Posterior Shoulder Instability: The Back is NOT the Front

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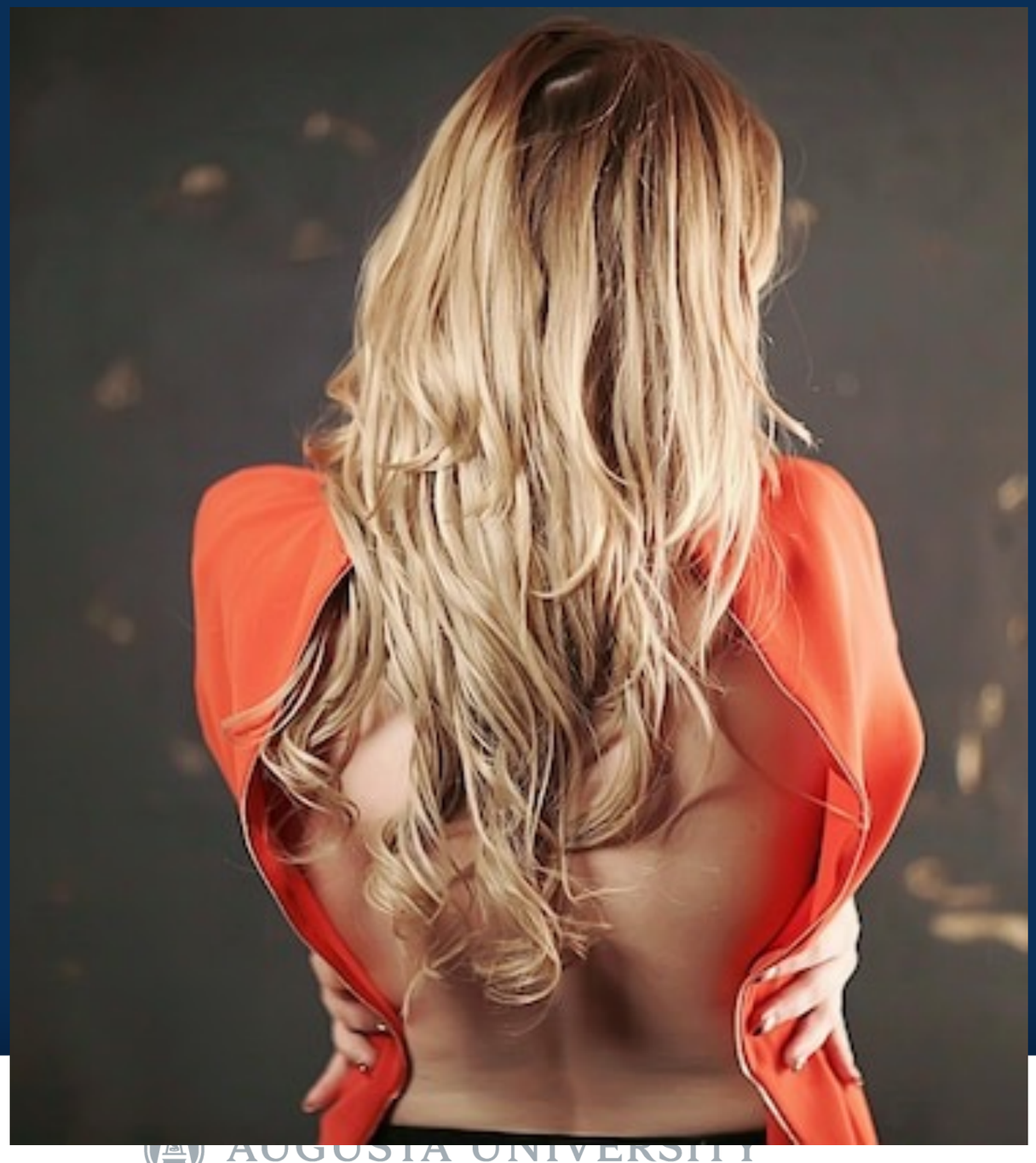


Disclosures

- Exactech, Inc – Consultant, Research Support
- Arthrex, Inc – Consultant
- AAOS Committee member
- ASES Committee member

Posterior Shoulder Instability: The Back is NOT the Front

Outline

History
Exam
Imaging
Arthroscopic Repair
Open Bony Reconstruction

The Back is NOT the Front: What Our Patients Tell Us

- Patients unlikely to c/o “instability” – unlike anterior instability patients
- C/o vague symptoms
  - Shoulder feels “weird”, “different”, “not right”
- Position of arm during symptoms = key
  - Flexed position, not abd/ER of ant instability

The Back is NOT the Front: Exam

Kim's Test: Feeling for posterior translation, clunk or pain with axial force, adduction

Modified Jerk Test:

From this position, slowly bring the arm back into abduction while keeping initial axial force and feel for reduction of the glenohumeral joint from a posteriorly subluxated position

Push/Pull:

Feeling for pain or posterior subluxation while pulling up on hand and posteriorly subluxating humerus, can relax arm and have less guarding

Technical Note

Arthroscopy Techniques
Companion to Arthroscopy:
The Journal of Arthroscopic and Related Surgery

The Thumb Test: A Simple Physical Examination Maneuver for the Diagnosis of Symptomatic Posterior Shoulder Instability

Pascal Boileau, M.D., Ph.D., Peter M. Van Steyn, M.D., Michael Czarnecki, D.O., Sylvain Teissier, Gregory Gasbarro, M.D., and Joseph W. Galvin, D.O.

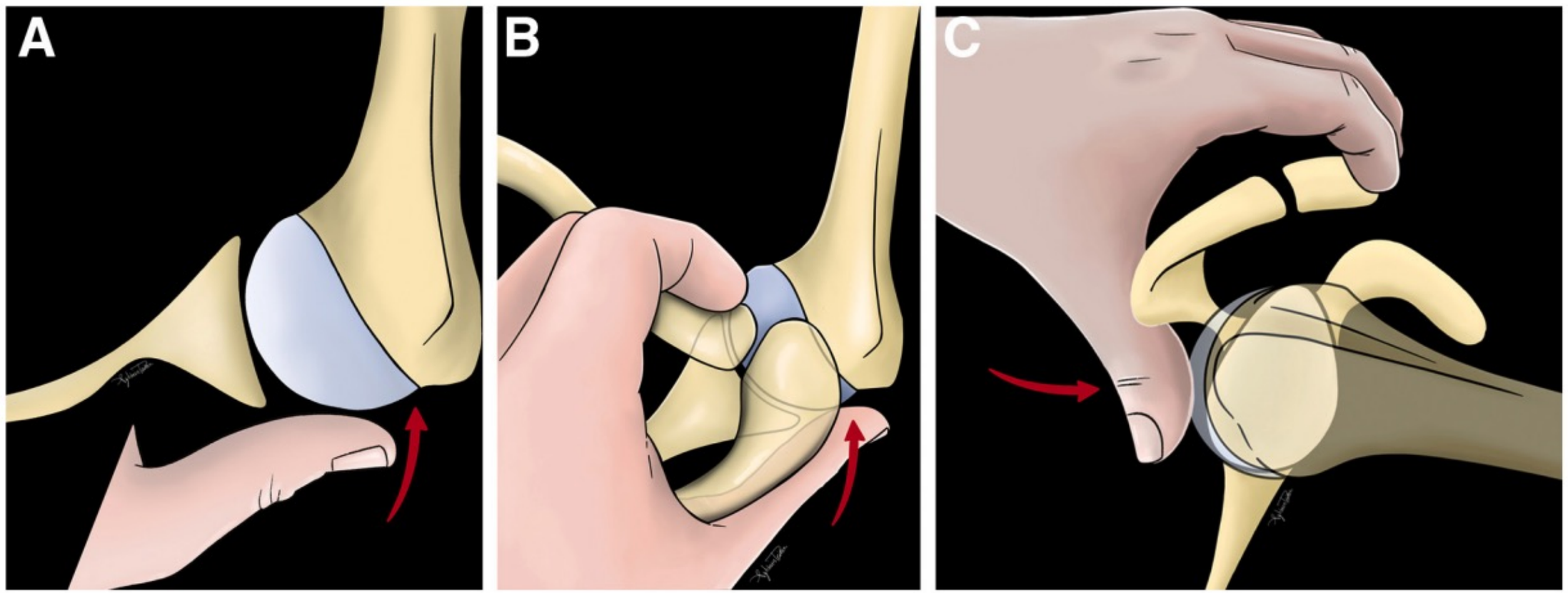
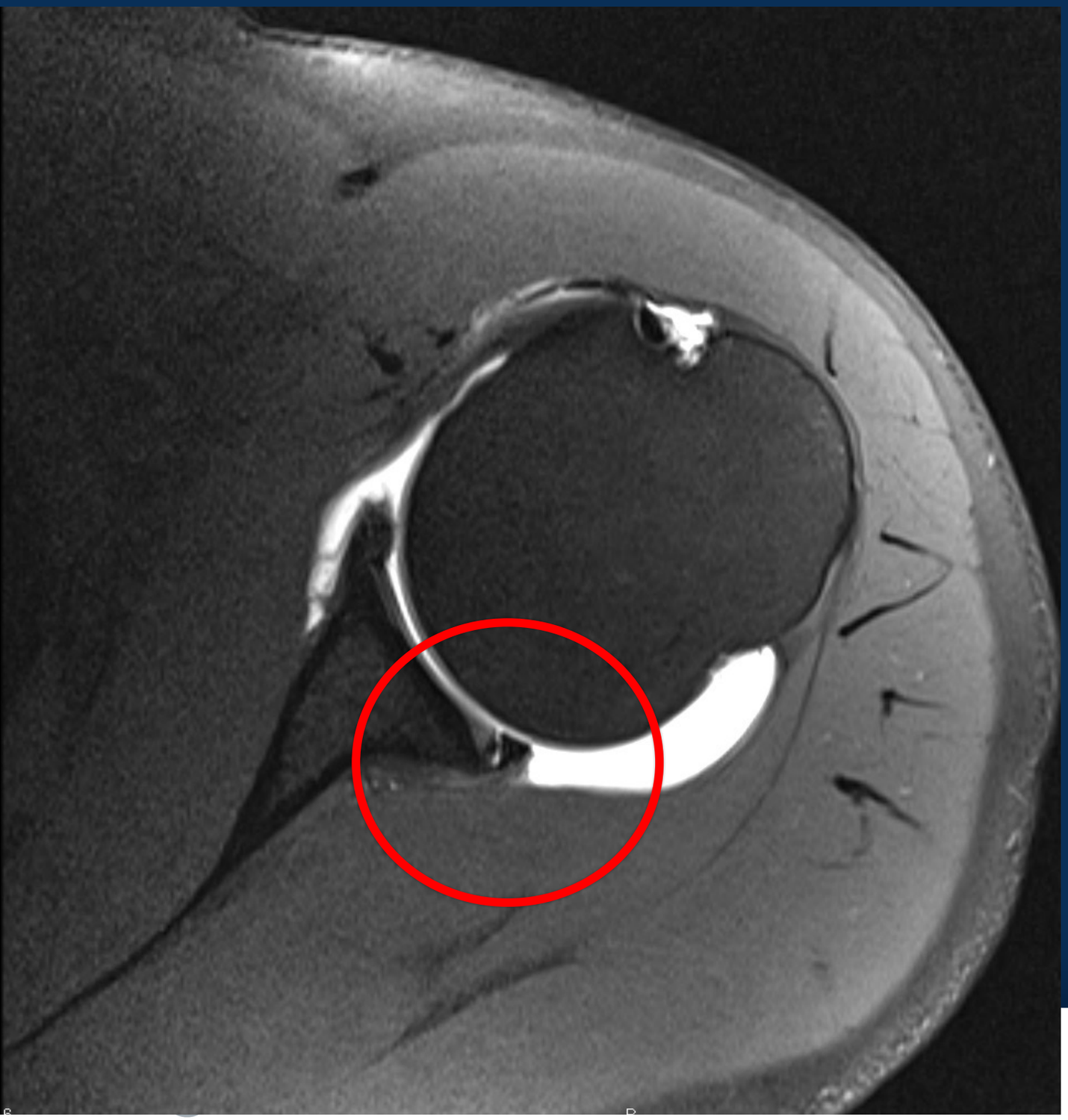


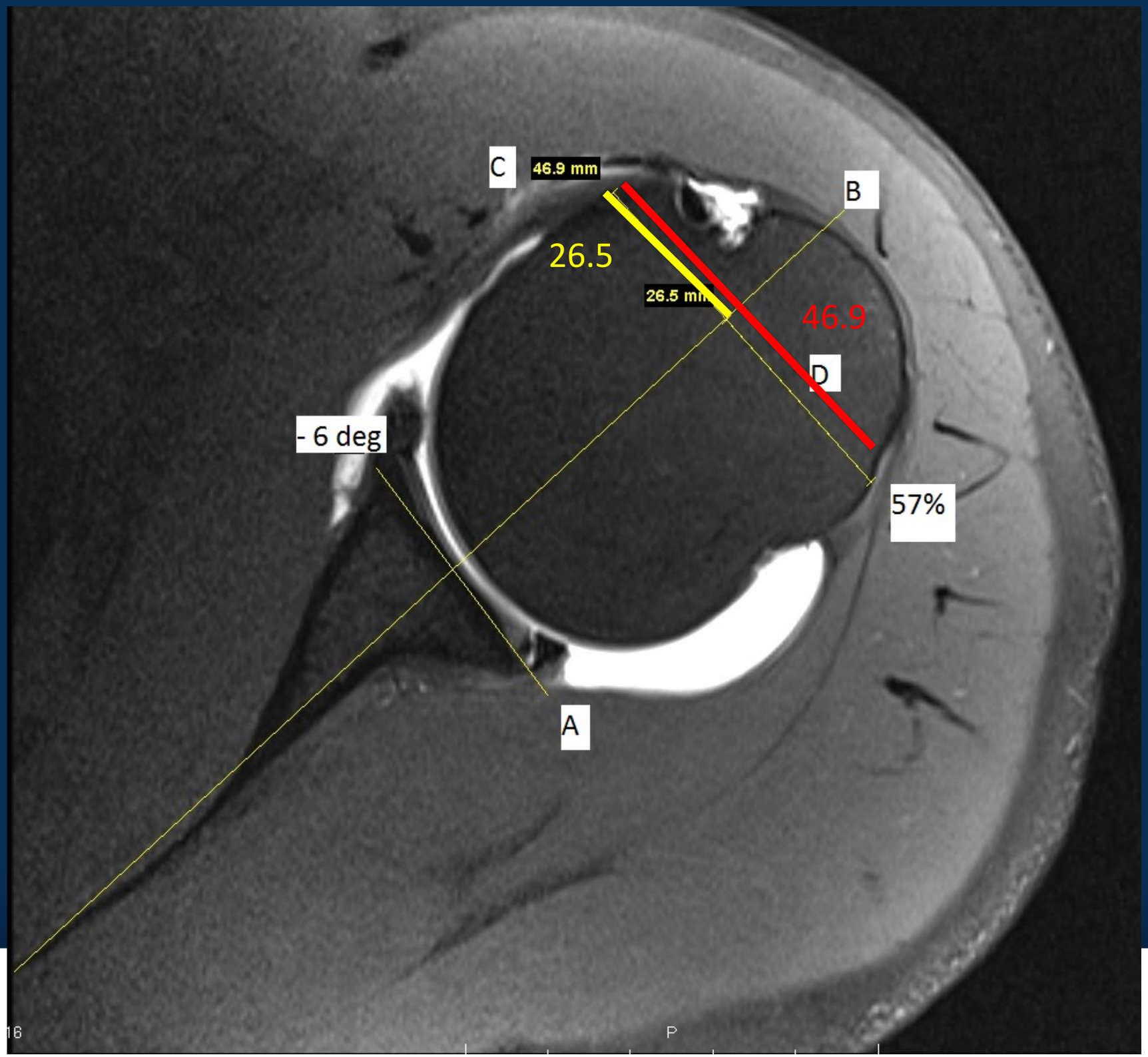
Fig 3. (A) Axial drawing depicting the thumb test for a right shoulder with placement of the examiner's thumb over the posterior glenohumeral joint line, which creates a functional posterior "bone block." (B) Axial drawing depicting the thumb test for a right shoulder with placement of the thumb over the posterior glenohumeral joint line. The examiner uses the fingers from the same hand to anchor to the anterior clavicle as a counterforce. (C) Sagittal drawing depicting the thumb test with the fingers anchored on the anterior clavicle.

The Back is NOT the Front: Imaging



- Some of these posterior labral tears seemed straightforward on MRI, but some seemed to also have posterior subluxation of the head

So, We Looked more closely at Version & Subluxation



26.5/46.9= 56.5%

**Within normal range*

So what if the humeral head is posteriorly subluxated?

Does it matter whether or not there is posterior subluxation on the MRI, or is that just a function of a patient being supine?

Arthroscopy: The Journal of Arthroscopic and Related Surgery,

Comparison of Glenoid Version and Posterior Humeral Subluxation in Patients With and Without Posterior Shoulder Instability

Stephen A. Parada, M.D., Josef K. Eichinger, M.D., Guillaume D. Dumont, M.D., Lauren E. Burton, B.A., Maggie S. Coats-Thomas, B.S., Stephen D. Daniels, B.S., Nathan J. Sinz, B.A., Matthew T. Provencher, M.D., Laurence D. Higgins, M.D., and Jon J. P. Warner, M.D.

Table 2. Results

	Posterior Instability Group		Control Group		
	M (SD)	95% CI	M (SD)	95% CI	*P* Value
Glenoid retroversion, °	8.1 (5.0)	6.6-9.6	5.6 (3.0)	4.7-6.5	.009
Humeral subluxation, %	56 (6.8)	53.9-58.1	54 (5.1)	52.4-55.6	.25
Number of patients with retroversion greater than −8°	18	—	10	—	—

CI, confidence interval; M, mean; SD, standard deviation.

Glenoid retroversion was significantly increased in patients with posterior labral tears compared with matched controls.

No statistically significantly difference between the groups with regard to posterior humeral subluxation.

Subluxation is not a reliable indicator of the presence or absence of posterior shoulder instability

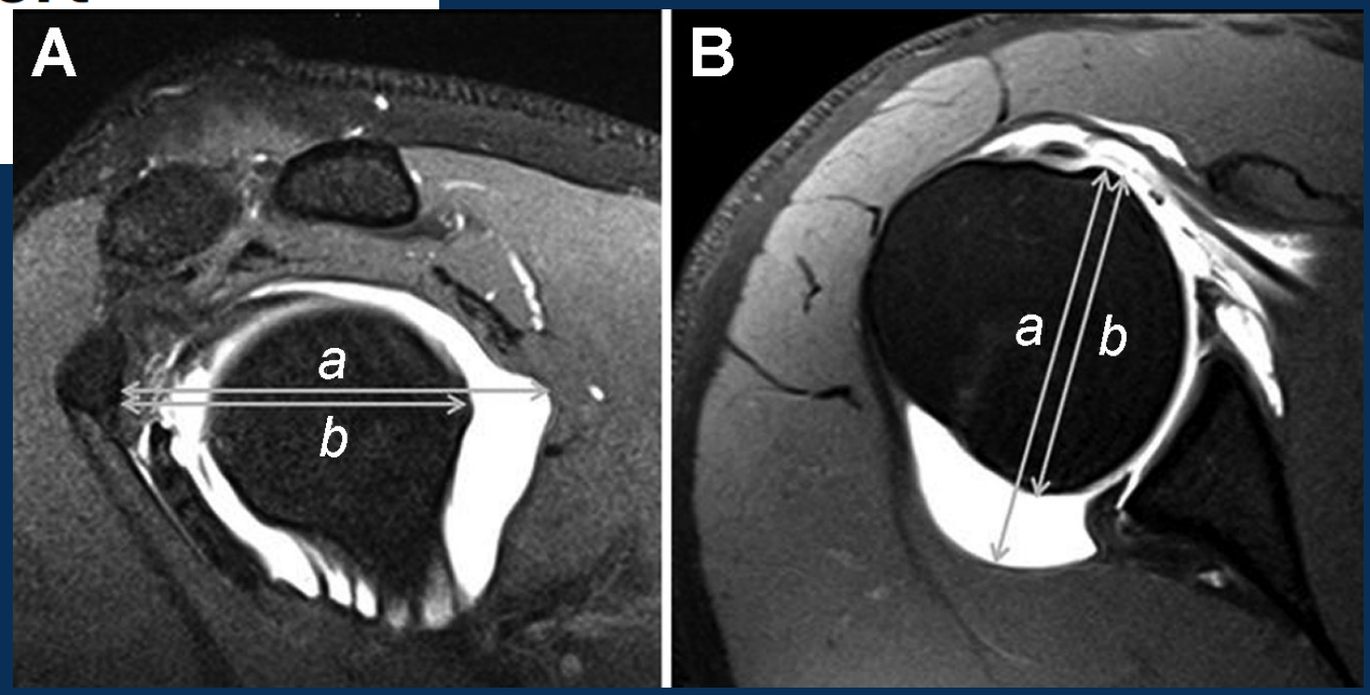
What if we added arthrograms, could we find specific differences?

Critical Findings on Magnetic Resonance Arthrograms in Posterior Shoulder Instability Compared With an Age-Matched Controlled Cohort

MAJ Joseph W. Galvin,*† DO, MAJ Stephen A. Parada,‡ MD, Xinning Li,§ MD, and LTC Josef K. Eichinger,† MD

The American Journal of Sports Medicine

Ok, subluxation doesn't matter, but I thought we needed a CT scan to measure version?



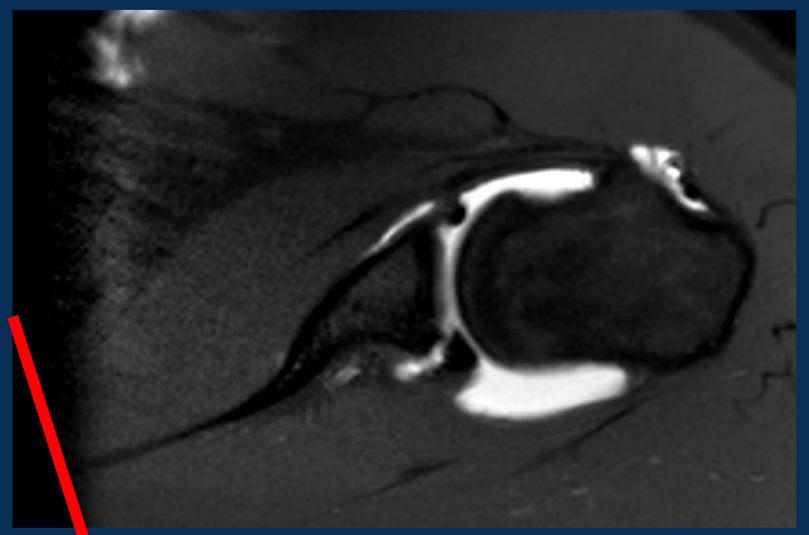
- Increased glenoid retroversion, glenoid dysplasia, and increased axial posterior capsular cross-sectional area significantly associated with posterior labral tears and symptomatic posterior instability compared with matched controls
- Posterior humeral head subluxation not statistically significant with posterior shoulder instability with multivariate logistic regression.

Can we trust the glenoid version that we obtain from the MRI or do we need a CT scan?

Magnetic Resonance Imaging Correlates With Computed Tomography for Glenoid Version Calculation Despite Lack of Visibility of Medial Scapula

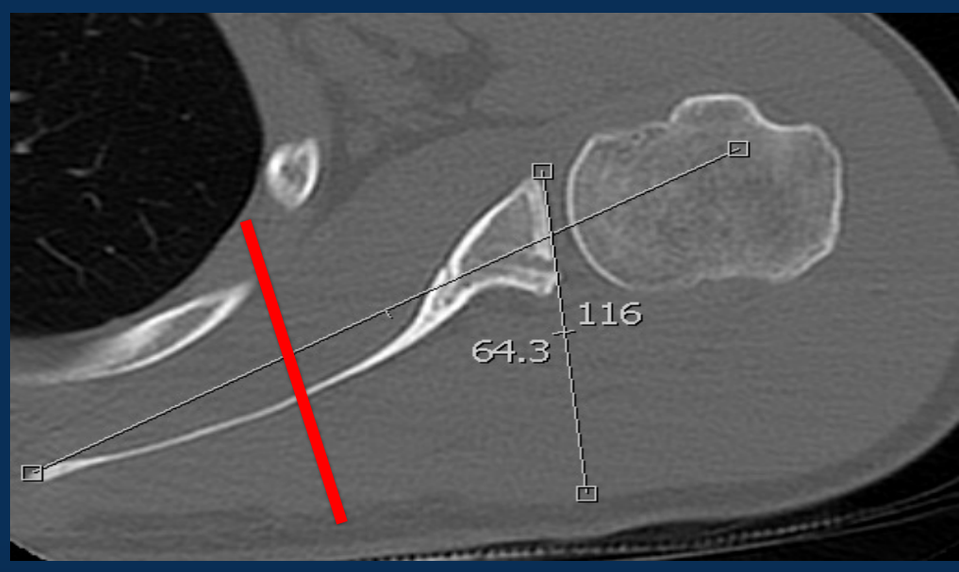
Stephen A. Parada, M.D., K. Aaron Shaw, D.O., Ivan J. Antosh, M.D., Josef K. Eichinger, M.D., Xinning Li, M.D., Emily J. Curry, B.A., and CAPT Matthew T. Provencher, M.D., MC, USNR

Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 36, No 1 (January), 2020: pp 99-105

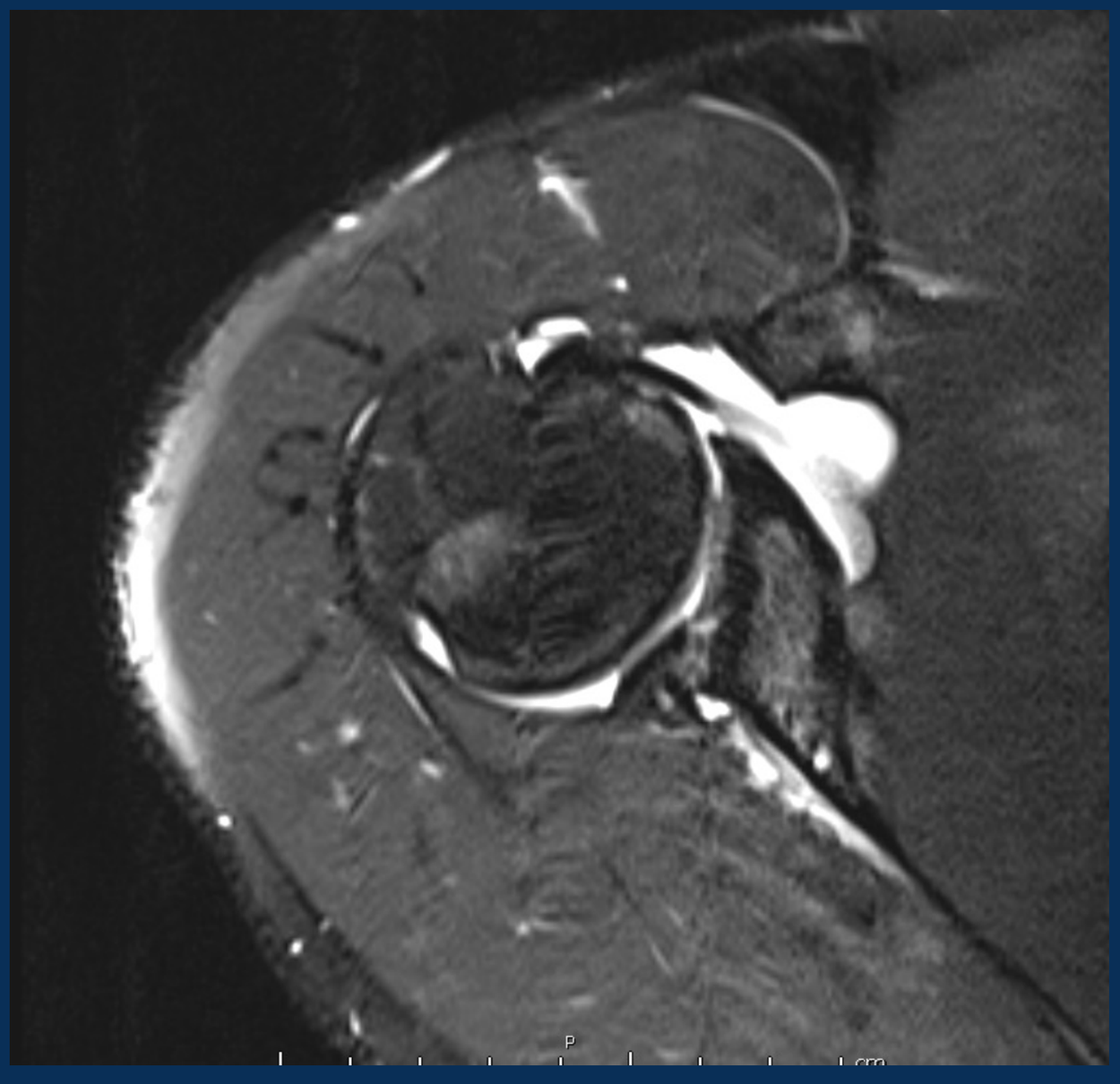


MRI = significant shorter scapular lengths when compared to CT imaging, however, no significant difference in glenoid version.

MRI analysis can be used to reliably assess version, even when the medial border of the scapula is truncated



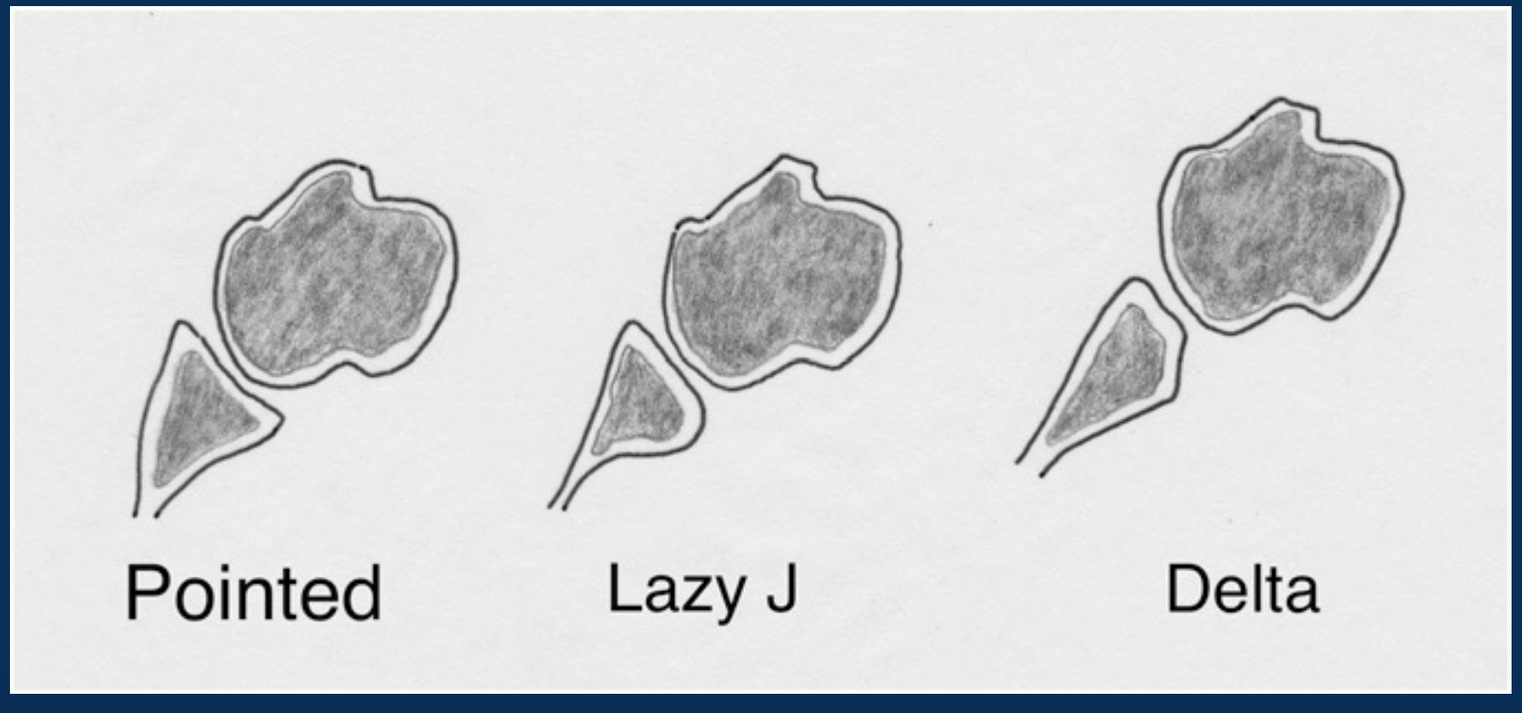
Still, be careful of jumping right to MRI

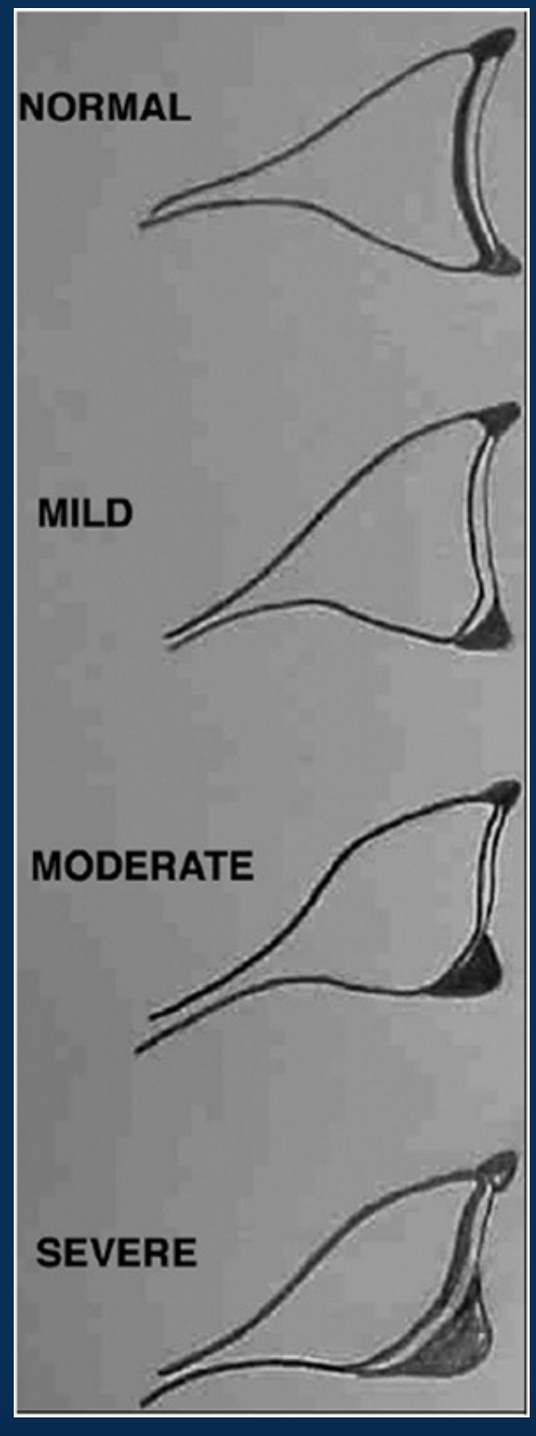


Recognize the “funny looking” scapula

We looked at a lot of imaging studies…and noticed some glenoids that looked different

Lit review demonstrated pencil drawings that didn't exactly describe what we were looking at



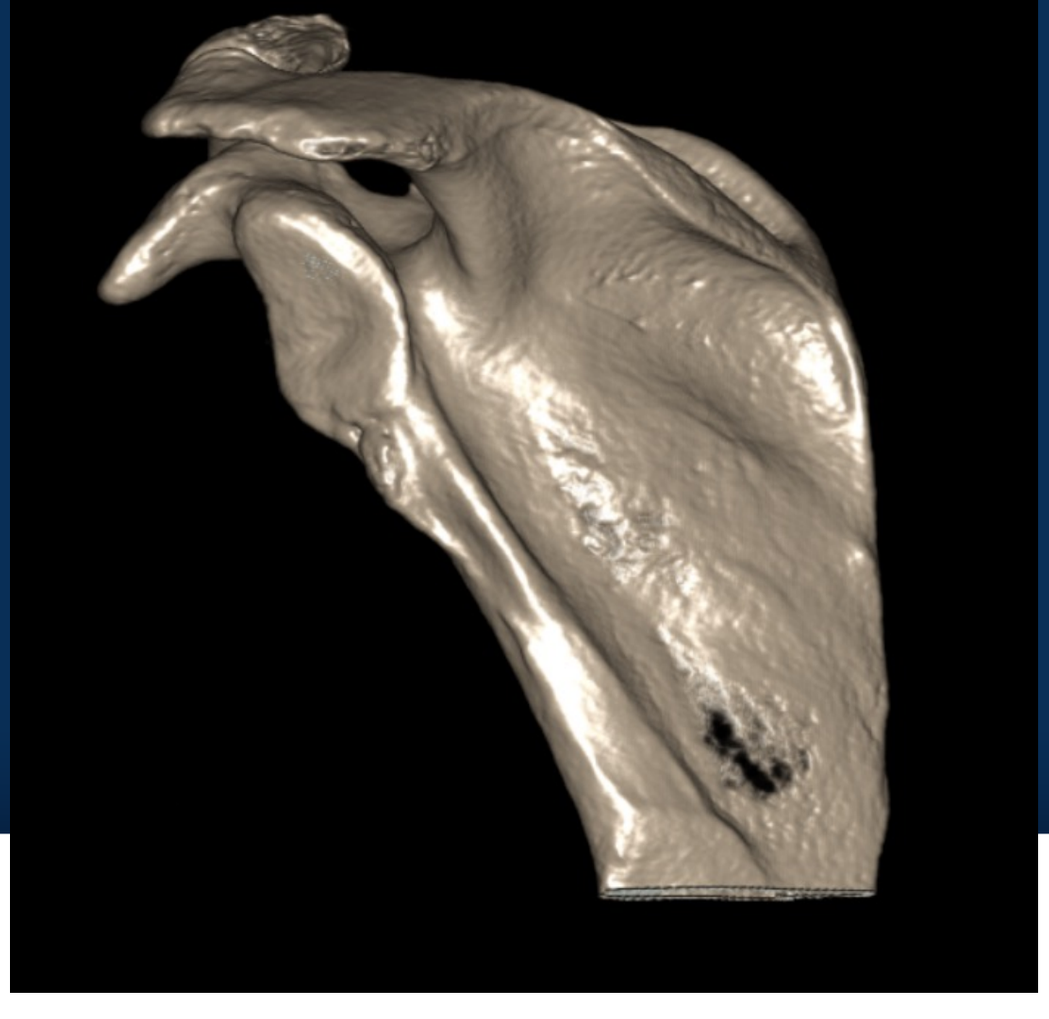


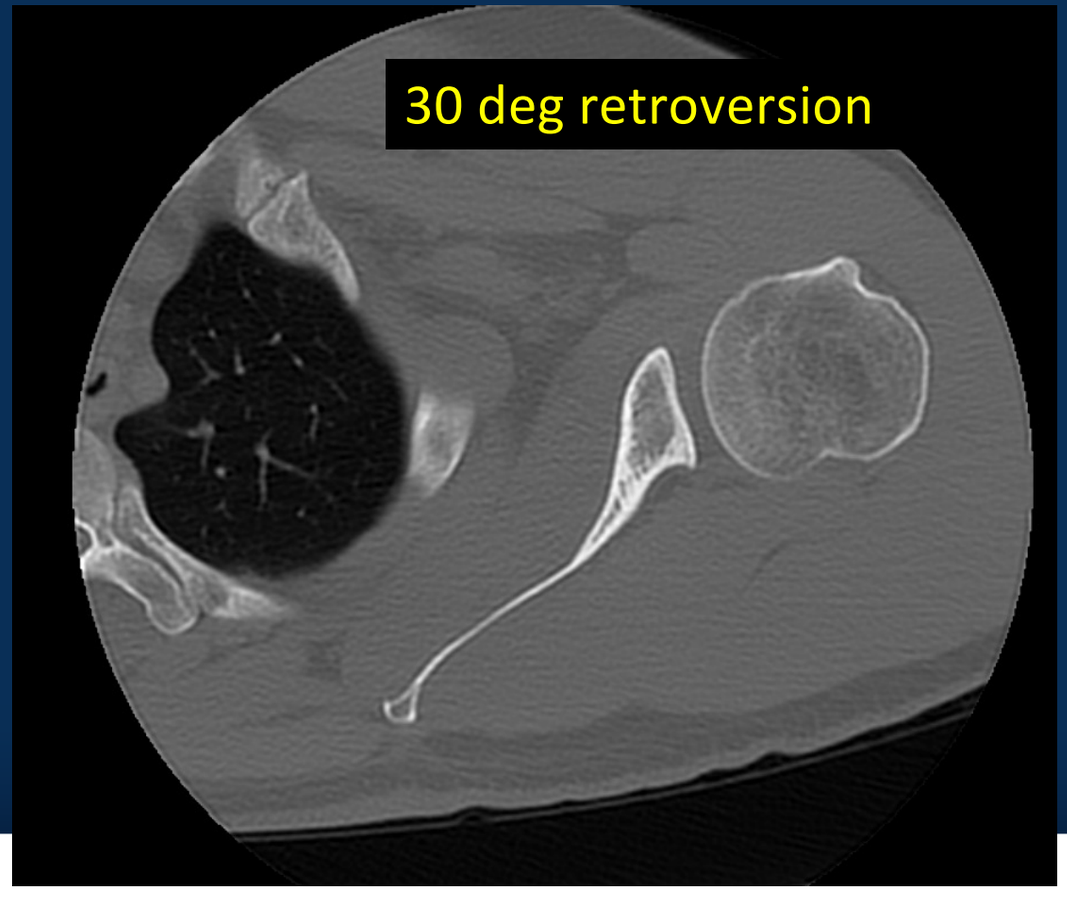
CURRENT CONCEPTS REVIEW

Glenoid Dysplasia

Pathophysiology, Diagnosis, and Management

LTC Josef K. Eichinger, MD, MAJ Joseph W. Galvin, DO, LTC Jason A. Grassbaugh, MD, MAJ Stephen A. Parada, MD, and Xinning Li, MD





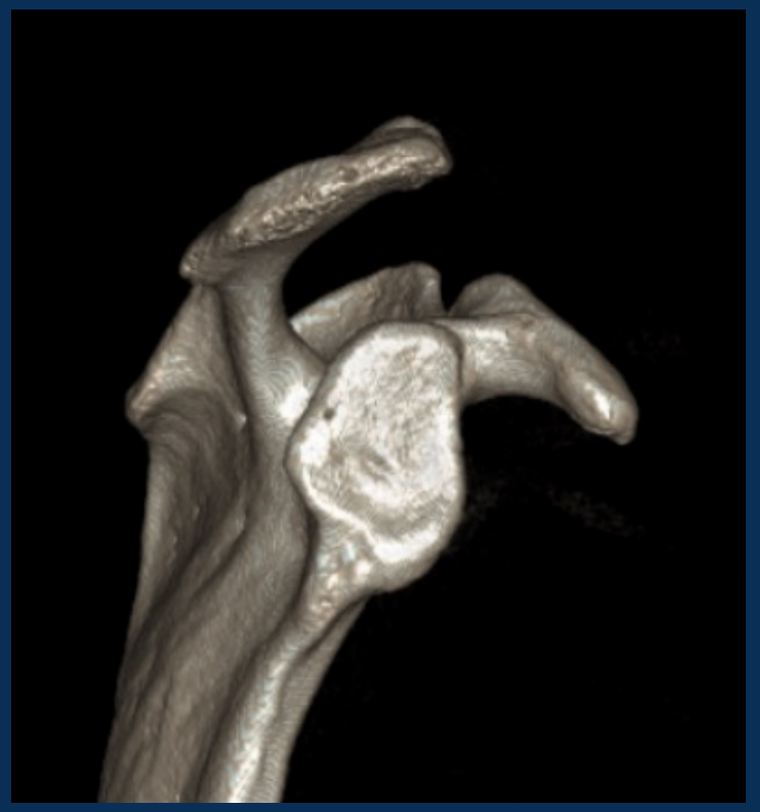
So Can you Still Repair the Labrum if Patients have Glenoid Dysplasia?

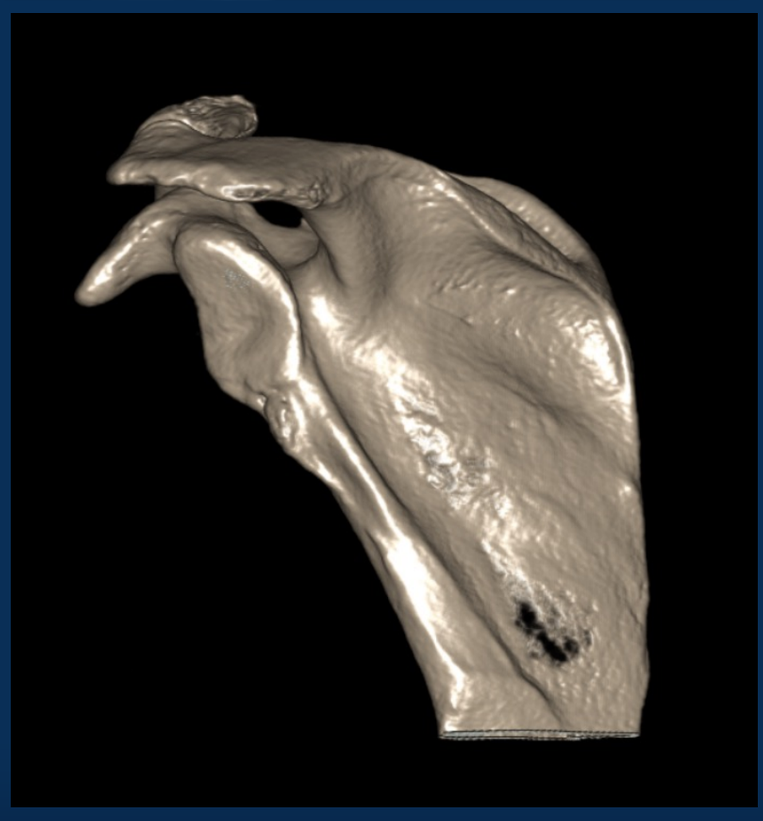
Arthroscopic treatment of posterior shoulder instability in patients with and without glenoid dysplasia: a comparative outcomes analysis

Joseph W. Galvin, MAJ, DO[a], Douglas R. Morte, BS[b], Jason A. Grassbaugh, LTC, MD[c], Stephen A. Parada, MAJ, MD[d], Samuel H. Burns, CPT, MD[c], Josef K. Eichinger, LTC, MD[e,*]

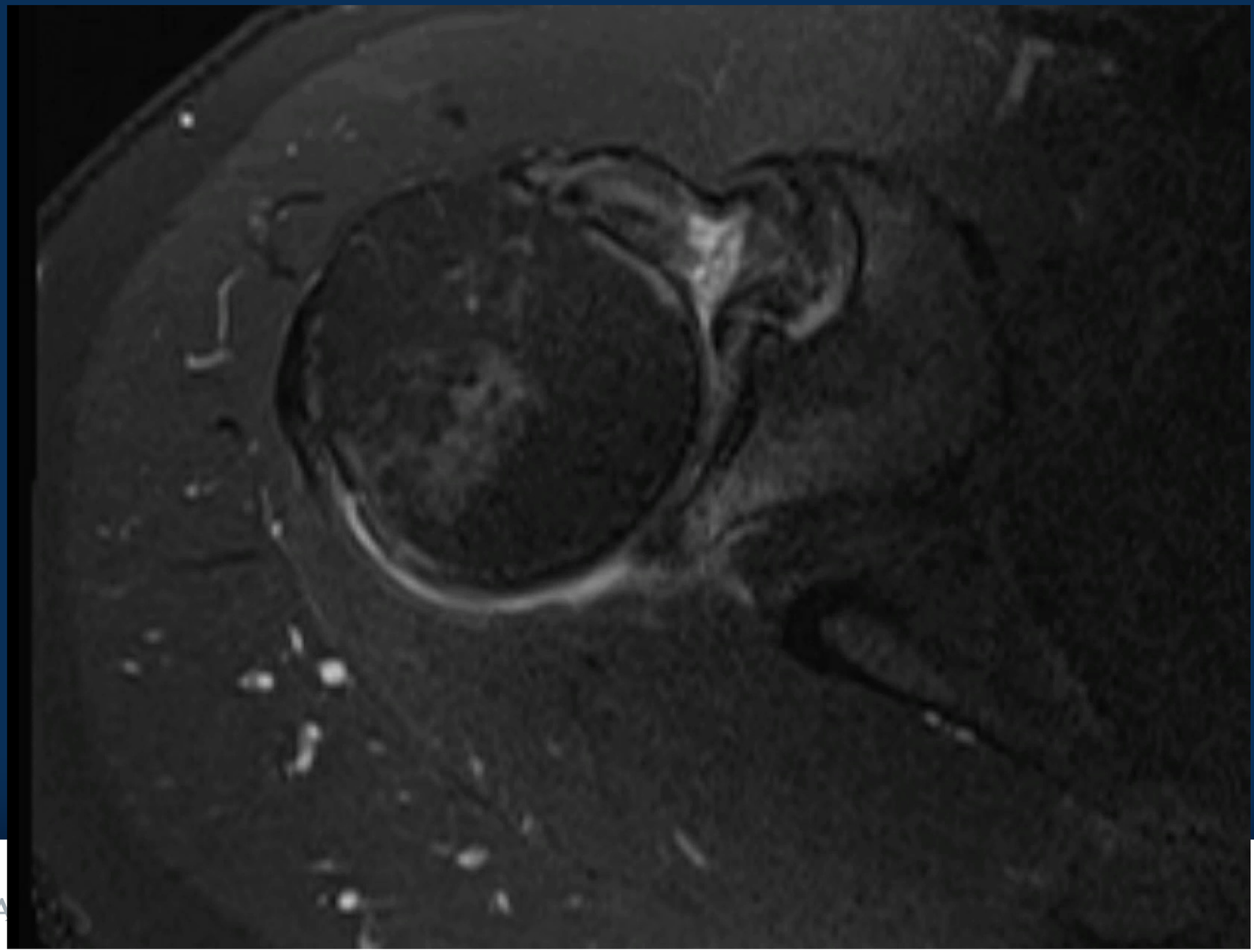
J Shoulder Elbow Surg (2017) 26, 2103–2109

- The presence or absence of glenoid dysplasia **did not** influence the outcome after arthroscopic posterior labral repair in a young military population
- **Other studies show > 10 deg retroversion is a predictor of higher failure rates

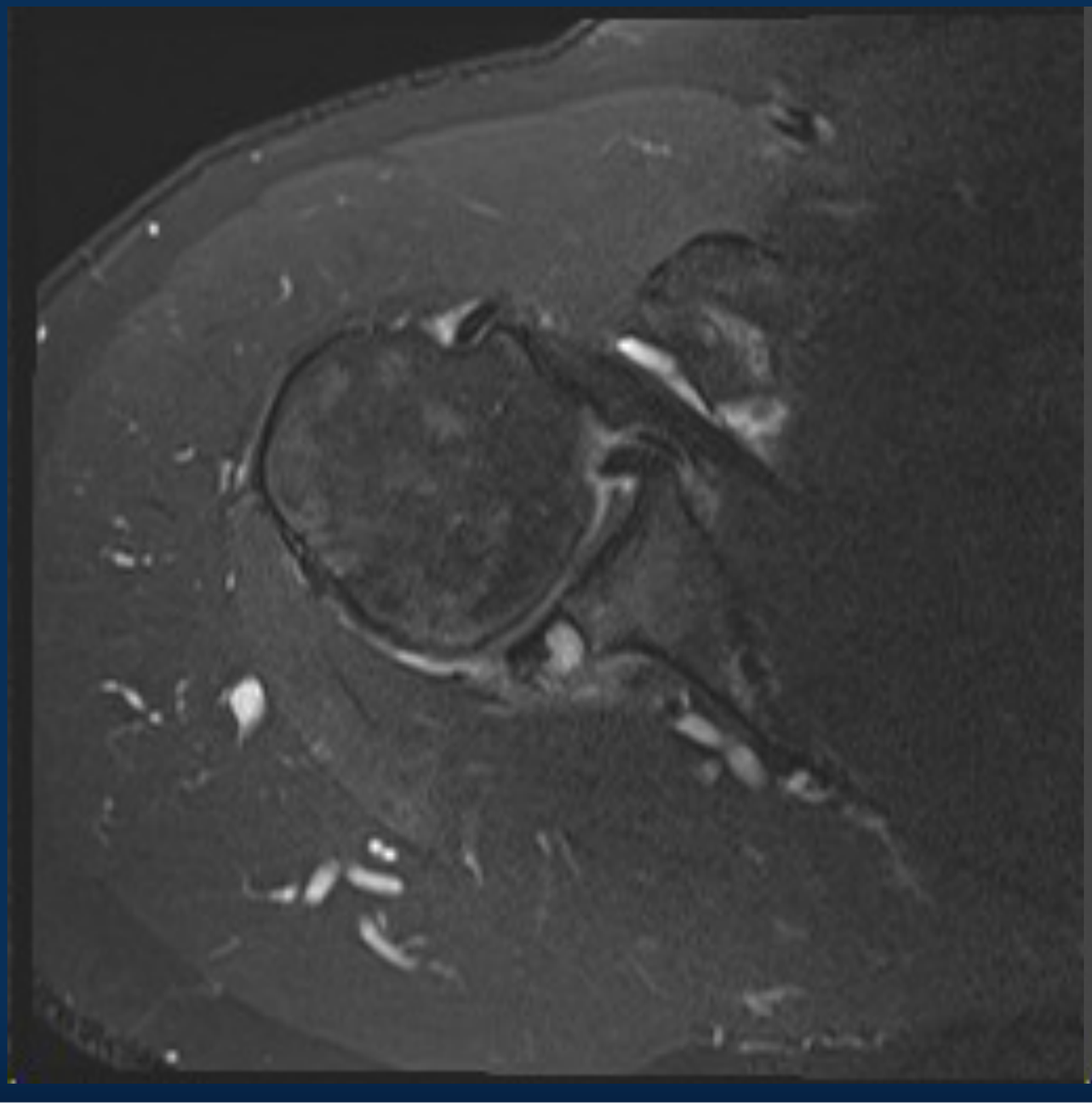


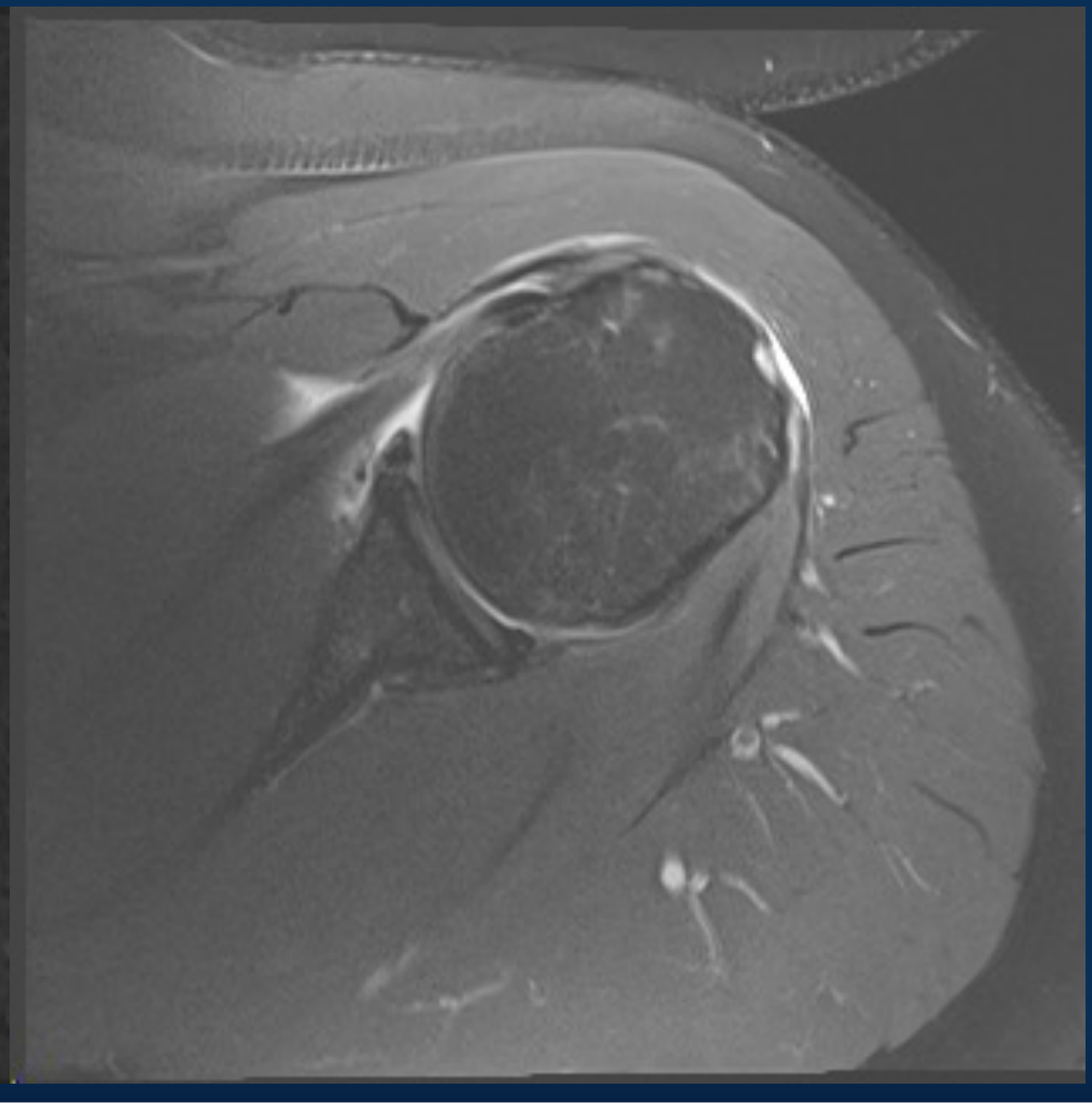


The Back is NOT the Front:
Another Variant of Labral Tears Exist! …in a very different patient population



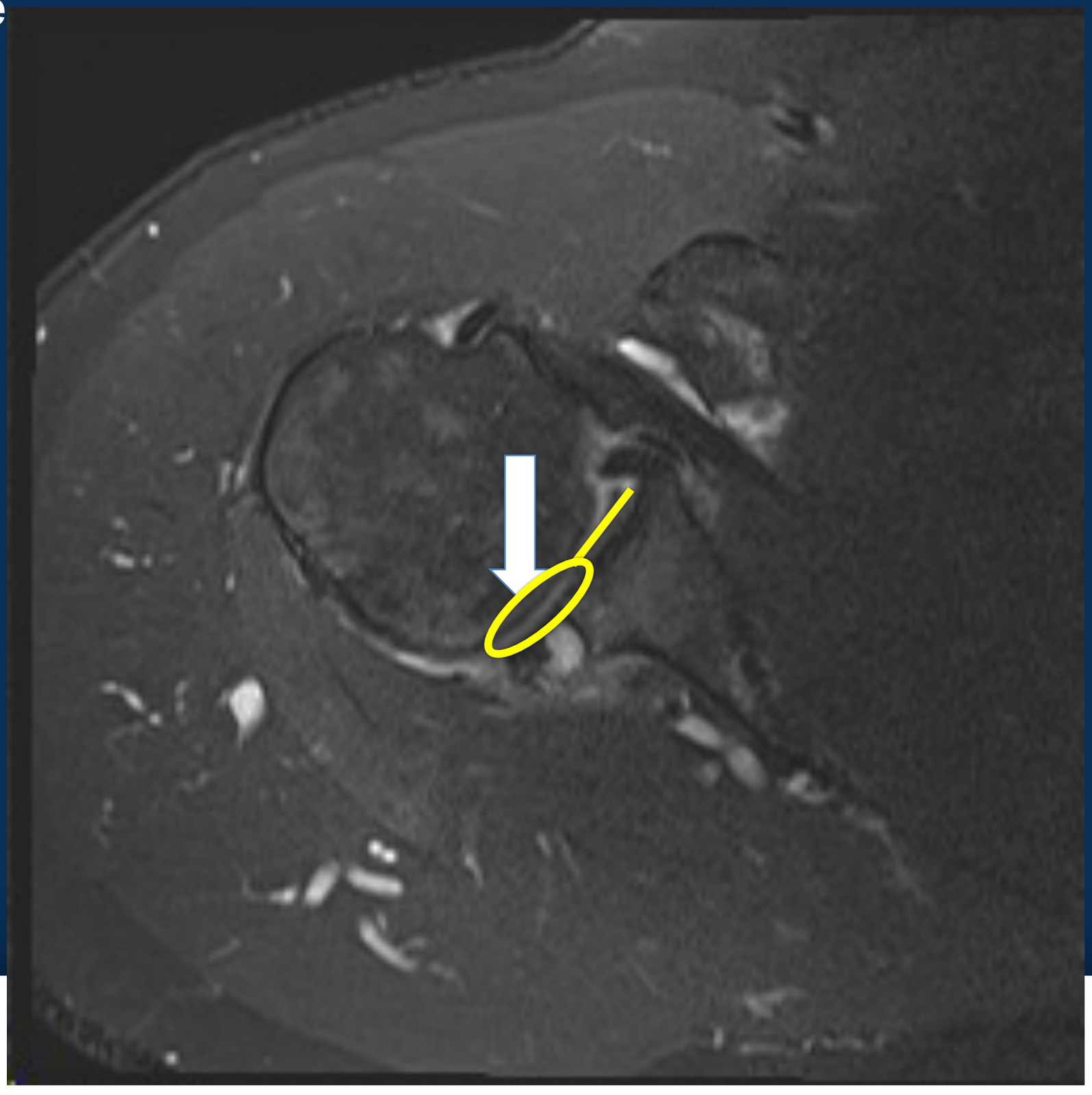
Pathologic vs Normal





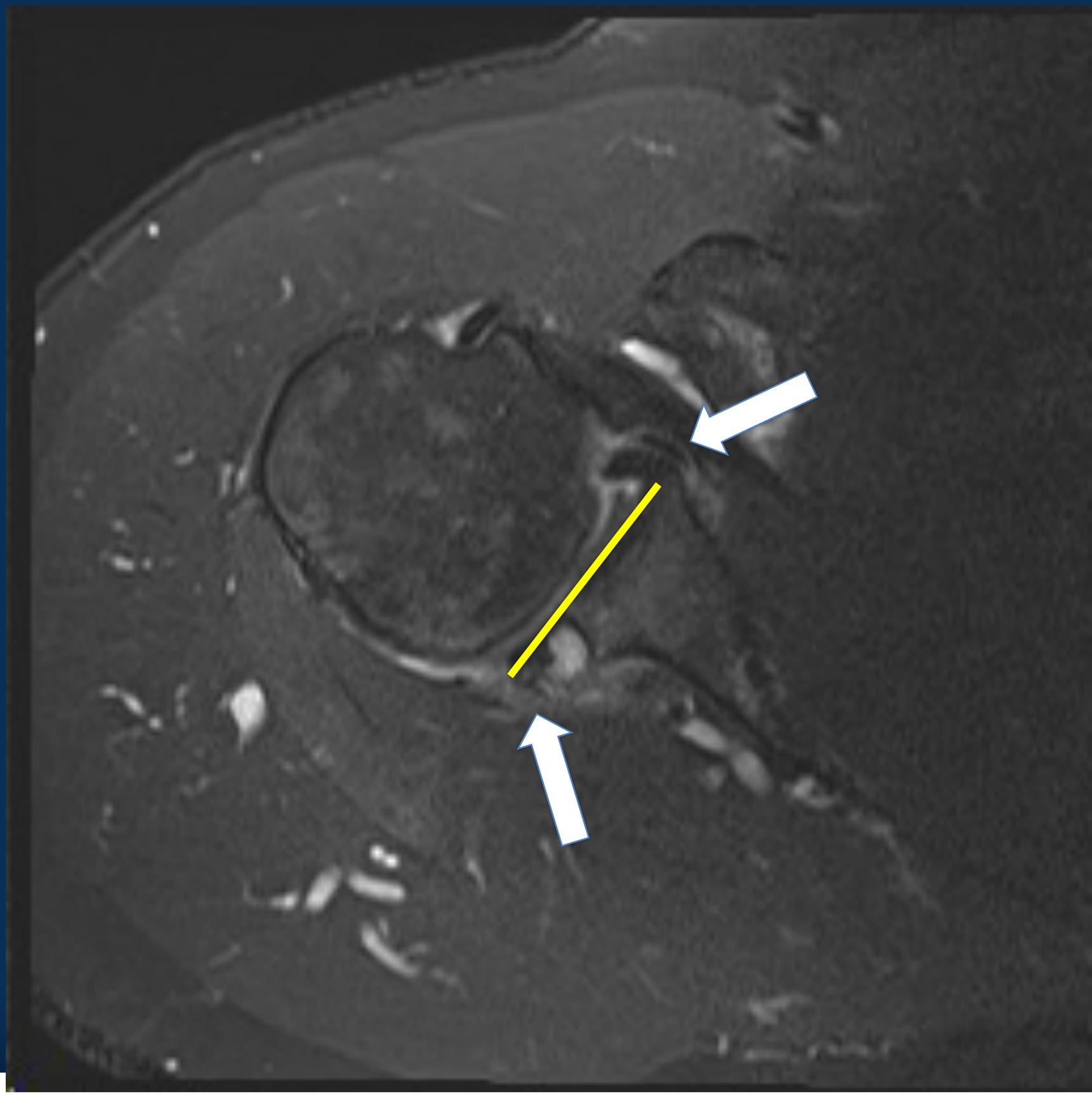
Key Findings

- Lack of posterior cartilage



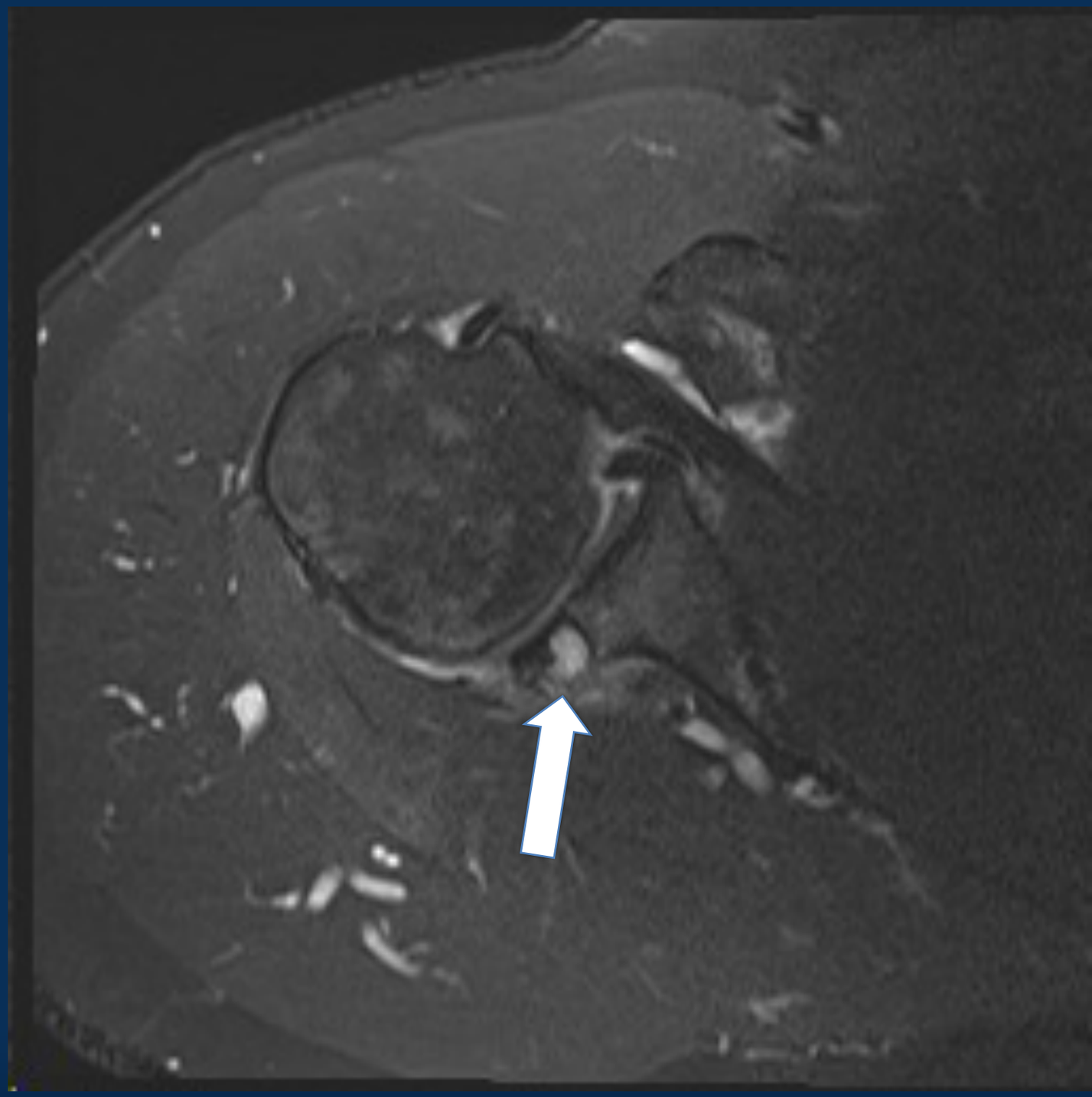
Key Findings

Asymmetry of posterior labrum with posterior labrum no longer on glenoid face



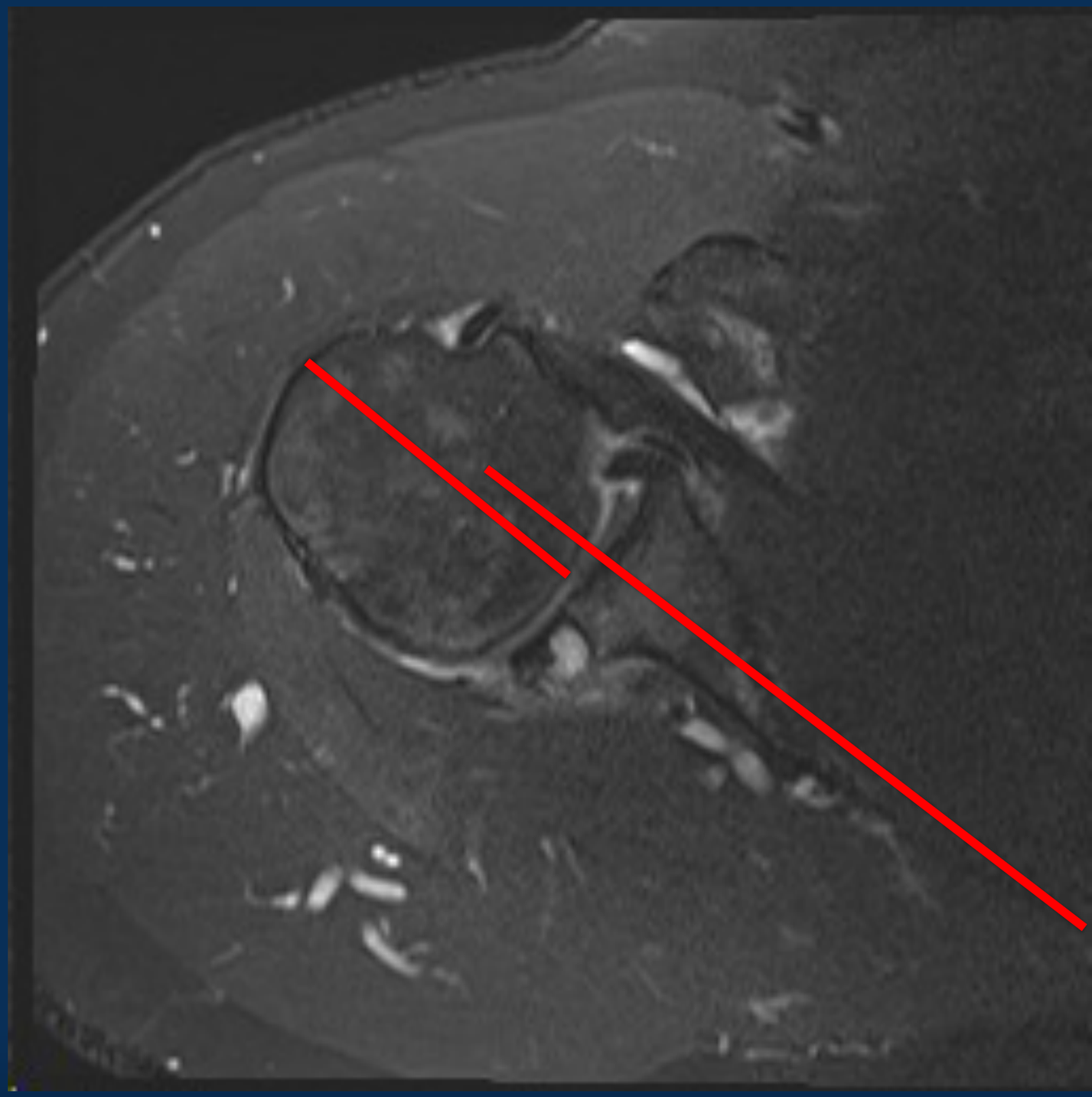
Key Findings

- Posterior labral cyst

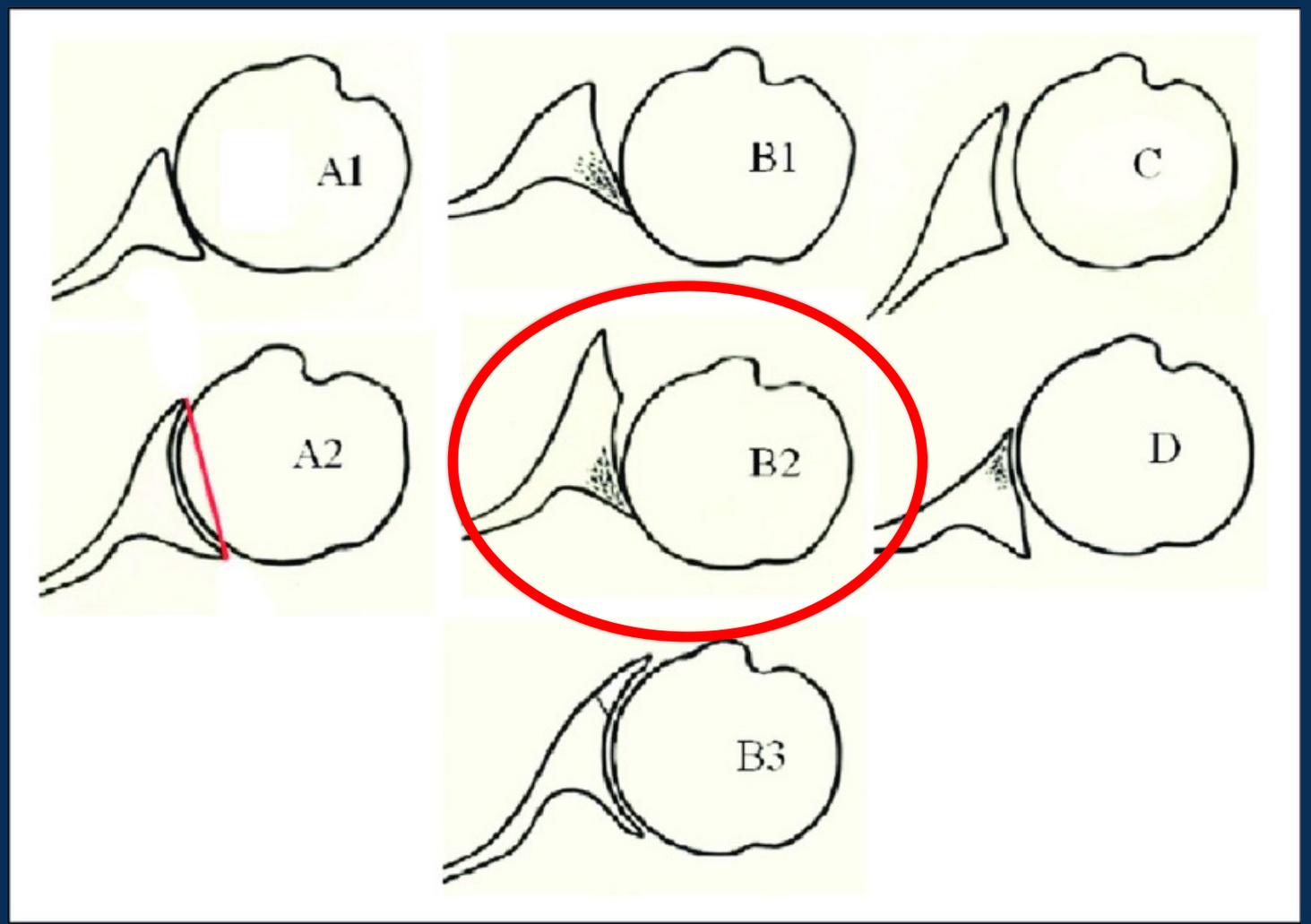


Key Findings

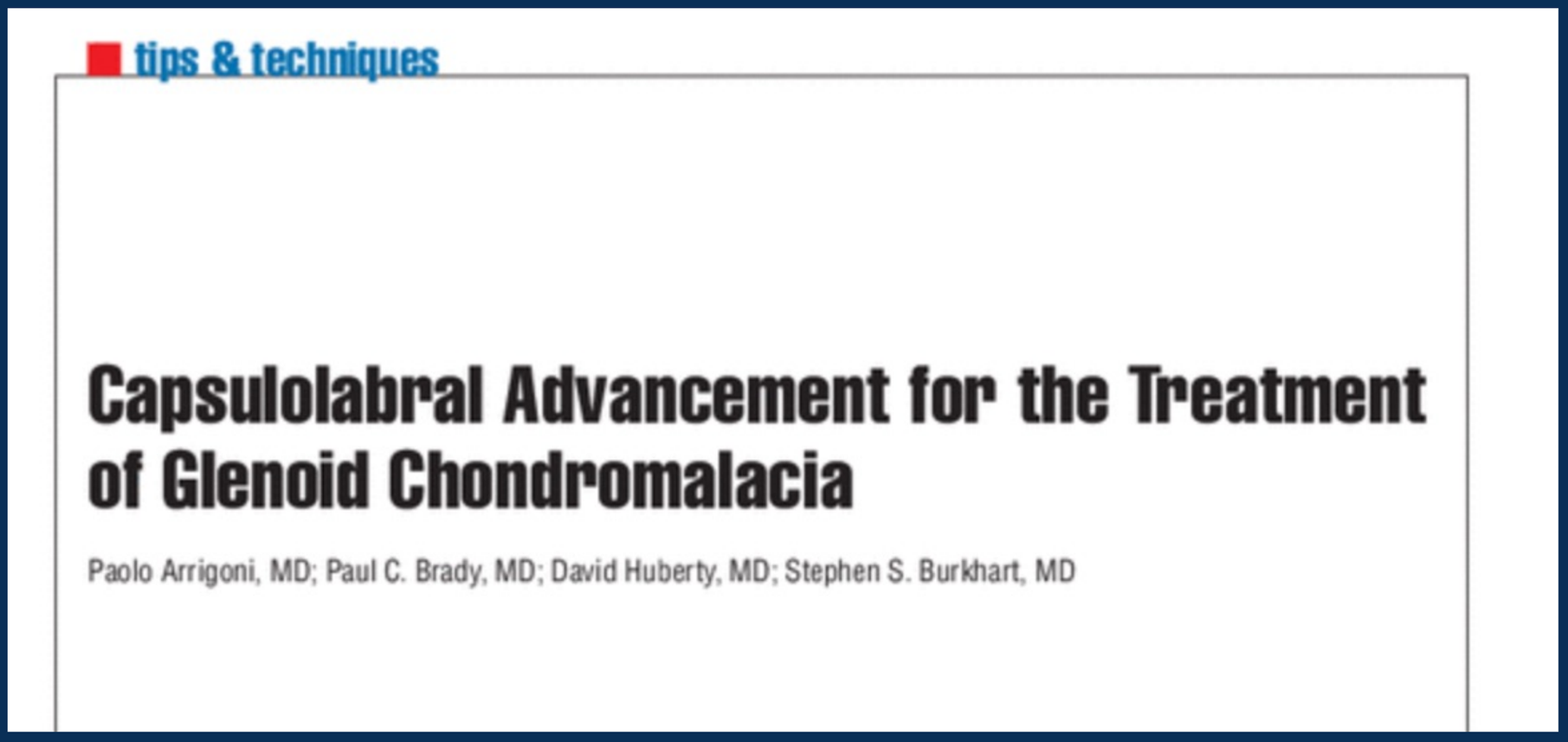
- Can have subtle posterior humeral subluxation



Unprotected Bone=
These Patients are on the Way to a Walch B2 Glenoid



The Back is NOT the Front: Unique Treatment Options



tips & techniques

Capsulolabral Advancement for the Treatment of Glenoid Chondromalacia

Paolo Arrigoni, MD; Paul C. Brady, MD; David Huberty, MD; Stephen S. Burkhart, MD

THE BLUE JOURNAL

ORTHOPEDICS

Orthopedics. 2010 Jul;33(7):480-5

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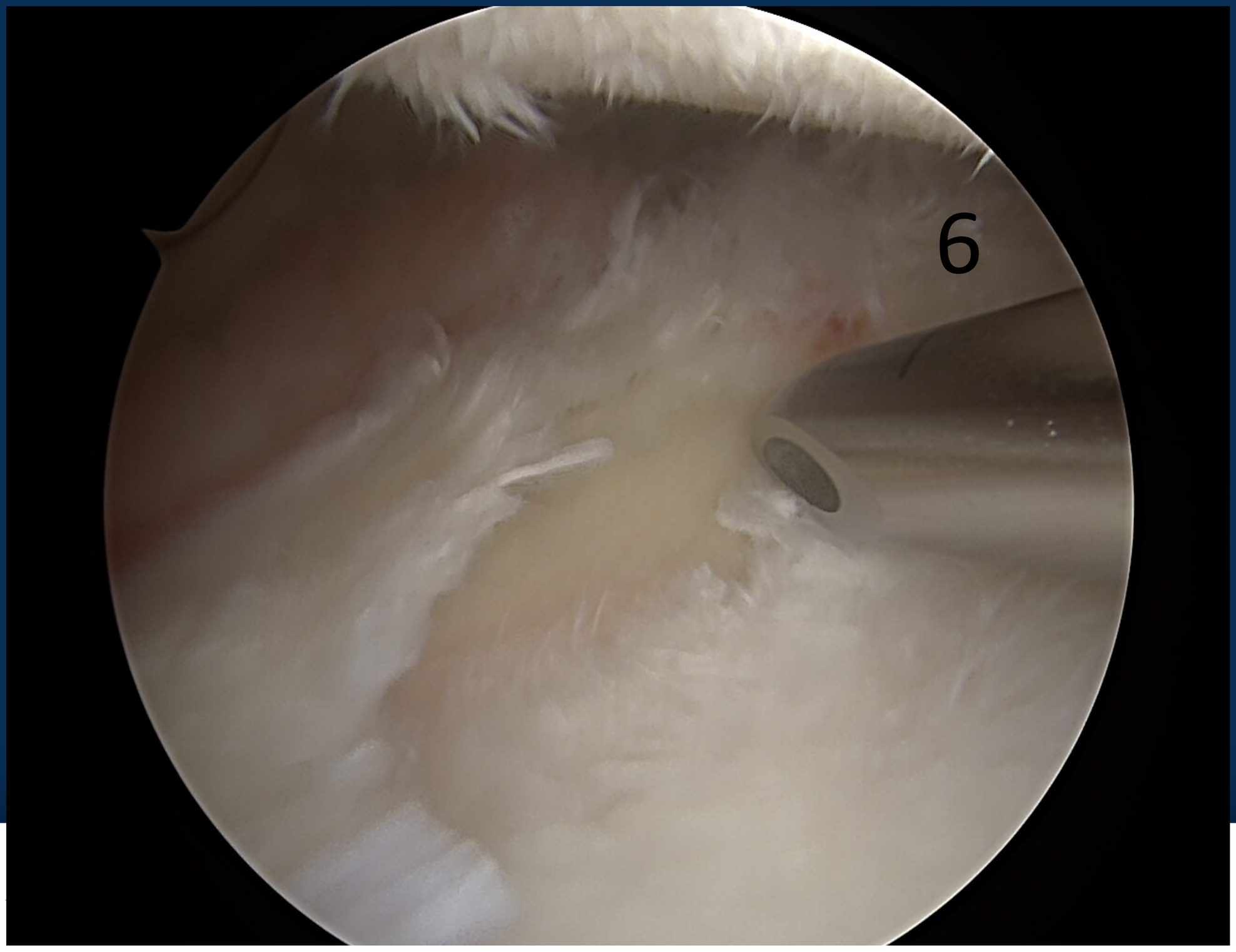
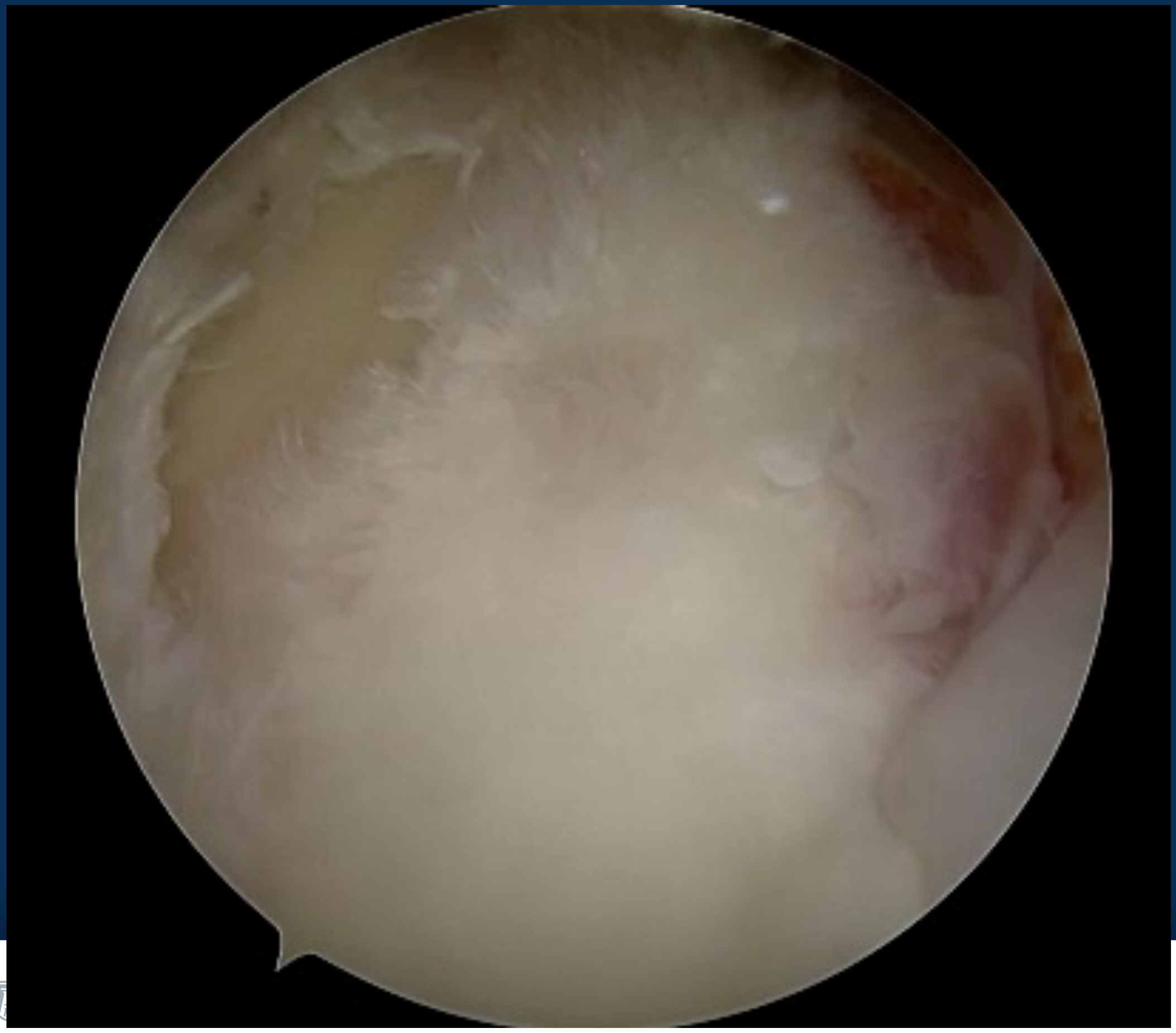
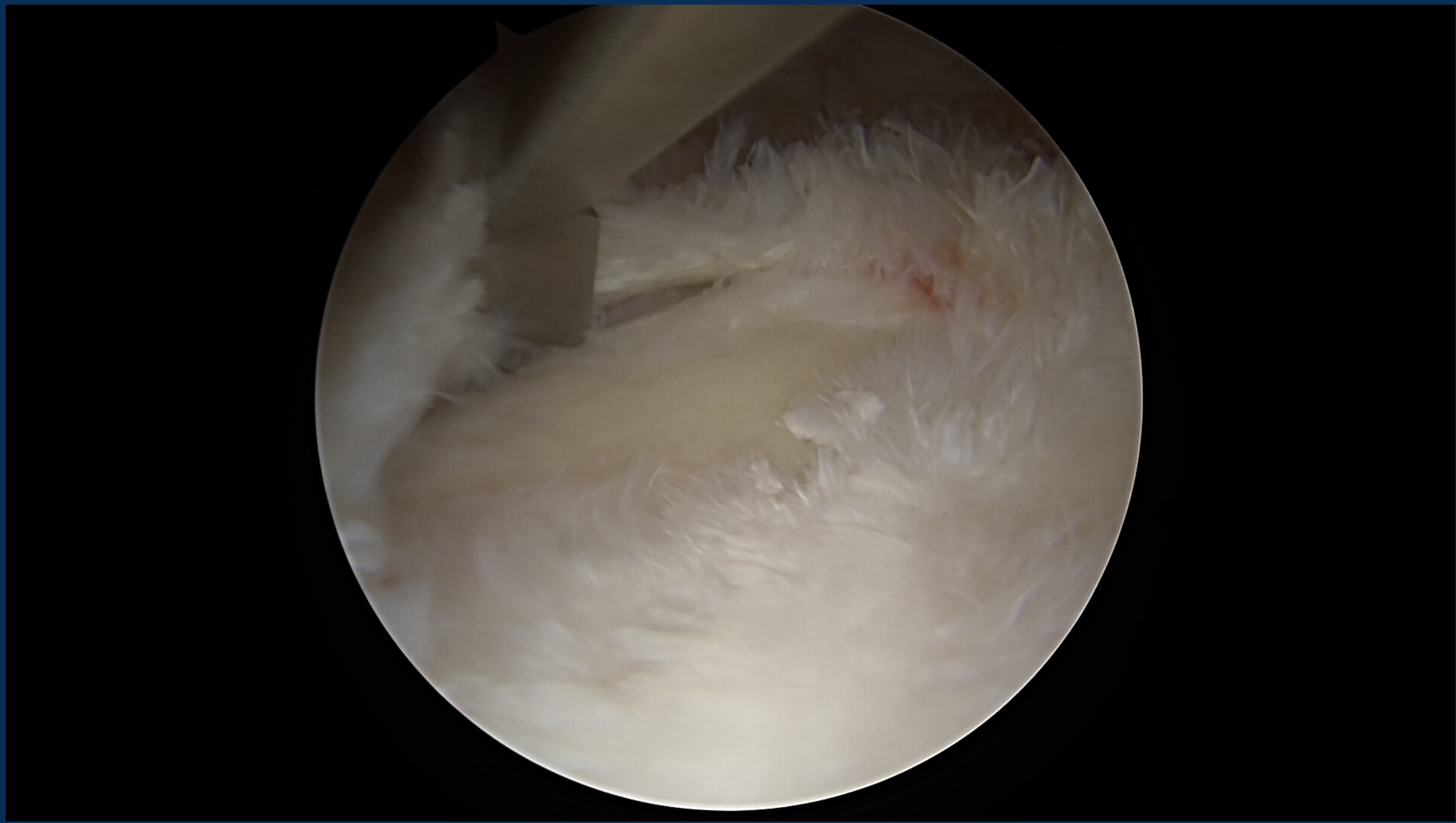
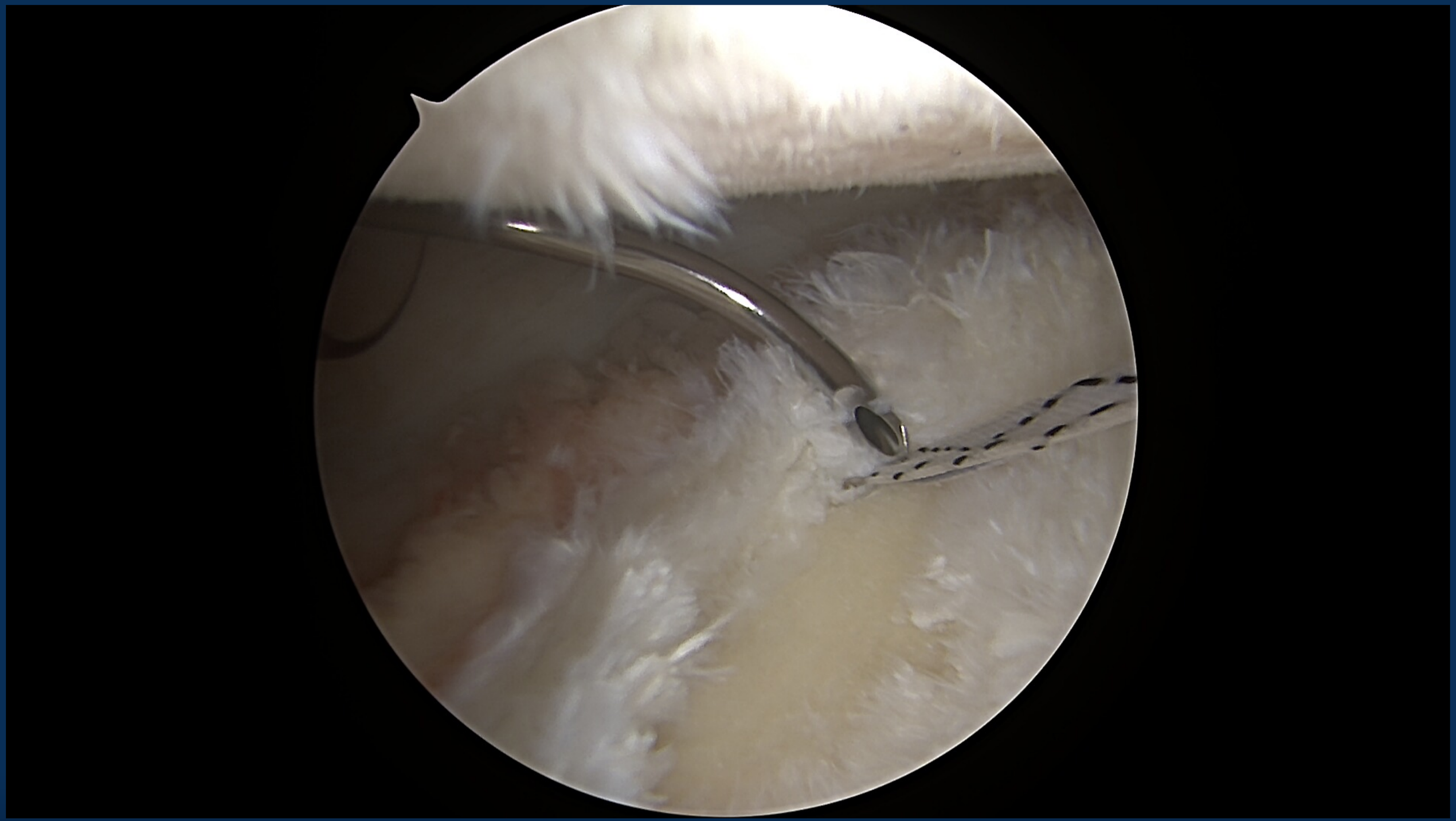
Lateral Position:
Looking from anterolat portal to 6 o’clock









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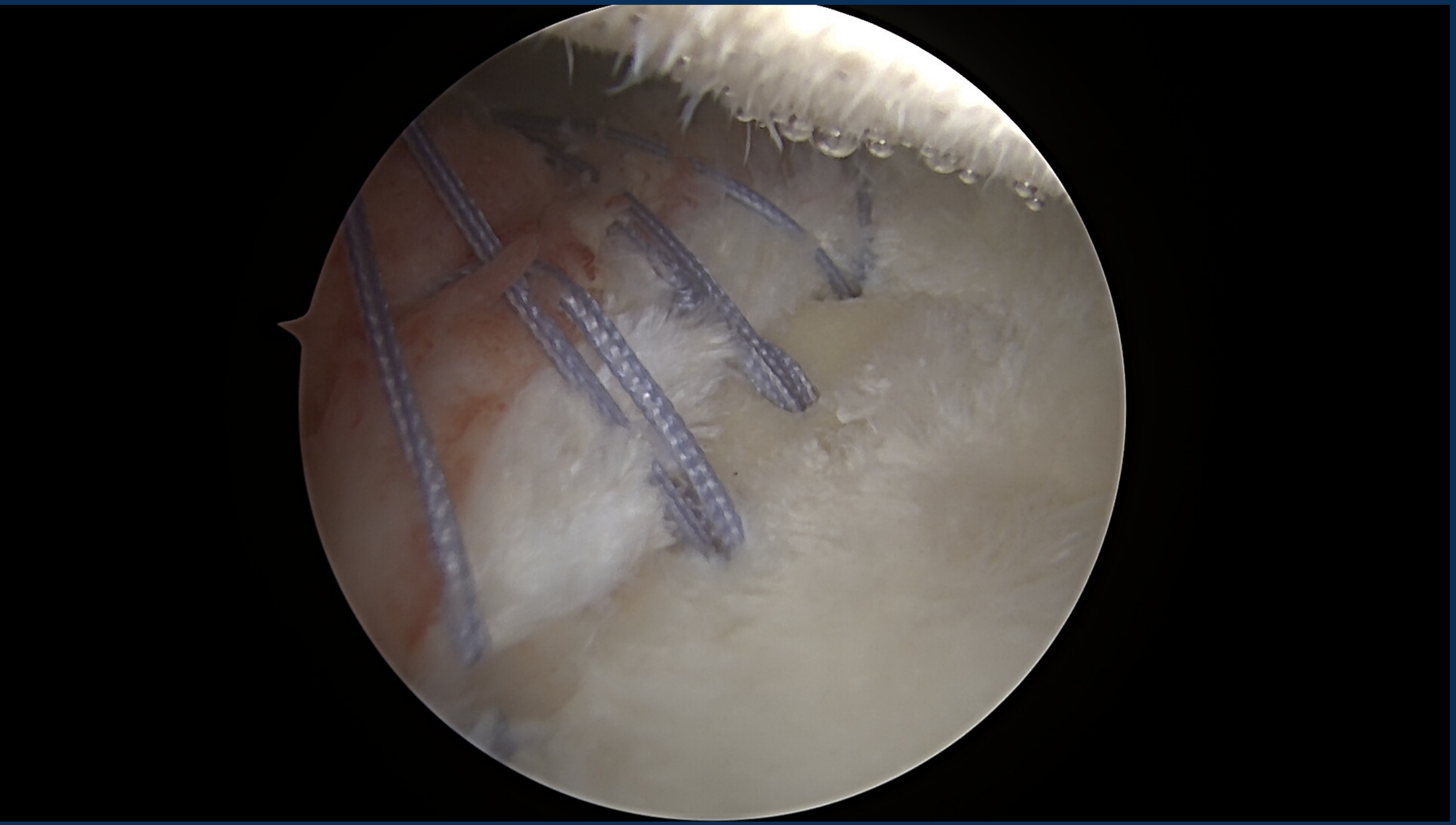

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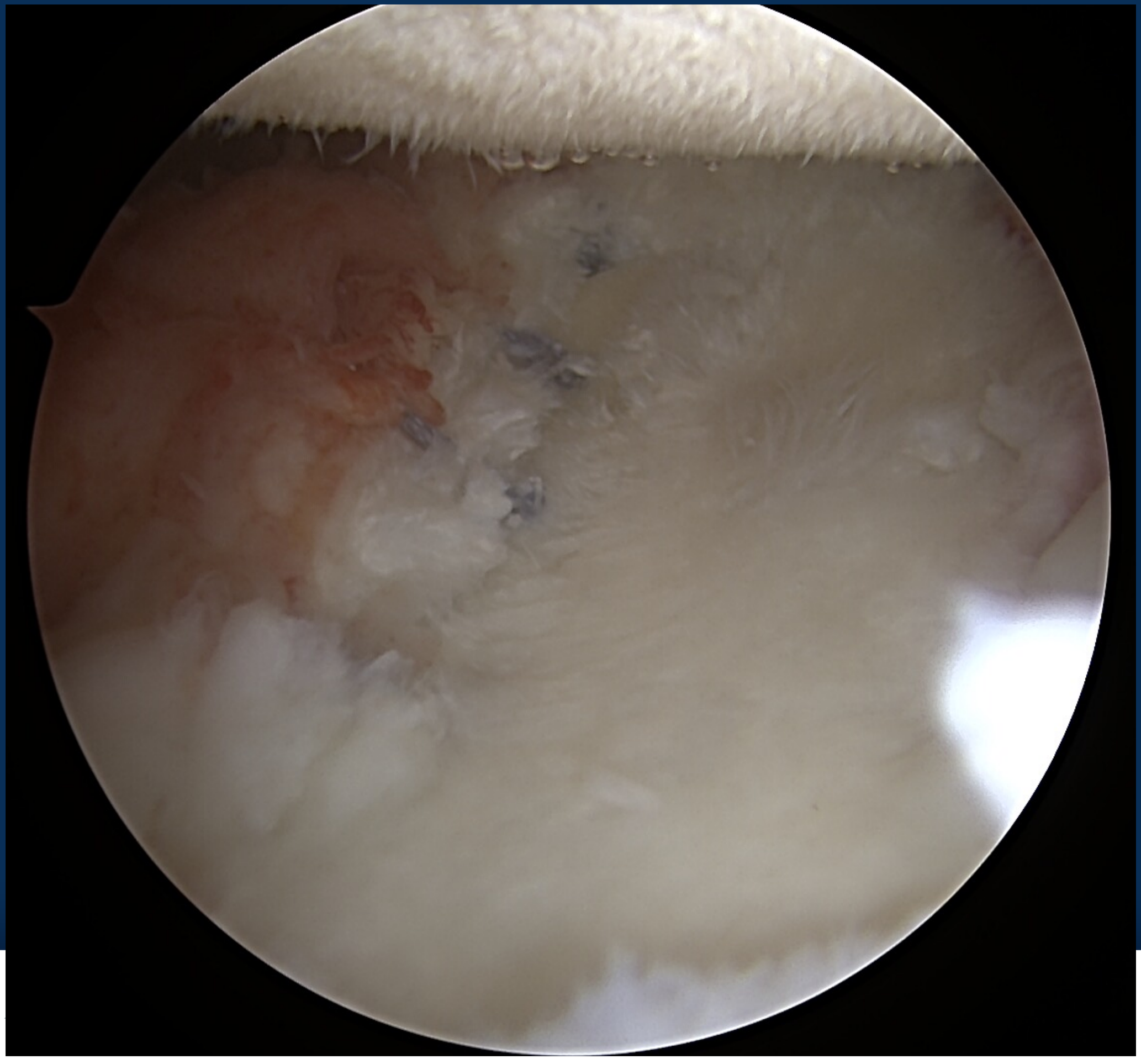

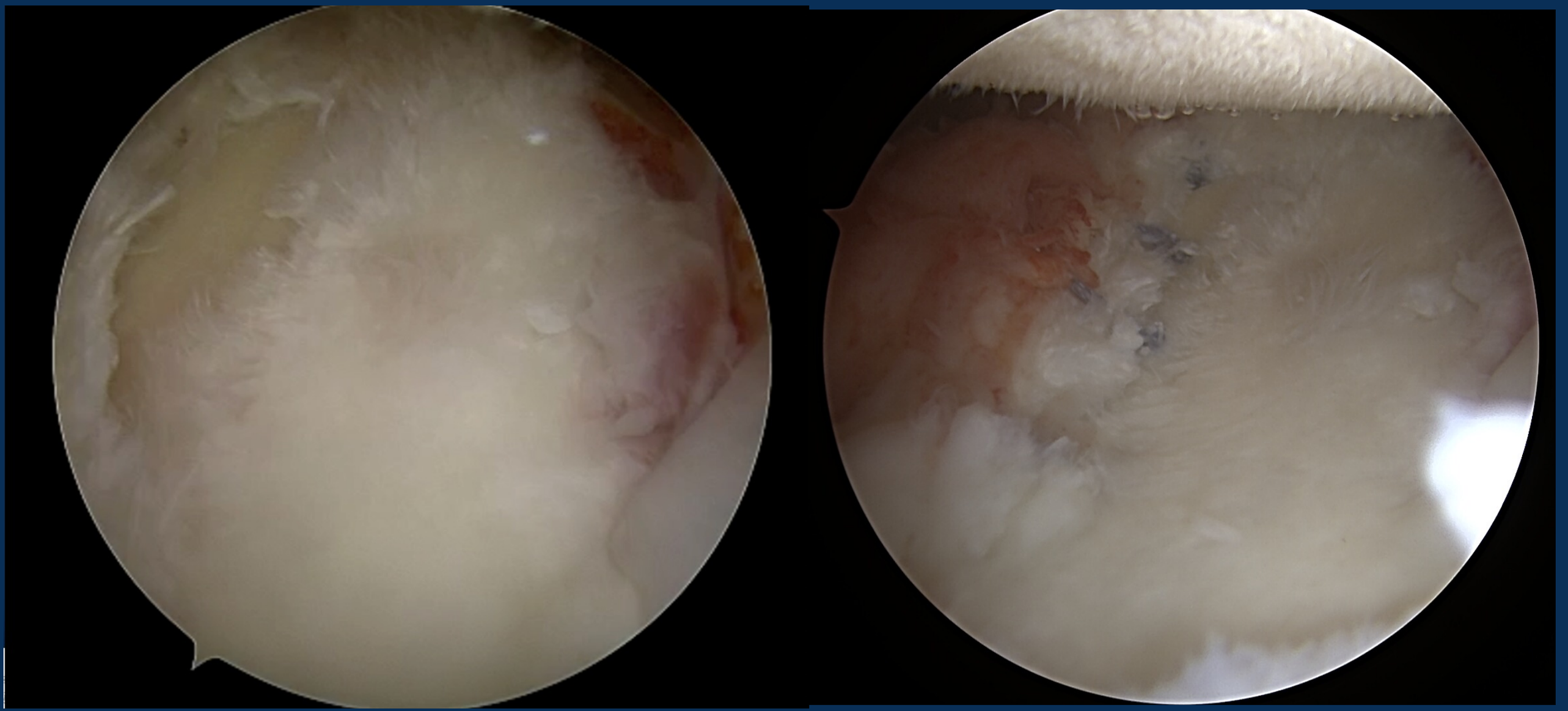

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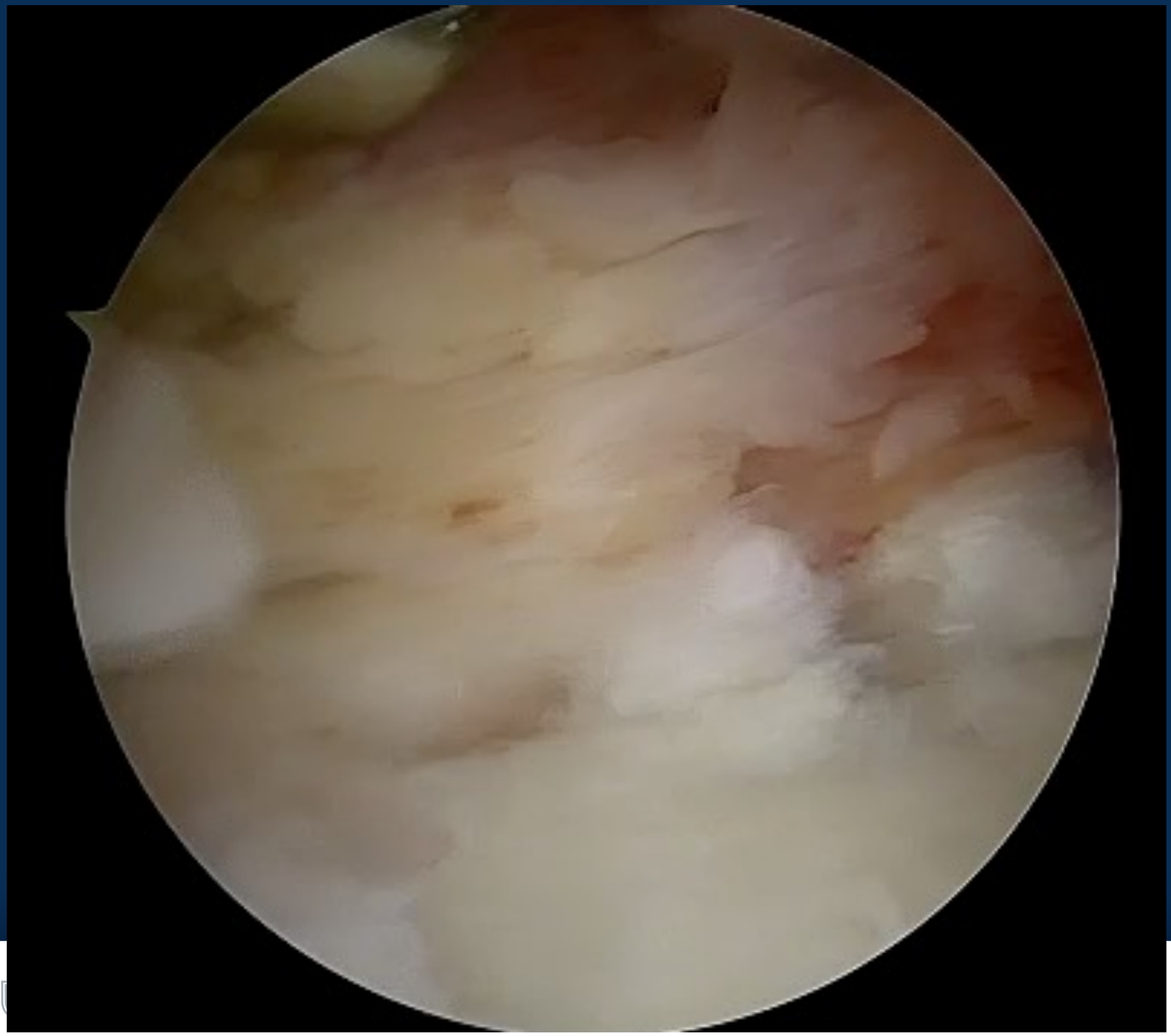
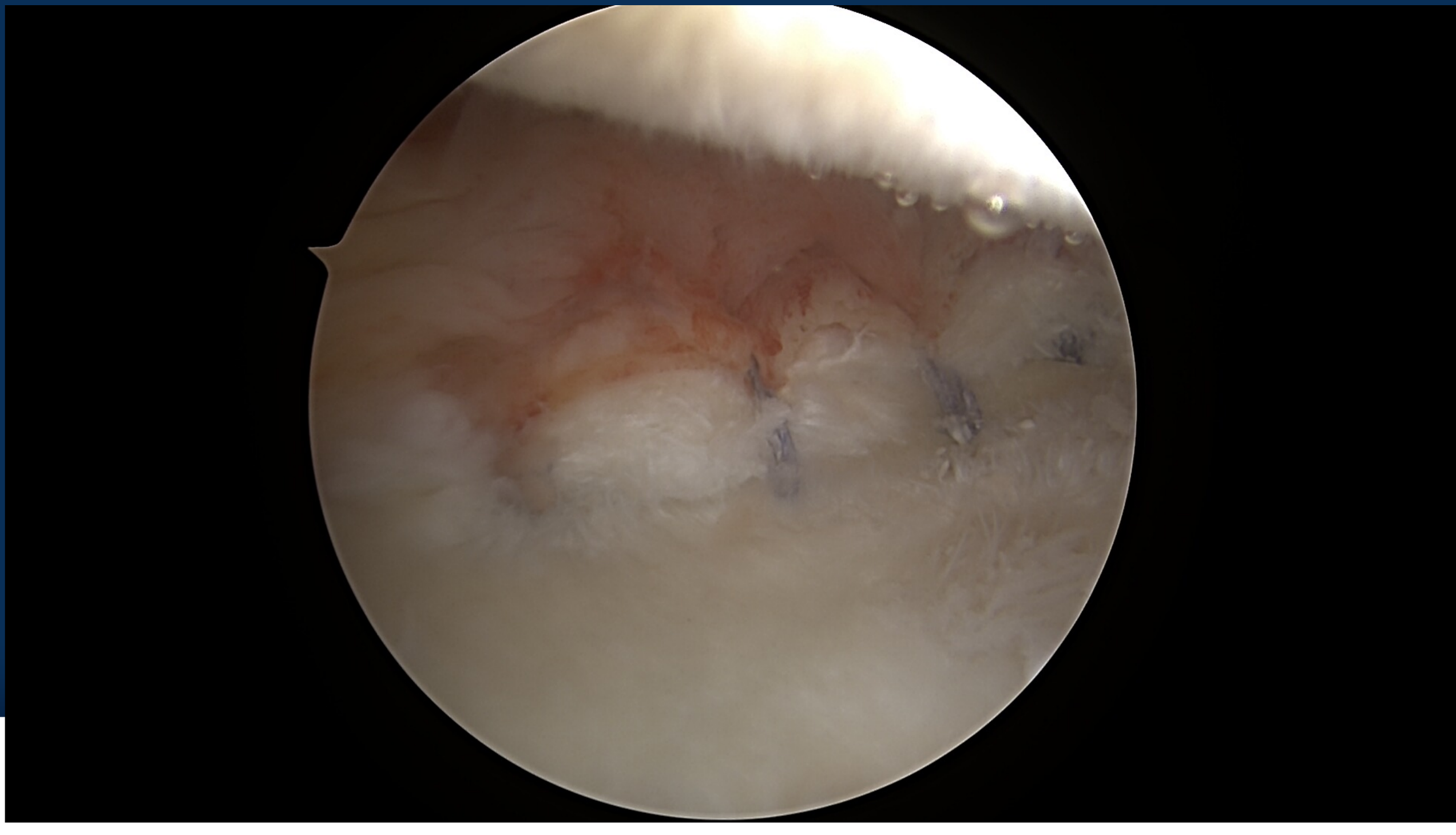


Looking across joint from anterior portal

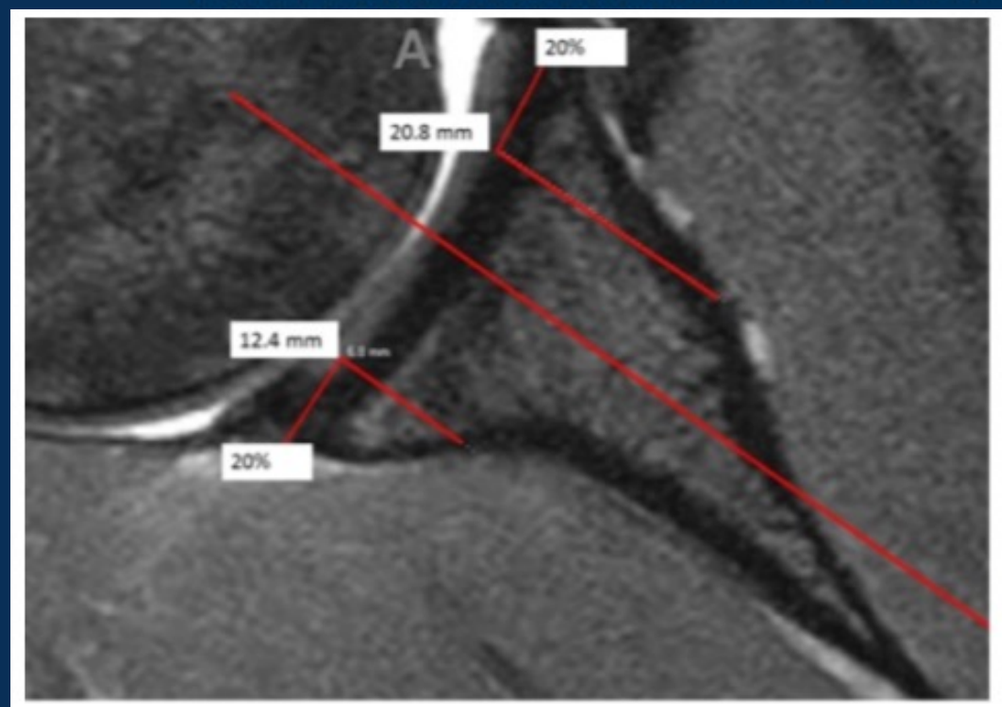


The Back is NOT the Front:
Why bone grafting is different

Difference in Anterior and Posterior Glenoid Morphology Affects Bone Graft Dimensions for Glenoid Reconstruction

Stephen A. Parada, MD[1]; B. Gage Griswold, MD[1]; Michael J. Steflik, BS[1]; Elizabeth P. Barker, BS[1]; Andrew Murphy, BS[1]; Dhara Patel, BS[1]; Joseph W. Galvin, DO[2]; Philipp Moroder, MD[3]; Matthew T. Provencher, MD[4]

Medical College of Georgia at Augusta University; Augusta, Georgia, USA[1]; Department of Orthopaedic Surgery, Madigan Army Community Hospital Orthopedic Clinic; Tacoma, Washington, USA[2]; Department for Shoulder and Elbow Surgery, Center for Musculoskeletal Surgery, Campus Virchow, Charité-Universitaetsmedizin Berlin; Berlin, Germany[3]; Steadman Philippon Research

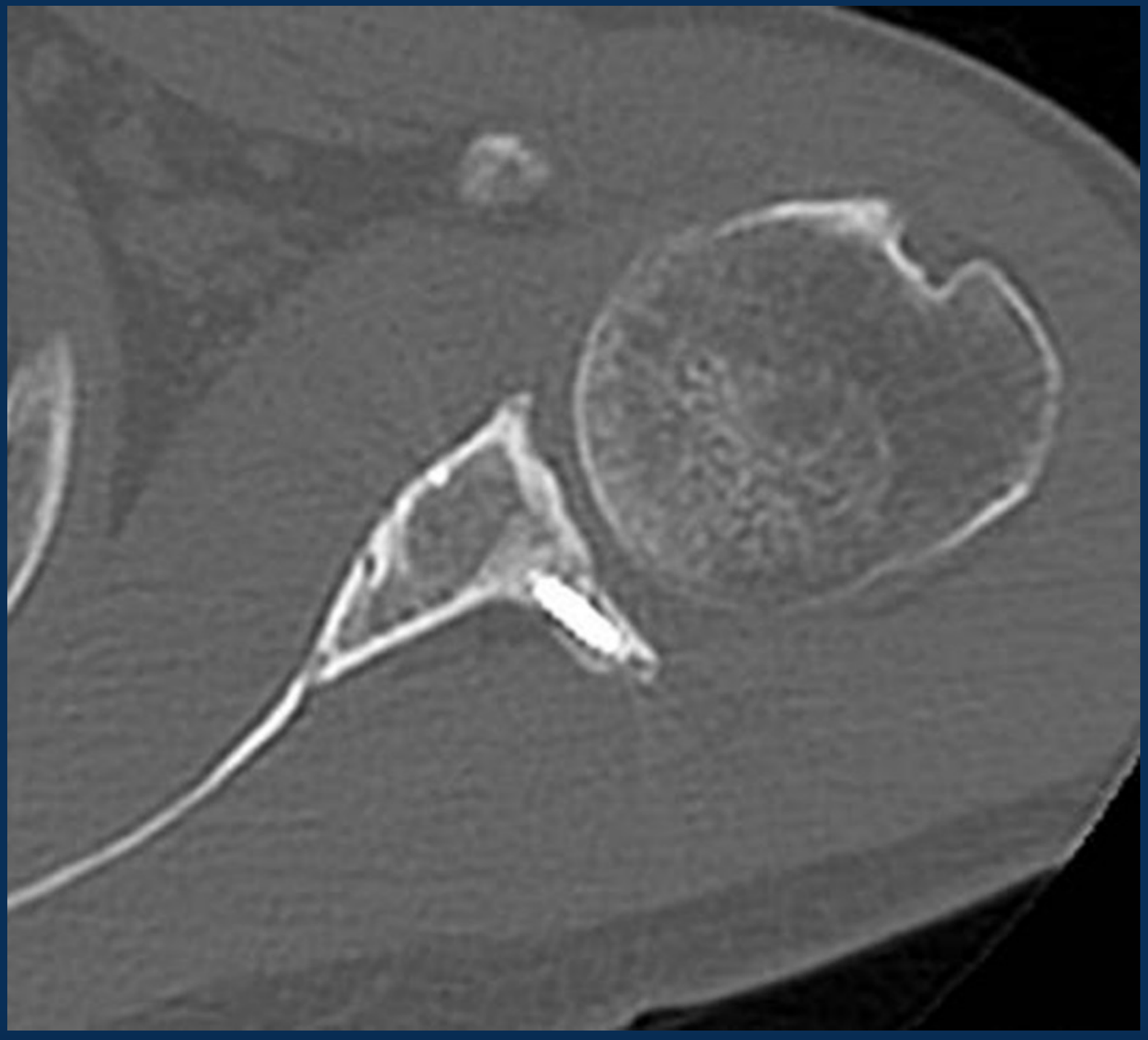


Measurement	Mean	Std Dev
Glenoid width (mm)	29.1	3.18
20% Bone loss (mm)	5.9	1.1
Depth anterior bone loss (mm)	17.8	3.03
Depth posterior bone loss (mm)	10.2	1.72
Difference of anterior: posterior (%)	180.8	44.4

Available bone surface is much different with a simulated 20% defect

anteriorly compared to posteriorly

This makes it difficult to “balance” graft on available posterior surface of glenoid



Posterior Glenoid Bony Augmentation

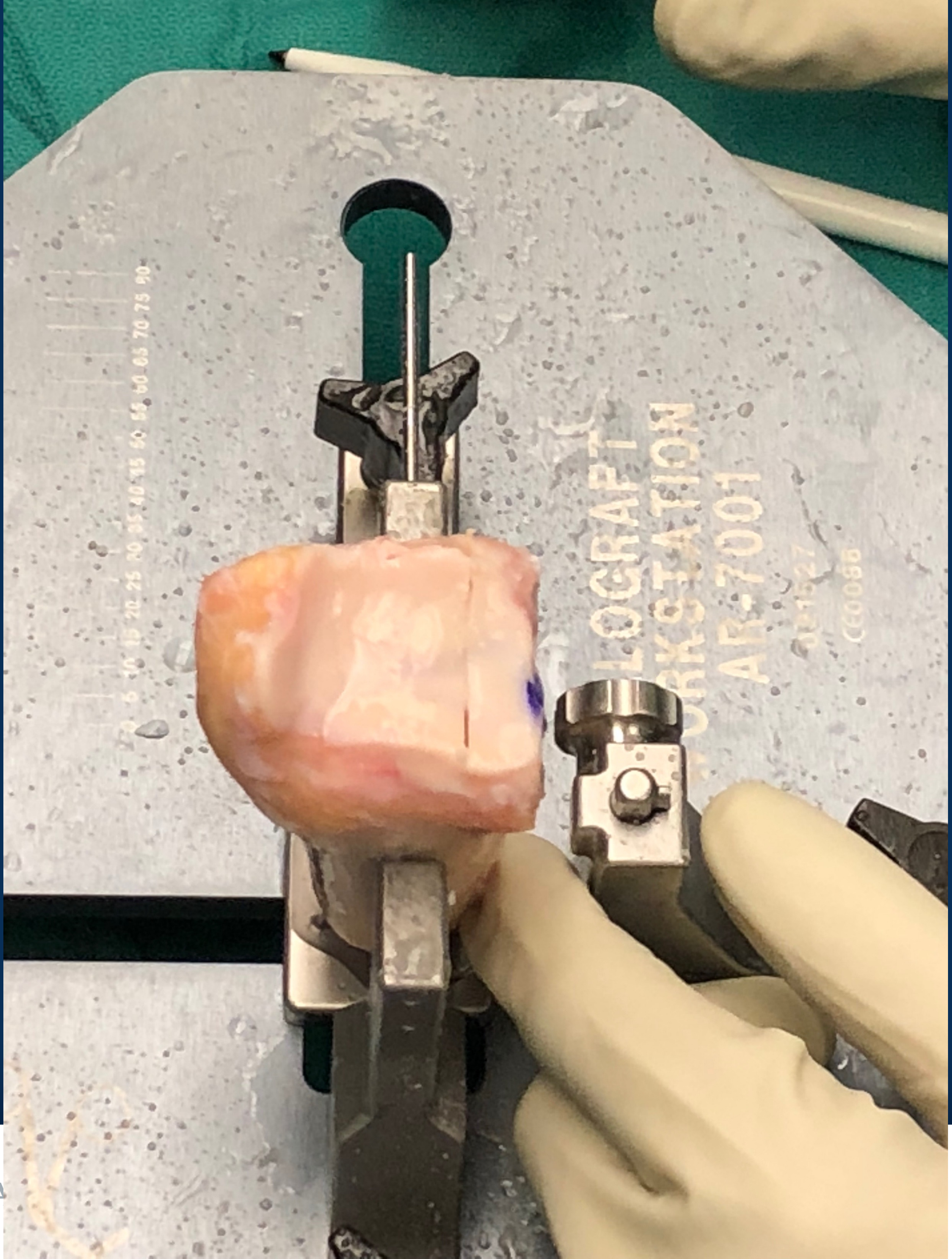
Graft Transfer Technique in Arthroscopic Posterior Glenoid Reconstruction With Distal Tibia Allograft

Stephen A. Parada, M.D., and K. Aaron Shaw, D.O.

Arthroscopy Techniques, Vol 6, No 5 (October), 2017: pp e1891-e1895

Set Up

- My graft size is based on preop planning, not intra-op measurements
- Separate table for graft prep
- I scrub in before patient comes in the room and have graft completely done before start of the case
  - *NO increased OR TIME*


LOCRAFT
AR-7001

Selecting a Graft

- I almost always use distal tibia allograft
  - 85% of distal tibias have a straight (or nearly straight) lateral border of the tibia to allow retention of lateral cortex for fixation of graft

Variations in the Anatomic Morphology of the Lateral Distal Tibia

Surgical Implications for Distal Tibial Allograft Glenoid Reconstruction

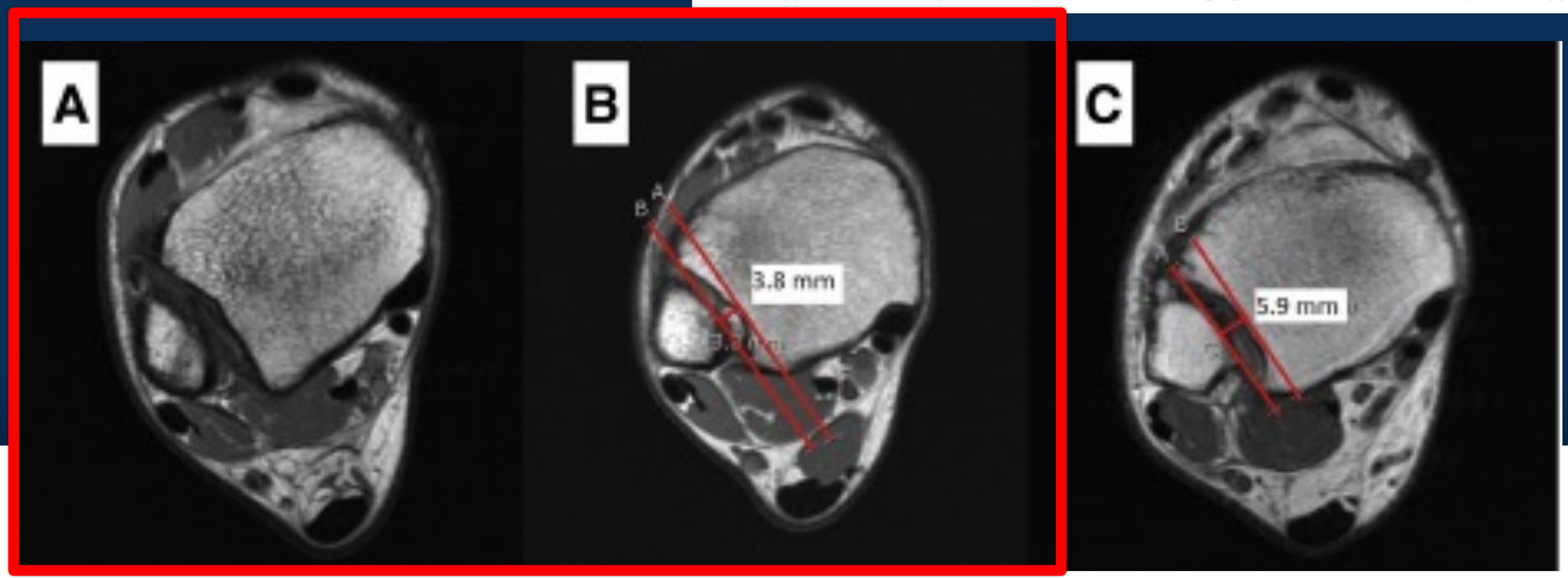
Stephen A. Parada,*† MD, K. Aaron Shaw,‡ DO, Colleen Moreland,‡ DO, Douglas R. Adams,§ MD, Mickey S. Chabak,‡ MD, and Matthew T. Provencher,‖ MD
Investigation performed at Eisenhower Army Medical Center, Orthopaedic Surgery, Fort Gordon, Georgia, USA

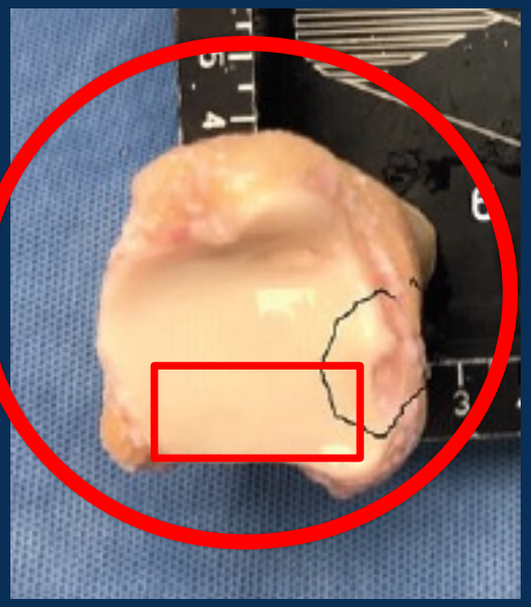
AJSM Vol. 46, No. 12, 2018

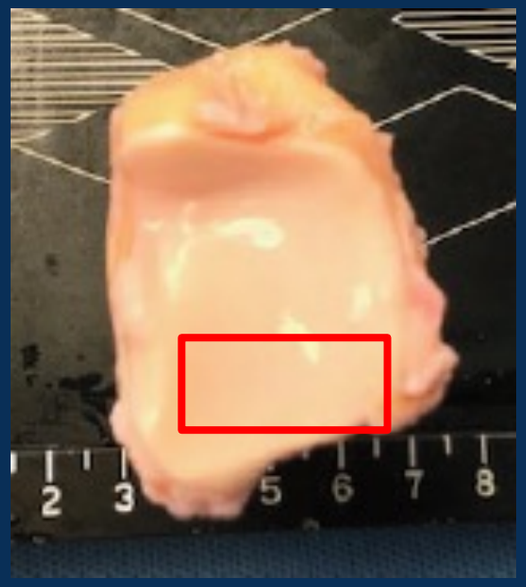
Demographics and Distal Tibial Dimensions of Suitable Distal Tibial Allografts for Glenoid Reconstruction

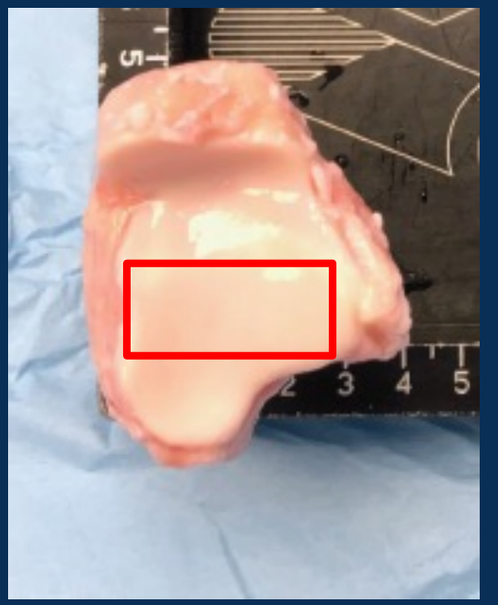
Stephen A. Parada, M.D., Matthew S. Griffith, M.D., K. Aaron Shaw, D.O., Brian R. Waterman, M.D., Josef K. Eichinger, M.D., Xinning Li, M.D., and Matthew T. Provencher, M.D.

Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 35, No 10 (October), 2019: pp 2788-2794





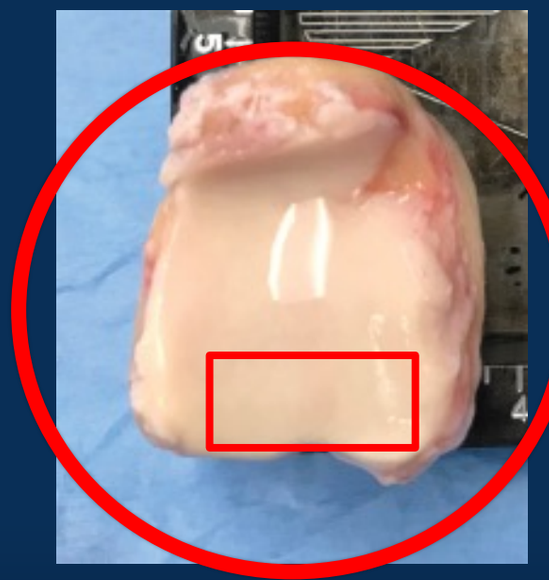


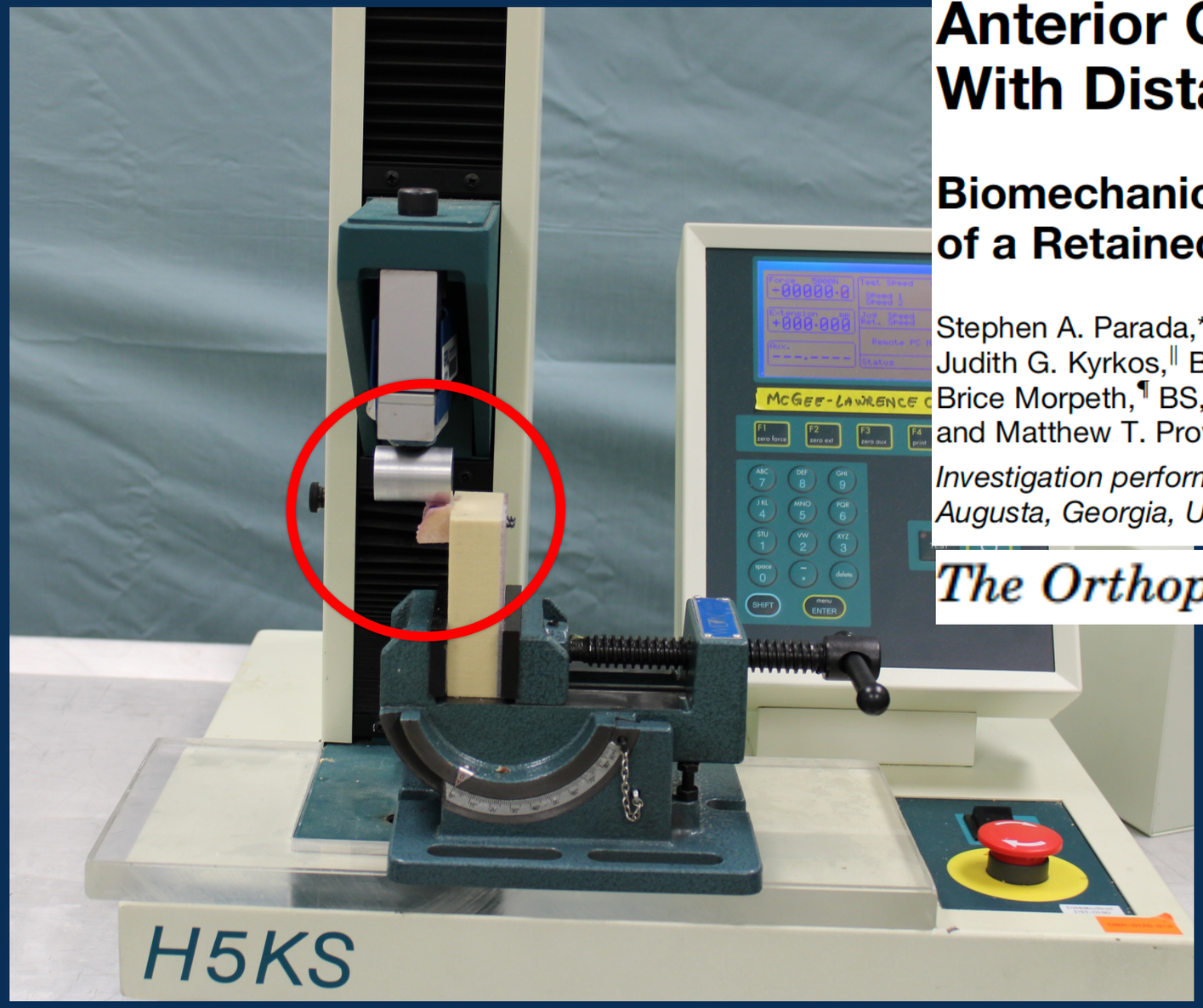


I use non-laterality, non-sized, non-gender matched FRESH *(never frozen)* allograft distal tibia

Fresh graft = living chondrocytes

Is it important to keep the lateral cortex?





Anterior Glenoid Reconstruction With Distal Tibial Allograft

Biomechanical Impact of Fixation and Presence of a Retained Lateral Cortex

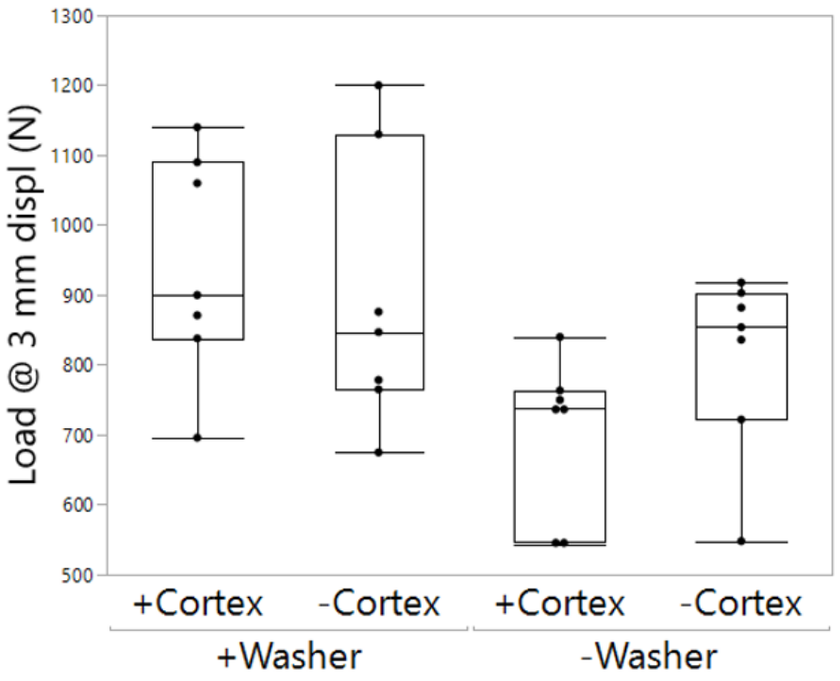
Stephen A. Parada,*† MD, K. Aaron Shaw,‡ DO, Meghan E. McGee-Lawrence,§ PhD, Judith G. Kyrkos,‖ BS, Daniel W. Paré,¶ BS, Jessica Amero,¶ BS, James W. Going,¶ BS, Brice Morpeth,¶ BS, Robert Shelley,† MD, Josef K. Eichinger,# MD, and Matthew T. Provencher,** MD

Investigation performed at the Medical College of Georgia at Augusta University, Augusta, Georgia, USA

The Orthopaedic Journal of Sports Medicine

Our study found that adding washers mattered more than keeping lateral cortex of tibia for load to failure

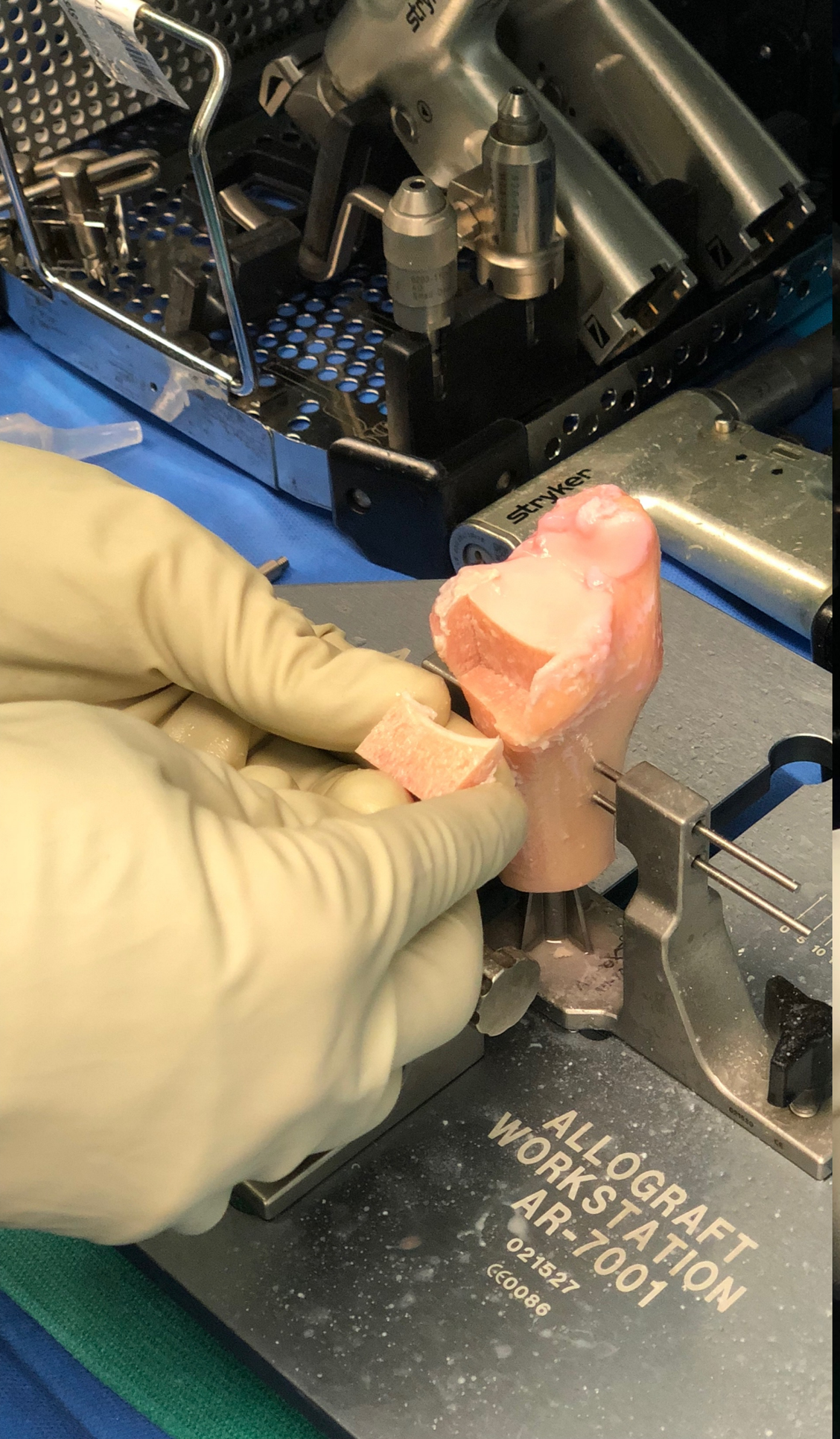
Table 1. Clinical failure of specimens (3 mm of displacement)



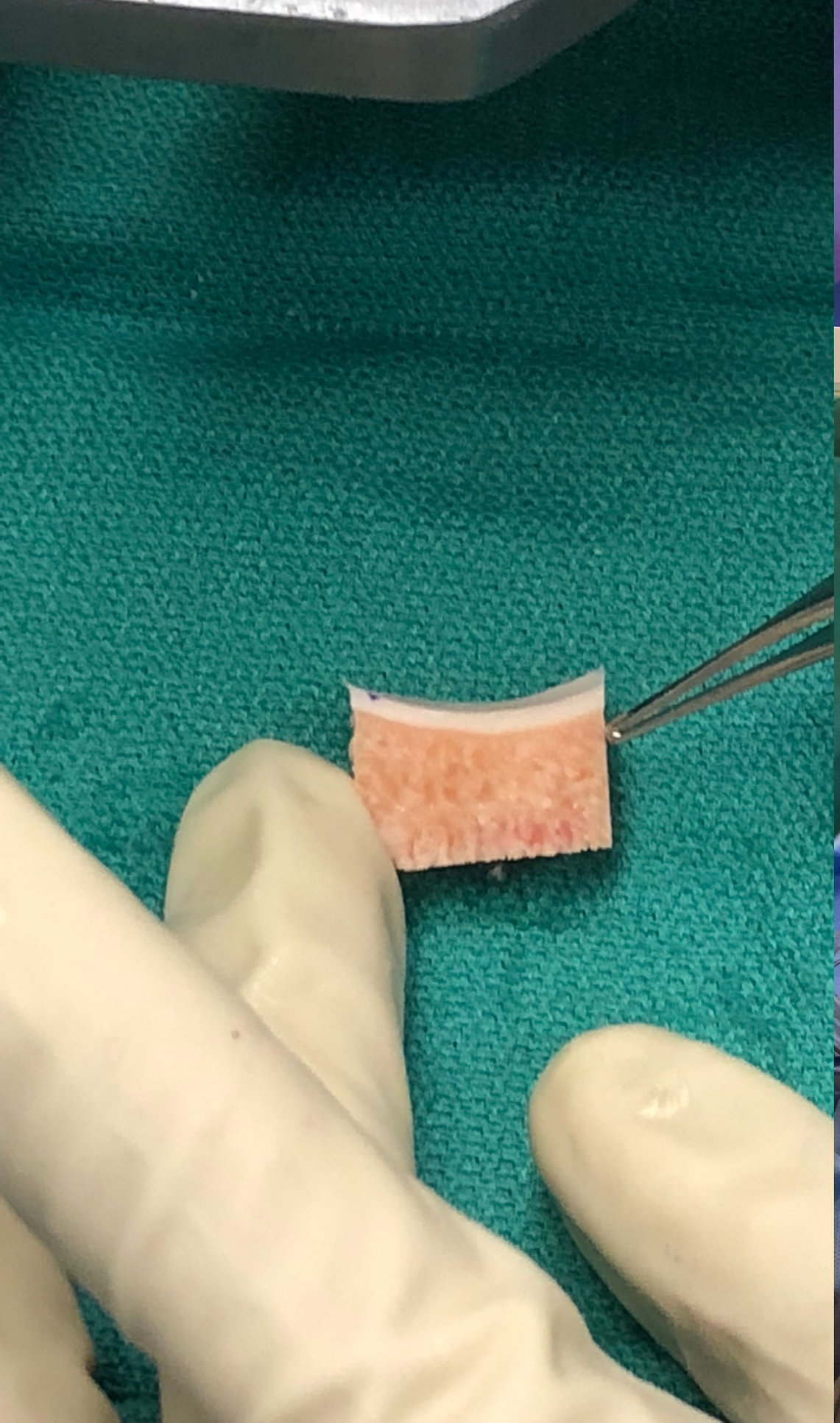
P-values:

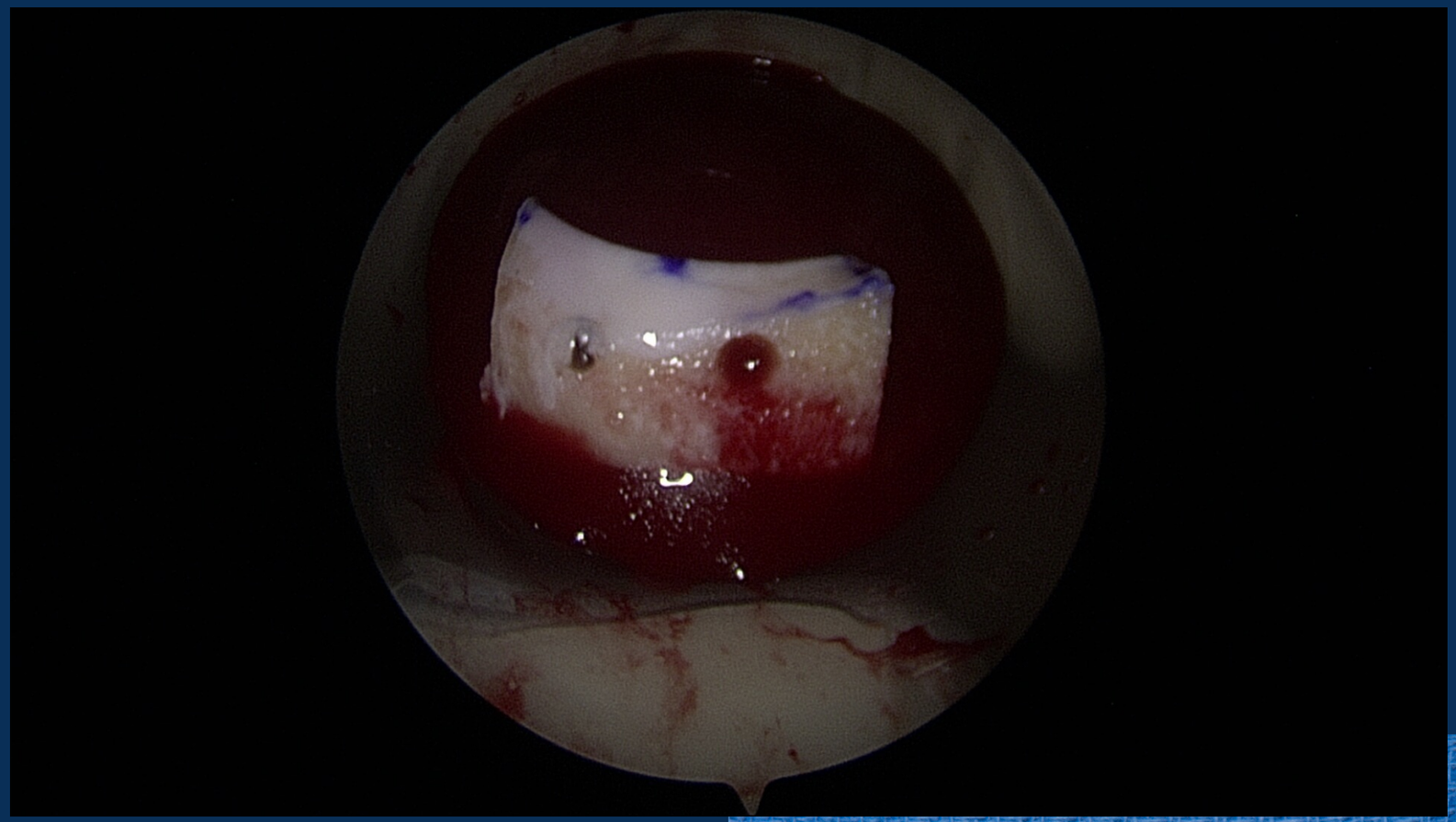
Cortex presence:	0.600
Washer presence:	**0.009**

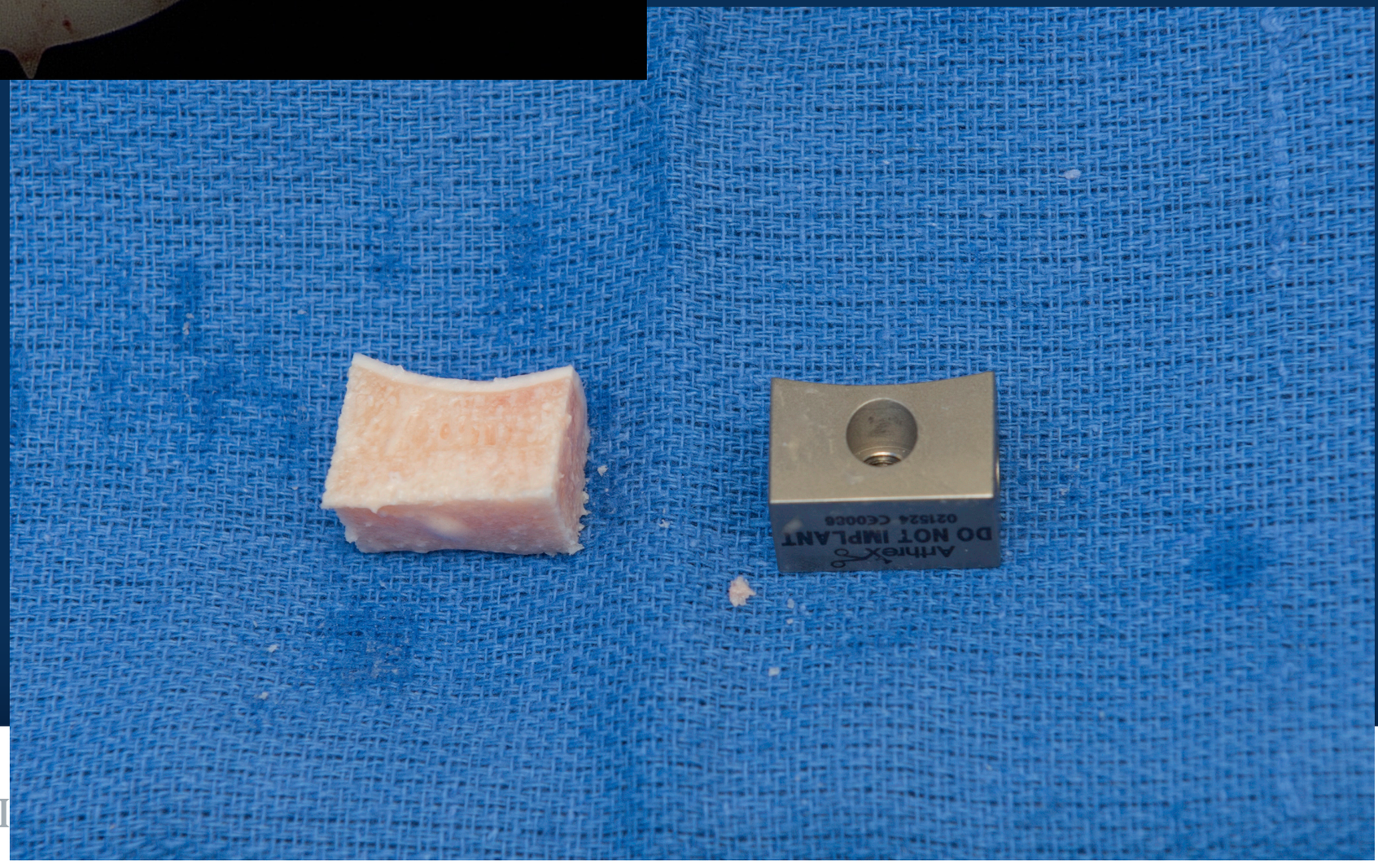

Stryker
CD4
Arthrex
RAR-700


stryker
ALLOGRAFT
WORKSTATION
AR-7001
021527
CE0086


stryker
ALLOGRAFT
WORKSTATION
AR-7001
021527
CE0086

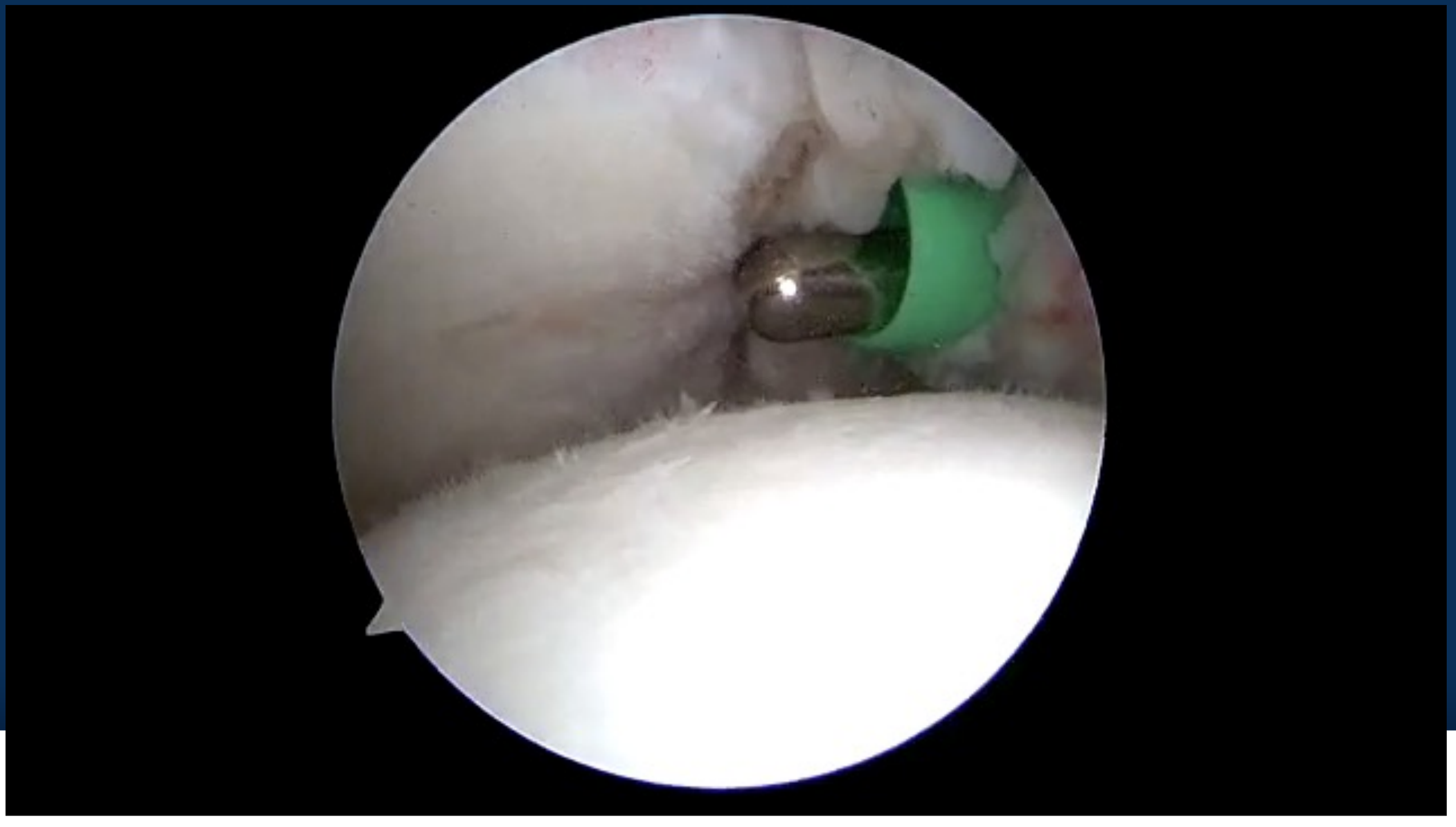




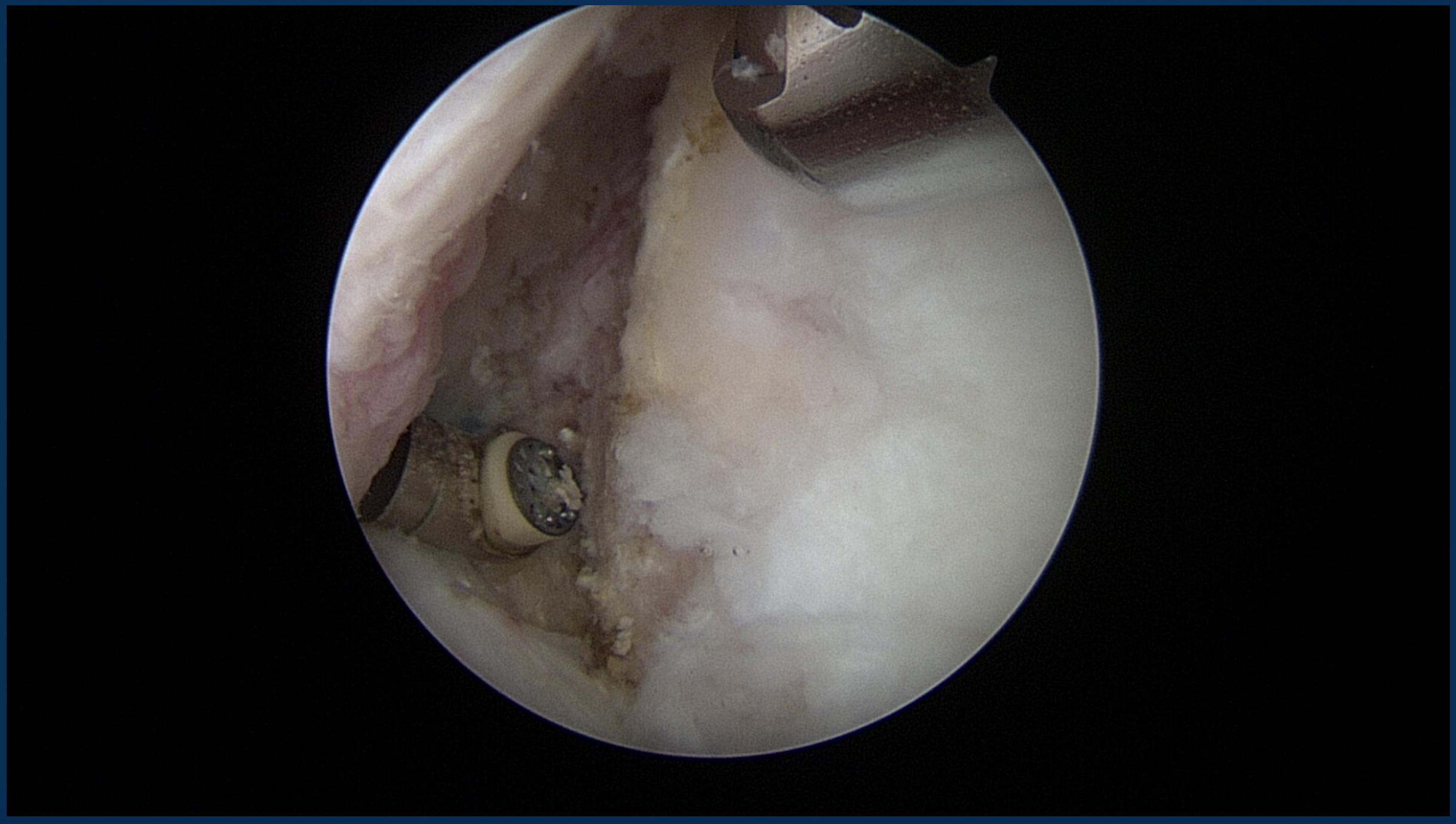

DO NOT IMPLANT
021524 CE0068


SPQR

Posterior portal / superior viewing portal / anterior working portal

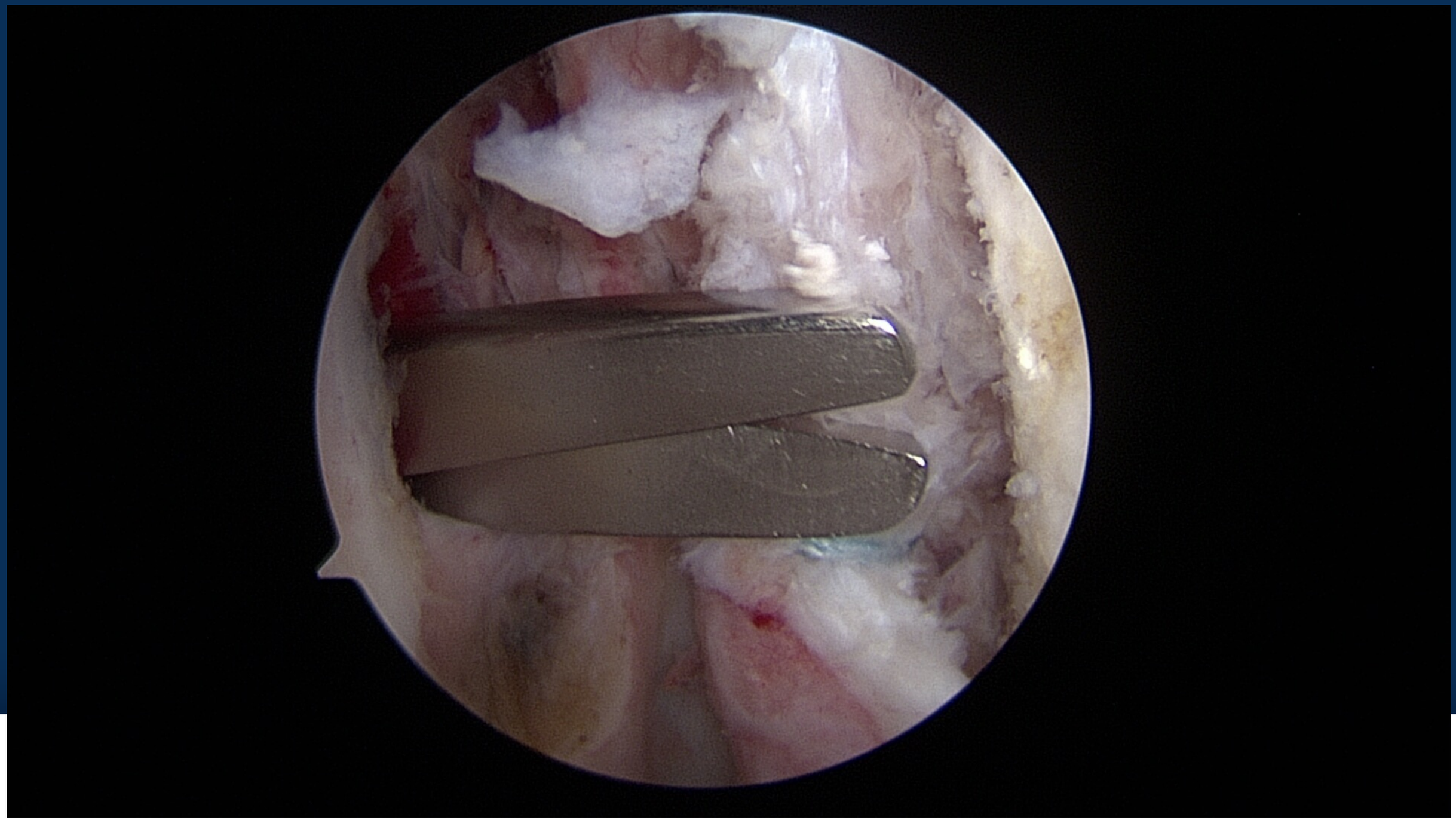


Glenoid Preparation:
Different case, opposite side



Creating split in posterior cuff & capsule

Dilate Capsular Split

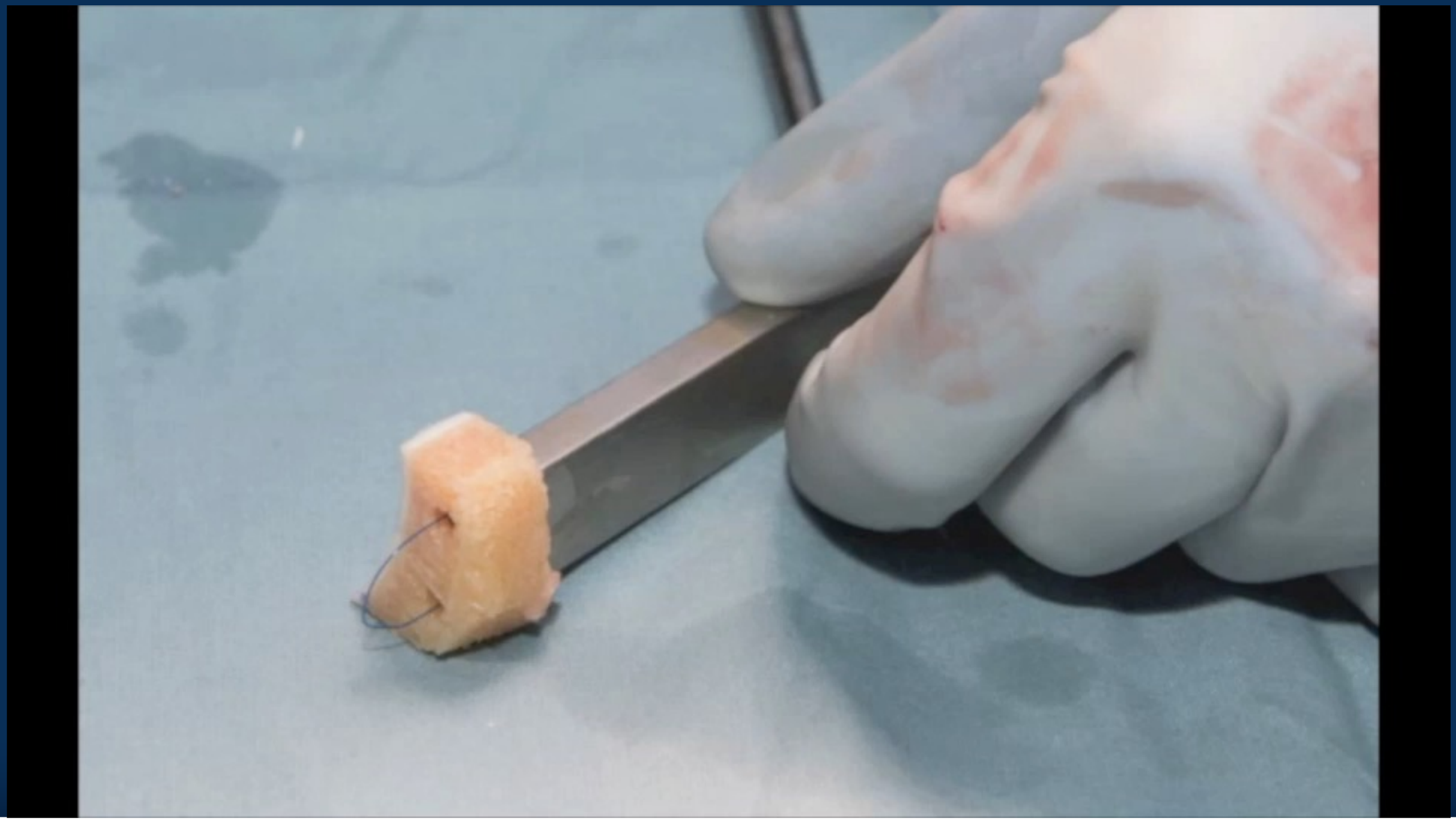


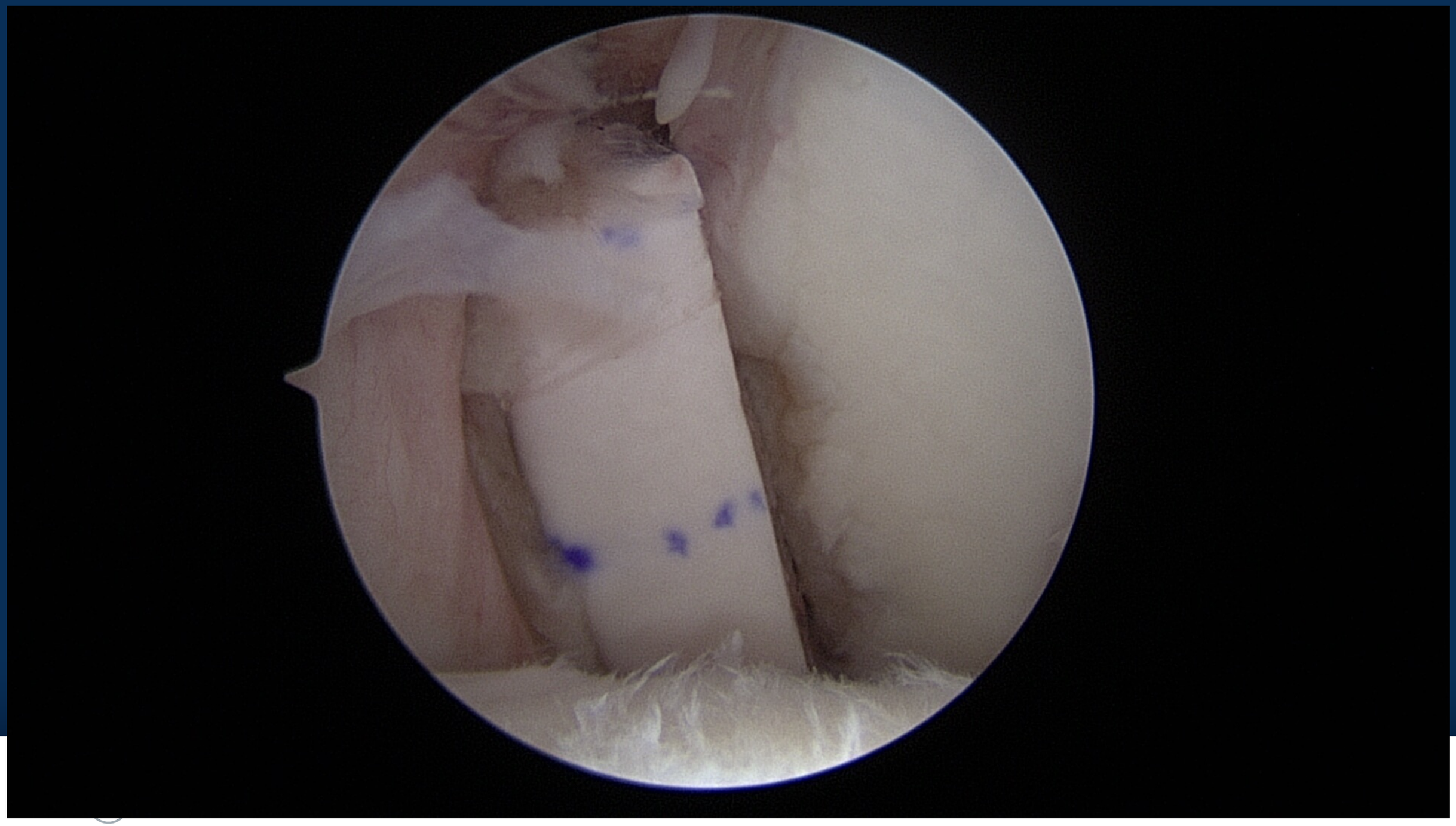
Lengthen Skin incision

-still not a big incision

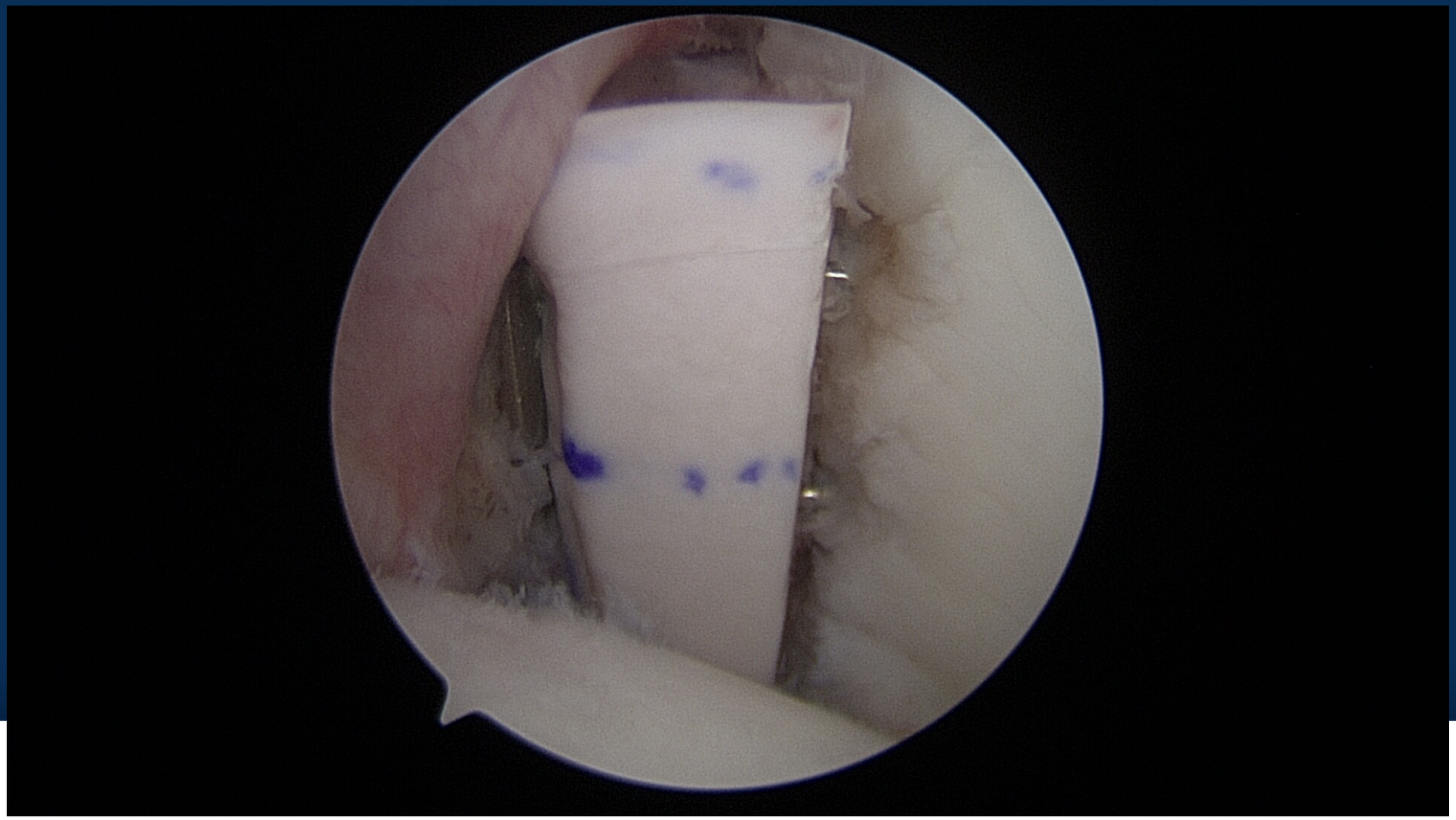
verify flat border prior to graft placement

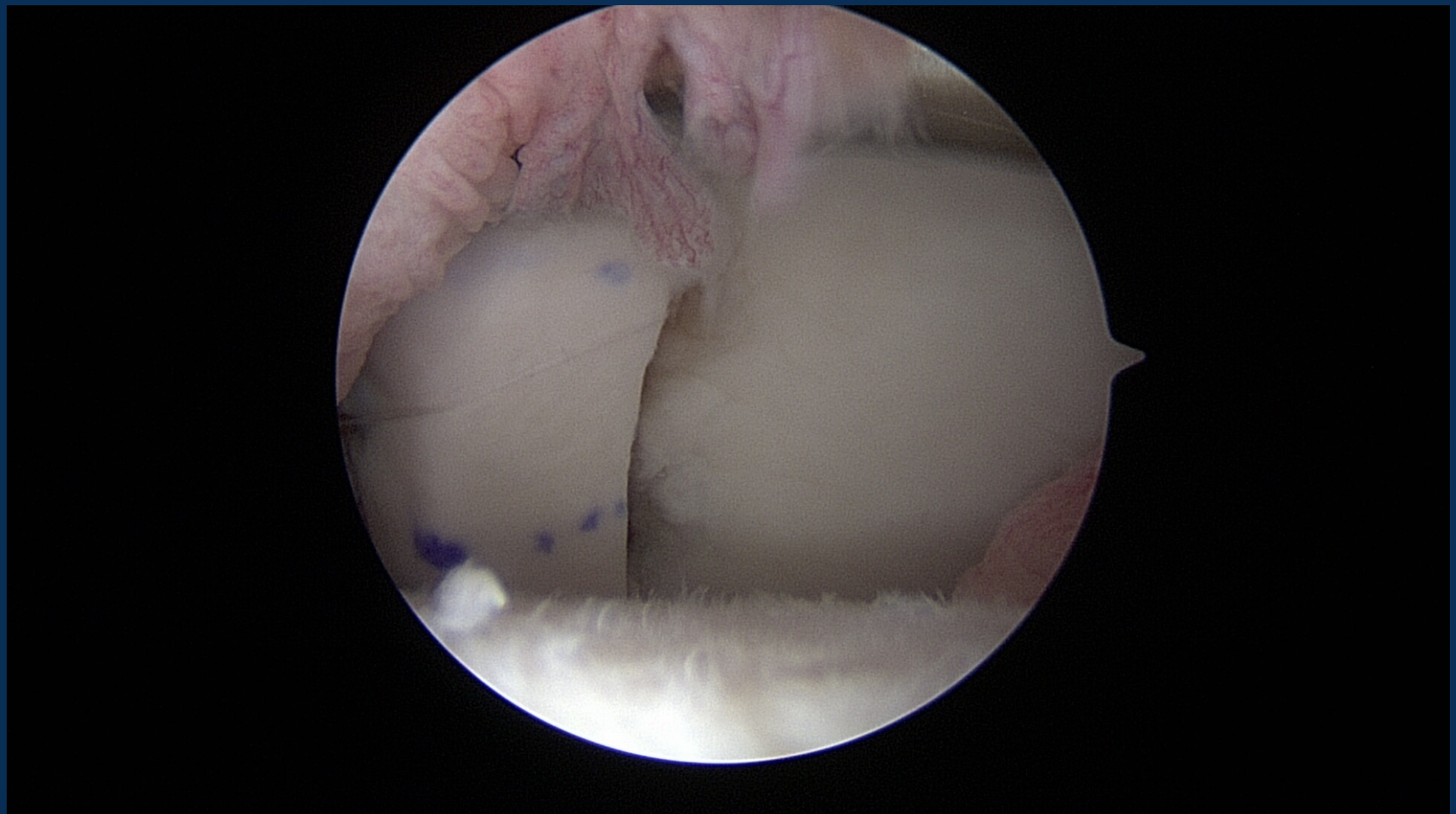
Insert graft





Place k-wires / cannulated drill / place screws +/- washers





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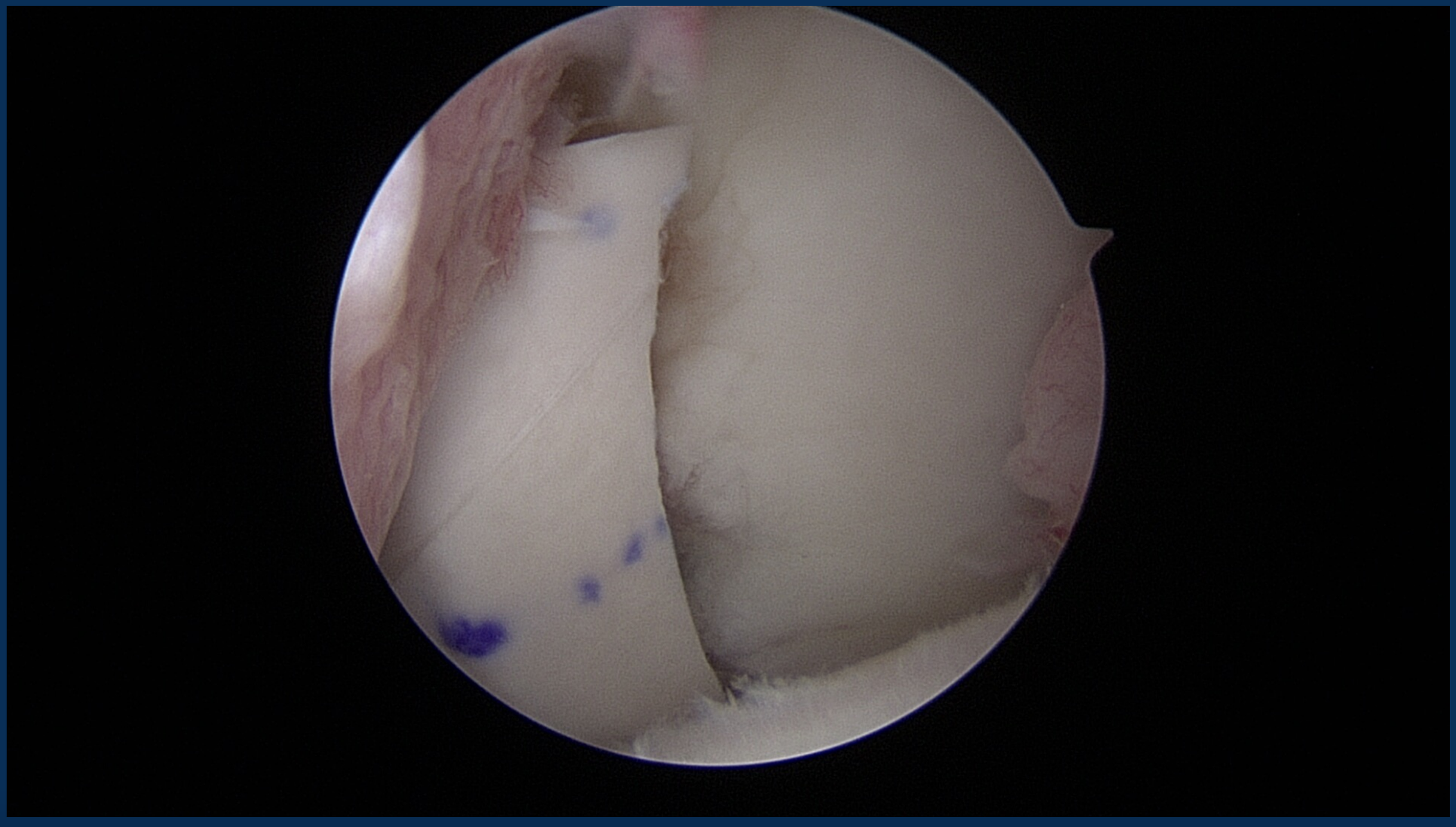
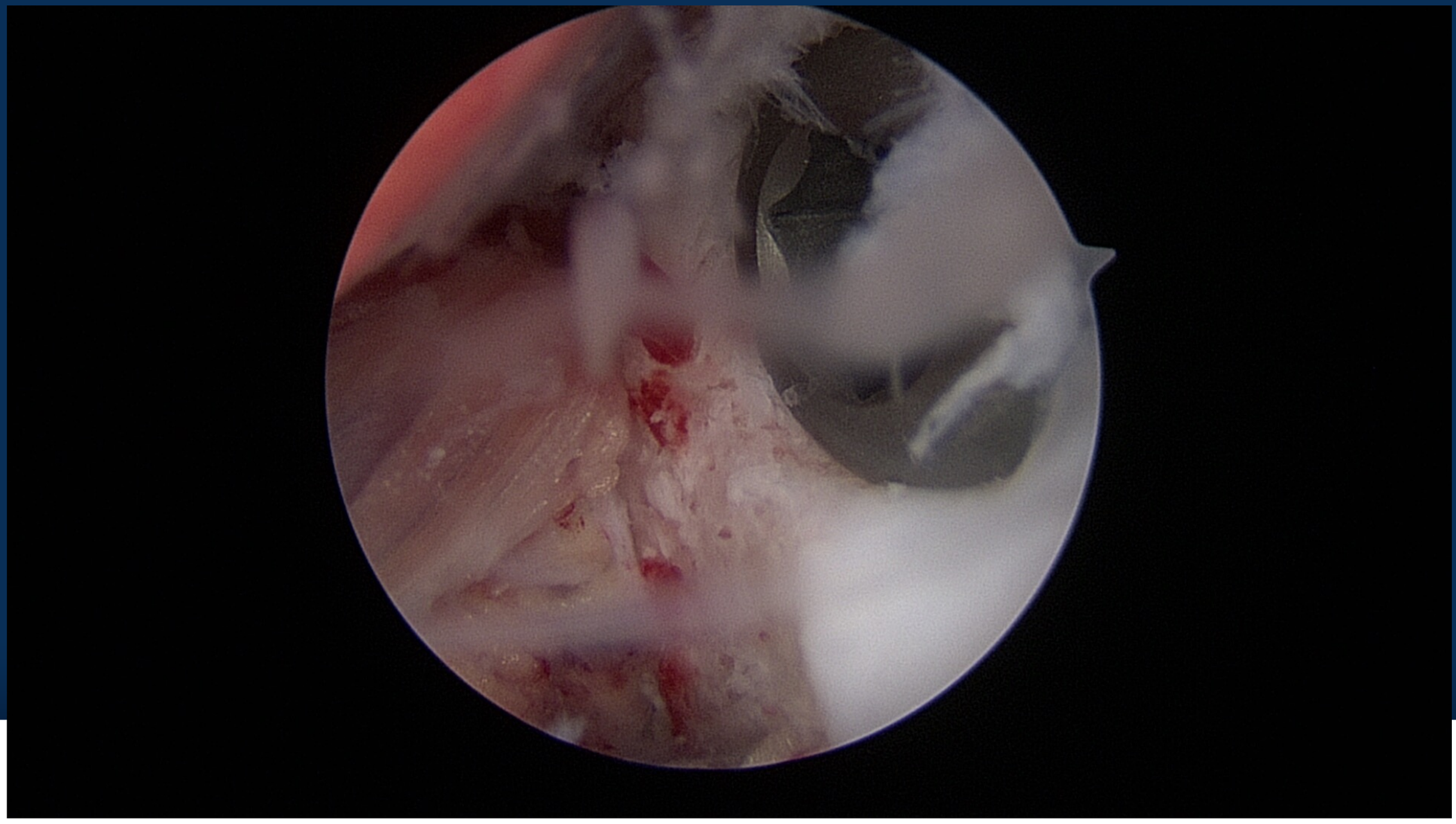
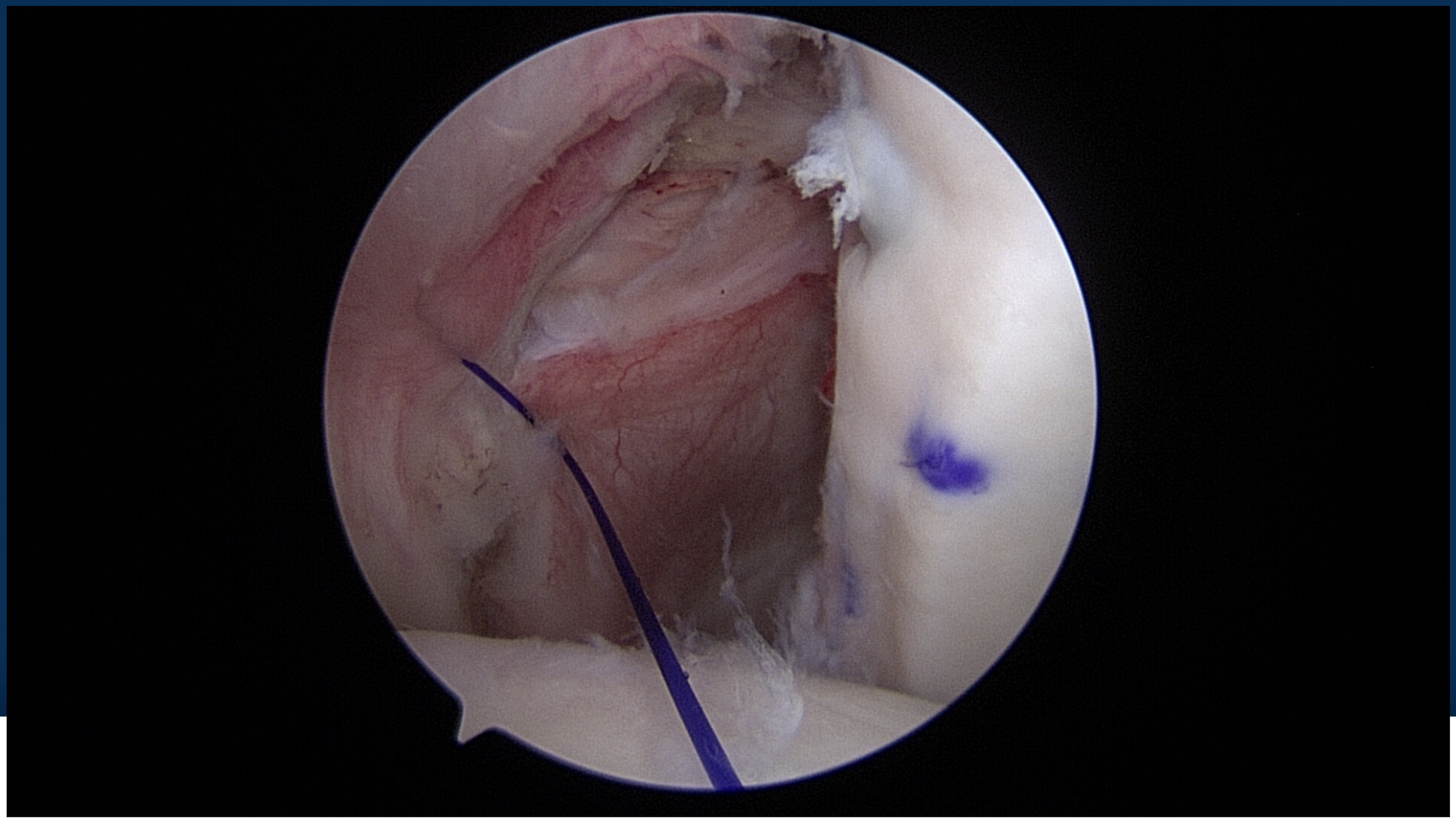


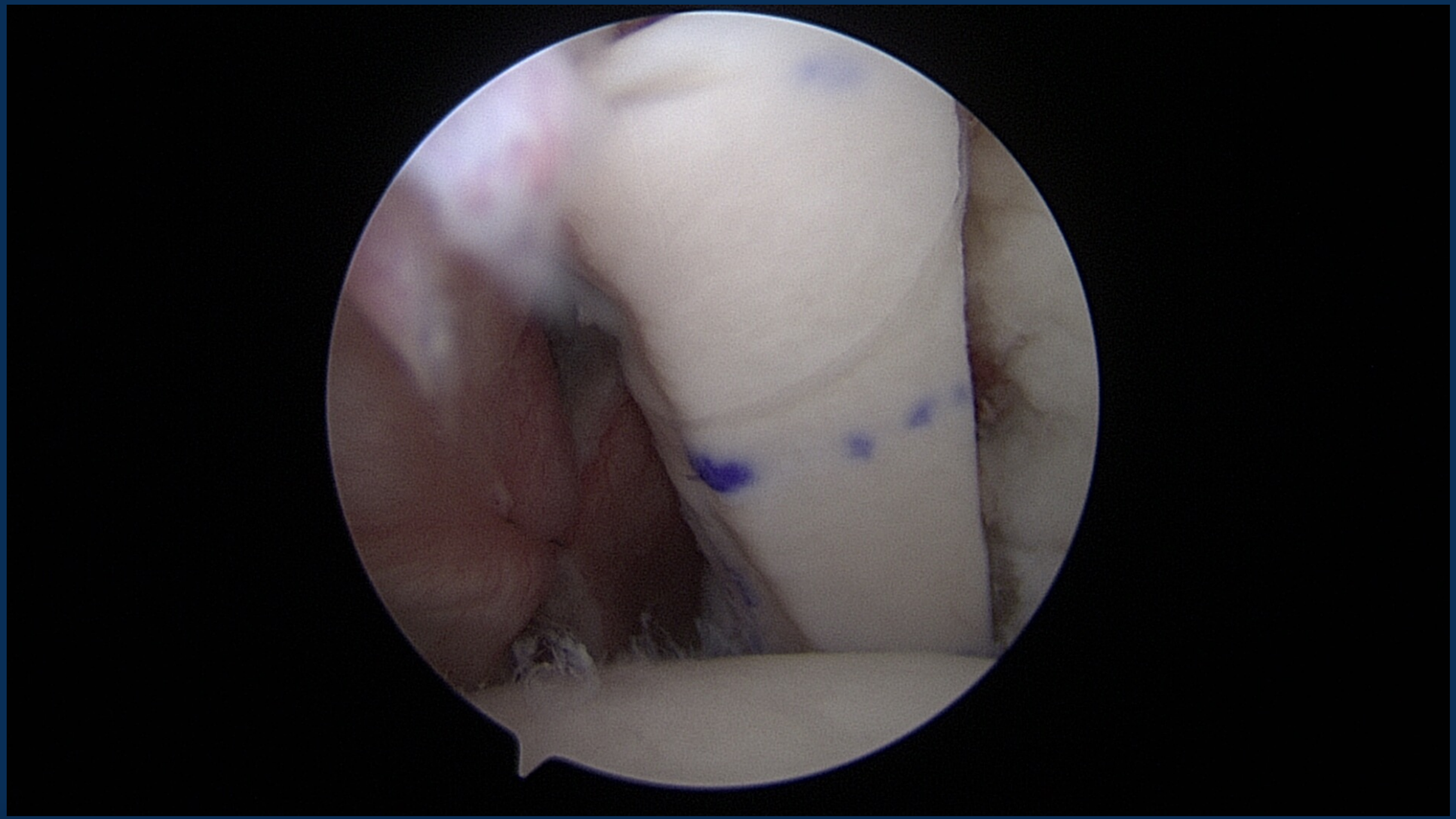
AUGUSTA UNIVERSITY

Verify screws are flush posteriorly



Capsular closure





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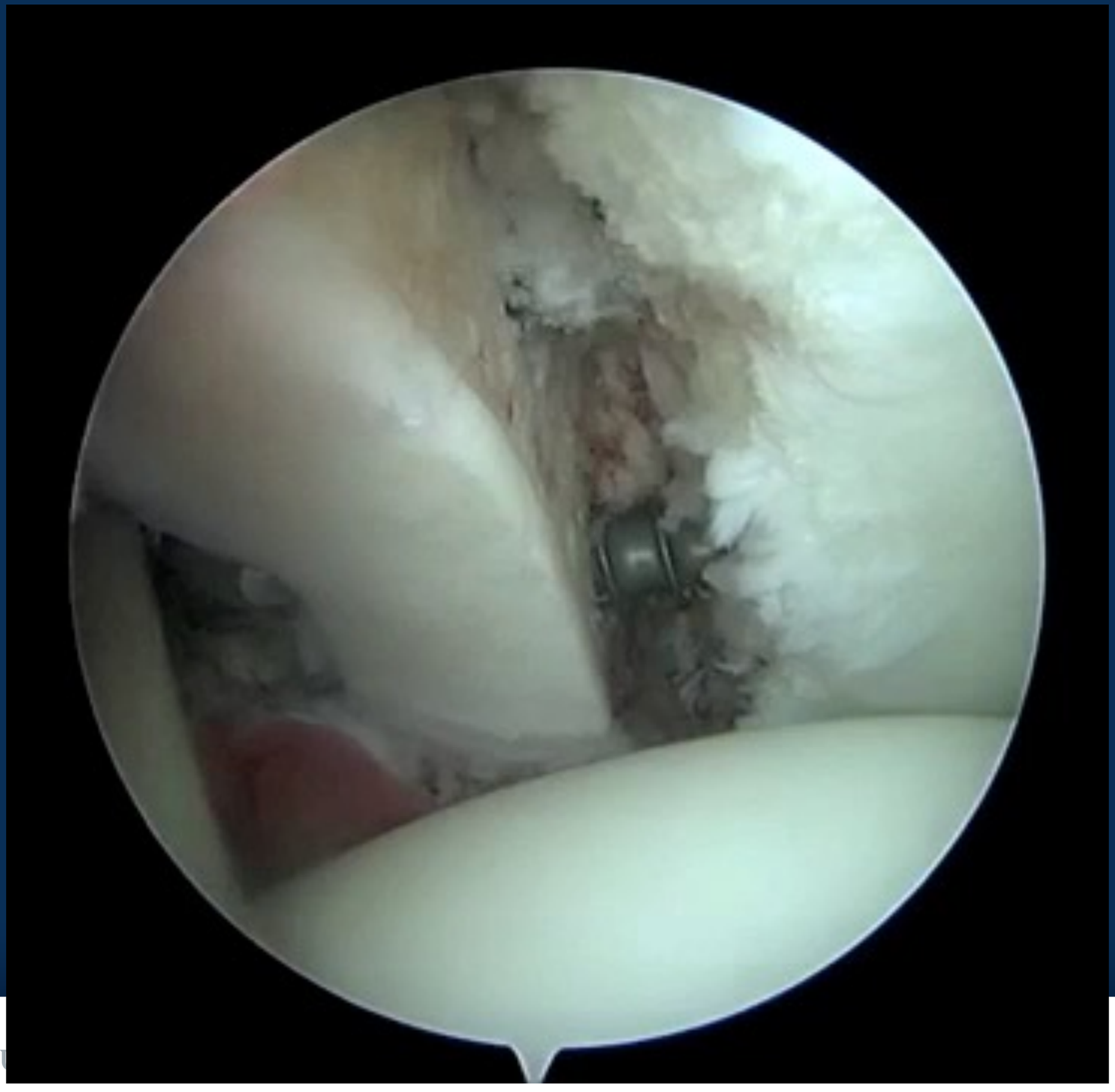
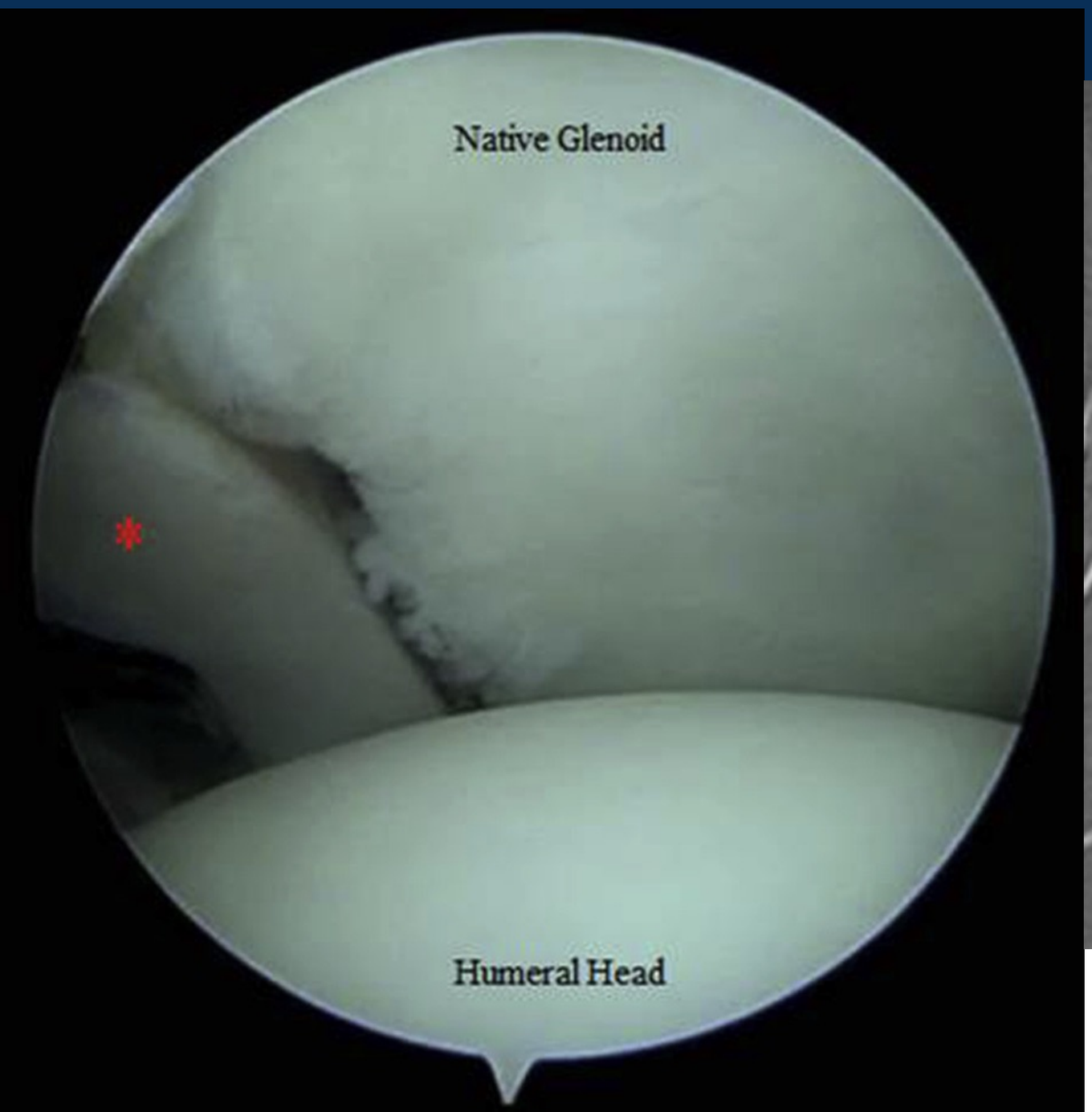
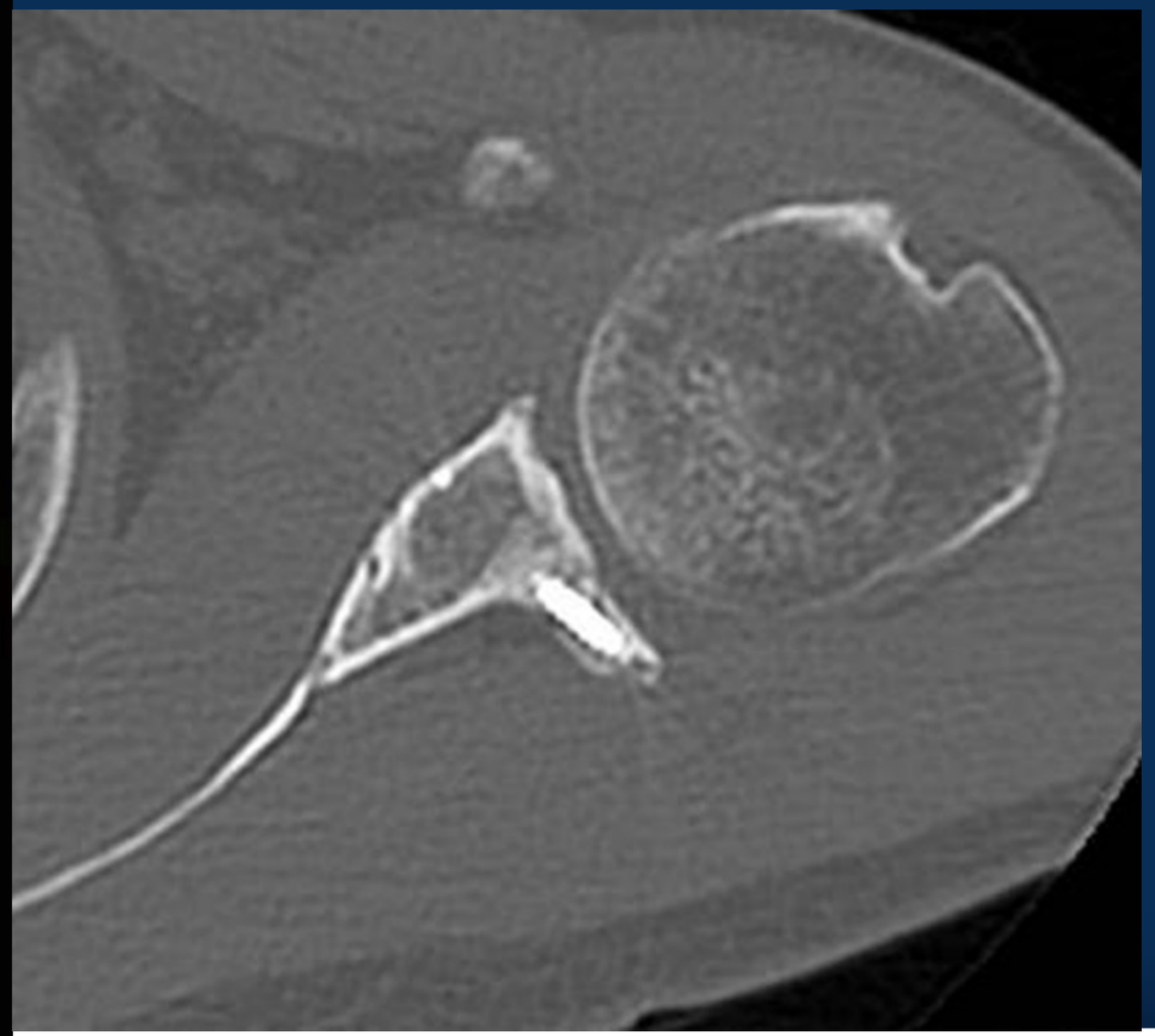


We don’t push the humerus forward, we just build the glenoid out so the humerus is now centered on the “new” joint

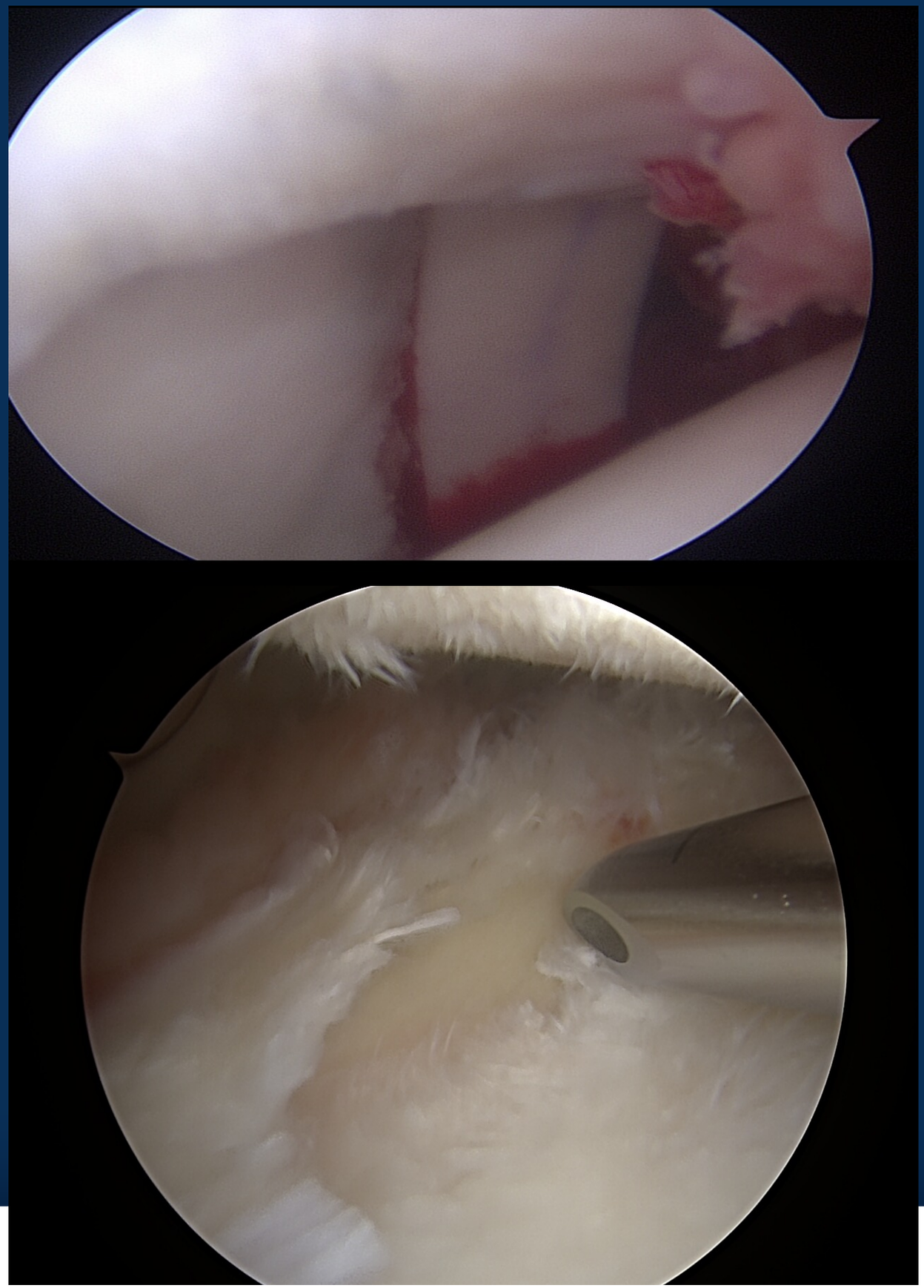





255
x Value: R:0 G:0 B:0
0 mm Z: 0.00 mm
s L-R: -4°, S-I: 0°
0
erarchical-1stOrderPrediction

Conclusion

- The back…is not the front
- Anterior instability will continue to be the ”easiest diagnosis” in shoulder surgery
- These patients present differently and use different words
- Critical examination of imaging
- Don’t miss glenoid dysplasia
- Complex treatment options exist for these patients



Conclusion

- I can’t do any of these cases without another skilled pair of hands
- Thanks for all you do to take care of these difficult patients from the clinic to the OR


Mikel Overgaard, PA-C
Orthopaedic Surgery