Shoulder Instability:
An Evidence Based Approach

Amit Momaya, MD
Chief of Sports Medicine
Team Physician for UAB Athletics, Legion FC, Bulls Hockey
www.MomayaMD.com
@AmitMomayaMD

Disclosures

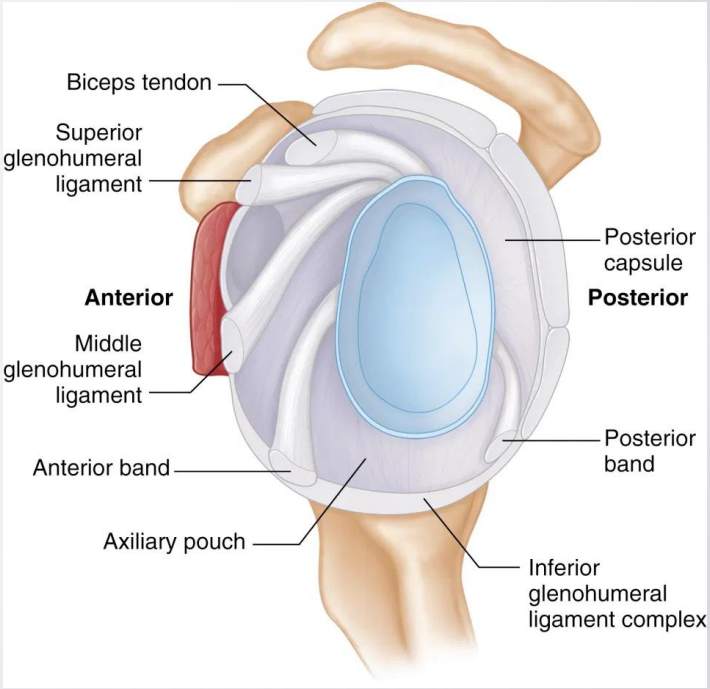
- Arthroscopy: Editorial or governing board
- Conmed: Paid consultant
- Miach Orthopaedics: Paid consultant
- Allsource: Paid consultant
- Reparel: Equity
- Convergence: Equity

Outline

- Anatomy
- Epidemiology / History
- Physical Exam
- Imaging
- Management

Anatomy

- Static Restraints
  - Bony
  - Capsule
  - Labrum
- Dynamic Restraints
  - Rotator Cuff
  - Long head of biceps tendon



Epidemiology

- Common sports pathology
- 1.7% in general cohort

History

- Injury Mechanism
- Number of times dislocated
- Patient demands
- Symptoms

Worrisome Risk Factors

- High energy mechanism
- Arm abduction / extension at time of dislocation
- Instability in midrange (20-60 deg abduction)
- Instability during normal daily activities
- Long history of instability

Athletes diagnosed with anterior and posterior shoulder instability display different chief complaints and disability

Lucas G. Teske, MD[a], John Arvesen, MD[a], Michael J. Kissenberth, MD[a], Stephan G. Pill, MD, MSPT[a], Adam Lutz, PT, OCS[b], Kyle J. Adams, BS[c], Charles A. Thigpen, PhD, PT, ATC[b], John M. Tokish, MD[d], Amit Momaya, MD[e], Ellen Shanley, PhD, PT, OCS[b,*]

- 58 high school and collegiate athletes
- Anterior instability: more likely to have chief complaint of instability (70%) compared to posterior instability report pain (96%)

Posterior Shoulder Instability – Jerk Test

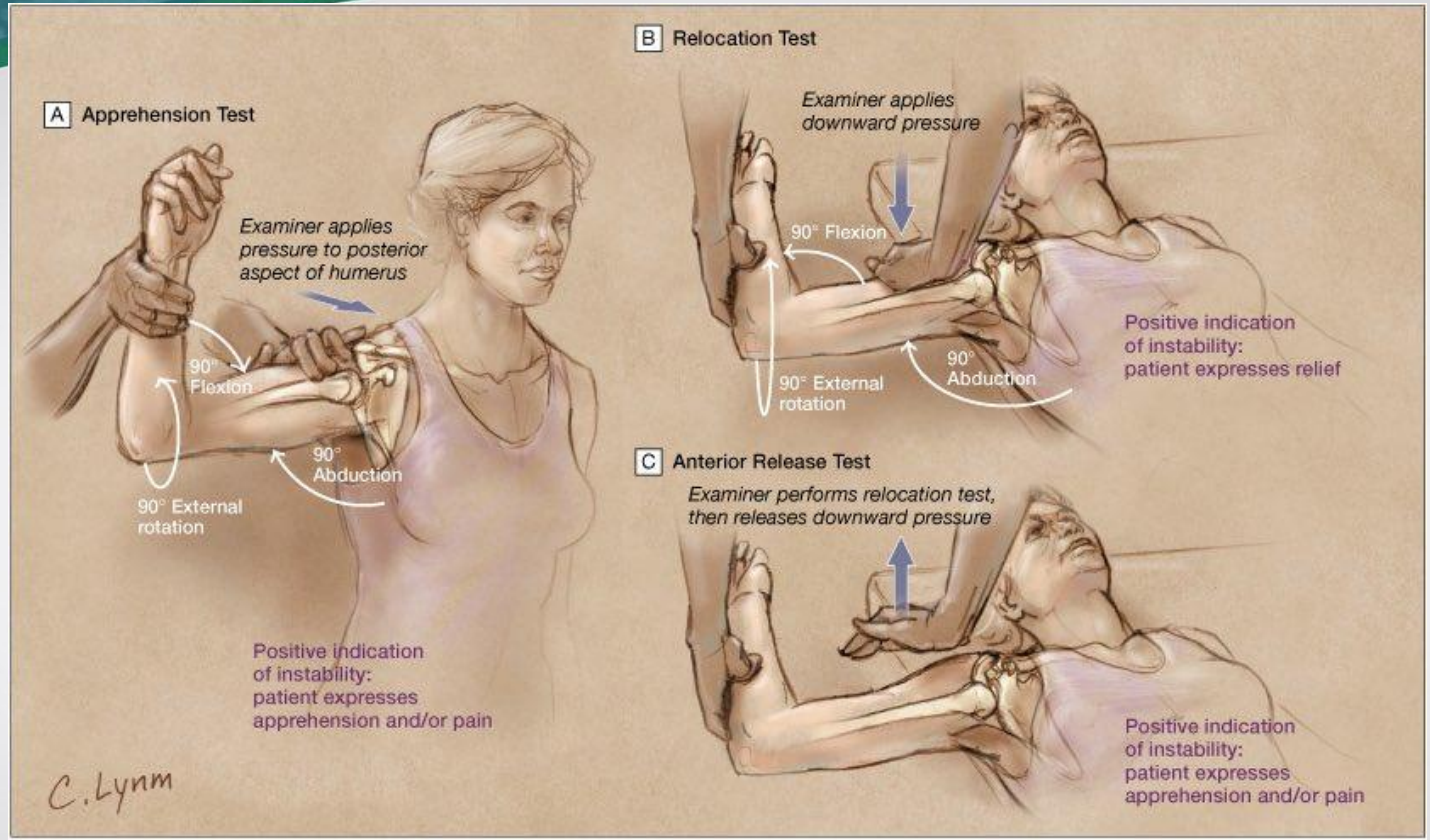
Risk Factors

- Risk factors for recurrent instability
  - Youth
  - Male
  - Contact sports

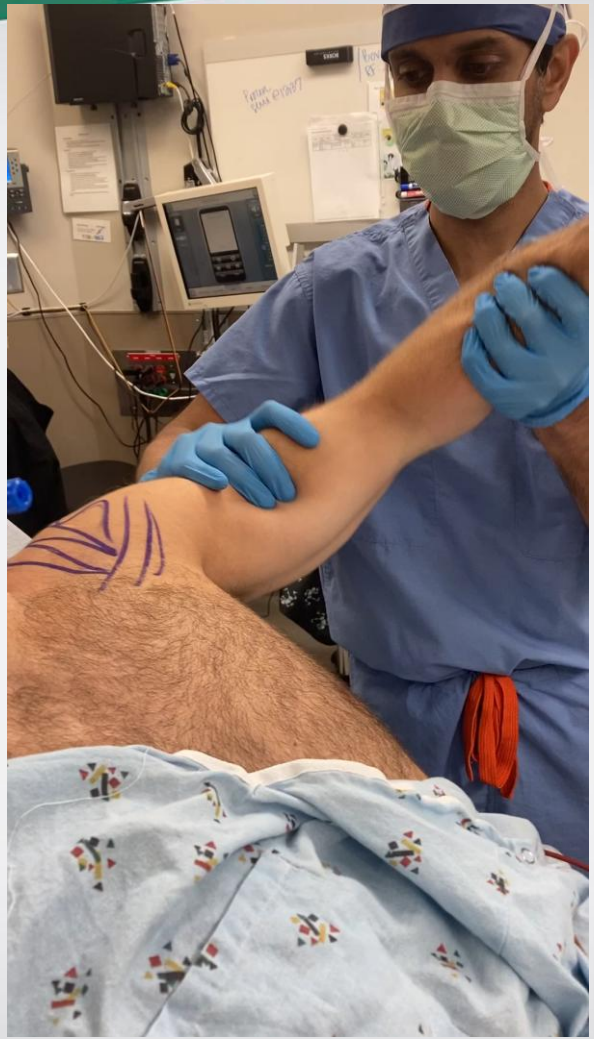
Reduction

Physical Examination

- Provocative testing to reproduce symptoms
  - Anterior apprehension / relocation test
- Sulcus sign
- Load and Shift test (anterior and posterior)

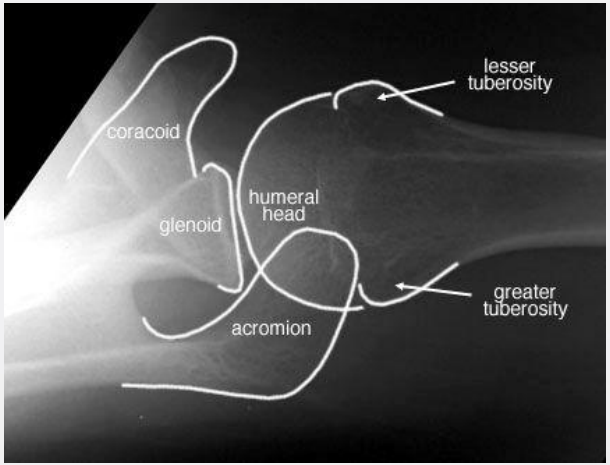


Source: Simel DL, Rennie D: *The Rational Clinical Examination: Evidence-Based Clinical Diagnosis:* http://www.jamaevidence.com



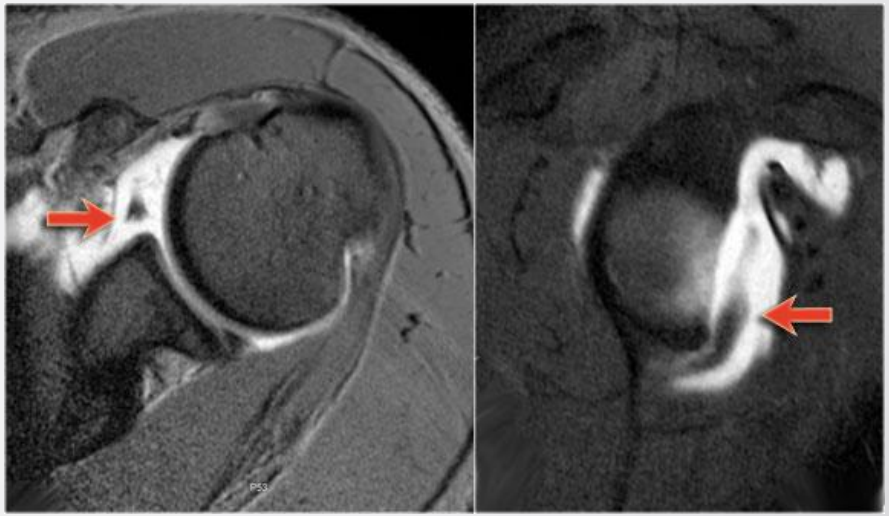
Imaging

- Radiographs
  - AP and IR view
  - Always get an axillary!
  - Valpeau view
  - Stryker notch view



Imaging

- MRI or MR arthrogram
  - MRA may be more sensitive for panlabral lesions and SLAP tears



CT

- CT helps with quantifying bone loss
  - En face sagittal 3D CT

Management – Non-op vs. Surgical

- For the younger, moderate to high risk individual, it is cost effective to perform primary stabilization in the first time shoulder dislocator
- Multiple cost effectiveness studies and recurrent instability studies to support early stabilization

Return to Sport as an Outcome Measure for Shoulder Instability

Surprising Findings in Nonoperative Management in a High School Athlete Population

Ellen Shanley,*†‡ PhD, PT, Charles Thigpen,†‡ PhD, PT, John Brooks,†§ PhD, Richard J. Hawkins,†‖ MD, Amit Momaya,¶ MD, Adam Kwapisz,# MD, PhD, Michael J. Kissenberth,†‖ MD, and John M. Tokish,** MD
Investigation performed at the Greenville Hospital System, Greenville, South Carolina, USA

- High percentage with shoulder instability do return to sport without missing time for injury
- Those with subluxations fare better than dislocations

Does Functional Bracing of the Unstable Shoulder Improve Return to Play in Scholastic Athletes? Returning the Unstable Shoulder to Play

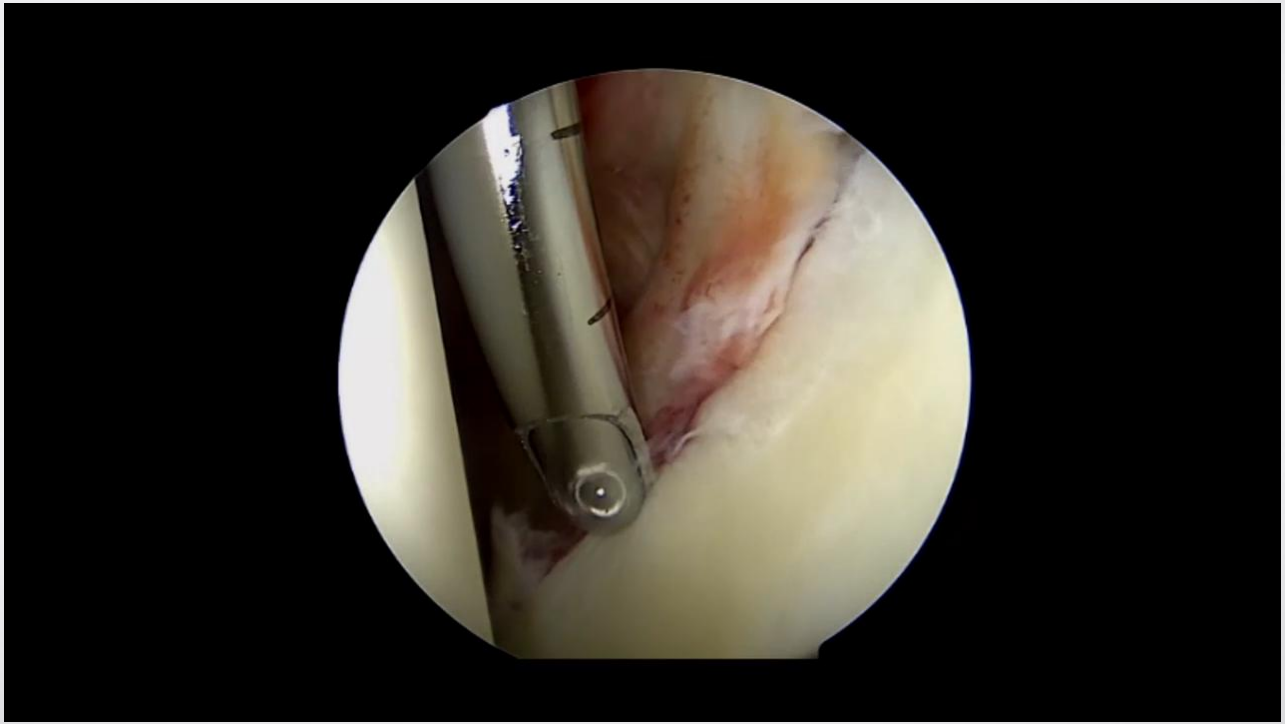
Adam Kwapisz, MD, PhD,[†,‡] Ellen Shanley, PhD, PT, OCS,[§] Amit M. Momaya, MD,[‖] Chris Young, ATC,[¶] Michael J. Kissenberth, MD,[*‖] Stefan J. Tolan, MD,[‖] Keith T. Lonergan, MD,[‖] Douglas J. Wyland, MD,[‖] Richard J. Hawkins, MD,[†] Stephan G. Pill, MD,[‖] and John M. Tokish, MD[#]

- Functional bracing did not lead to increased success rates compared with no bracing

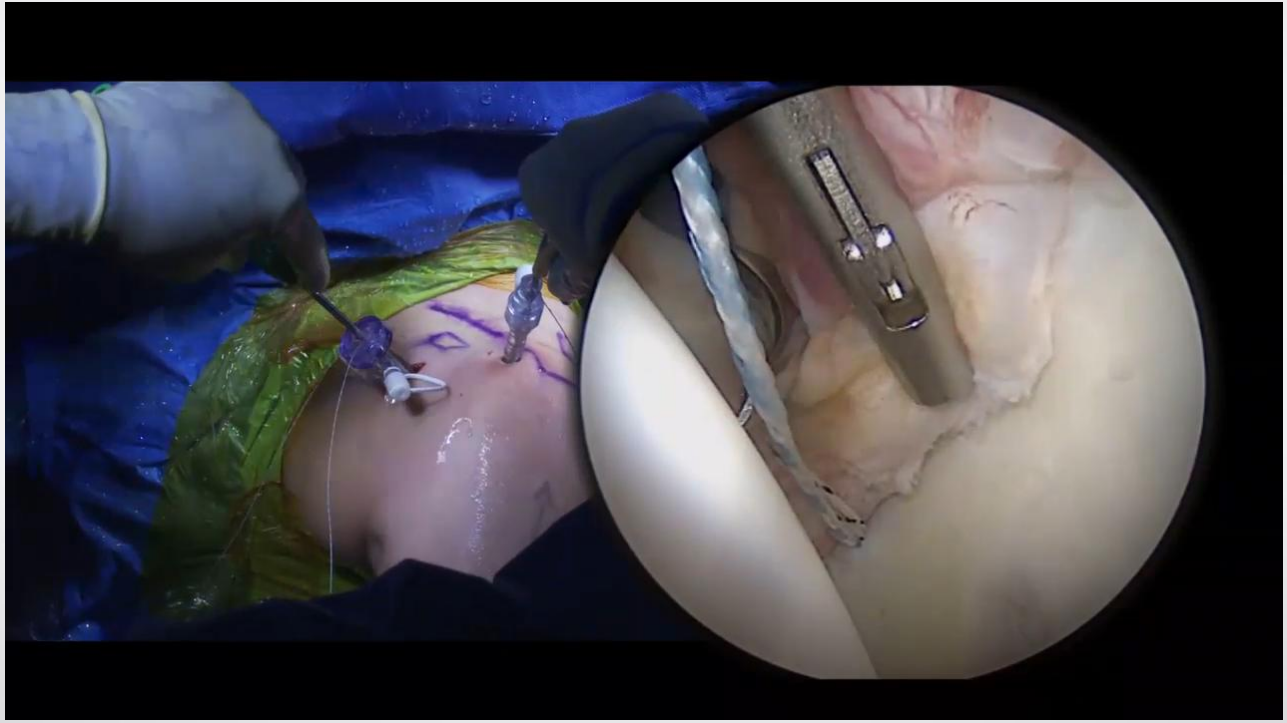
Surgical Treatment

- Arthroscopic Bankart
  - Minimally invasive
  - Easier recovery
  - Higher rates of recurrence?
    - 6.3% to 35.3%
  - Likely most useful for primary procedures without any notable bone loss

Bankart Repair

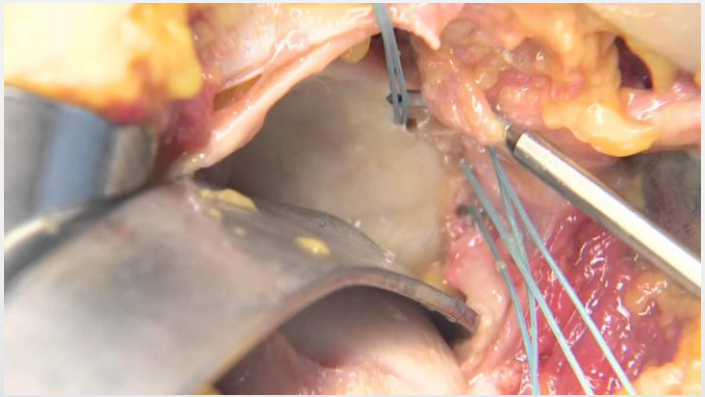


Bankart Repair



Open Bankart

- Better capsular shift?
- Lower incidence of recurrent instability?



Clinical Outcomes of Arthroscopic Bankart Repair

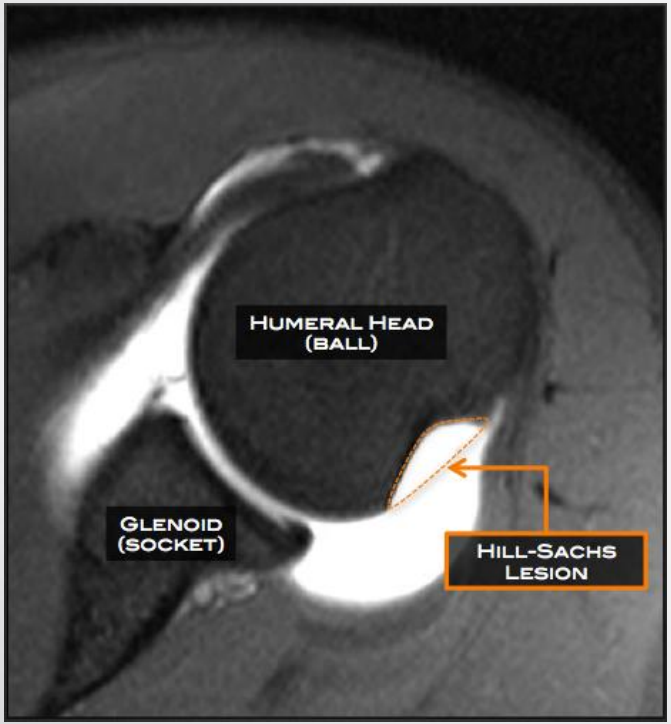
Study	Total No. of Patients in Study	Mean Age (Range)	Complications	Dislocation Events (%)	Rowe Score (Mean)
Kim et al[29]	32	38 (30–62)	0	6.3	90
Castagna et al[30]	31	26.3 (17–46)	0	19.4	80.1
Franceschi et al[31]	60	27.6 (15–40)	0	8.3	88
Van der Linde et al[32]	68	31	0	35.3	NR
Boughebri et al[33]	45	29.4 (17–58)	0	8.9	82.6
Plath et al[34]	100	27.7 (16–57)	0	21.0	NR

NR = not reported

Bankart + Remplissage

- Remplissage (French: to fill in)
  - Fill in the Hill Sachs defect
  - Two mechanisms of action
    - Prevent engagement of the Hill Sachs lesion
    - Tether the humeral head back

Remplissage



Arthroscopic Bankart repair with and without arthroscopic infraspinatus remplissage in anterior shoulder instability with a Hill-Sachs defect: a randomized controlled trial

Peter MacDonald, MD[a,b,*], Sheila McRae, PhD[b,c], Jason Old, MD[a,b], Jonathan Marsh, MD[a,b], Jamie Dubberley, MD[a,b], Greg Stranges, MD[a,b], James Koenig, MD[a,b], Jeff Leiter, PhD[b,c], Randy Mascarenhas, MD[d], Sharad Prabhakar, MD[a], Treny Sasyniuk, MSc[c], Peter Lapner, MD[e]

- 108 patients randomized
- No REMP group 18% recurrent instability vs. 2% in REMP group

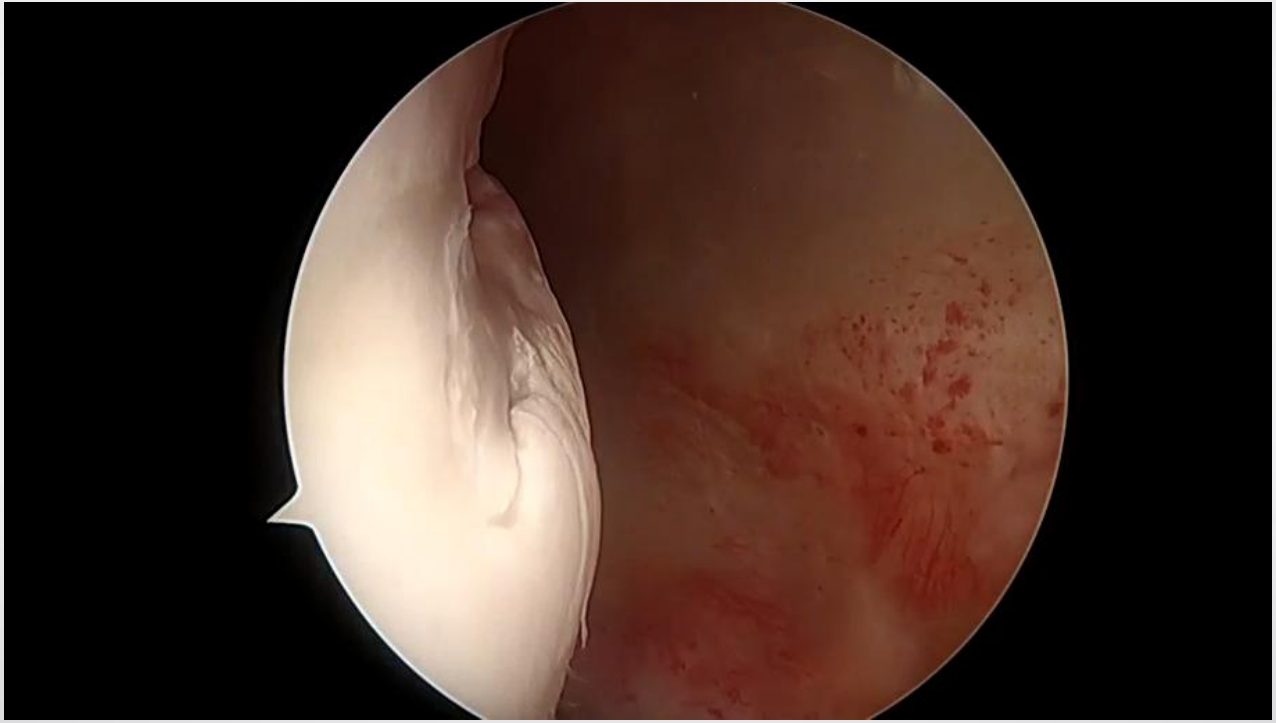
Indications

- Hill Sachs lesions
- Contact athletes
- Young patients
- Male patients

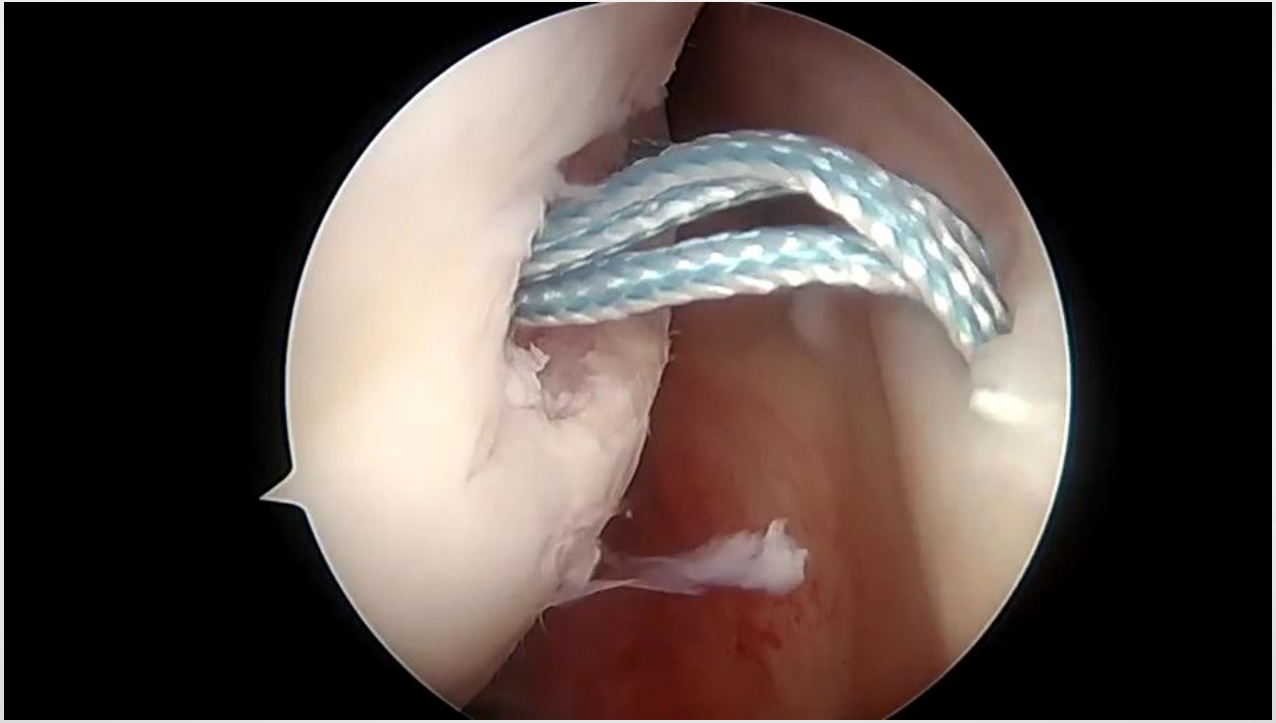
Perils

- Avoid anchors too medial into HS lesion
- Cautious about overhead throwing athletes

Technique

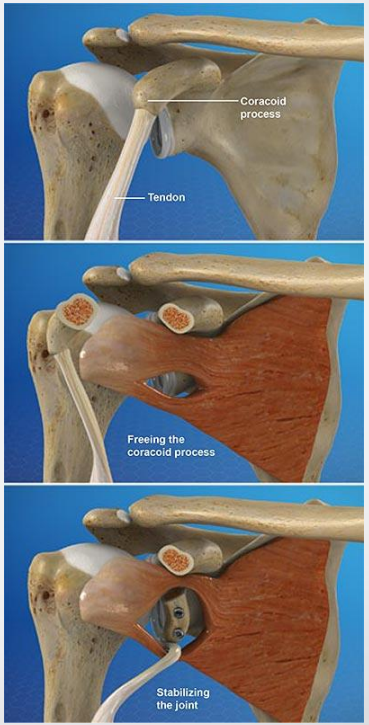


Technique



Latarjet Technique

- Coracoid transfer procedure
- Technically demanding procedure
- Restores bone loss on glenoid
- Triple effect (sling, bone, capsule)



Latarjet Outcomes

Clinical Outcomes of Latarjet Technique

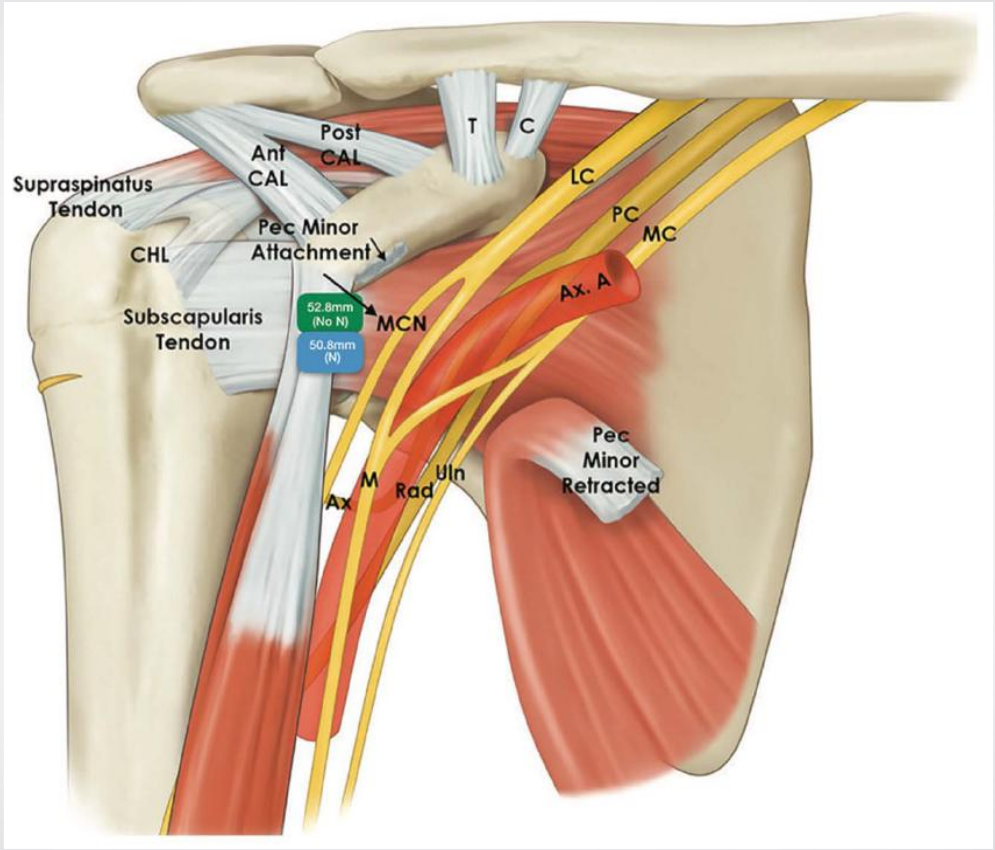
Study	Total No. of Patients	Mean Age (Range) (Years)	Complications	Dislocation Events (%)	Rowe Score (Mean)
Singer et al.[45]	14	25 (18–36)	0	0.0	85.3
Allain et al[46]	58	27.5 (15–58)	16	0.0	86.6
Hovelius et al[47]	118	27 (15–57)	21	3.4	89.4
Schroder et al[48]	52	20.5 (18–22)	6	9.6	81.8
Hovelius et al[49]	97	27.8 (17–51)	3	5.2	87.5
Neyton et al[50]	37	23.4 (17–33)	5	0.0	93
Hovelius et al[51]	34	26 (17–40)	0	8.8	NR
Laderman et al[52]	117	28.4 (16–55)	11	0.9	NR
Bouju et al[53]	58	26.7 (NR)	19	1.7	NR
Mizuno et al[54]	68	29.4 (16–58)	5	2.9	89.6
Gordins et al[55]	31	26.7 (15–39)	6	3.2	NR

NR = not reported

Latarjet Imaging

Latarjet complications

- Neuropraxia
- Graft and screw breakage
- Graft osteolysis
- Nonunion
- Recurrent instability vs. OA



Other Graft Options

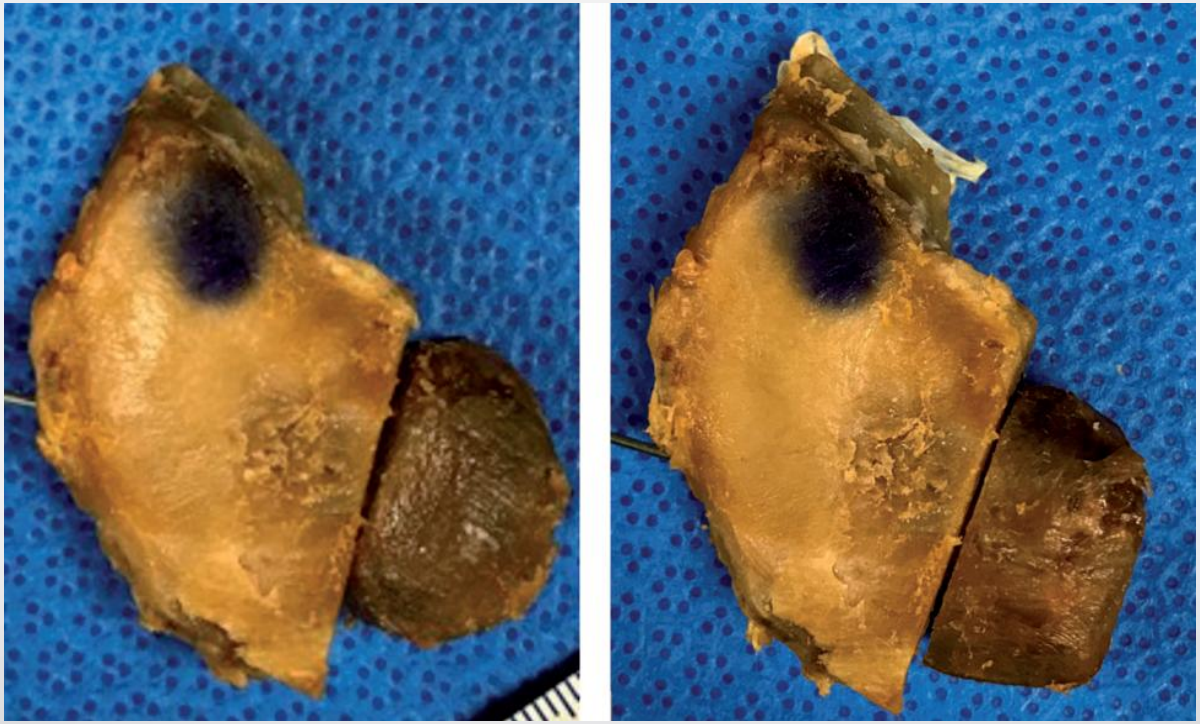
- Distal clavicle
- Iliac crest bone
- Distal tibial allograft
- Pre-shaped allograft

Distal clavicle autograft for anterior-inferior glenoid augmentation: A comparative cadaveric anatomic study

Parke W Hudson, Martim C Pinto, Eugene W Brabston, Matthew C Hess, Brent M Cone, Johnathan F Williams, William S Brooks, Amit M Momaya and Brent A Ponce

- Distal clavicle graft are larger and can restore larger bone defects when compared to coracoid

Distal Clavicle



Applying the Glenoid Track Concept in the Management of Patients with Anterior Shoulder Instability

Amit M. Momaya[1] · John M. Tokish[1]

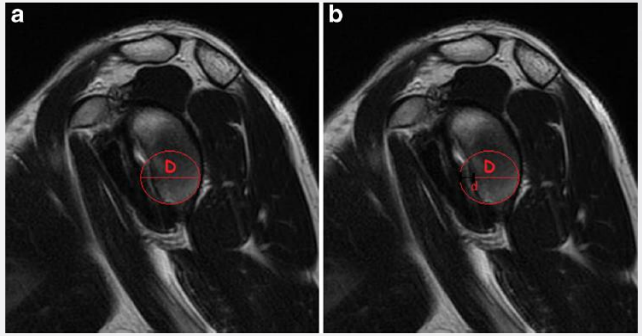
- Need to think about this concept as a bipolar lesion (both glenoid and humeral head sides)

Glenoid Track

- Yamamoto et al. introduced the concept of the glenoid track, which helps us understand the dynamic interaction between bony lesions on the glenoid and humeral head.
- Using a cadaveric model, the authors demonstrated that the glenoid track is equivalent to approximately 84% of the width of the normal glenoid

Glenoid Track formula

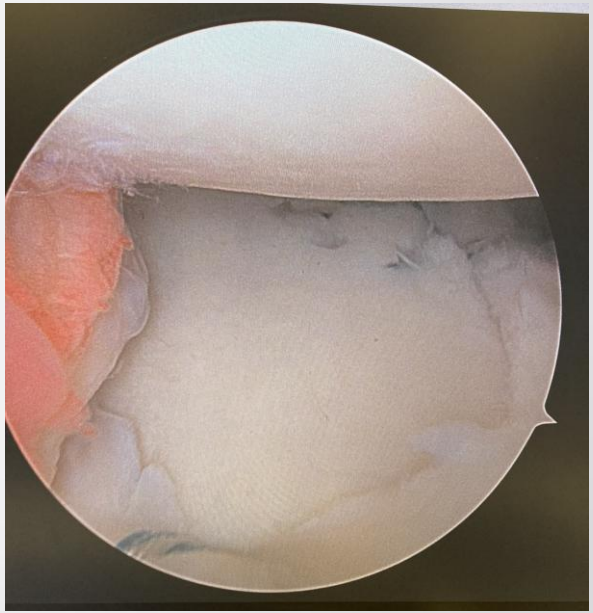
- GT – Glenoid Track
- GT = 0.83D – d
- HSI – Hill Sachs Interval



Glenoid Track

- If GT > HSI then “on track”
- If GT < HSI then “off track”





Clinical Validation of the Glenoid Track Concept in Anterior Glenohumeral Instability

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

Investigation performed at the Tripler Army Medical Center, Honolulu, Hawaii

- 57 shoulders with isolated arthroscopic Bankart repair
- 8% failure in on track group compared to 75% of the off track group

GBL (%)	On-track HSL	Off-track HSL
0%-13.5%	Arthroscopic Bankart repair	Arthroscopic Bankart repair + remplissage
		Open inferior capsular shift
		Latarjet procedure
13.5%-25%	Arthroscopic Bankart repair + remplissage	Arthroscopic Bankart repair + remplissage
	Open inferior capsular shift	Open inferior capsular shift
	Latarjet procedure	Latarjet procedure
>25%	Latarjet procedure	Latarjet procedure

Rehab after Bankart

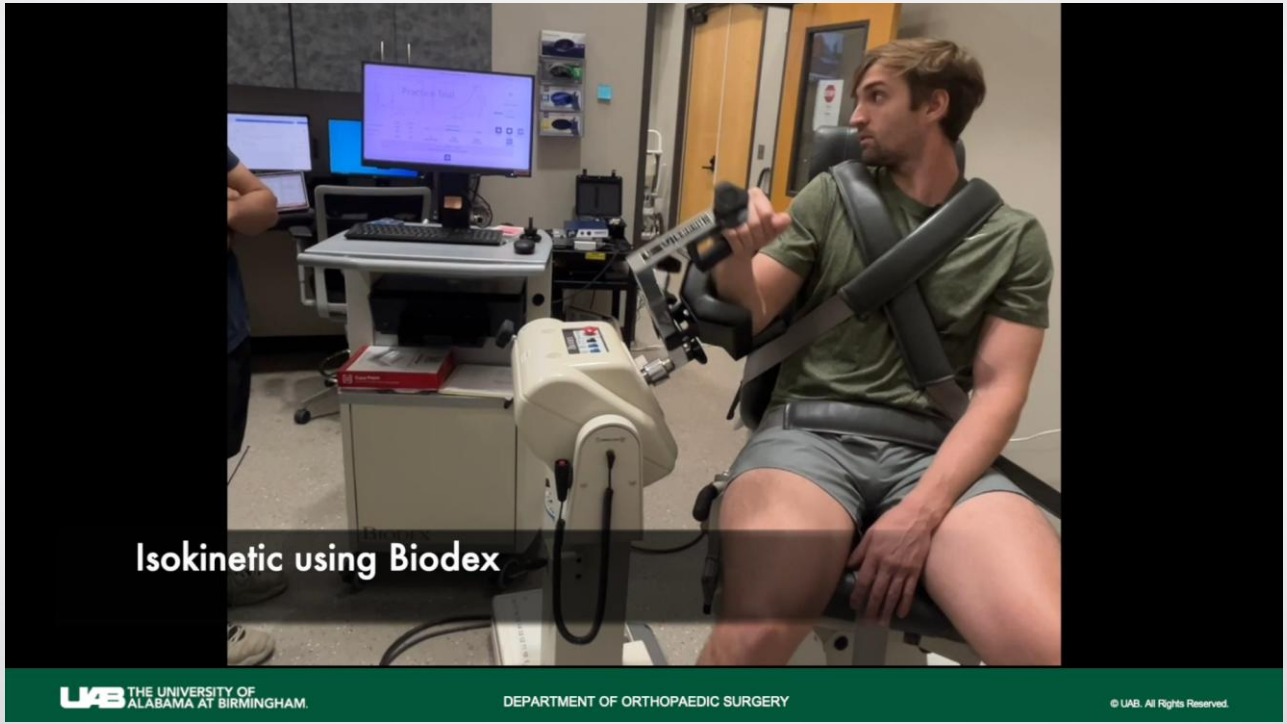
A High Percentage of Healthy Volunteers Fail to Pass Criteria-based Return to Sport Testing for Arthroscopic Bankart Repair

Mathew Hargreaves, B.S., Audria Wood, M.P.H., Nick Manfredi, B.S., Dev Dayal, B.S., Jacobi Hudson, B.S., Kaitlin Higgins Pyrz, B.S., Mike Bagwell, P.T., D.P.T., Aaron Casp, M.D., Thomas Evely, D.O., Eugene Brabston, M.D., Kevin Wilk, P.T., D.P.T., and Amit Momaya, M.D.

Background

- Drummond et al. evaluated a criteria based return to sport (CBRTS) protocol after arthroscopic Bankart repair
  - Patients who underwent CBRTS had reduced recurrent shoulder instability (5% vs. 22%, P <.001)

Methods


Isokinetic using Biodex
THE UNIVERSITY OF ALABAMA AT BIRMINGHAM.
DEPARTMENT OF ORTHOPAEDIC SURGERY
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Methods

- Do healthy participants pass such protocols?
  - Non-dominant arm = “affected” side
  - Limb symmetry index (LSI) within 10% of contralateral side
  - Pass for shotput test 80% < LSI < 110%
  - CKCUE greater than or equal to 21

Results

Number of participants	26
Male sex, n (%)	14 (53.8)
Female sex, n (%)	12 (46.2)
Age, yr (SD)	24.8 (2.50)
Weight, lb (SD)	163.0 (30.5)
Dominant arm R, n (%)	22 (84.6)
Dominant arm L, n (%)	2 (7.7)
No dominance, n (%)	2 (7.7)

L, left; R, right; SD, standard deviation.

Results

- No individual passed all tests
  - Individual on average passed 47% of tests
- Non-dominant arm deficit in only 4/12 tests

Test	Overall Passing Rate
Isometric Testing	60.6%
Isokinetic Testing	41.4%
Endurance Testing	23.1%
Shot Put	96.2%
CKCUE	50%

Discussion

- RTS after ACLR (24% of uninjured athletes pass symmetry thresholds)
- Protocols individualized for type of athlete (contact vs. non contact)
- Not applicable to postop Bankart patients?
- Psychosocial factors (kinesiophobia, low confidence, etc)

Conclusion

- High percentage of healthy individuals are unable to pass many of the post-Bankart repair CBRTS protocol tests

Case 1

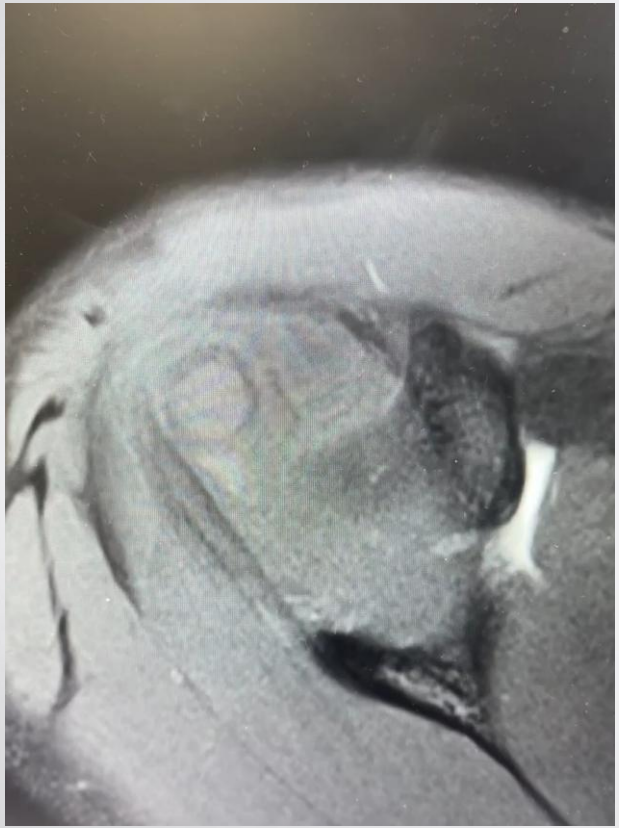
- 19 year old collegiate soccer goalie
- Reports 4-5 anterior shoulder dislocations during play
  - Now easily “subluxes” with everyday activity
- Aspirations to play professionally

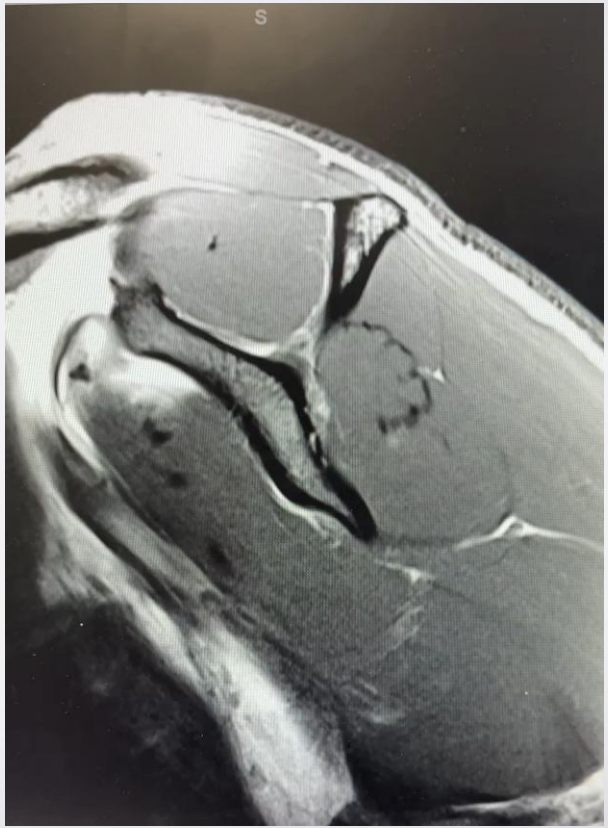
Physical Exam

- + Anterior apprehension and + relocation test
- Full ROM
- Beighton score: No hypermobility
- Negative push-pull test
- Equivocal O’Briens
- NVI

Imaging

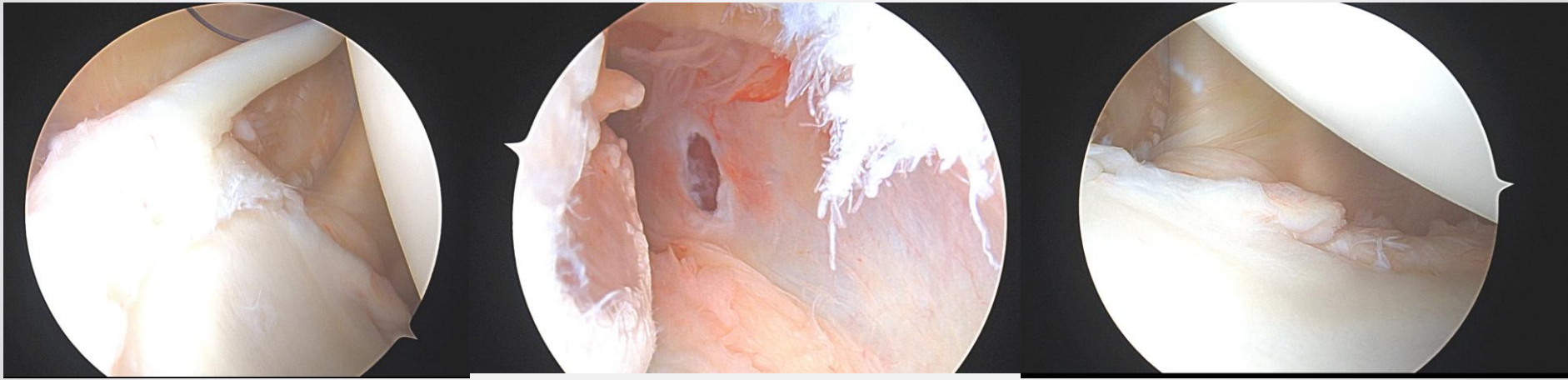
Imaging



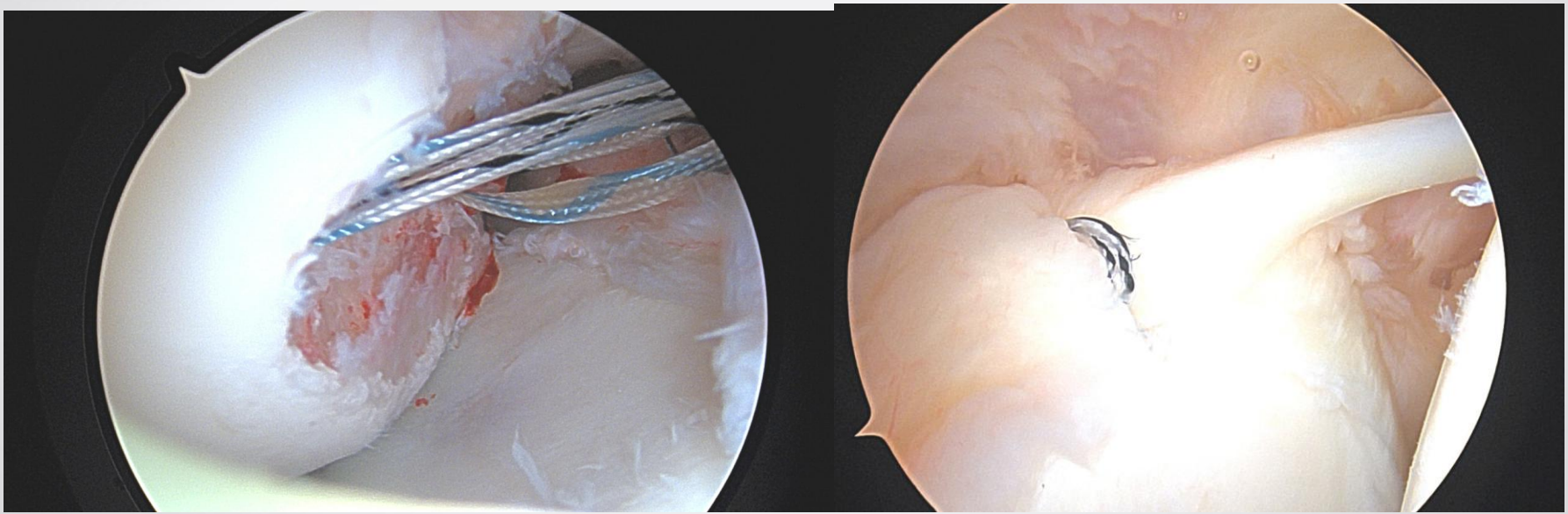


Intra-Op Exam

Scope Imaging



Intra-Op Imaging



Postop

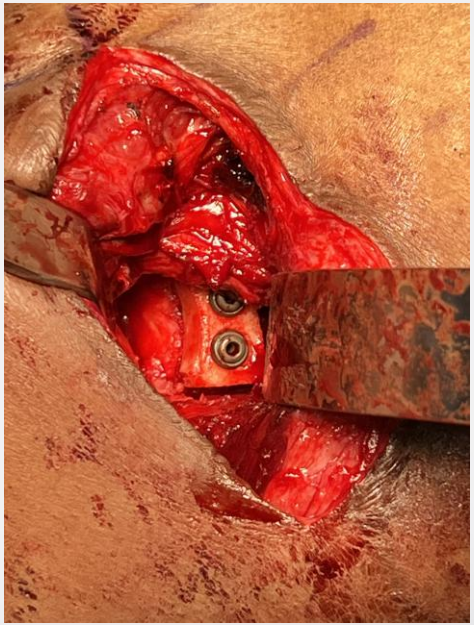
Post Op Range of Motion

Case 2

- Collegiate football athlete
- Previous surgery in Georgia with latarjet
- Transfers in with gross instability

Revision Case – Failed Latarjet

Distal Tibia Fresh Allograft



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Knowledge that will change your world