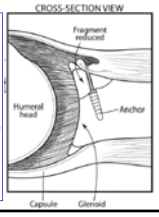
Images: B Wolf personal file

Arthroscopic repair of bony Bankart

- *ORV – Caldwell et al.*
  - Sutures placed through bony Bankart fragment
    - Pre-drill fragment
    - Long K-wire from posterior
- *Sugaya*
  - Single row
  - Sutures wrap around fragment







How To Deal with Glenoid Bone Injury / Loss

XR, CT, MRI
Arthroscopy?

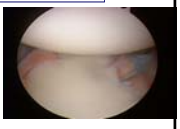
0 to 10%	10% to 20%	> 15-20%
Primary Repair (Scope or open) •Incorporate Bony Fragment if present •Liberal use of anchors •Consider inferior / posterior repair / plication (contact athletes)	**Primary Repair (Scope or open)** •Best with bony fragment that is incorporated **Open procedures ± bone augmentation** •+/- address Hill Sachs	**OPEN bone Augmentation Procedures** • +/- address Hill Sachs • LTJ, DTA, ICBG

Arthroscopic Stabilization in Patients With an Inverted Pear Glenoid

Results in Patients With Bone Loss of the Anterior Glenoid

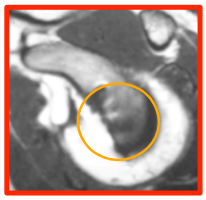
Timothy S. Mologne,*† MD, Matthew T. Provencher,†‡ MD, LCDR, MC, USNR, Kyle A. Menzel,† MD, LCDR, MC, USNR, Tyler A. Vachon,† MD, LT, MC, USNR, and Christopher B. Dewing,† MD, LCDR, MC, USNR
*From *The Sports Medicine Center, Appleton, Wisconsin and the †Naval Medical Center San Diego, San Diego, California*

- **21 patients**
- **25% bone *involvement or loss***
- **Arthroscopic Repair - *13% Failure***



Results of arthroscopic stabilization in presence of "inverted-pear" (25% loss) glenoid not as dismal as previously reported

Bony Bankart vs. Attritional Loss Results



- *"Bony" Bankart*
  - **0% Failure (0/11)**
  - p=0.001
- *"Attritional" Loss*
  - No bone, soft tissue only
  - **33% failure (3/10)**
    - p=0.024

Open Capsular Repair Without Bone Block for Recurrent Anterior Shoulder Instability in Patients With and Without Bony Defects of the Glenoid and/or Humeral Head

The American Journal of Sports Medicine, Vol. 36, No. 9 © 2008

Michael J. Pagnani, MD
From the Nashville Knee & Shoulder Center, Nashville, Tennessee

- *103 patients, ave age 20 years*
  - Bone loss determined at arthroscopy
    - 27% engaging Hill Sachs
    - 4% >20% bone loss on glenoid
  - Open Bankart repair
    - Incorporate fragment if present
  - 2% recurrence
  - Bone loss not significant predictor

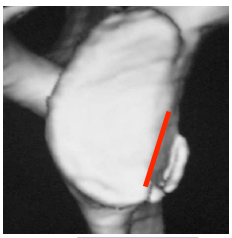
Arthroscopic Osseous Bankart Repair for Chronic Recurrent Traumatic Anterior Glenohumeral Instability

JBJS The Journal of Bone & Joint Surgery

Surgical Technique

By Hiroyuki Sugaya, MD, Jun Moriishi, MD, Izumi Kanisawa, MD, and Akihiro Tsuchiya, MD

- *Sugaya et al.*
  - **42 shoulders**
    - **Average glenoid bone injury 24.8%**
      - **(range, 11 - 38%)**
      - **F/U = 34 months**
  - **Displaced Osseous fragment in all shoulders**
  - **Arthroscopic repair incorporating fragment**
  - **39/42 Good/excellent**
  - **93° ER in ABD**
    - **Minimal loss ER**



Sugaya *et.al.* JBJS 2005

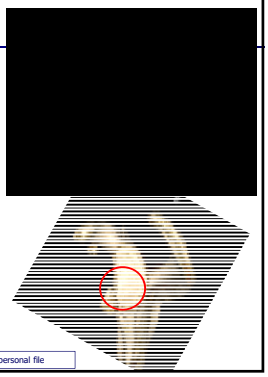
How To Deal with Glenoid Bone Injury / Loss

XR, CT, MRI
Arthroscopy?

0 to 10%	10% to 20%	> 15-20%
Primary Repair (Scope or open) •Incorporate Bony Fragment if present •Liberal use of anchors •Consider inferior / posterior repair / plication (contact athletes)	**Primary Repair (Scope or open)** •Best with bony fragment that is incorporated **Open procedures ± bone augmentation** •+/- address Hill Sachs	**OPEN or SCOPE bone Augmentation Procedures** • +/- address Hill Sachs • LTJ, DTA, ICBG

GREATER THAN 20-25%

- *Must restore bone stock*
- *Open ORIF if the bone fragment is viable*
- *Glenoid reconstruction if bone fragment is not available*
  - Latarjet
  - ICBG
  - Allograft

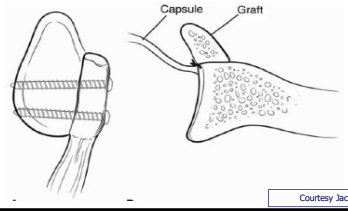


Images: B Wolf personal file

LATARJET

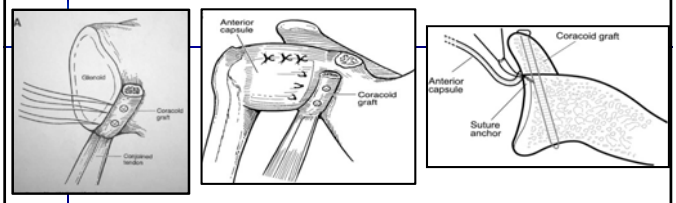
Latarjet (1954) first described coracoid bone block technique to prevent anterior dislocation, suggesting horizontal limb of coracoid process be fixed to anteroinferior margin of glenoid with screws.

Latarjet M; Lyon Chir 1954



Courtesy Jack Kazanjian DO

Latarjet Procedure



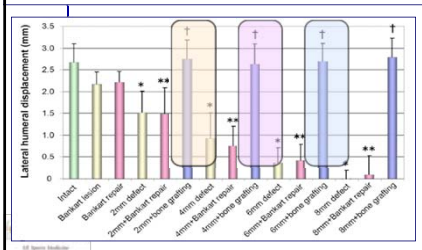
Graft is placed so that it becomes an *extra-articular* platform that acts as an extension of the articular arc of the glenoid

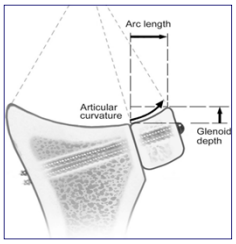
Many ways in which to do a Latarjet

Stabilizing Mechanism in Bone-Grafting of a Large Glenoid Defect

By Nobuyuki Yamamoto, MD, Takayuki Muraki, PhD, John W. Sperling, MD, Scott P. Steinmann, MD, Robert H. Cofield, MD, Eiji Itoi, MD, and Kai-Nan An, PhD

Investigation performed at the Mayo Clinic, Rochester, Minnesota



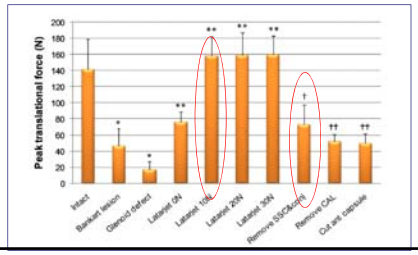


The Stabilizing Mechanism of the Latarjet Procedure

A Cadaveric Study

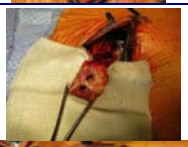
Nobuyuki Yamamoto, MD, PhD, Takayuki Muraki, PhD, Kai-Nan An, PhD, John W. Sperling, MD, Robert H. Cofield, MD, Eiji Itoi, MD, PhD, Gilles Walch, MD, and Scott P. Steinmann, MD

- *Sling effect of the conjoint tendons is significant*
- *Coracoid restores bony stability*



LATARJET

- *Technique as described by Walch*
  - Walch G; JSES 2011
- *Coracoid osteotomy – 20-25 mm graft*
- *Subscapularis split at junction of upper 2/3 and lower 1/3*
- *Inferior surface of coracoid fixed to anterior glenoid with two screws*
- *Capsule repaired to stump of CA ligament*



Modified Latarjet

- *Burkhart Arthroscopy 07*
- *Coracoid osteotomy at elbow*
- *Subscapularis tenotomy*
- *Graft can be oriented traditionally*
  - Or with inferior surface laterally
  - "Congruent arc"
- *Capsule repaired to native glenoid with anchors – extra-articular graft*

Images: B Wolf personal file

Latarjet

Images B. Wolf personal file

Postoperative Rehabilitation

- *0-2 weeks - simple sling and gentle ROM*
- *2-4 weeks - out of sling and start ADL's*
- *1-2 months - progressively resume athletic conditioning (jogging, cycling, etc.)*
- *4-5 months - return to all activities, including contact sports*

Latarjet Procedure

Walch G; JSES 2011

- *Outcomes*
  - 2000 procedures performed
  - Recurrent instability-1%
  - Return to sport at preinjury level- 83%
  - good to excellent results-76%
    - according to modified Rowe score
  - No significant loss of ER using this technique

Courtesy Jack Kazanjian DO

The Arthroscopic Latarjet Procedure for Anterior Shoulder Instability

5-Year Minimum Follow-up

Guillaume D. Dumont,*† MD, Simon Fogerty,‡ MBChB, Dip SEM (UK), FRCS (Tr&Orth), Claudio Rosso,§ MD, MSc, and Laurent Lafosse,‖ MD

TABLE 3
Comparison of Western Ontario Shoulder Instability (WOSI) Scores in Arthroscopic Latarjet Procedure: Revision vs Primary Instability Surgery and 1 Dislocation vs Multiple Dislocations

	WOSI Score, %		
(A) Revision vs Primary Instability Surgery	Primary Surgery	Revision Surgery	*P* Value (Student *t* Test)*
Aggregate score	90.5	91	.88
Physical Symptoms	89.8	91.04	.67
Sports/Recreation/Work	89.9	92.1	.60
Lifestyle	93.5	94.7	.70
Emotions	89.7	84.3	.33
(B) Patients With History of 1 Dislocation vs Multiple Dislocations	1 Dislocation	Multiple Dislocations	*P* Value (Student *t* Test)*
Aggregate score	90.9	90.6	.94
Physical Symptoms	91.4	89.9	.66
Sports/Recreation/Work	92	90.1	.72
Lifestyle	90.2	94.1	.32
Emotions	88.3	88.7	.96

*Significant at $P < .05$.

Latarjet is *NOT* Benign Procedure

- *Pulled-off conjoint*
- *Miserable scar for revision*
- *Resorption of Latarjet - IT Exists!*
- *Arthrosis concerns*
- *BUT, Test of time is hard to argue*



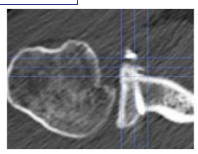
Images: B Wolf personal file

Coracoid graft osteolysis after the Latarjet procedure for anteroinferior shoulder instability: a computed tomography scan study of twenty-six patients

Giovanni Di Giacomo, MD[a], Alberto Costantini, MD[a], Nicola de Gasperis, MD[a,*], Andrea De Vita, MD[a], Bernard K.H. Lin, MD[a], Marco Francone, MD[b], Mario A. Rojas Beccaglia, MD[a], Marco Mastantuono, MD[b]

Journal of Shoulder and Elbow Surgery
2011

- *CT scan, 26 pts*
  - 3 days
  - 17 months
- *Overall = 59.5% of entire coracoid underwent osteolysis*
- *Proximal and superficial most common lysis pattern*

- Proximal - Superficial osteolysis #1 area

Fate of coracoid grafts after the Latarjet procedure: will be analogous to the original glenoid by remodelling

Knee Surgery, Sports Traumatology, Arthroscopy

Young Moon Kee[1] · Jung Youn Kim[2] · Hwan Jin Kim[1] · Skand Sinha[3] · Yong-Girl Rhee[1]

- *54 pts*
- *Resorption of superior outer graft in LTJ*
- *3D CT at preop, postop, 8 mos, 32 mos*
- *Glenoid Surface Area*
  - 78% ->110% ->102% -> 100%
  - Resorption back to normal surface area

Bristow / Latarjet is a difficult procedure - not benign

- *Greissler, Bishop JY et al JSES'13*
- *Systematic review 1904 shoulders*
- *30% complication rate after Bristow Latarjet*
  - Recurrent instability 9%
  - Non-union / fibrous union of coracoid 9%
  - Neurovascular complication 2%
  - Average ER loss 13 degrees

Images B. Wolf personal file

Technical Note

Anatomic Osteochondral Glenoid Reconstruction for Recurrent Glenohumeral Instability With Glenoid Deficiency Using a Distal Tibia Allograft

Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 25, No 4 (April), 2009: pp 440-452

LCDR Matthew T. Provencher, M.D., MC, USN, Neil Ghodadra, M.D., Lance LeClere, M.D., MC, USN, CDR Daniel J. Solomon, M.D., MC, USN, and Anthony A. Romeo, M.D.

Distal Tibial Allograft

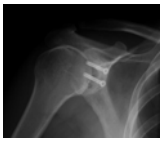
- *Benefits:*
  - Less distortion of anatomy
  - Can size graft to be as big as needed
  - Grafts are readily available
  - Cartilage articular surface
- *Issues:*
  - Very expensive
  - Outcomes still unclear
  - Concerns over graft resorption
  - No sling effect

Images B. Wolf personal file

Distal Tibial Allograft





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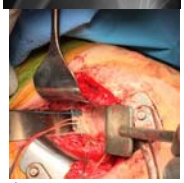
Distal Tibia Allograft

- *Provencher et al, Arthros '16*
  - 27 patients, ≥15° GBL
    - Ave age 31 yrs, all male
  - Min 2 year f/u, ave 45 mos
  - 89% healing rate by CT scan
  - 3% lysis
  - No recurrent instability
- *Frank et al AJSM '18 – matched cohort*
  - No significant difference DTA v. LTJ – 100 pts

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Humeral Defects


- *Indications for treatment:*
  - Still evolving
  - Engaging Hill Sachs in ABER
    - "Large" Hill-Sachs lesions
    - Moderate Hill-Sachs with associated glenoid bone loss

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Treatment options

- *Latarjet*
- *Arthroplasty*
- *Grafting*
  - OATS
  - Bulk allograft
- *Rotational osteotomy*
- *Remplissage*

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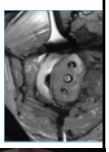
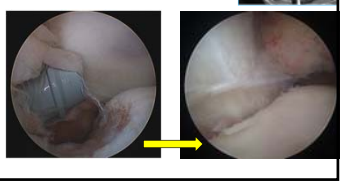
Latarjet as treatment for large Hill Sachs lesions

- *Increase arc of glenoid – harder for large HS defect to engage*
- *Indirect treatment*
- *Often easier to treat glenoid than Hill Sachs*

Latarjet not perfect for Hill Sachs approaching 30%

- *Miniaci et al ASES '15*
  - Cadaver model
  - Tested for stability after LTJ with increasing Hill Sachs lesions
  - Hill Sachs lesions > 30% resulted in drop in stability in ABER
- *May need to address Hill Sachs in addition*
  - Remplissage
  - Grafting





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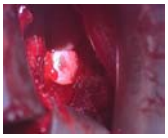
Treatment options

- *Arthroplasty*
  - Partial resurfacing with metal implant
  - Typically for very large defects
  - Done open
  - May be done in conjunction with open stabilization / Latarjet

Image: www.arthrosurface.com

Treatment Options: Grafting

- *OATS / Mosaicplasty*
  - Multiple grafts similar to knee
  - Usually from fresh allograft humeral head
  - Press fit
- *Bulk allograft*
  - Large wedge or circular graft
  - Press fit / fix with screws
  - Fresh allograft H Head



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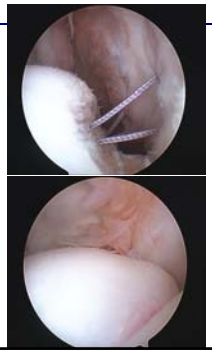
Treatment: Remplissage

- *Tissue tenodesis into Hill Sachs*
  - Posterior capsule and rotator cuff
  - Prevents engagement of Hill Sachs



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Remplissage: Portals

- *Posterior soft spot*
  - Standard position

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- *Can make second posterior portal if needed to get perpendicular to Hill Sachs*
  - More medial

Remplissage

- *Place anchors and shuttle sutures prior to completing bankart repair*
  - If after, protect repair during anchor insertion
  - Shaver to prep bone similar to cuff repair

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Remplissage

- *1-2 anchors in <u>prepared</u> Hill Sachs area*
  - 3-5mm from articular edge
- *Mattress configuration through posterior cuff*
  - Anchor through cannula- then back out cannula to make penetrate cuff through second soft tissue position
  - Penetrator or suture passer
  - Grasp one suture from anchor
    - Mattress config created

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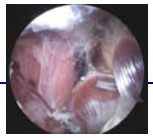
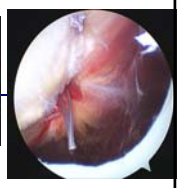
Remplissage





- *Find sutures in SA space*
- *Tie down over cuff*
- *Then visualize through anterior portals*

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Outcomes

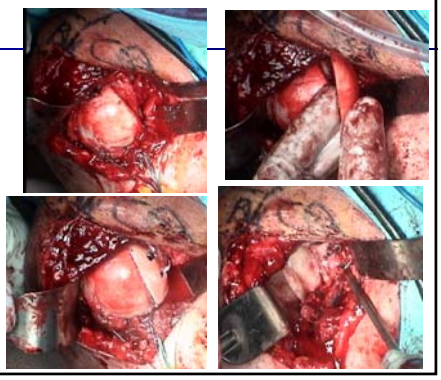
- *Rashid et al KSSTA 2014*
  - Sys Review 207 pts
  - 8 studies
  - Heterogeneous group
  - Re-dislocation rate
    - 4.2% +/-3.8%
  - Mean ↓ Ad ER: 5.6°
  - Mean ↓ ABER: 11.3°
- *Athwal G et al JBJS '12*
  - No benefit for remplissage for 15% HS lesions
  - + Benefit for 30% lesions
  - Cadaveric model

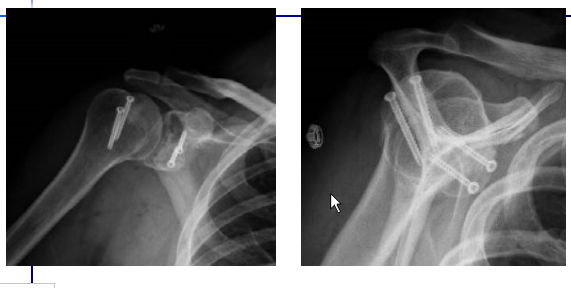
Summary

- *Bone loss in shoulder instability is relatively common*
- *Don't miss it!*
  - Advanced imaging
- *Reliable techniques available to optimize outcomes and decrease risk for recurrence*
- *Algorithms for treatment*

So what about that case?????

- *EUA: grade 3 anterior instability*
  - OCA HH
  - LTJ





Thank you
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