



Sonoanatomy and Ultrasound Guided Interventions of the Elbow: Foundational Level

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Treasurer, Founding Member of NOMA
Co-Owner of FoRM Health, LLC

DISCLOSURES / CONFLICTS

No relevant disclosures or conflicts of interest



ABOUT THE SPEAKER

Ryan Minarik, ND, LAc.

Education

- Undergrad: University of Washington
- Med school: NUNM 2000-2006.
- Residency, 2 year: NUNM: 2006-2008
- Numerous post-grad injection and ultrasound trainings through AAOM, HHF, AOAPRM, TOBI, NATI, SDARTs....

Professional

- Co-Founder of **FoRM Health** in 2008 (previously Elixia Wellness Group) in SE Portland
- Started practicing prolotherapy in ~2006, PRP ~2010, MSK Ultrasound ~2010.
- Practice specialty in sports medicine and non-surgical regenerative orthopedics: Injections, Ultrasound, dry needling and manual therapies for soft tissue injuries
- OBNM Board Member
- NOMA Founding Board Member, Treasurer



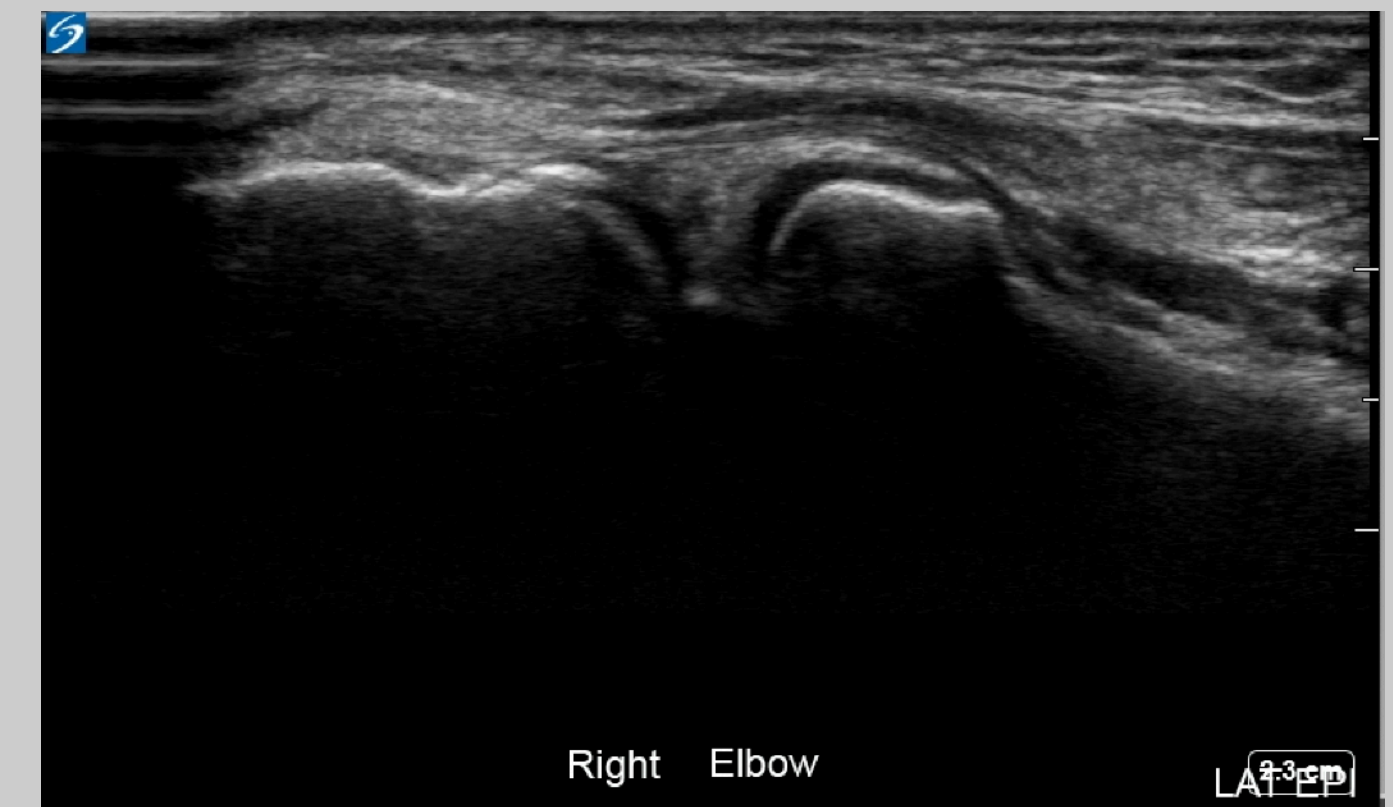
Circa 2010

NOMA

OVERVIEW

Ultrasound Images

- All used from my personal cases, unless otherwise cited
- Left Side of screen = Lateral / Radial / Proximal
- Right Side of screen = Medial / Ulnar / Distal
- Example probe positions are shown to highlight orientation of anatomy. But... make sure to optimize your, and patient's positioning!
- Highlighted Structure/Outlined in Blue
- Relevant Anatomy in Yellow



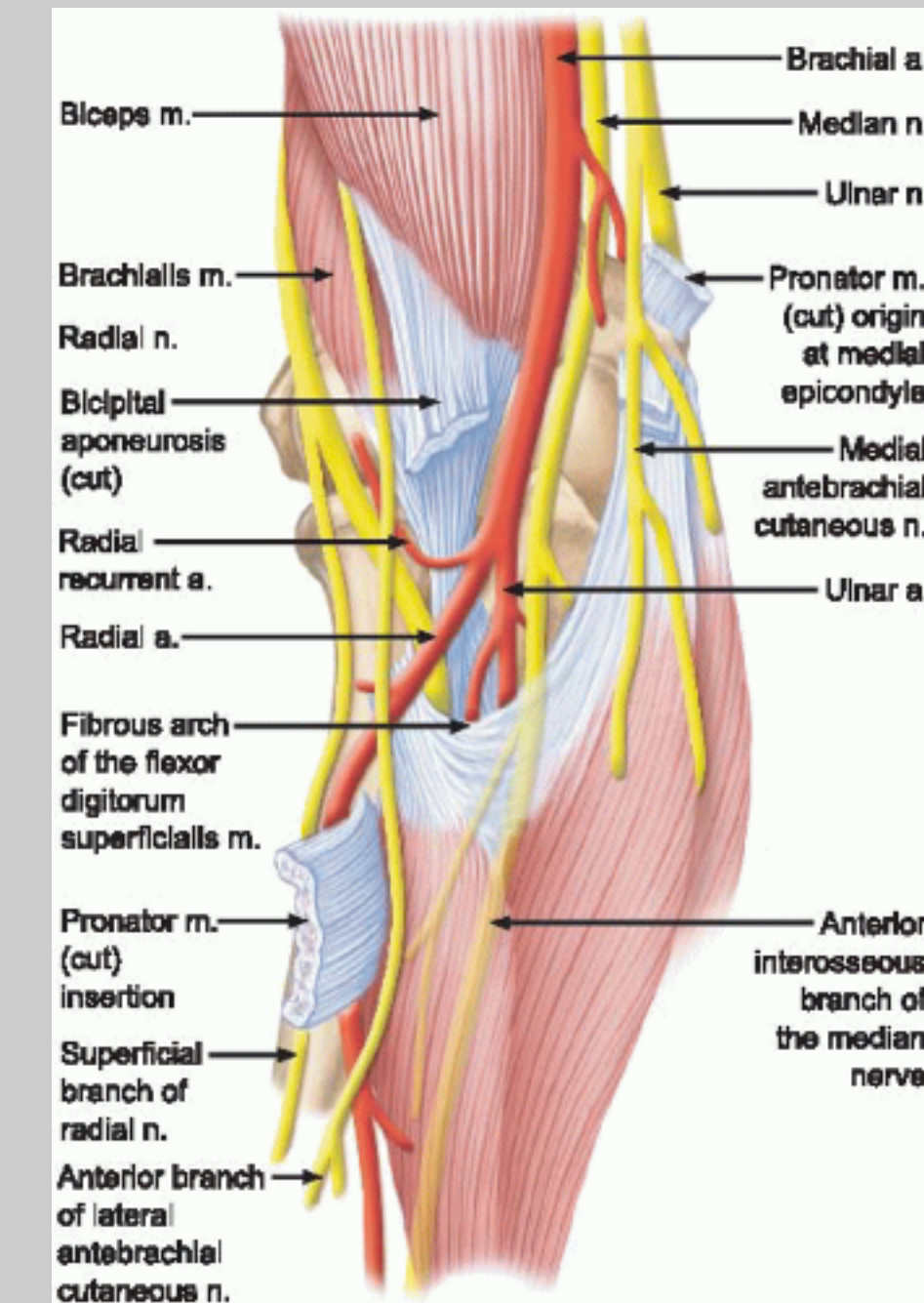
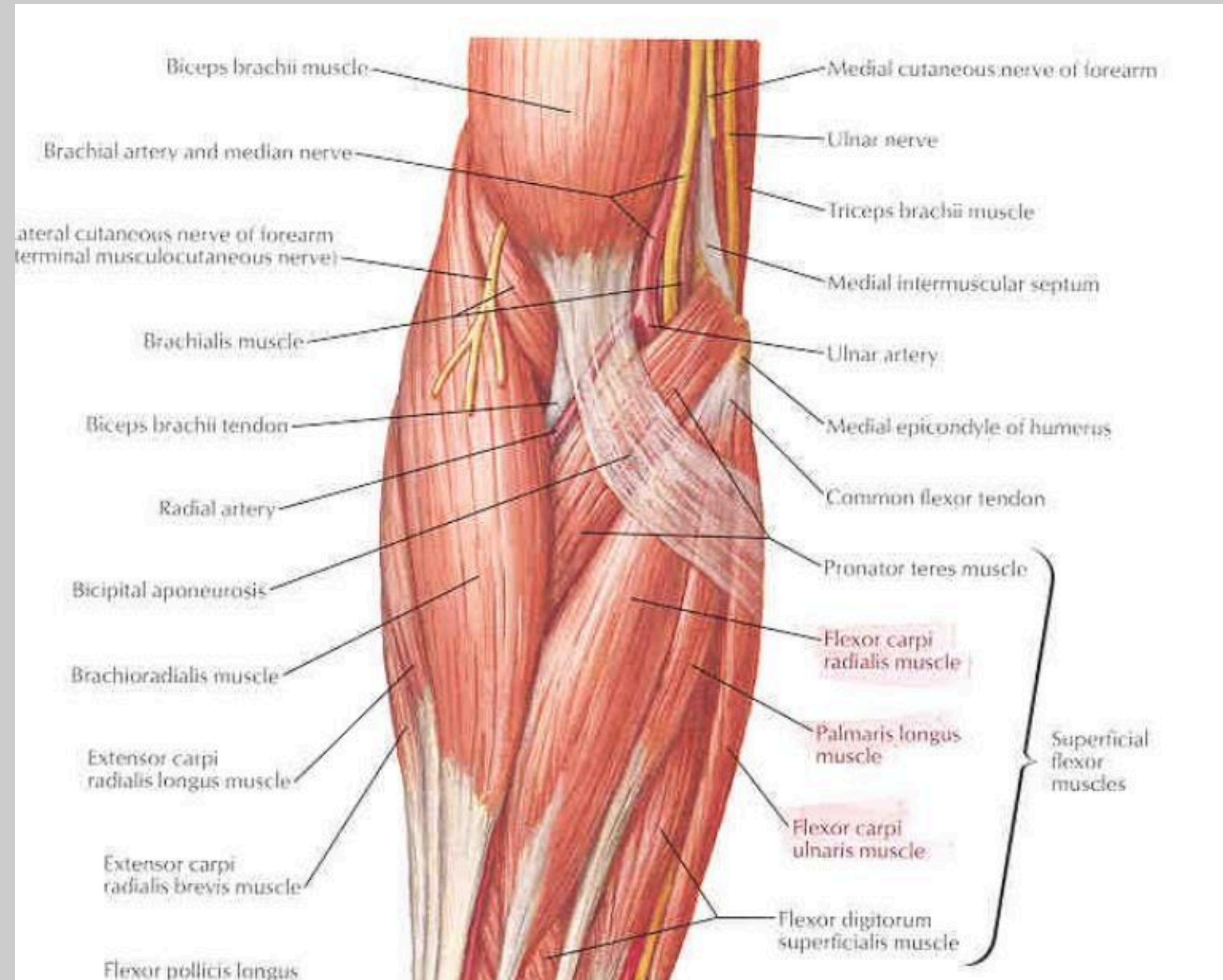
NOMA

SONOANATOMY STRUCTURE LIST

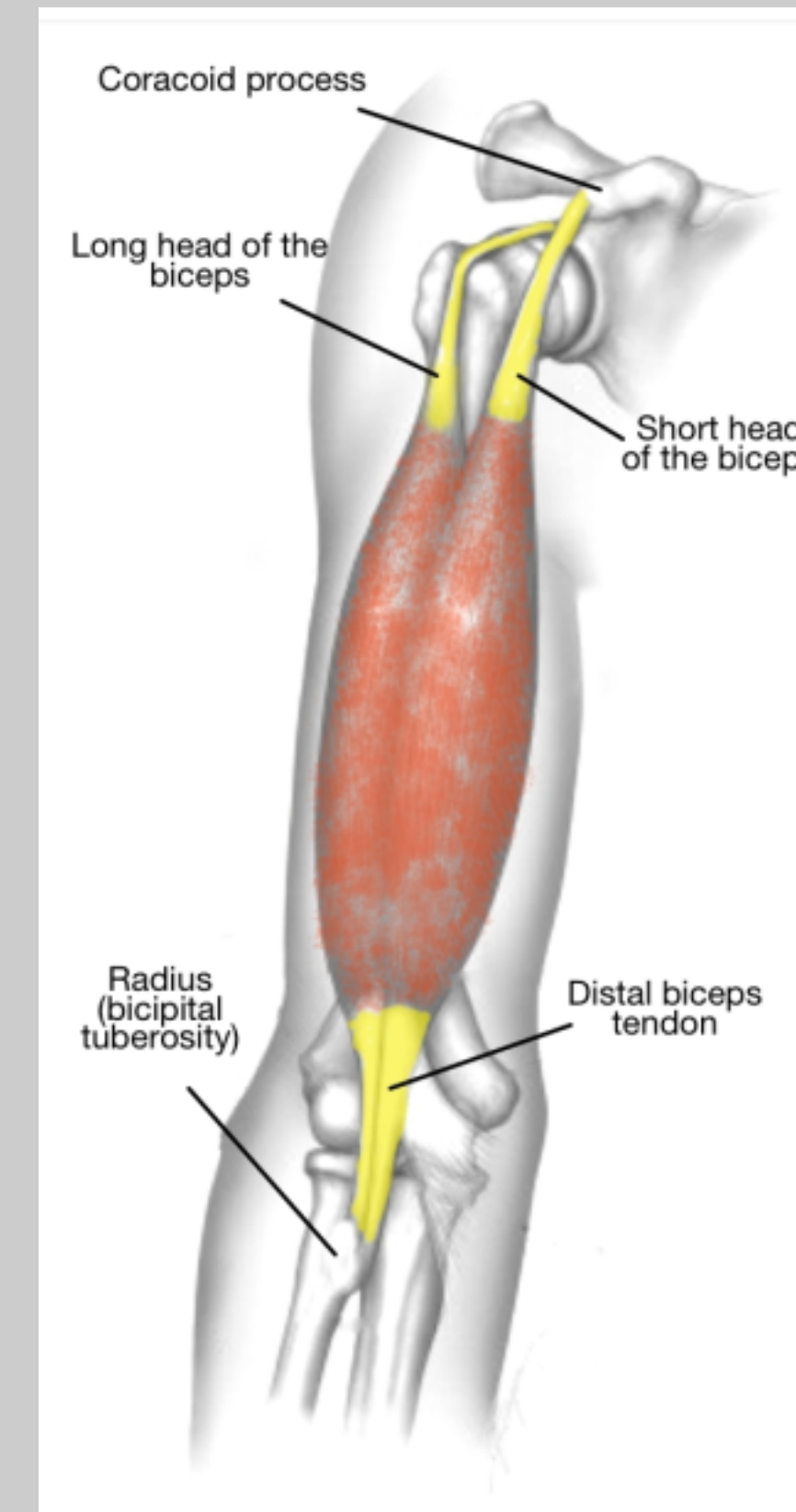
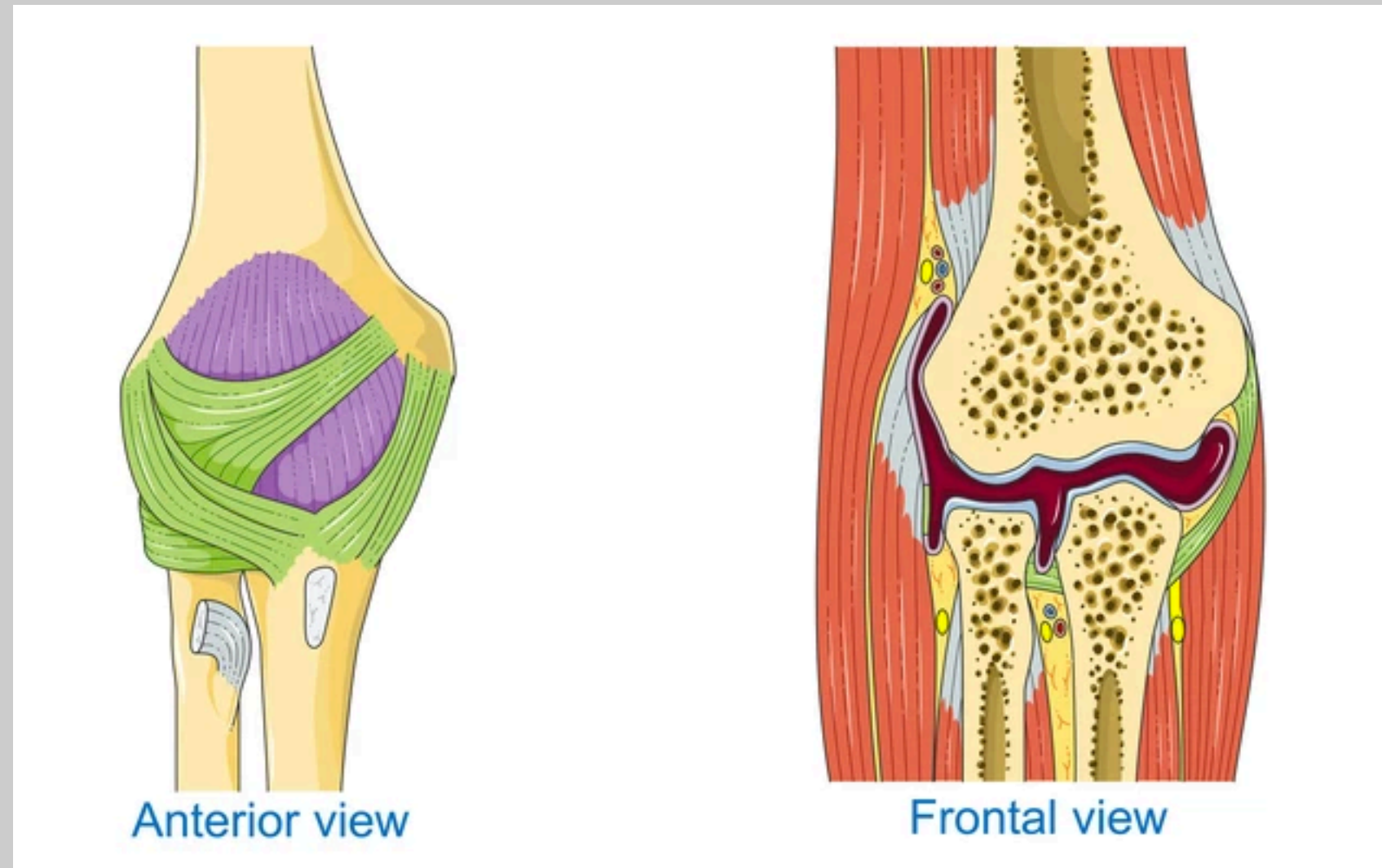
<u>Anterior</u>	<u>Medial</u>	<u>Lateral</u>	<u>Posterior</u>
Distal biceps tendon	Common flexor tendon	Radial Head	Humerus
Median nerve	Ulnar collateral ligament (UCL)	Common extensor tendon	Olecranon and fossa
		Radial collateral ligament (RCL)	Olecranon bursa
		Radial nerve and PIN	Ulnar nerve
		[Distal biceps tendon]	Triceps tendon



ANATOMY: Anterior

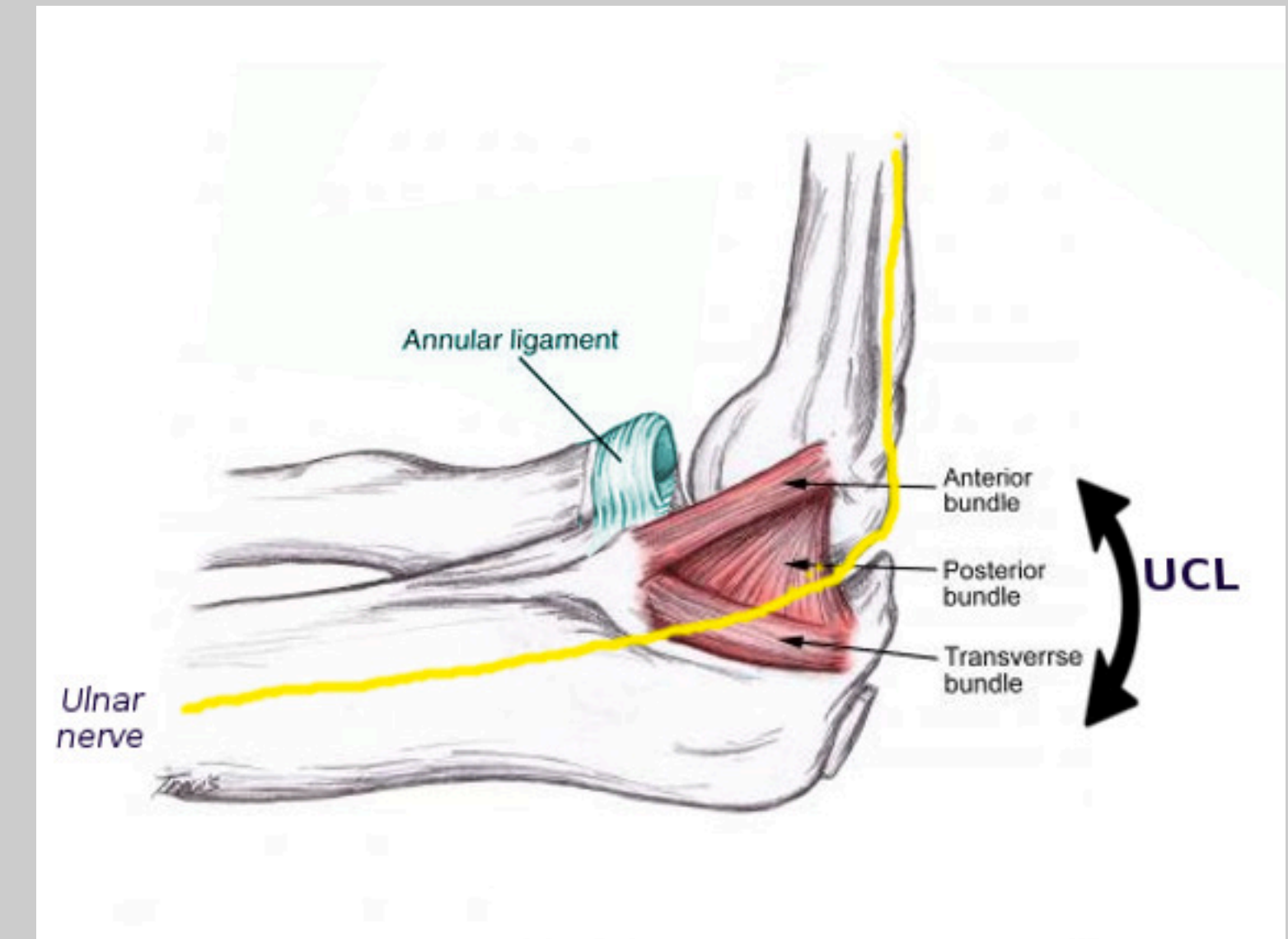
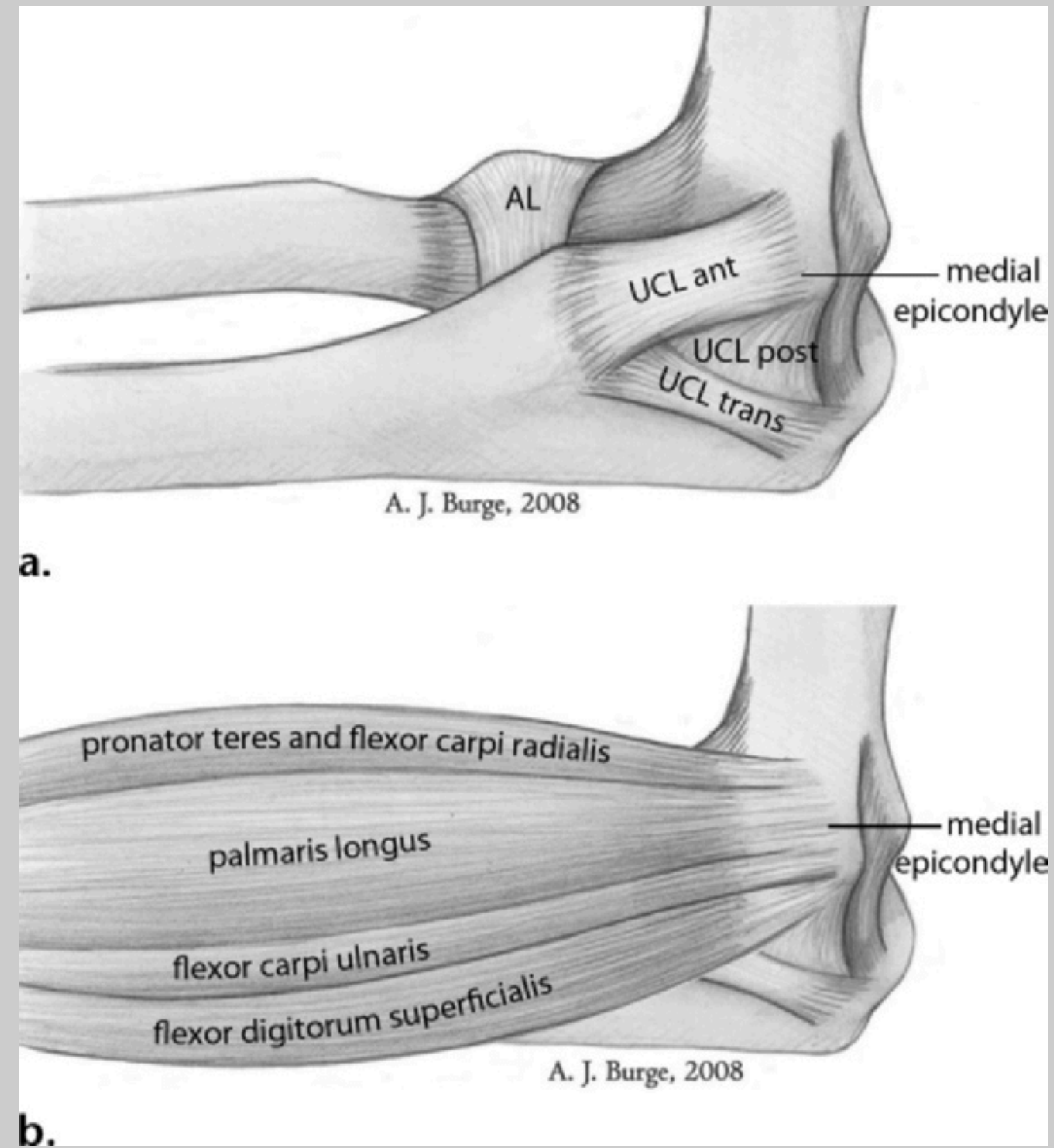
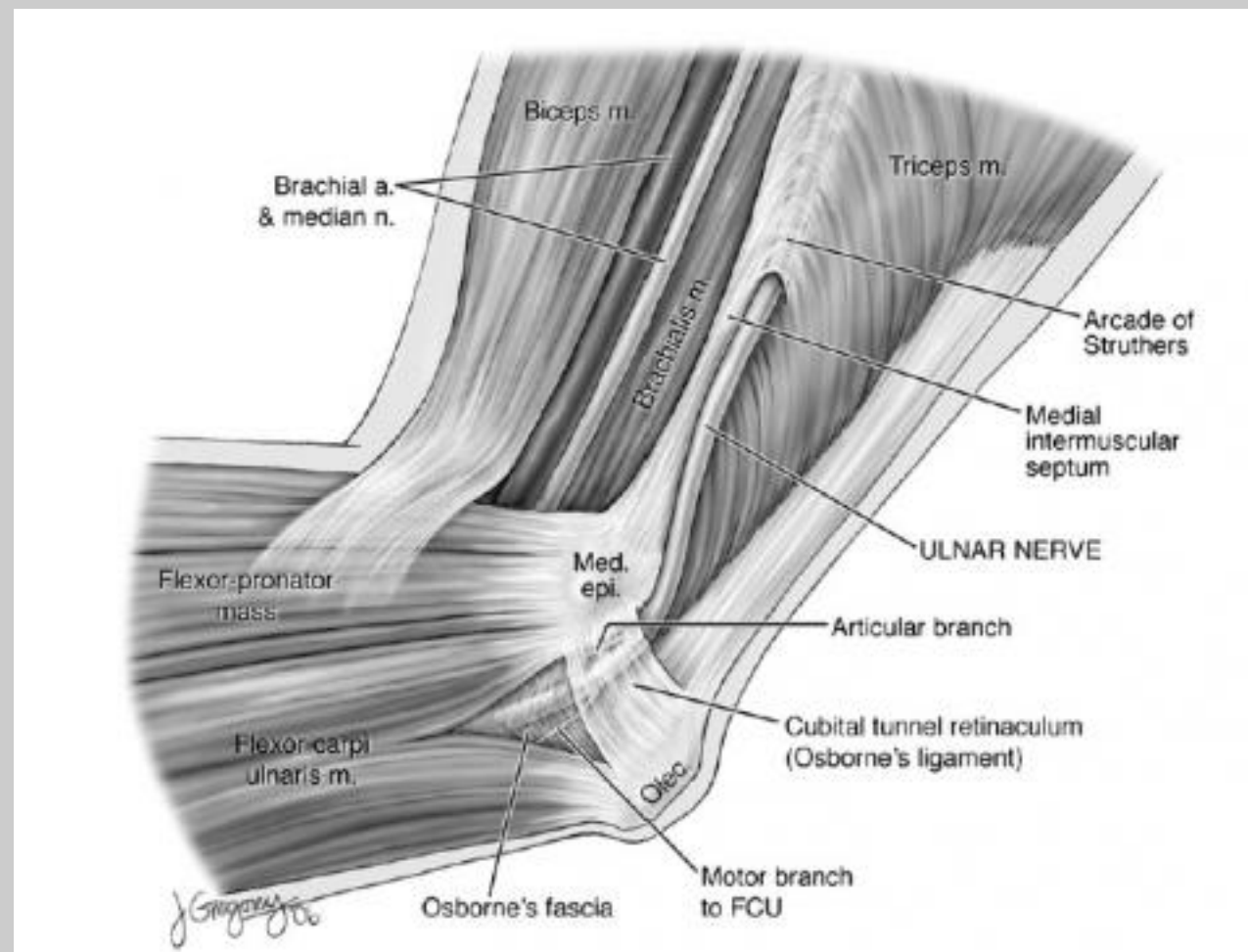


ANATOMY: Anterior



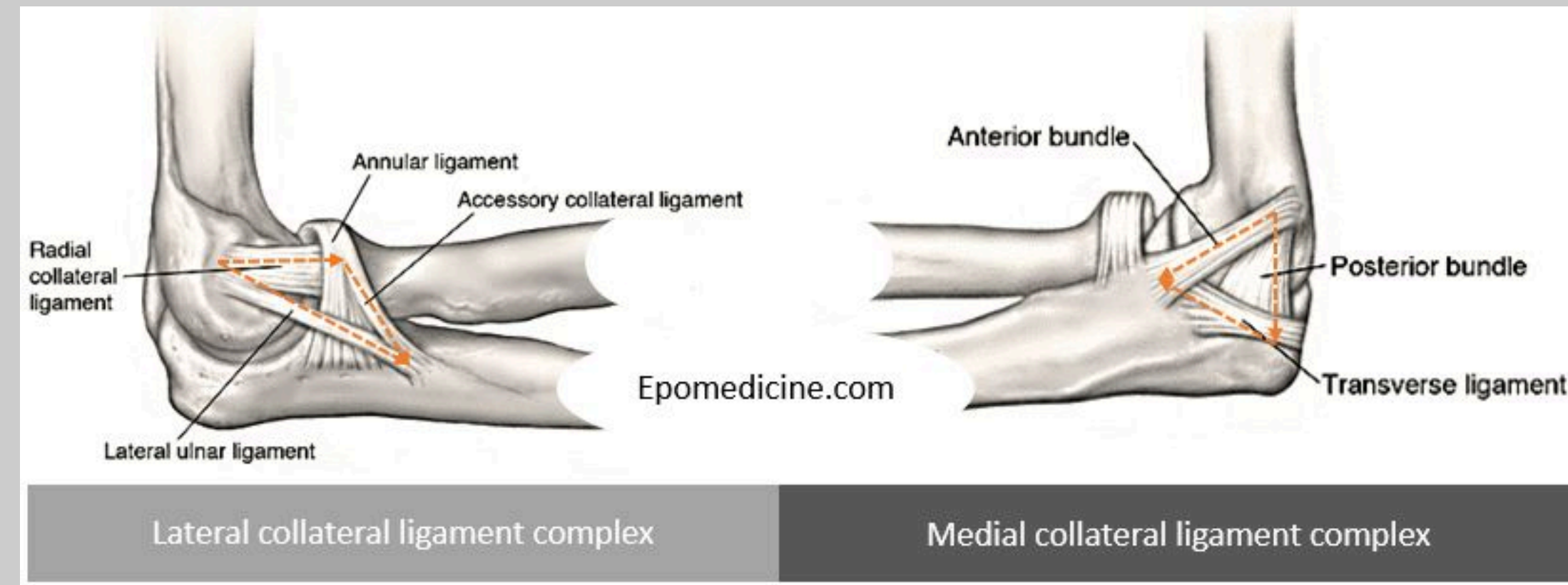
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ANATOMY: Medial



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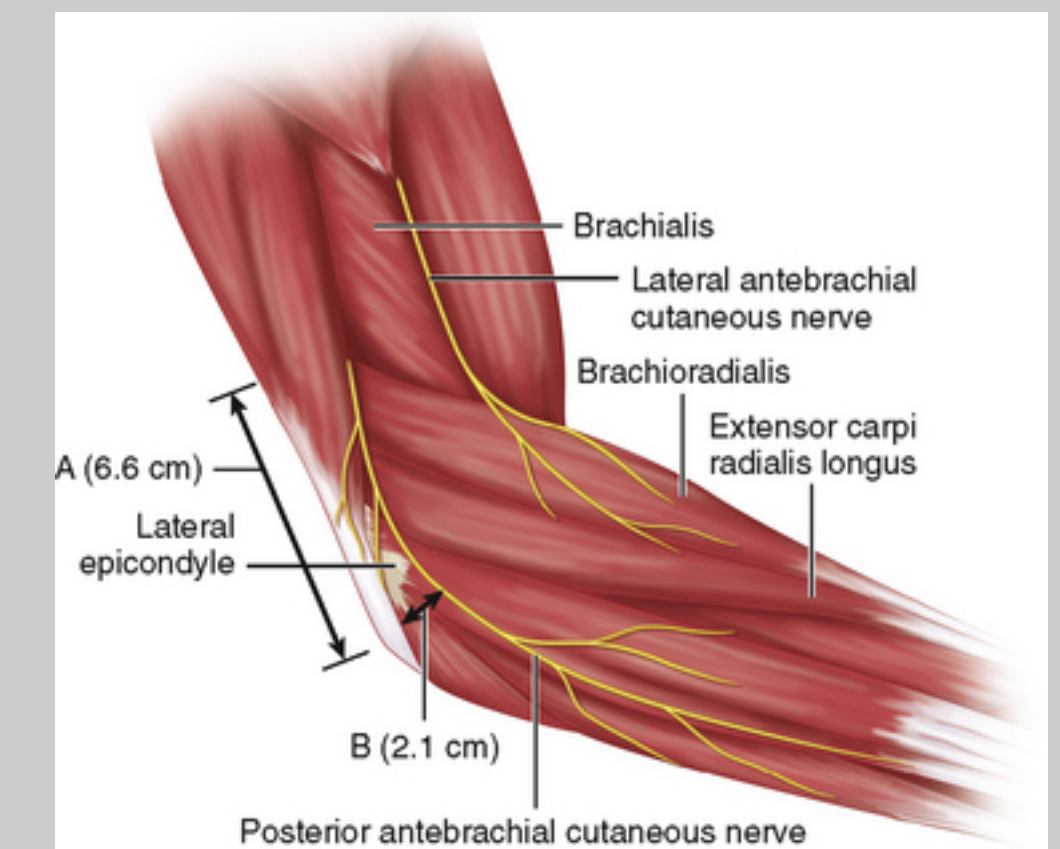
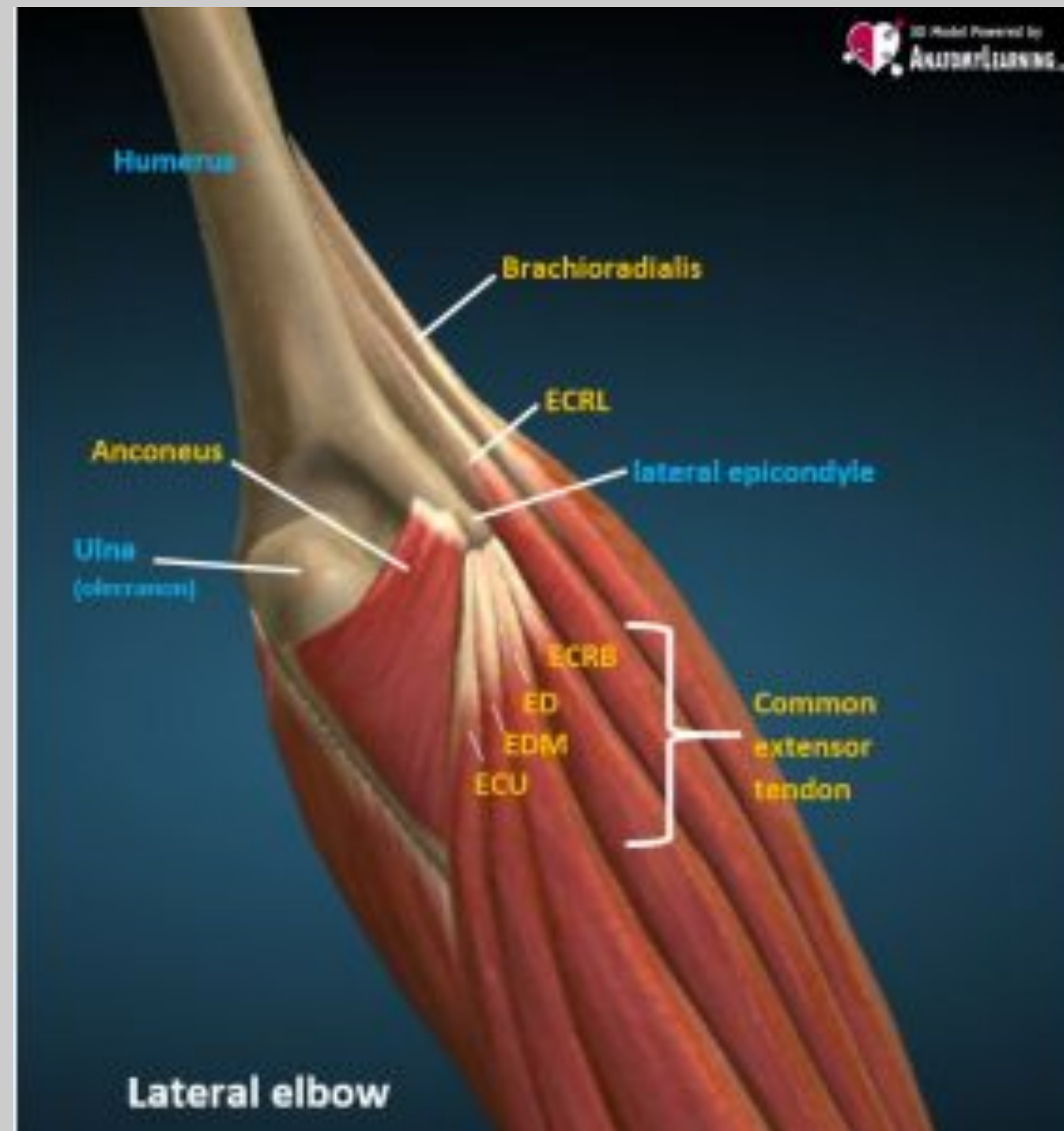
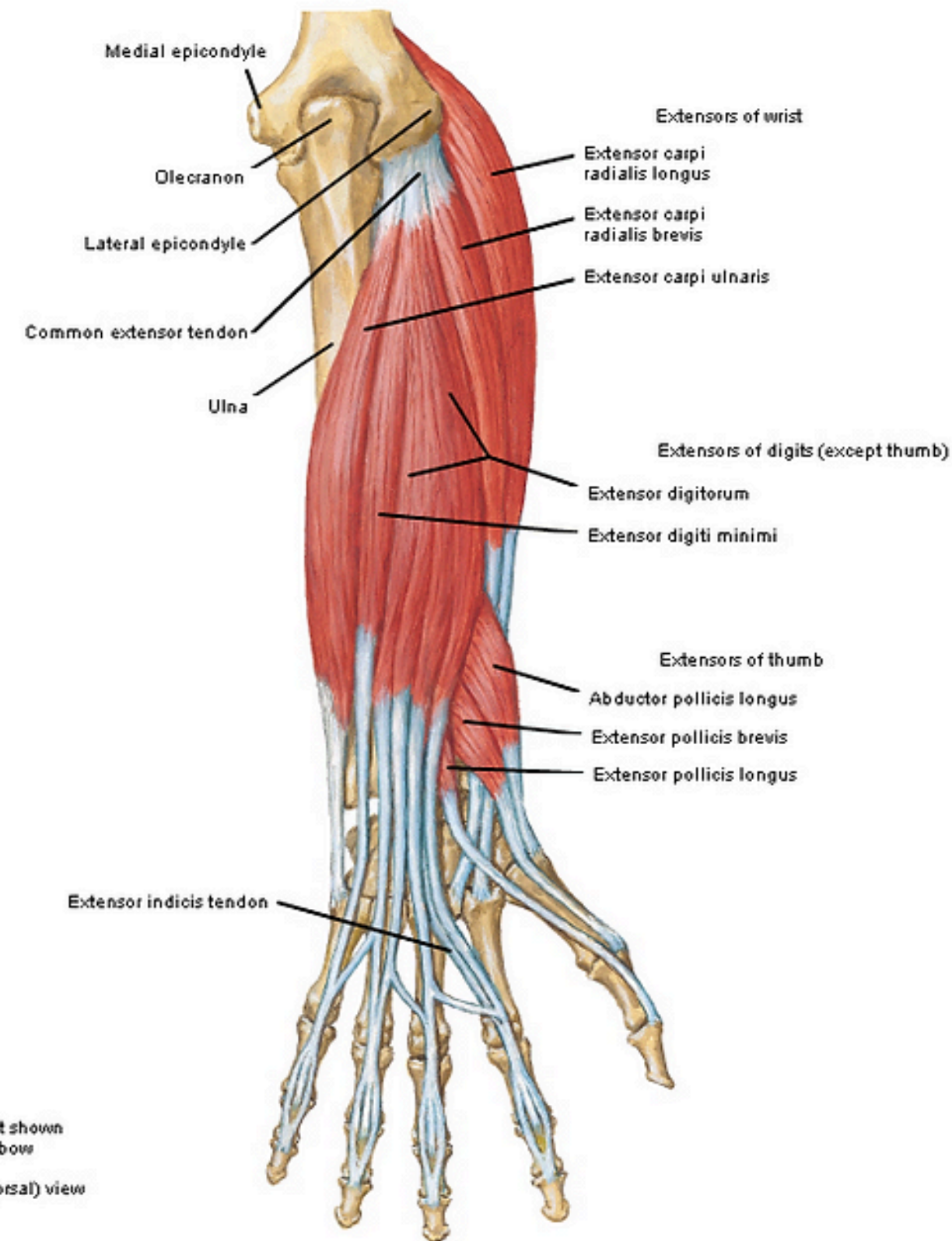
ANATOMY



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ANATOMY: Lateral

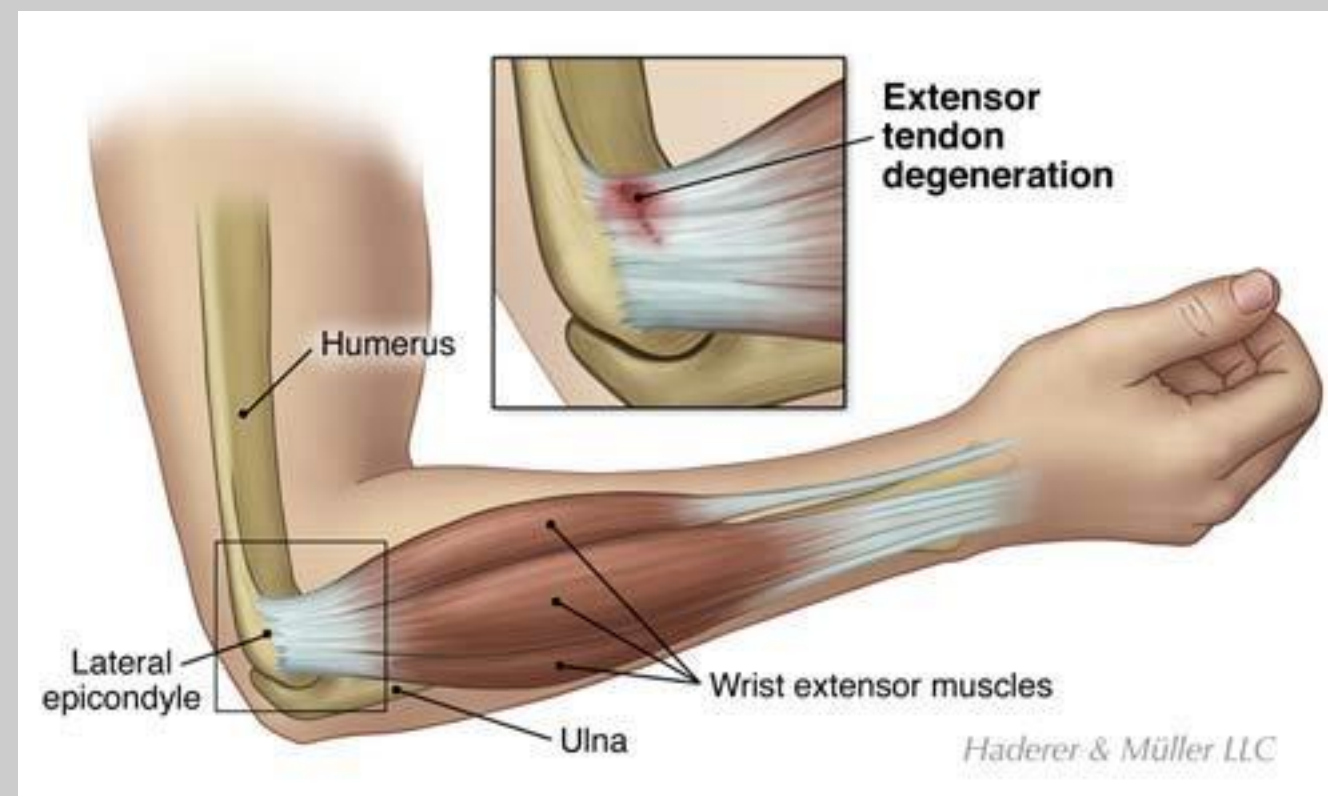
Individual Muscles of Forearm Extensors of Wrist and Digits



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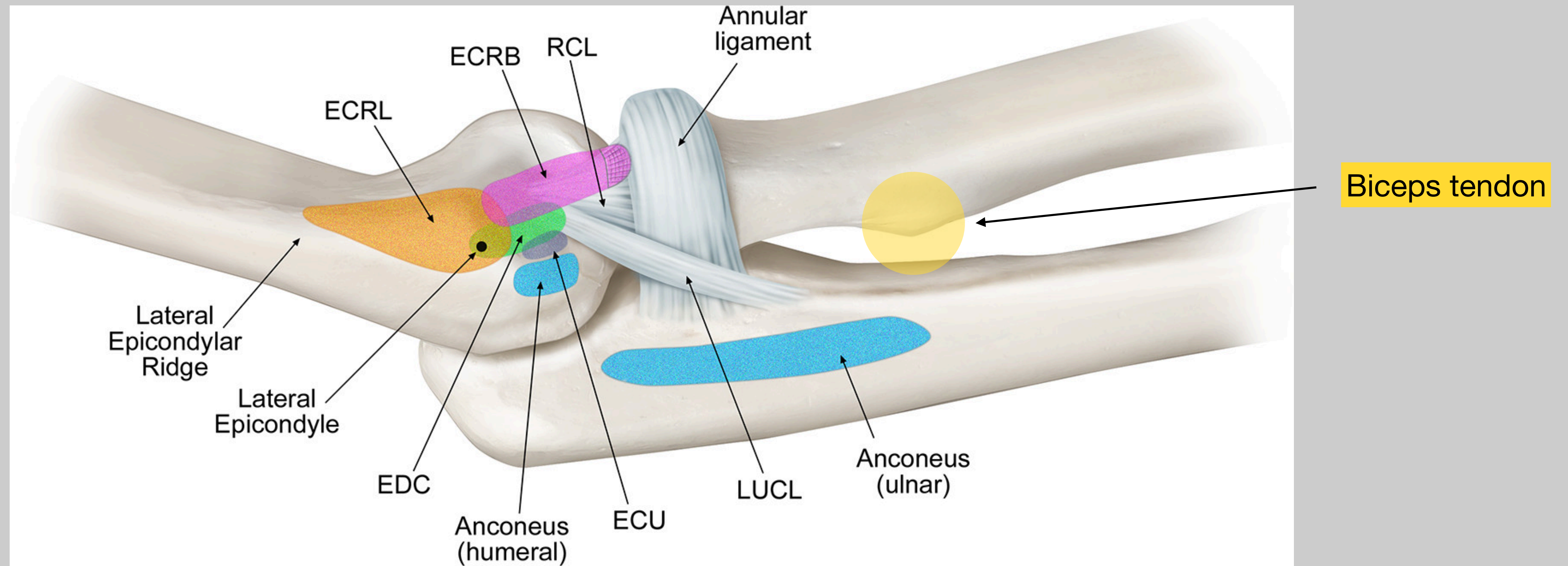
ANATOMY: Lateral

Simplify It!



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ANATOMY: Lateral



1.

Bernholt DL, Rosenberg SI, Brady AW, Storaci HW, Viola RW, Hackett TR. Quantitative and Qualitative Analyses of the Lateral Ligamentous Complex and Extensor Tendon Origins of the Elbow: An Anatomic Study. Orthopaedic Journal of Sports Medicine. 2020;8(10). doi:10.1177/2325967120961373

ANATOMY: Lateral

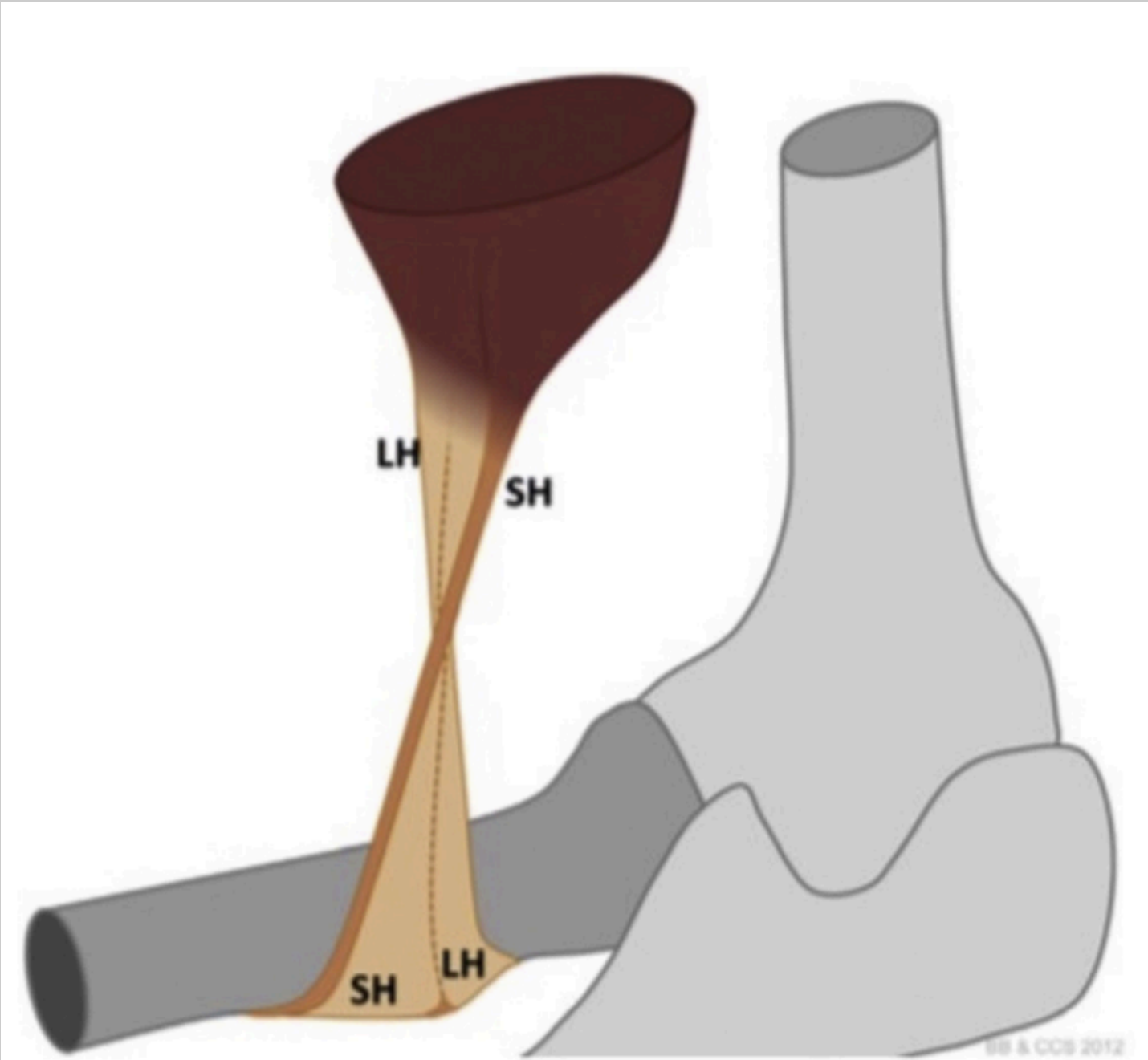
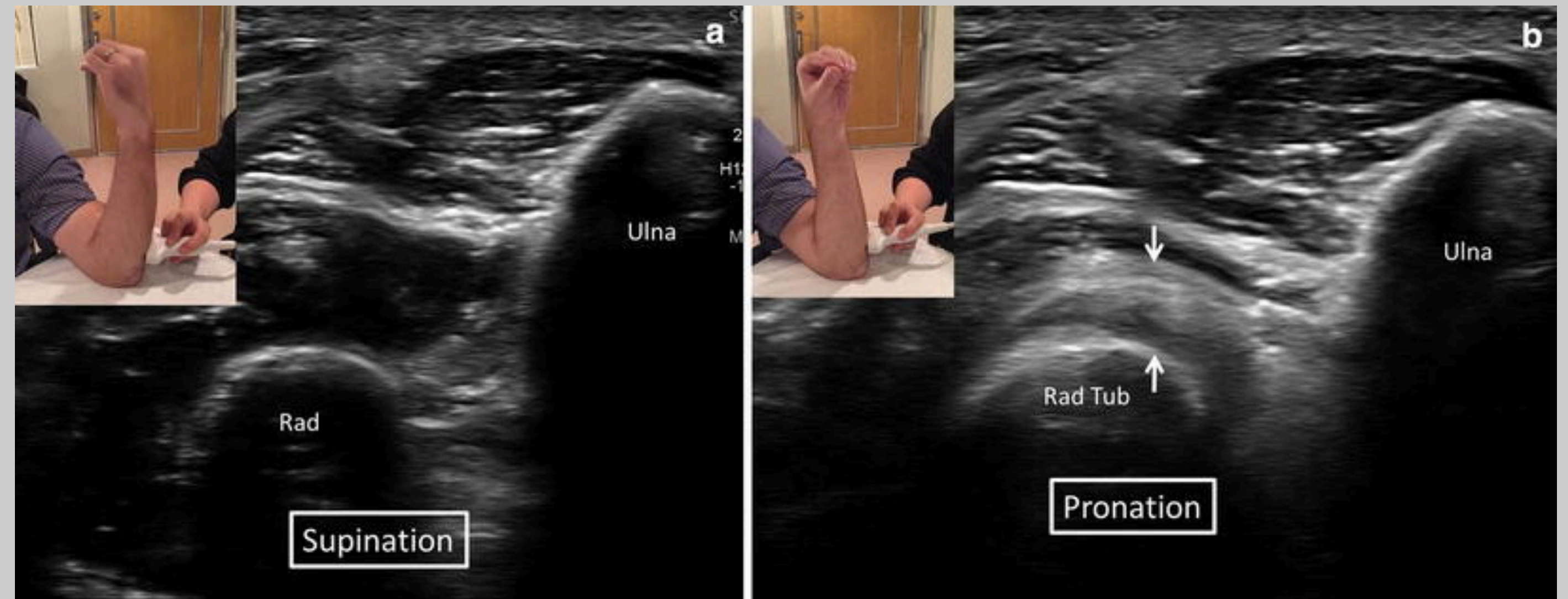
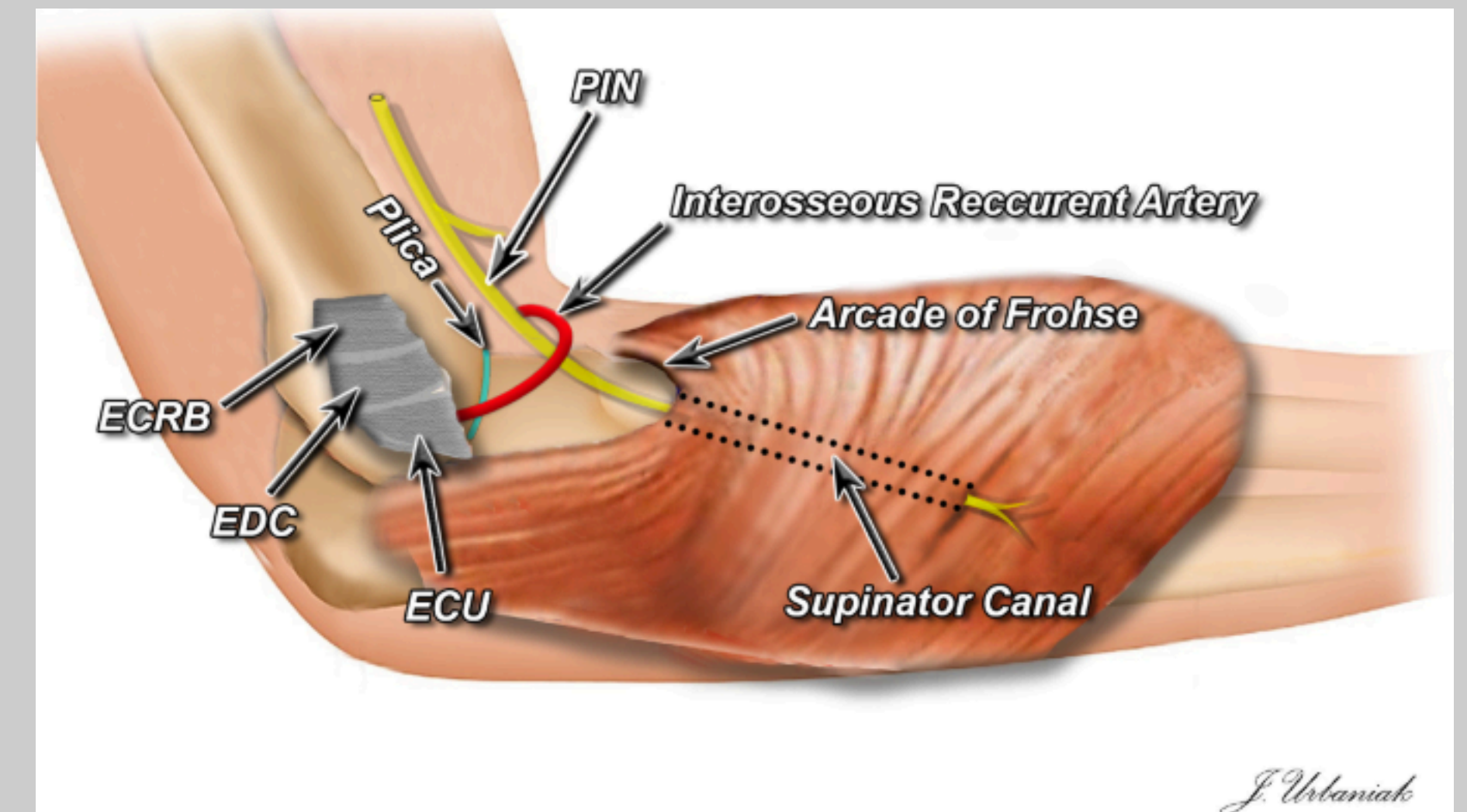
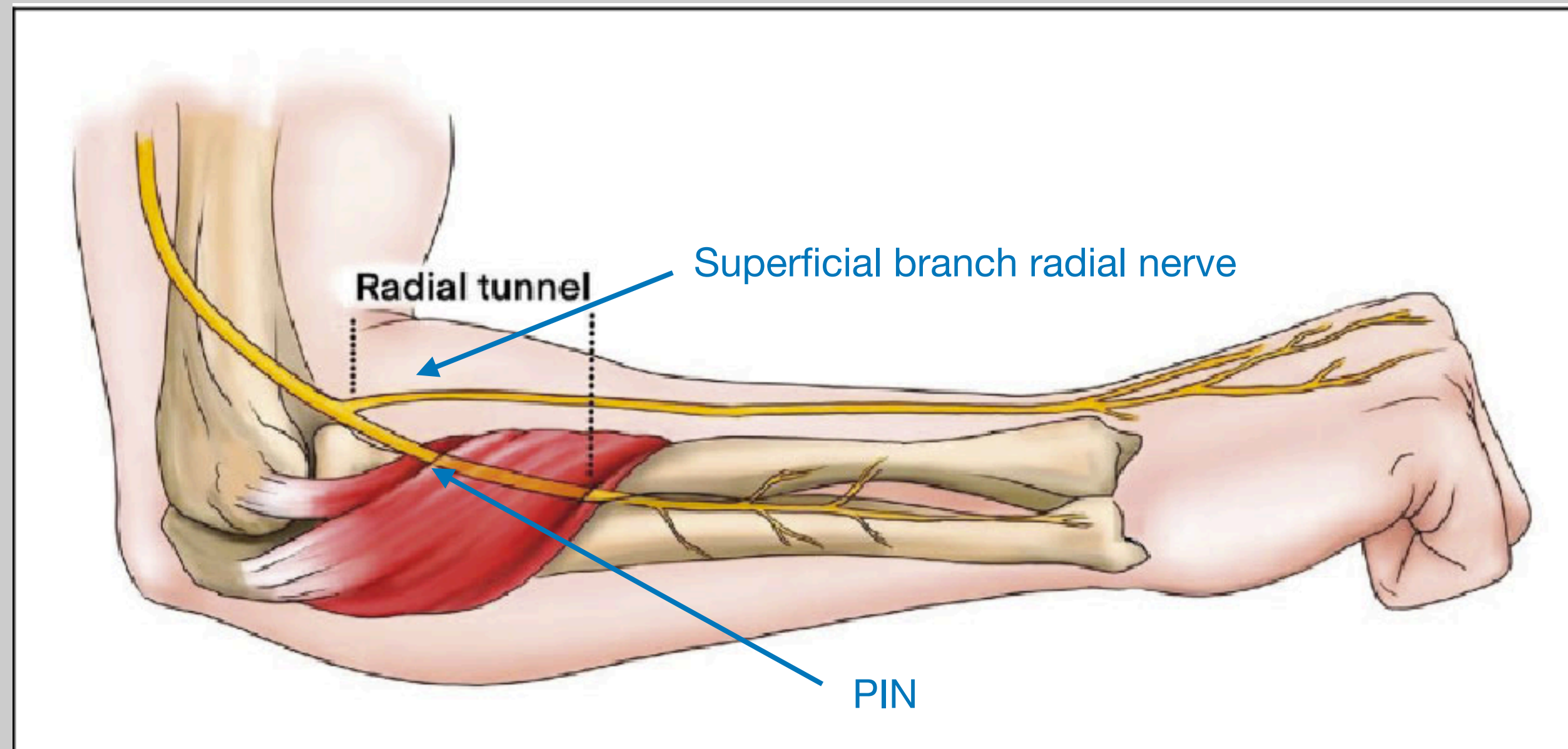


FIGURE 1: The schematic illustrates 90° of external rotation of the distal biceps tendon with the short head (SH) inserting distally. LH, long head.



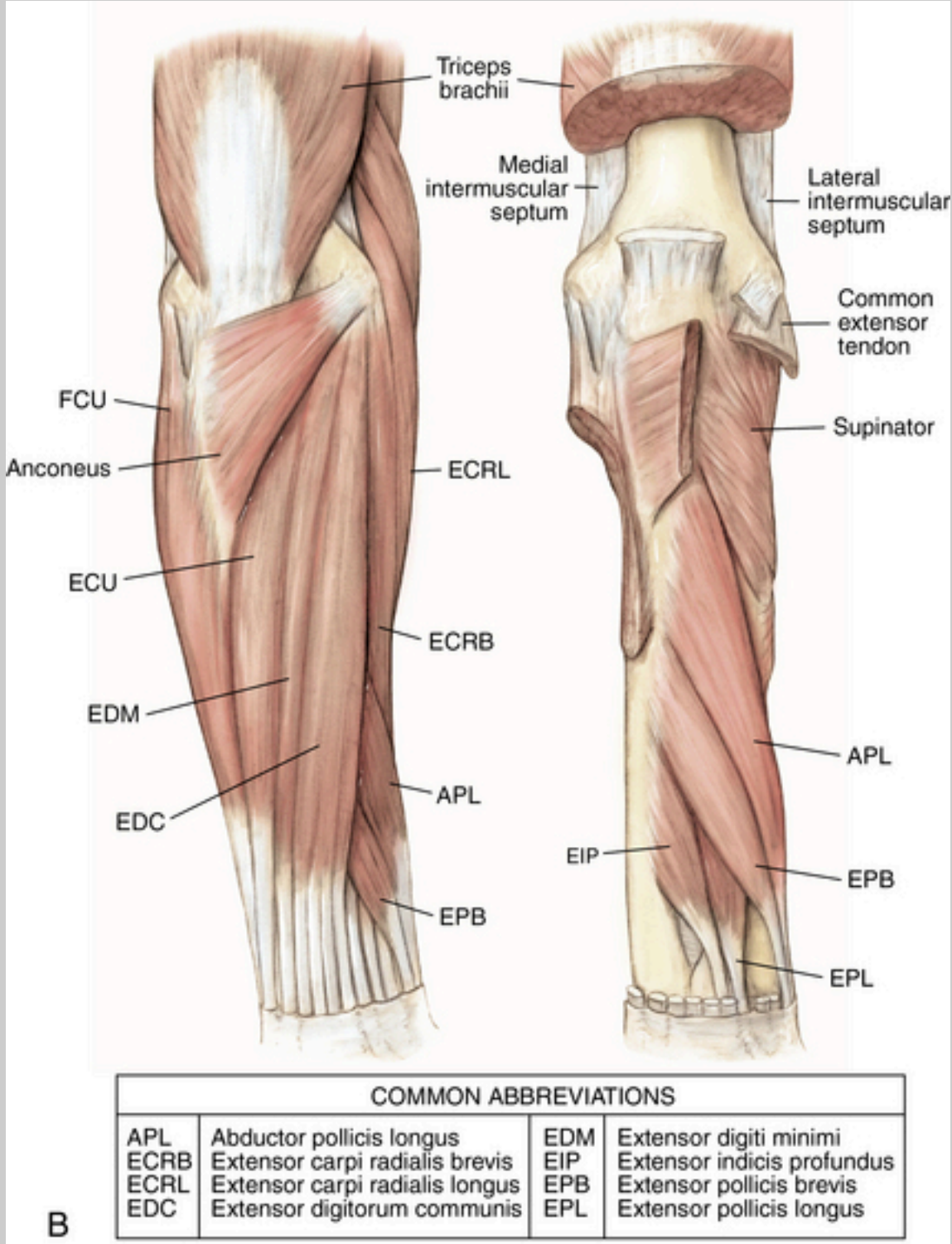
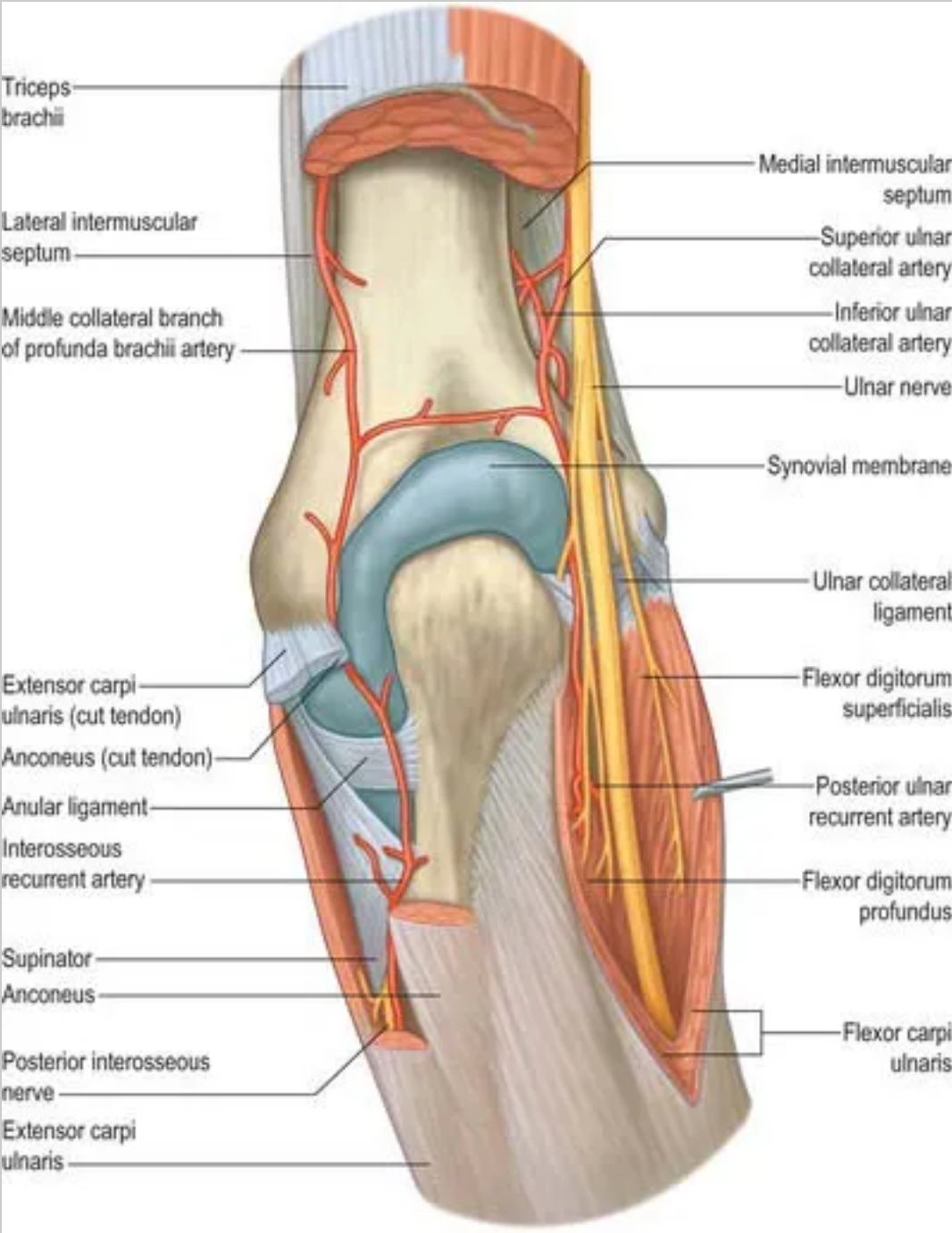
https://www.researchgate.net/figure/Posterior-or-cobra-technique-for-the-distal-biceps-tendon-a-Transverse-plane-at-the_fig5_306071997 [accessed 24 Sep, 2023]

ANATOMY: Lateral



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ANATOMY: Posterior

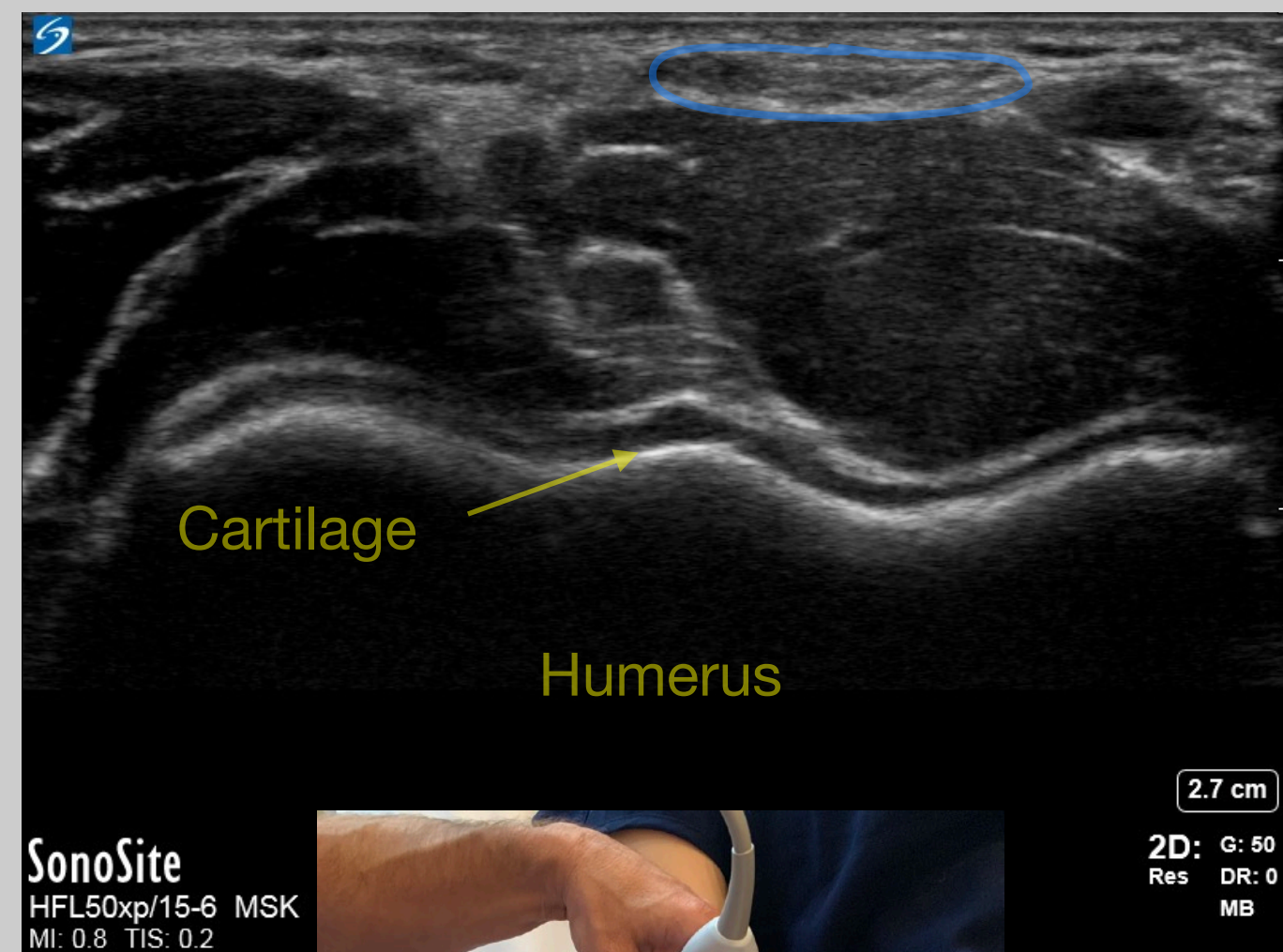


SONOANATOMY STRUCTURE LIST

<u>Anterior</u>	<u>Medial</u>	<u>Lateral</u>	<u>Posterior</u>
Distal biceps tendon	Common flexor tendon	Radial Head	Humerus
Median nerve	Ulnar collateral ligament (UCL)	Common extensor tendon	Olecranon and fossa
		Radial collateral ligament (RCL)	Olecranon bursa
		Radial nerve and PIN	Ulnar nerve
		[Distal biceps tendon]	Triceps tendon

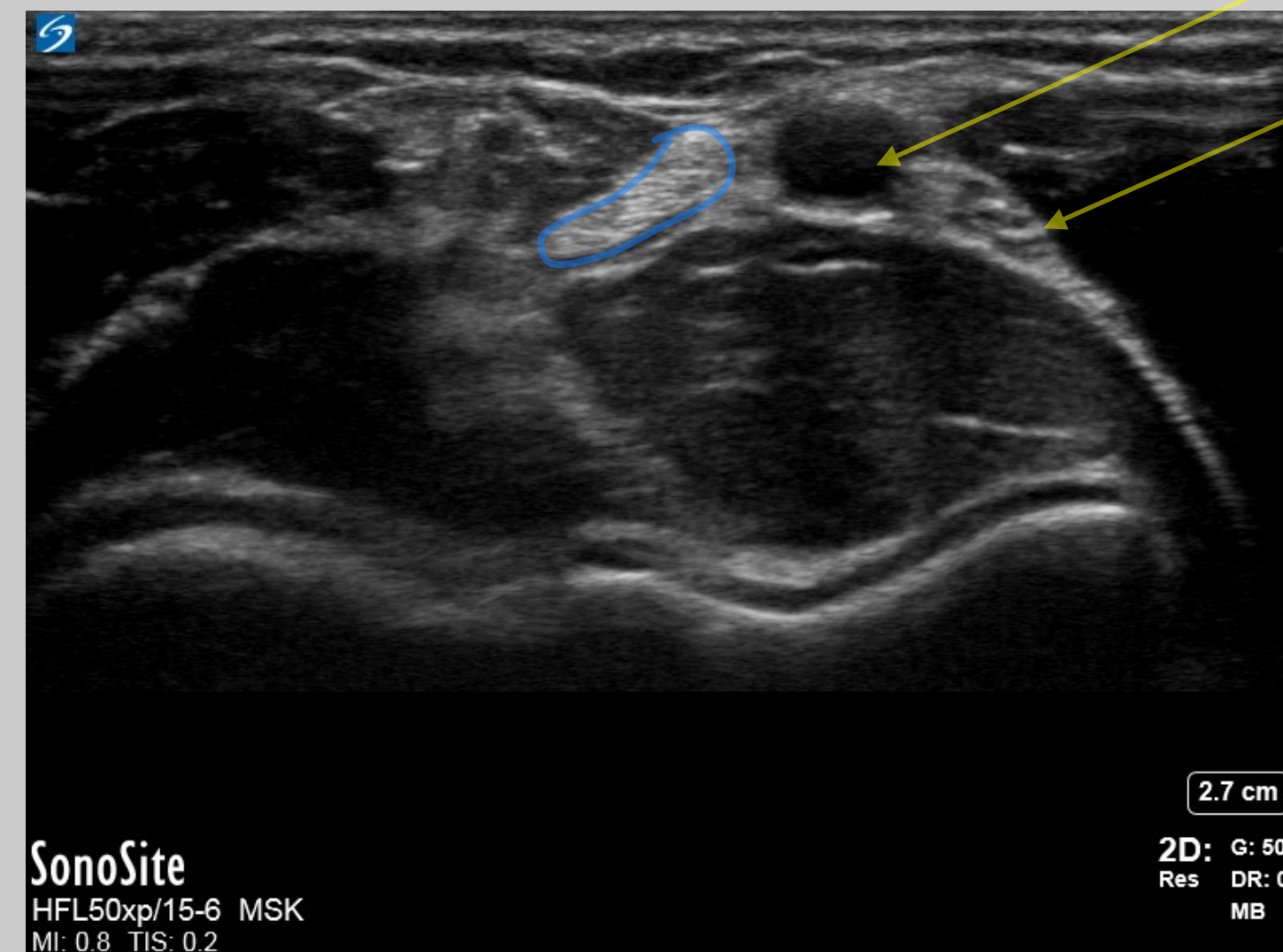


SONOANATOMY ANTERIOR ELBOW



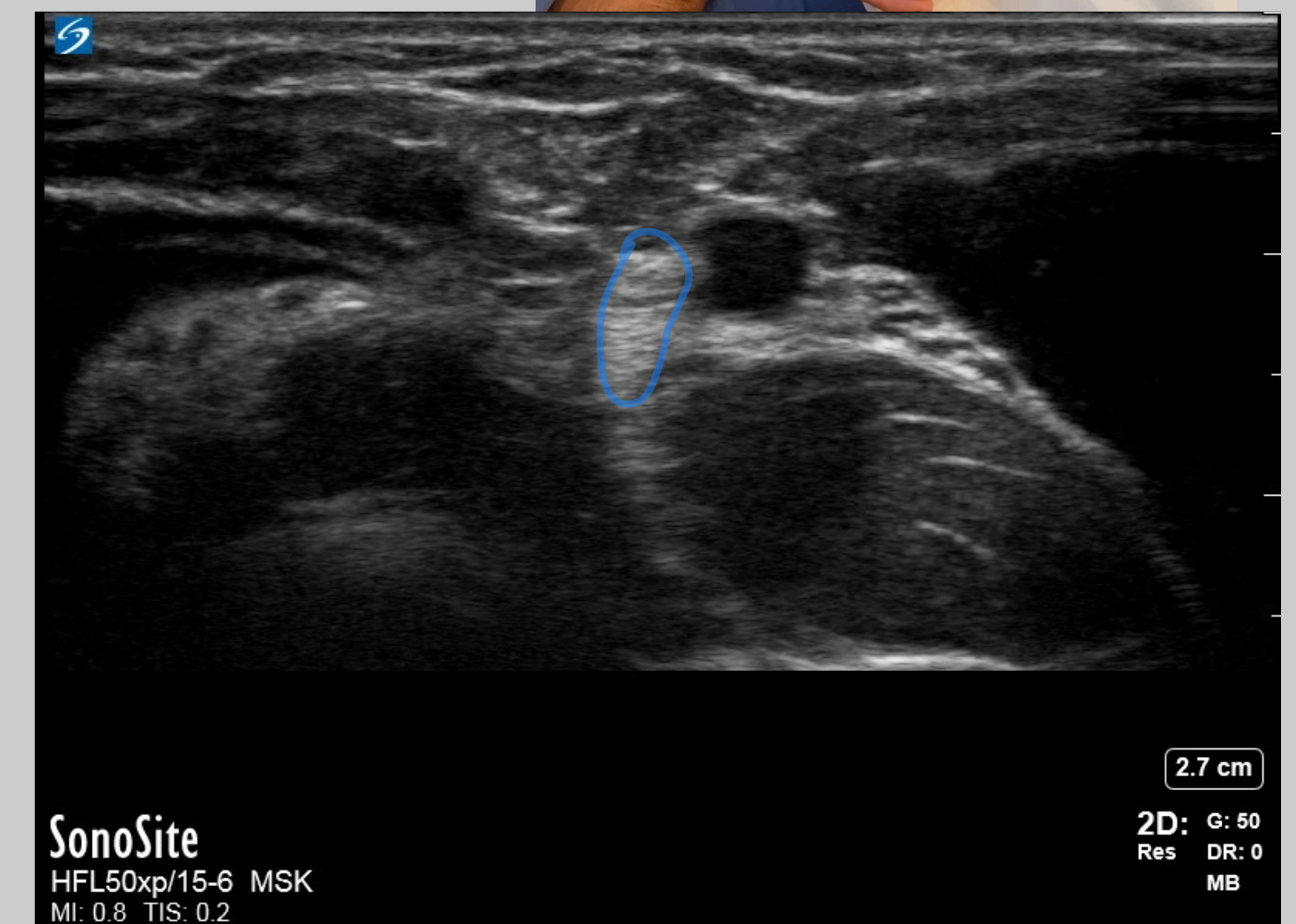
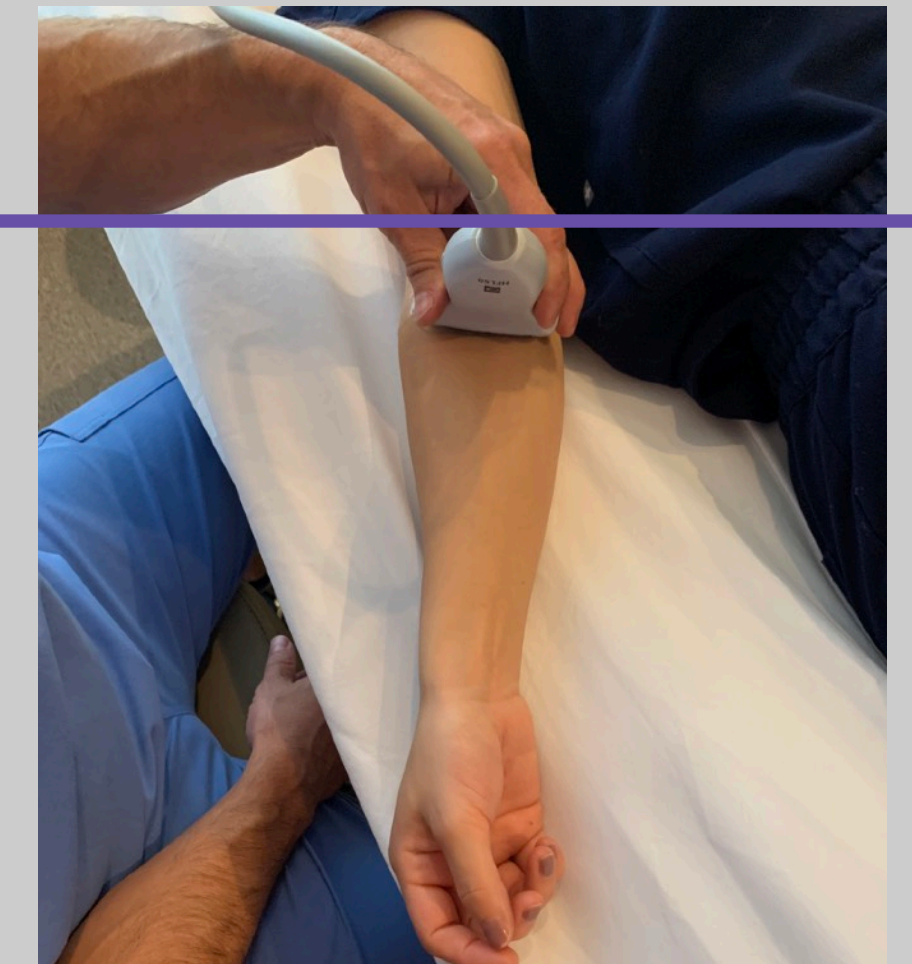
Distal Biceps Tendon

Short Axis



Brachial Artery

Median Nerve



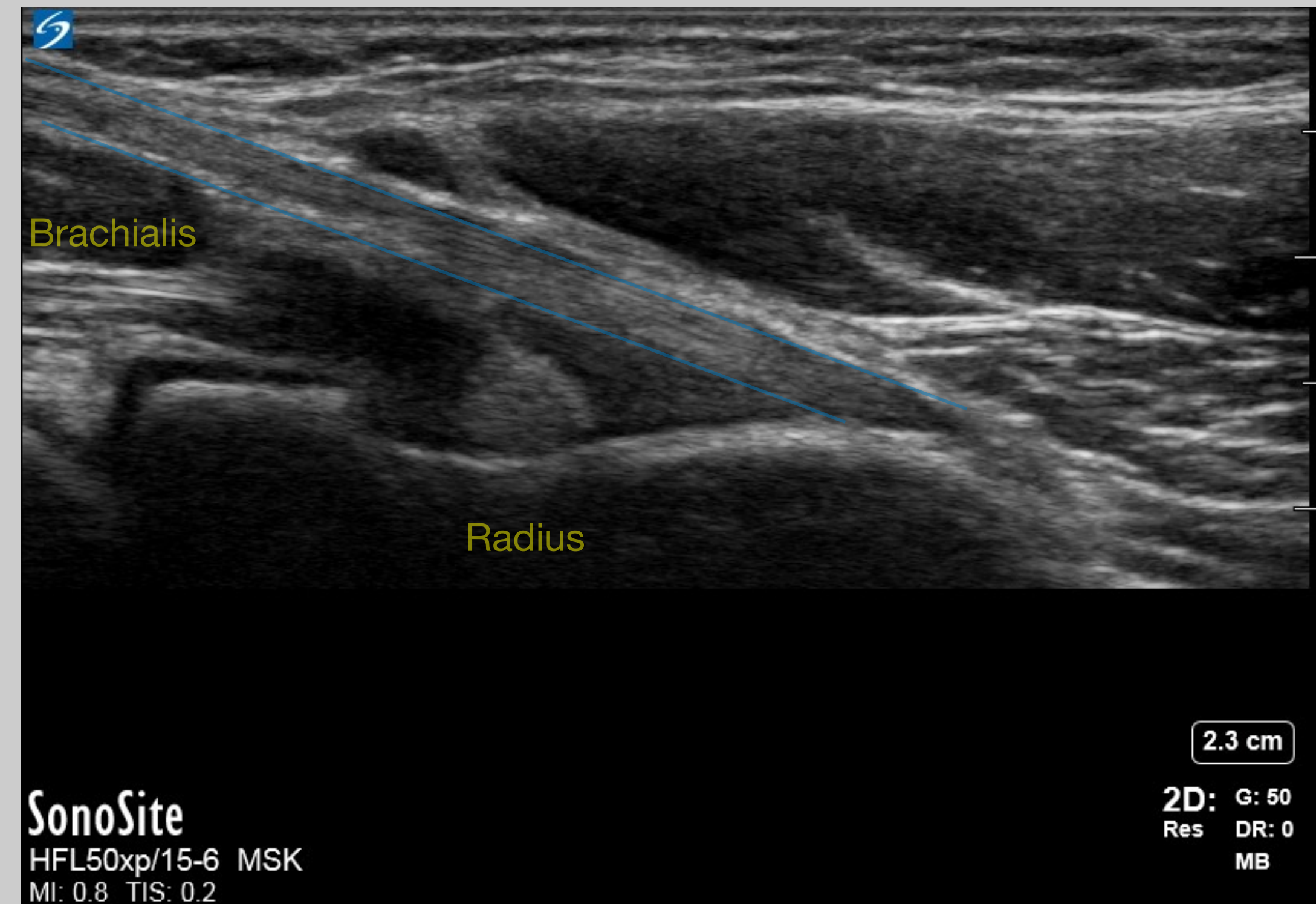
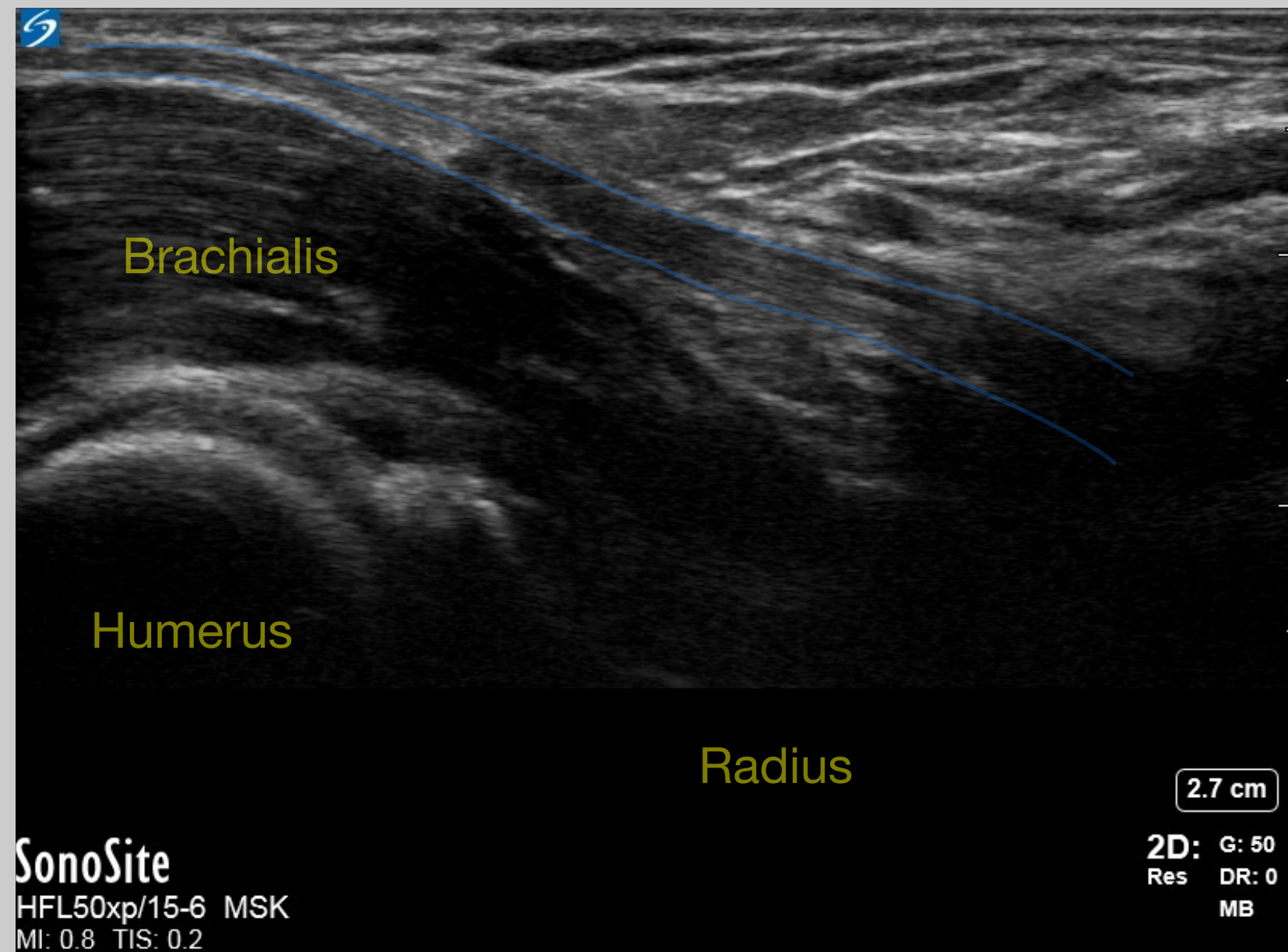
Need to change probe angle as you go distally!

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SONOANATOMY ANTERIOR ELBOW

Distal Biceps Tendon

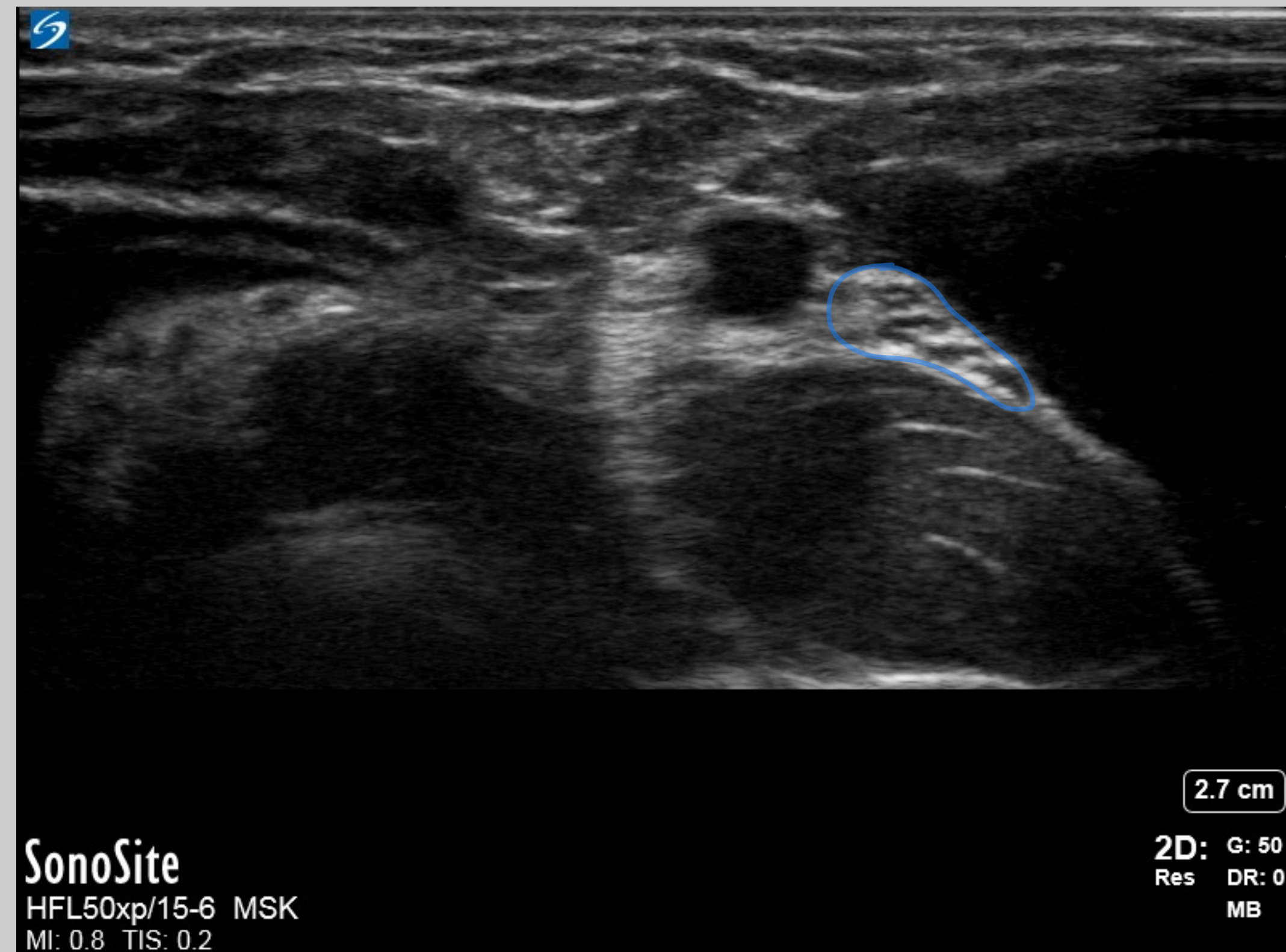
Long Axis



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SONOANATOMY ANTERIOR ELBOW

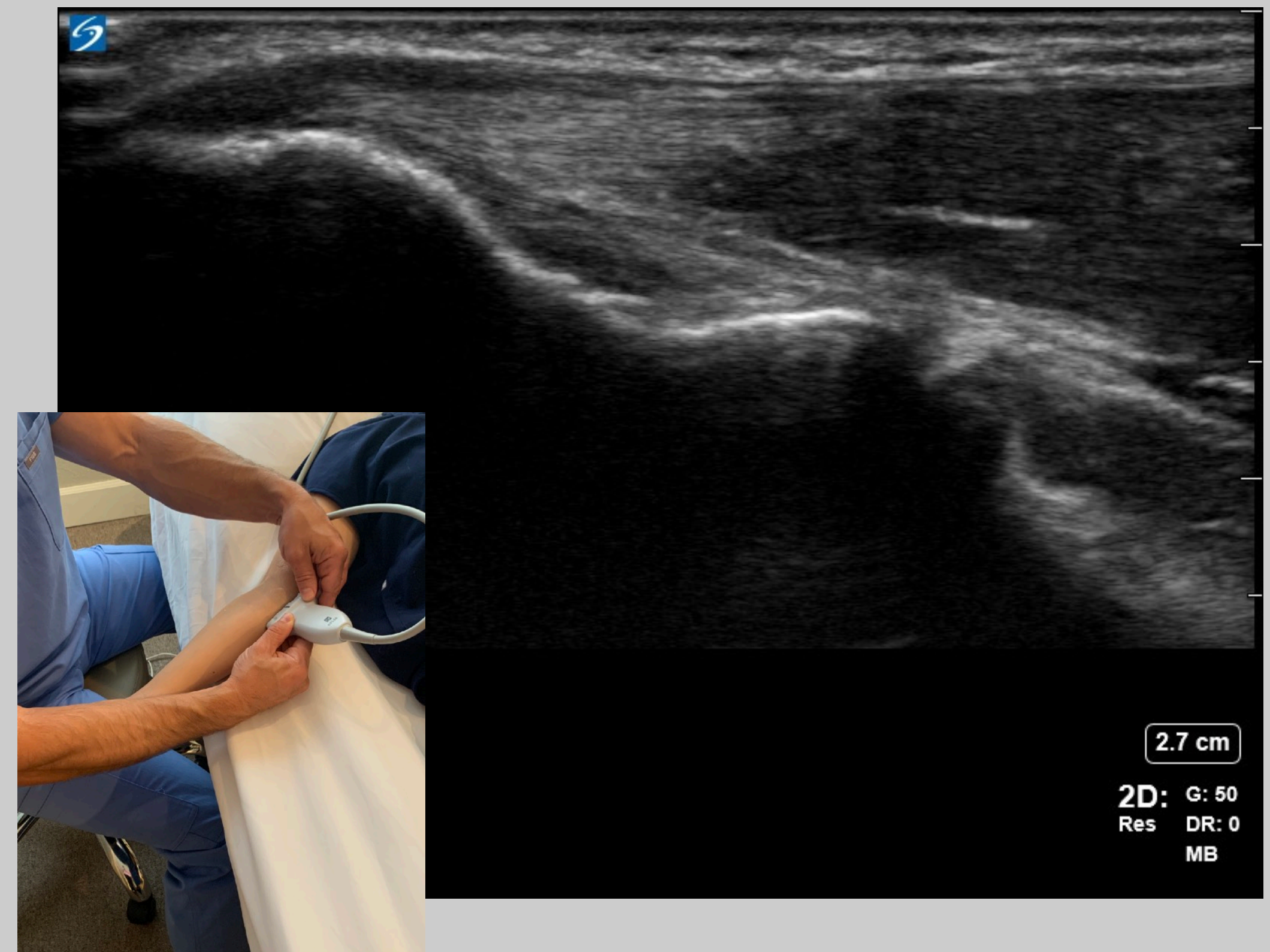
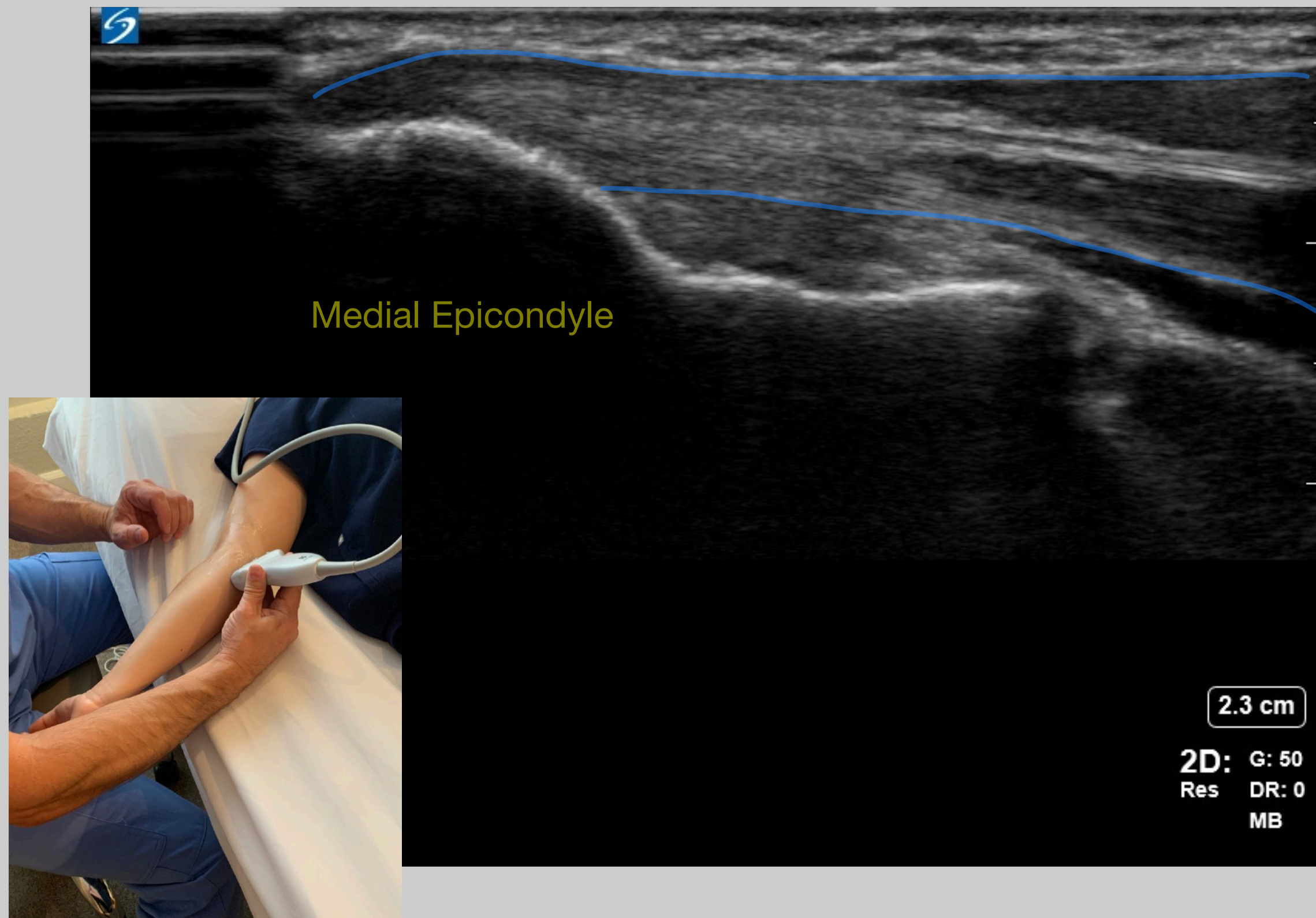
Median Nerve Short Axis



SONOANATOMY MEDIAL ELBOW

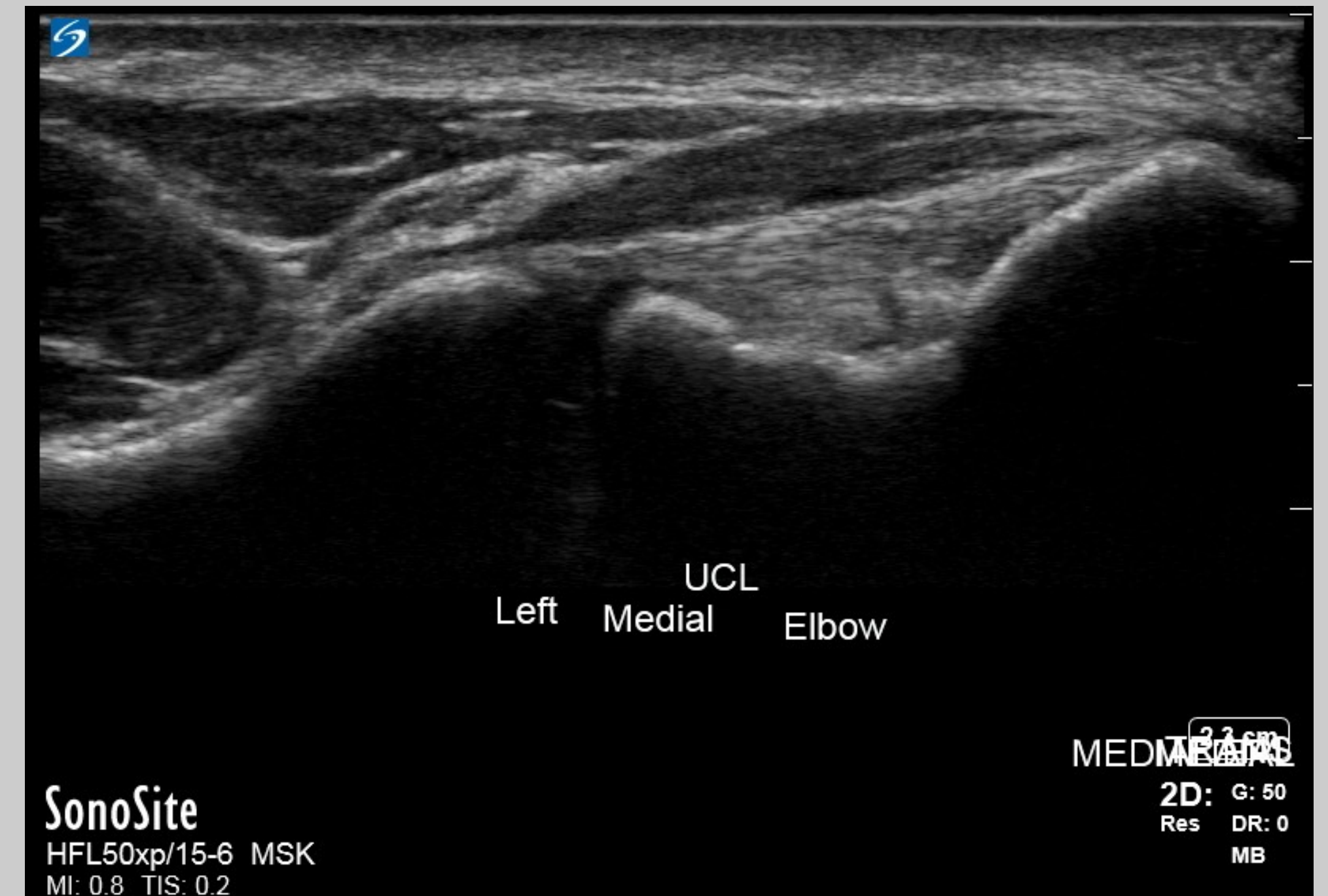
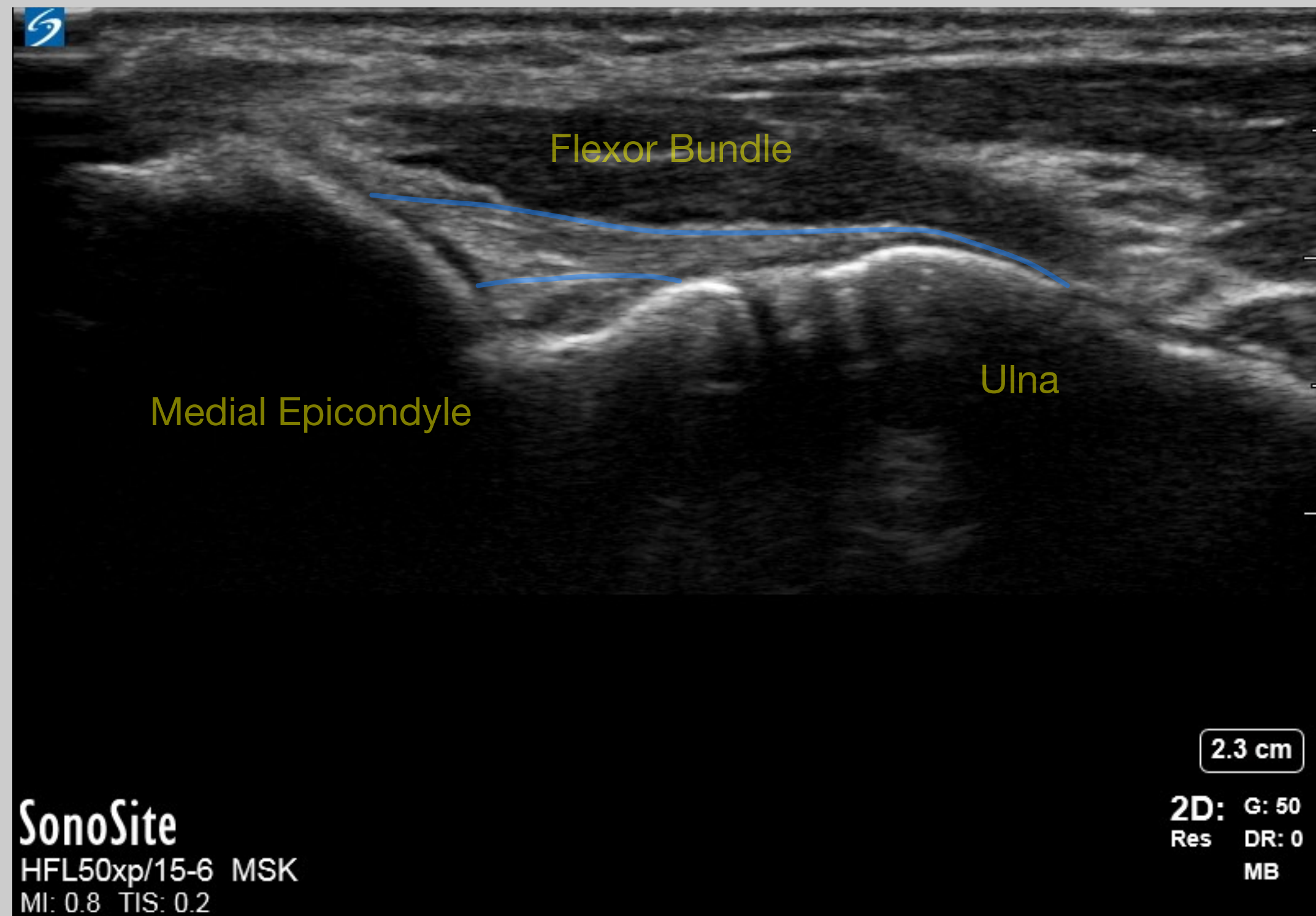
Common Flexor Tendon

Long Axis



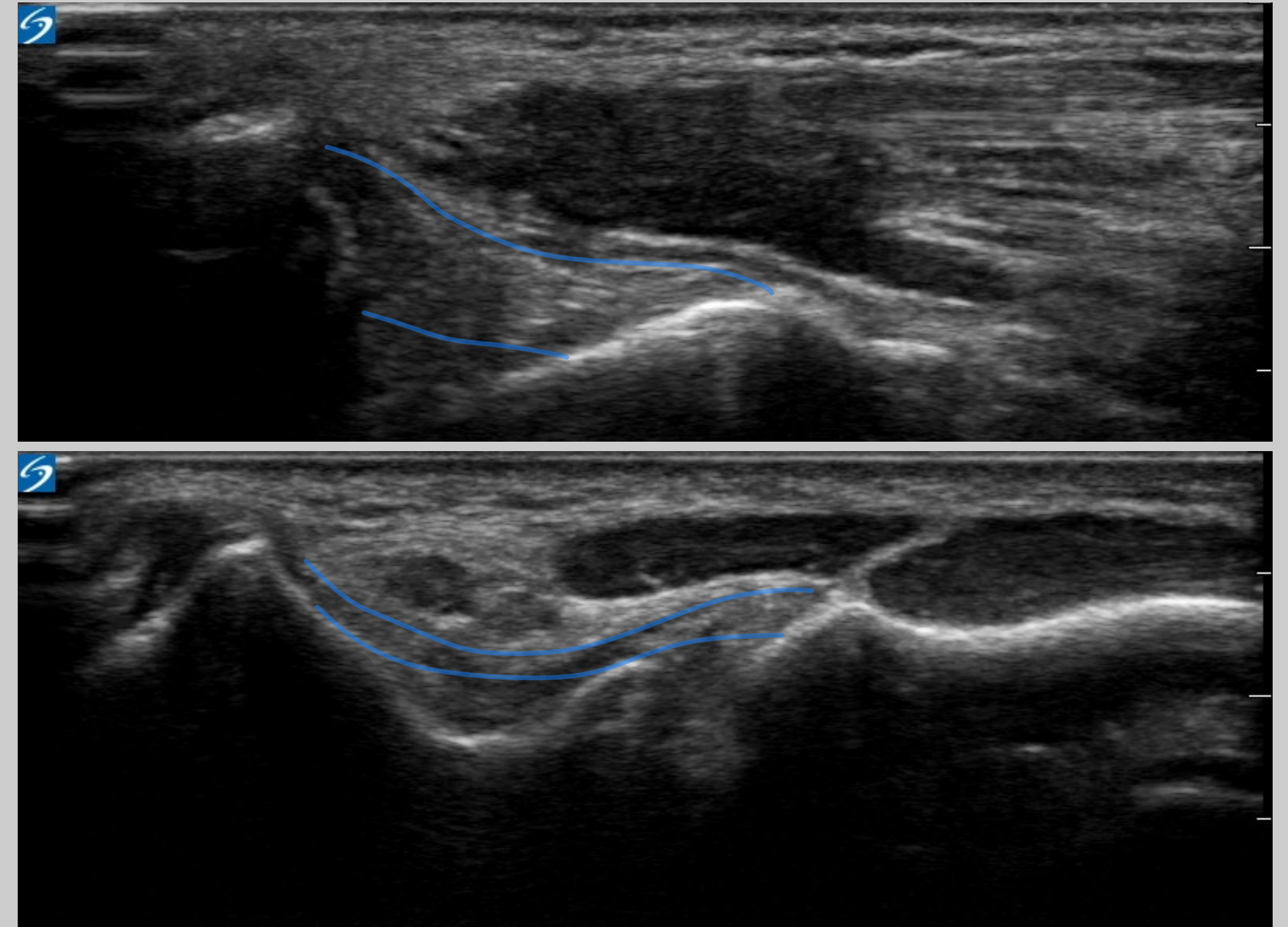
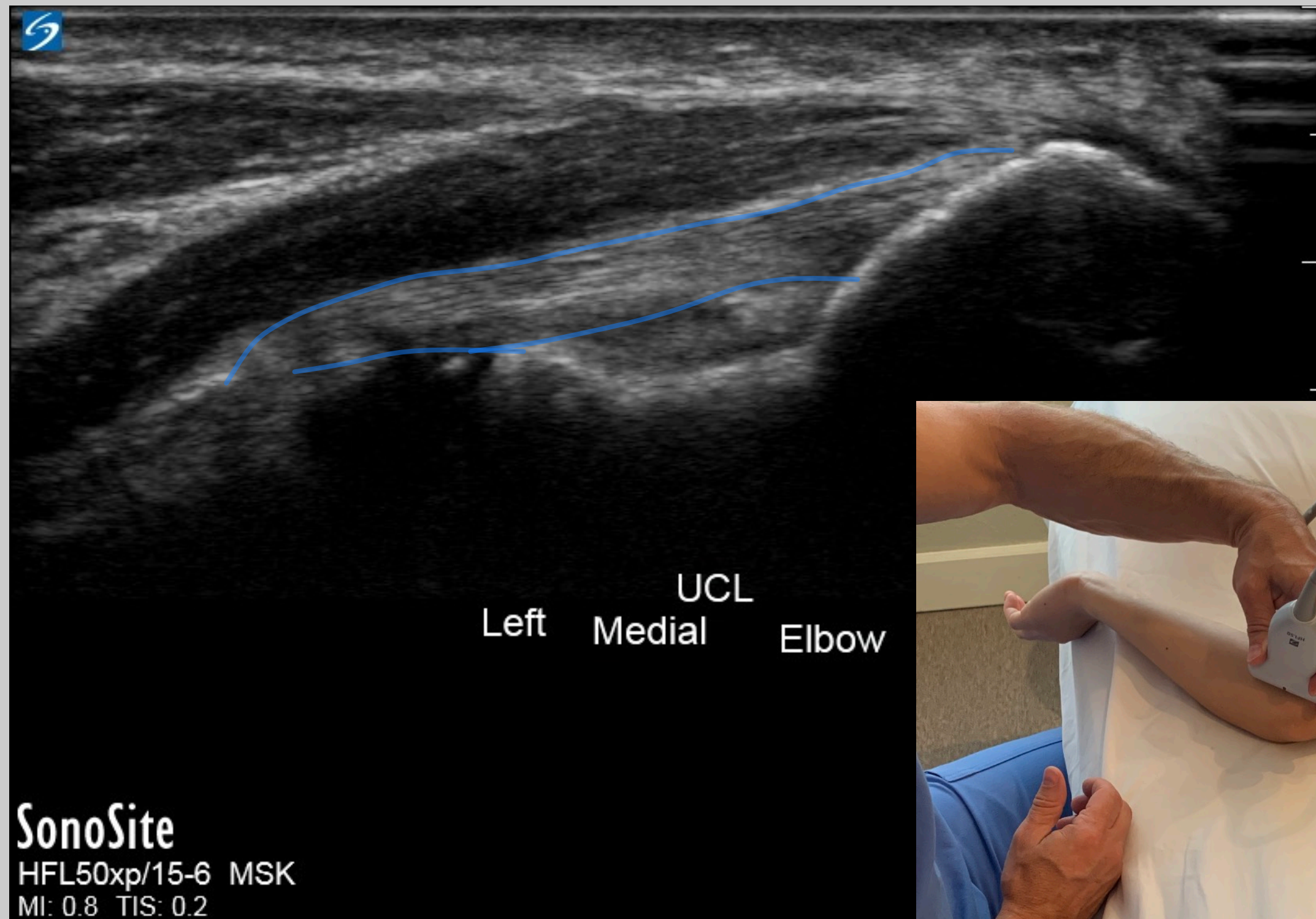
SONOANATOMY MEDIAL ELBOW

Ulnar Collateral Ligament (UCL)



SONOANATOMY MEDIAL ELBOW

Ulnar Collateral Ligament (UCL)

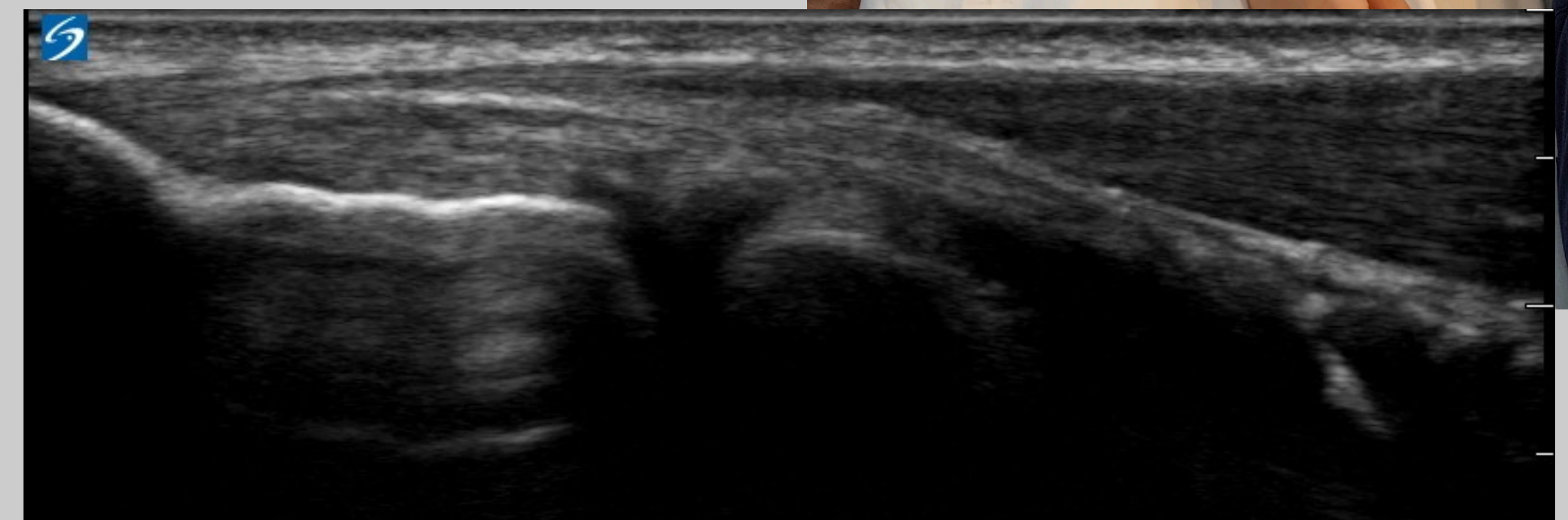
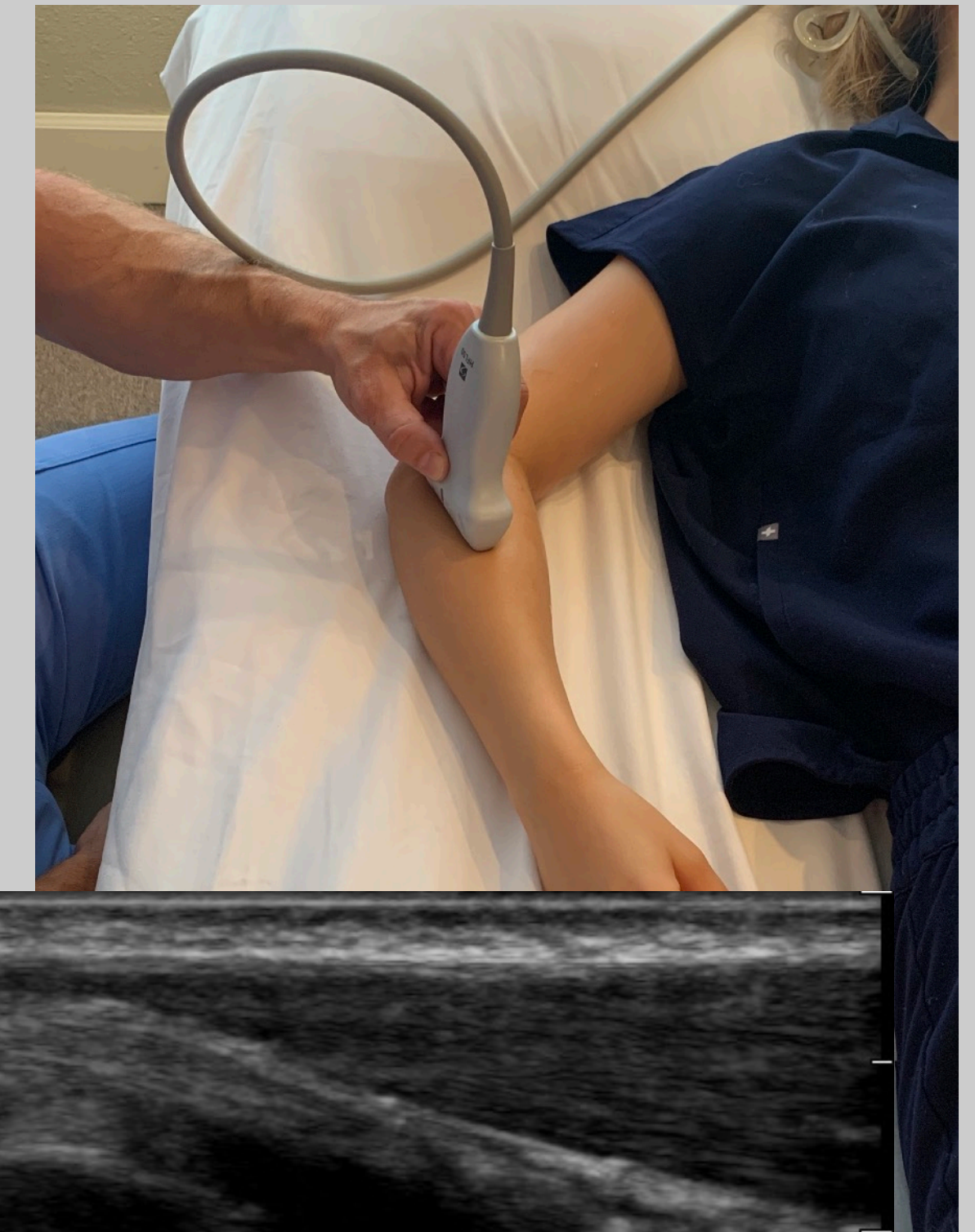
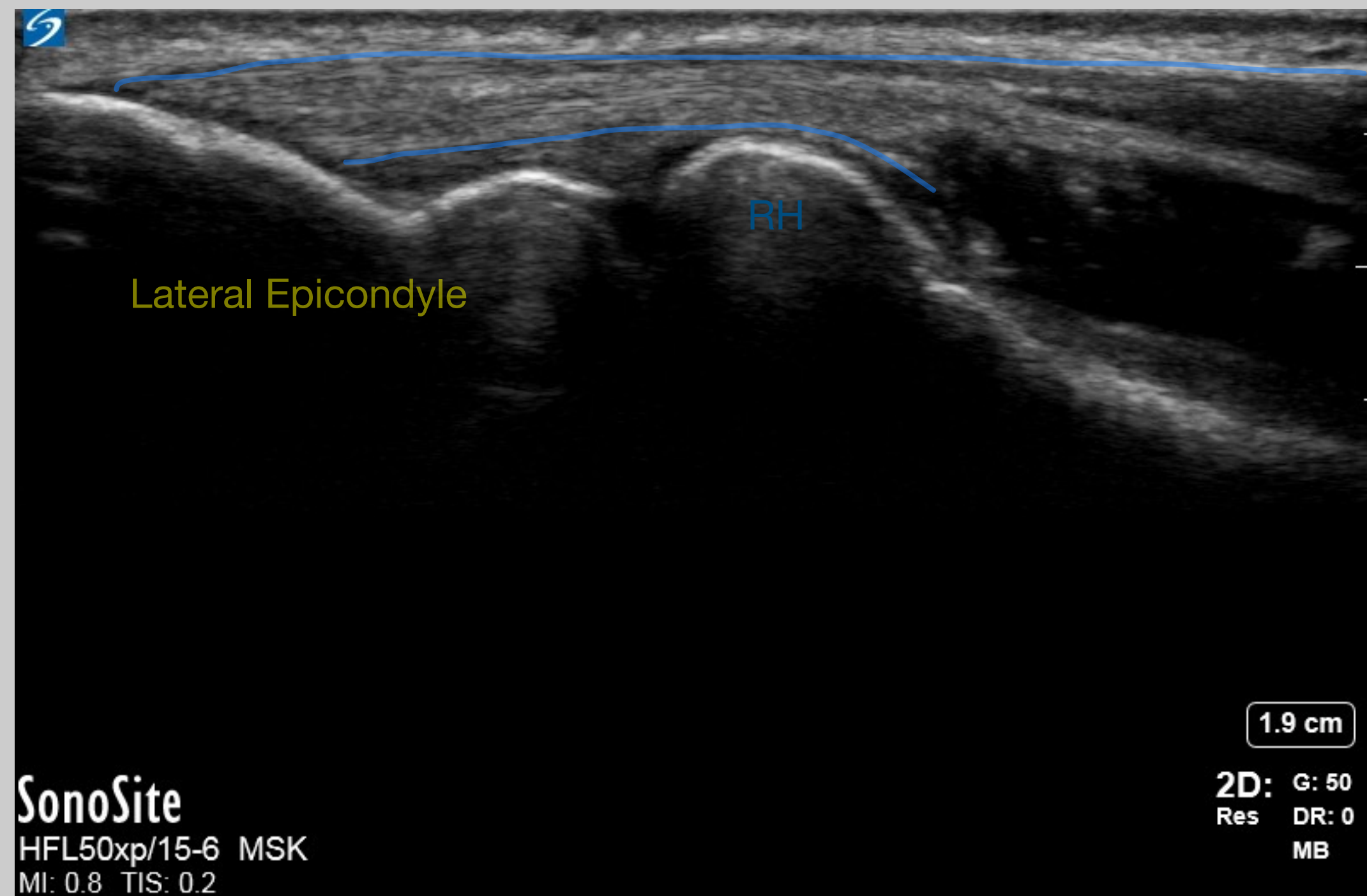


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SONOANATOMY LATERAL ELBOW

Common Extensor Tendon

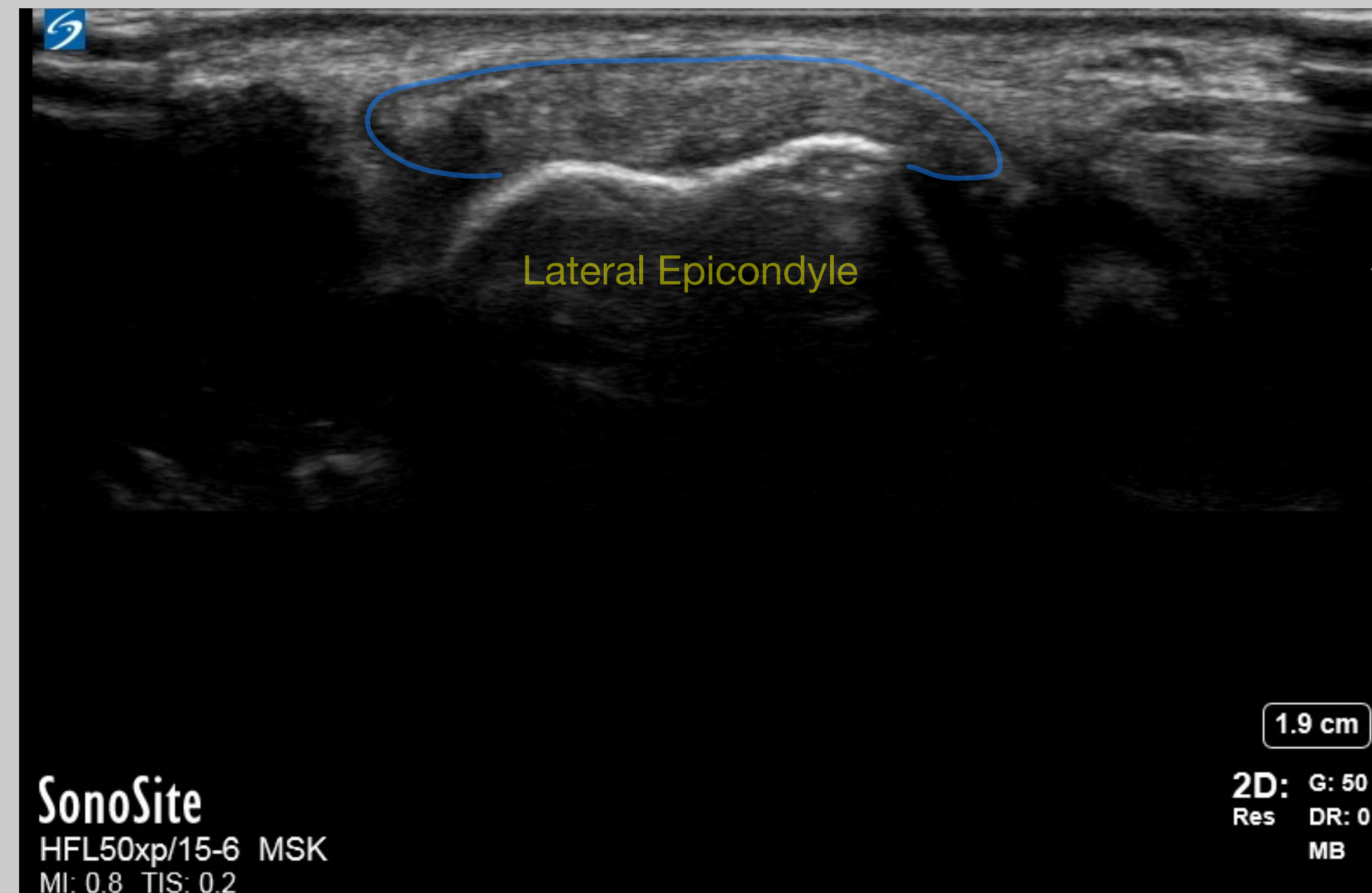
Long Axis



NOMA

SONOANATOMY LATERAL ELBOW

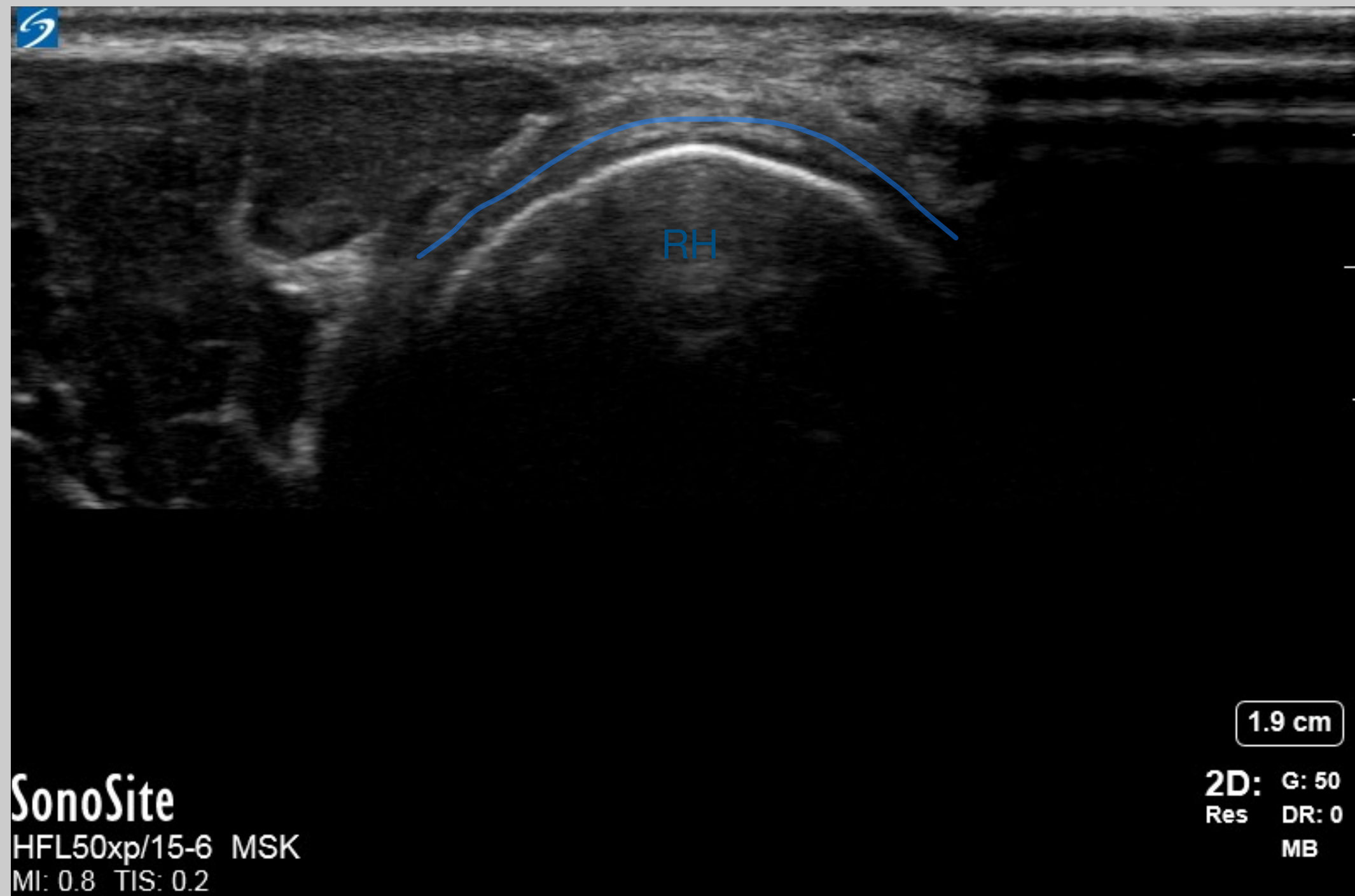
Common Extensor Tendon Short Axis



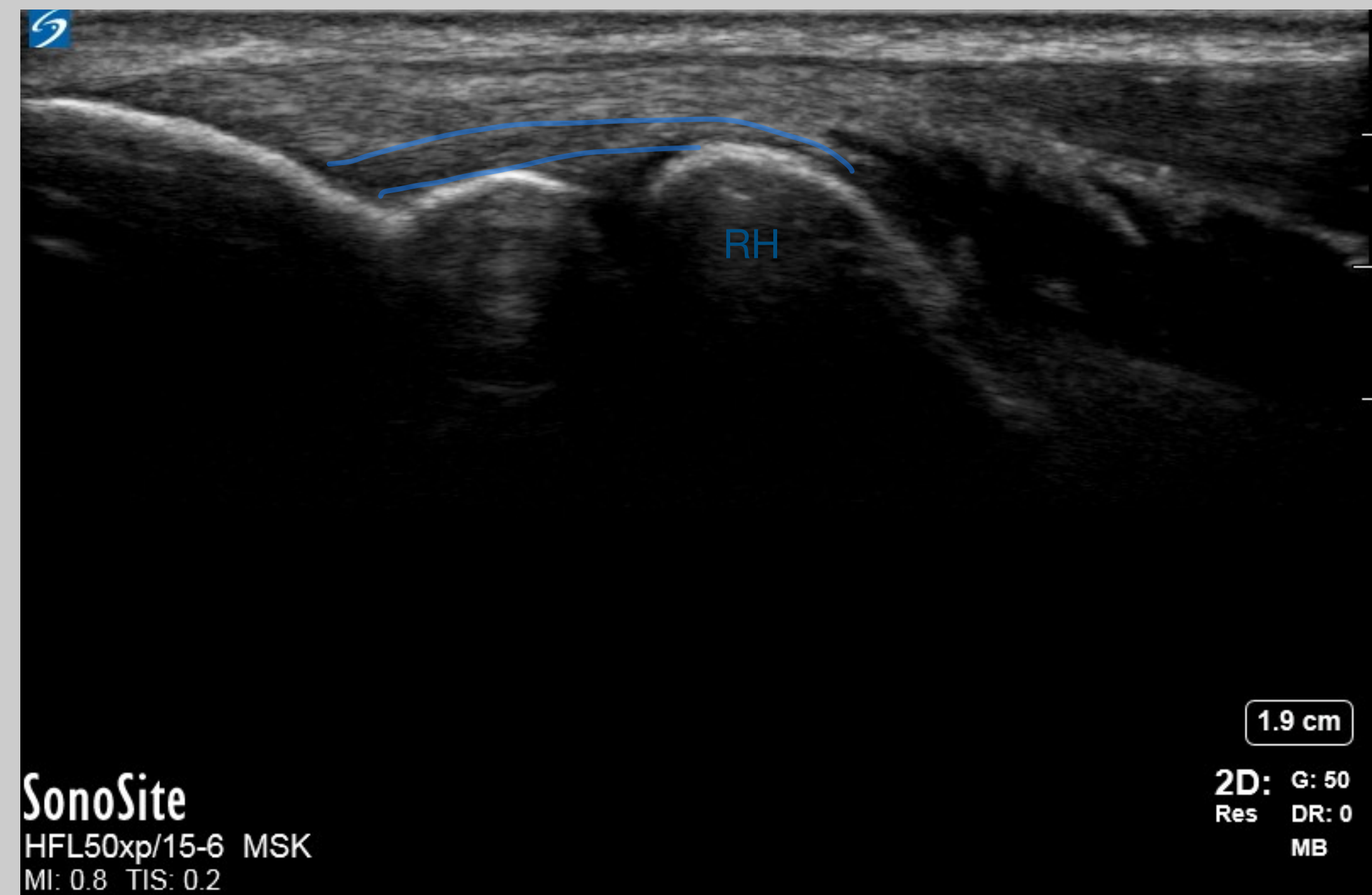
SONOANATOMY LATERAL ELBOW

Radial Collateral Ligament (RCL)

Short Axis



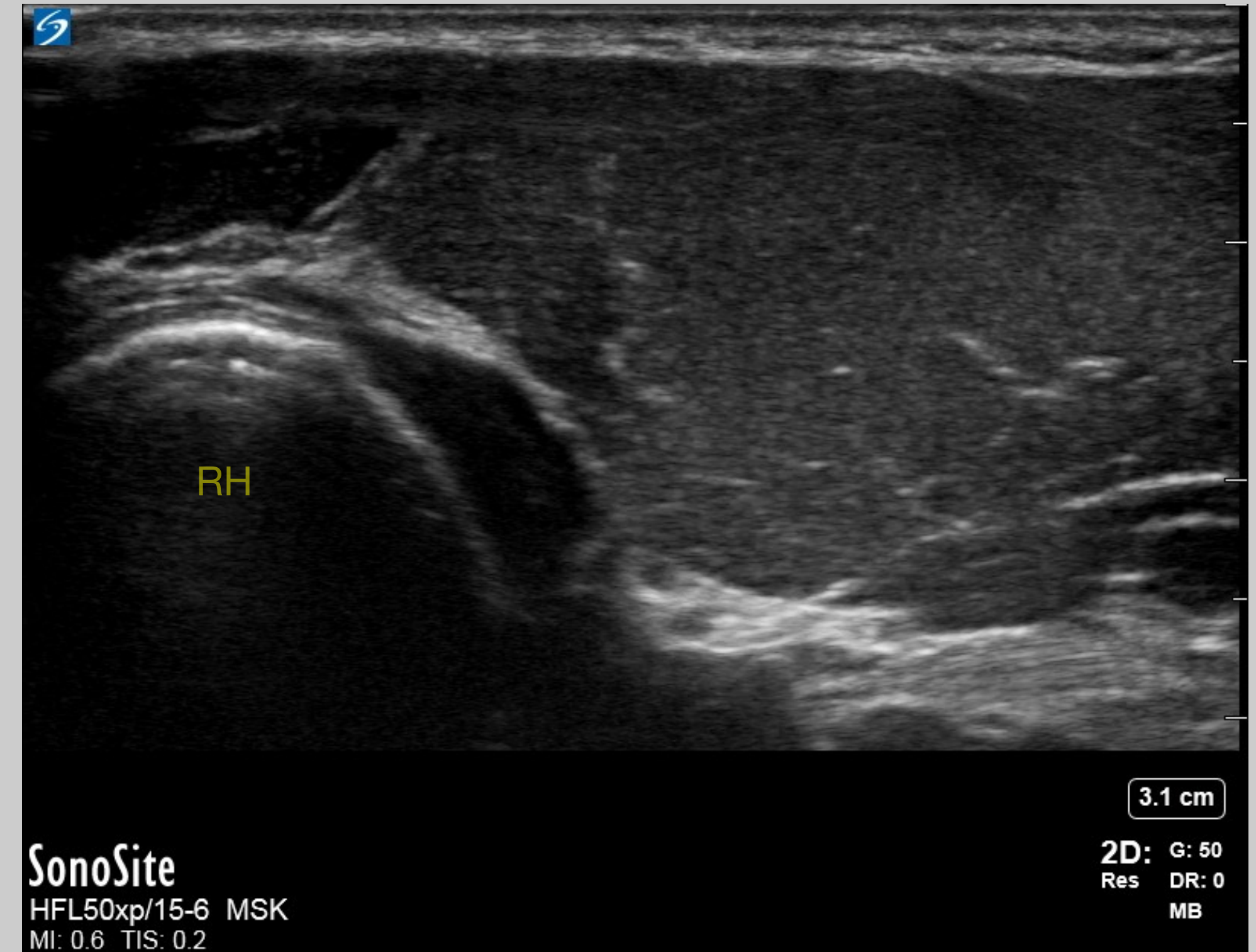
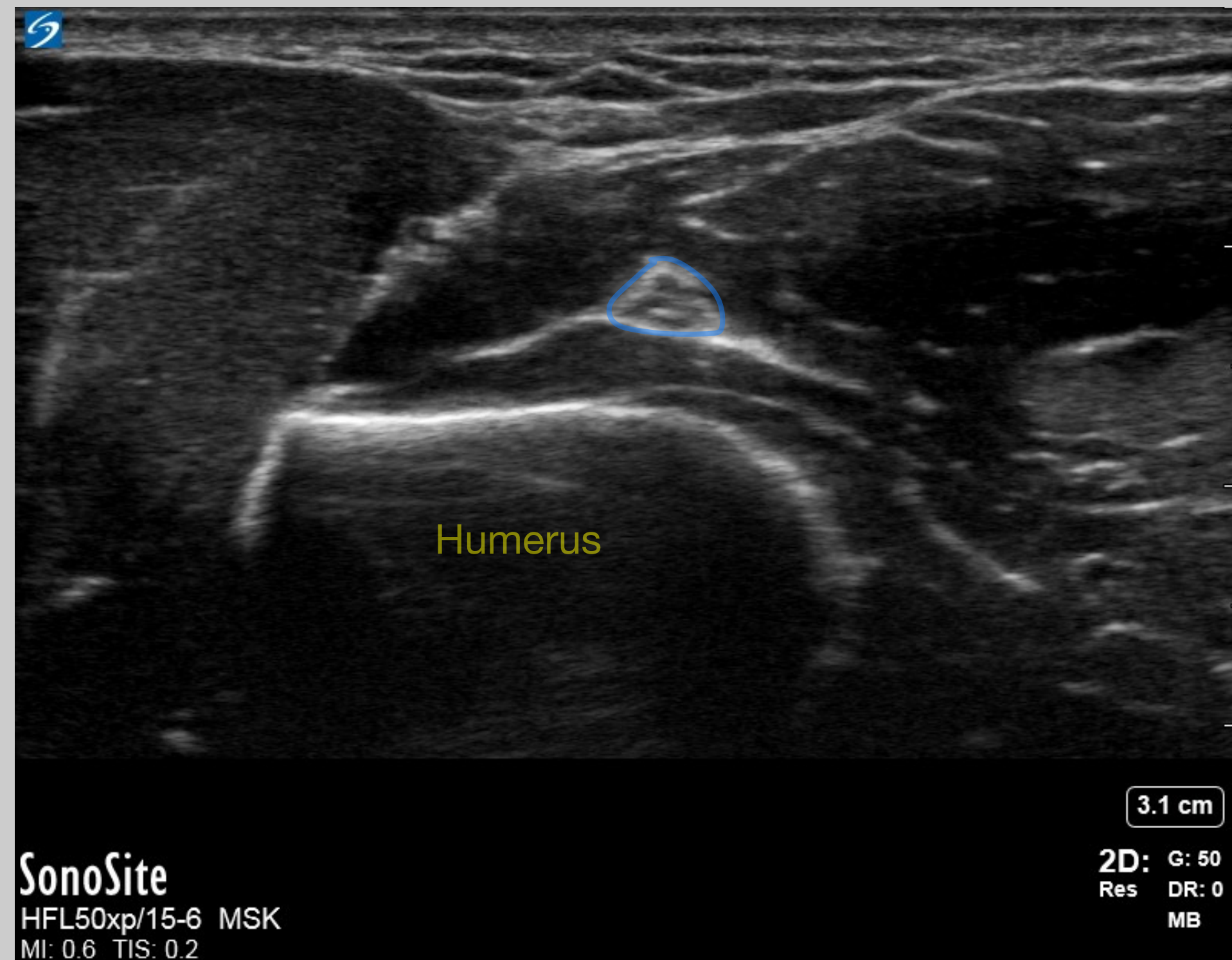
Long Axis



SONOANATOMY LATERAL ELBOW

Radial Nerve and Posterior Interosseus Nerve (PIN)

Short Axis



SONOANATOMY LATERAL ELBOW

Radial Nerve and Posterior Interosseus Nerve (PIN)

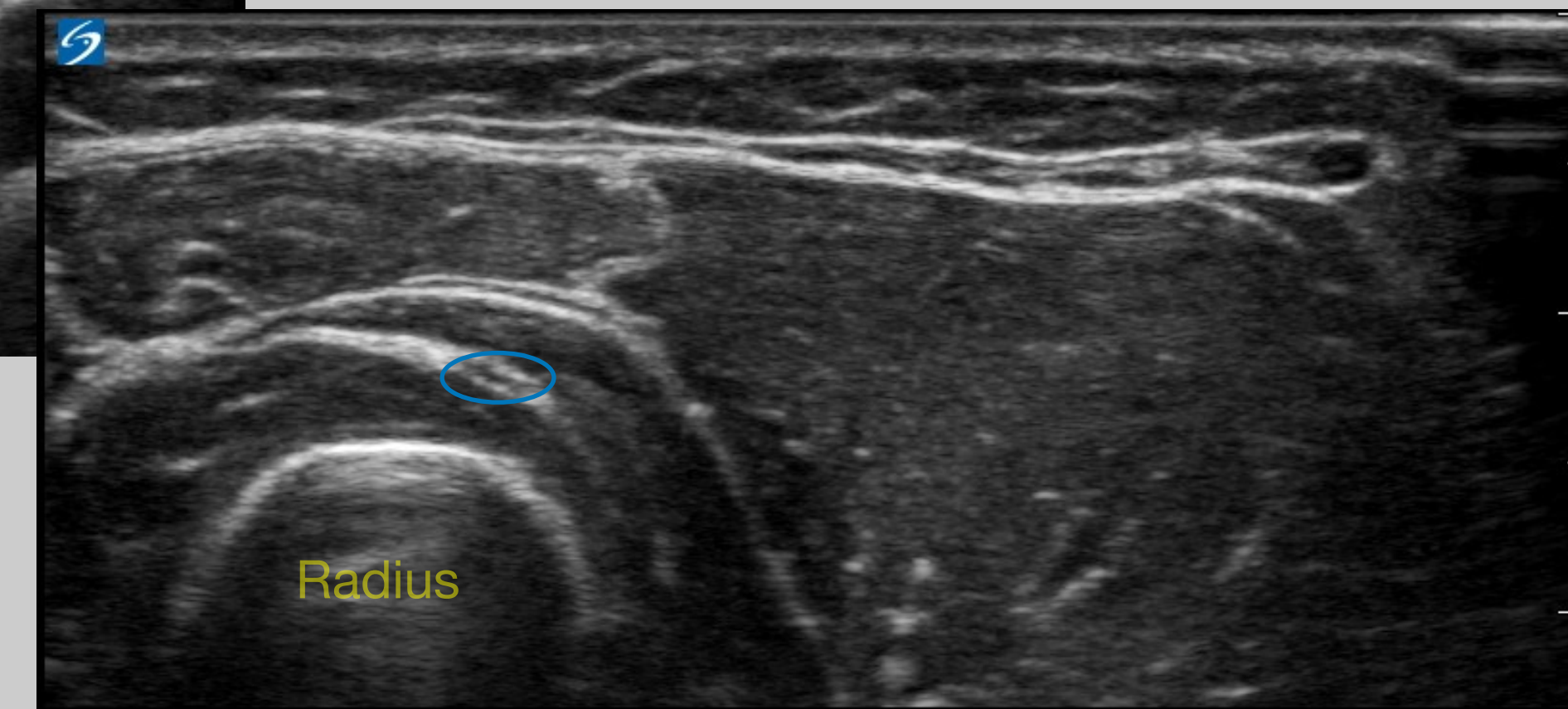
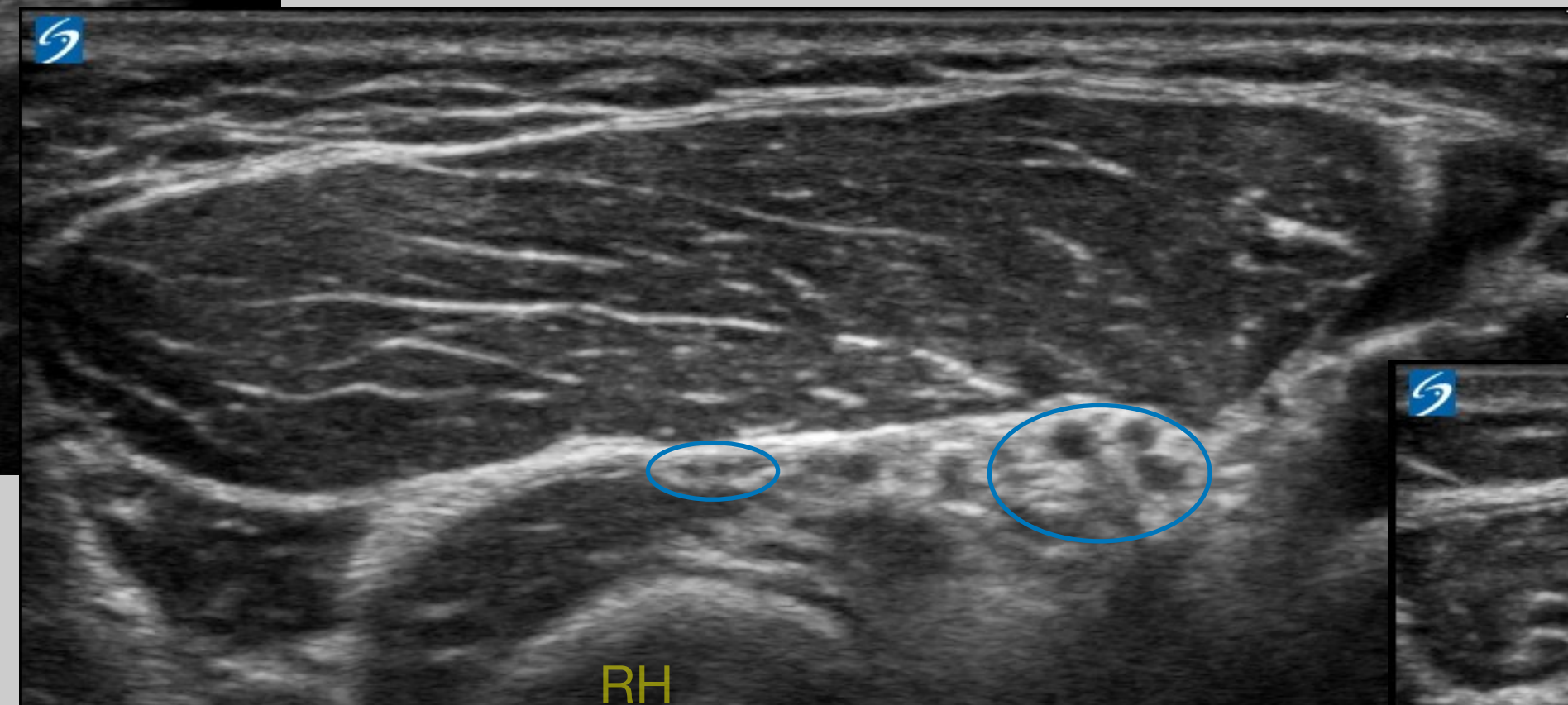
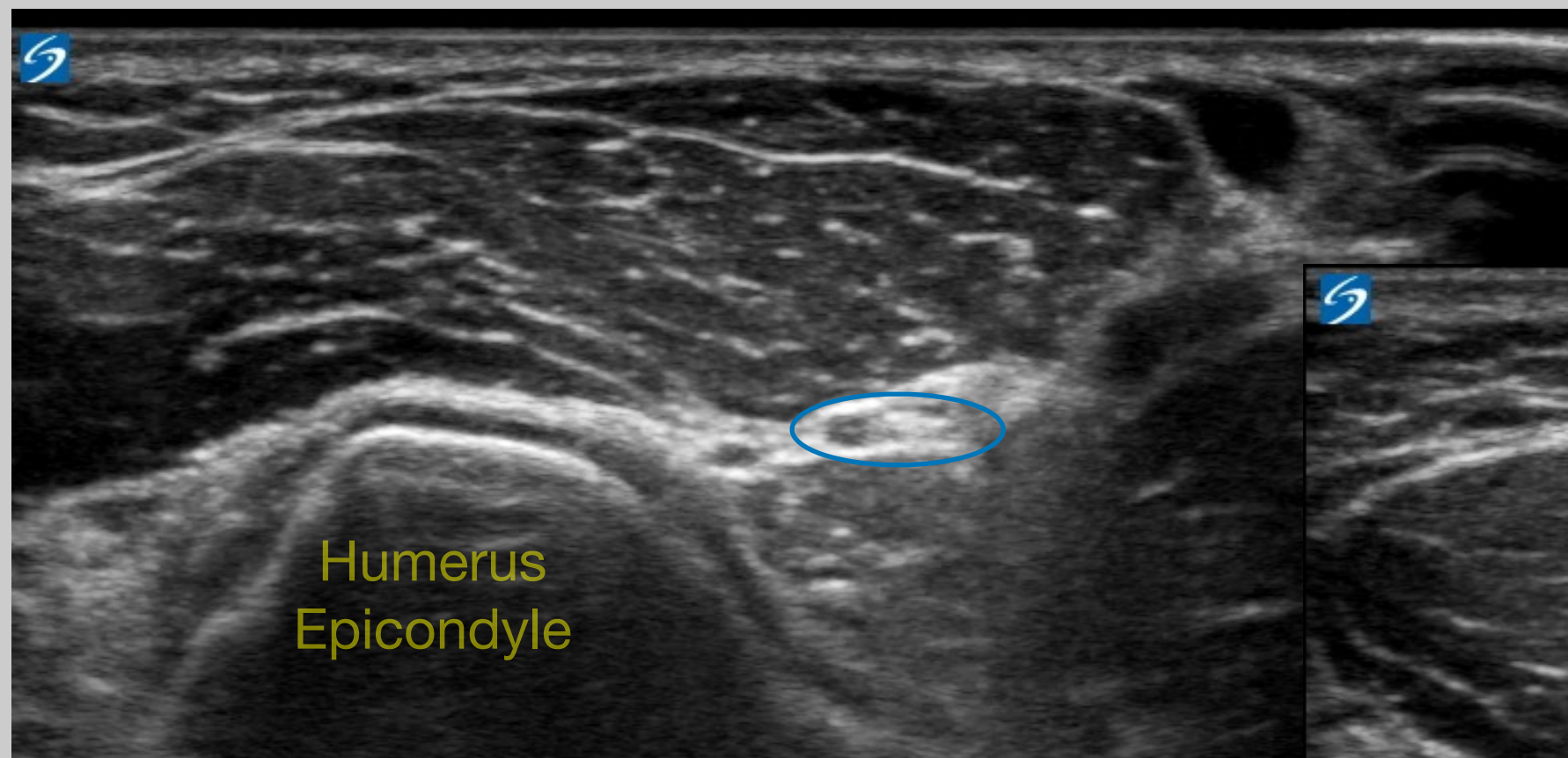
Short Axis



SONOANATOMY LATERAL ELBOW

Radial Nerve and Posterior Interosseus Nerve (PIN)

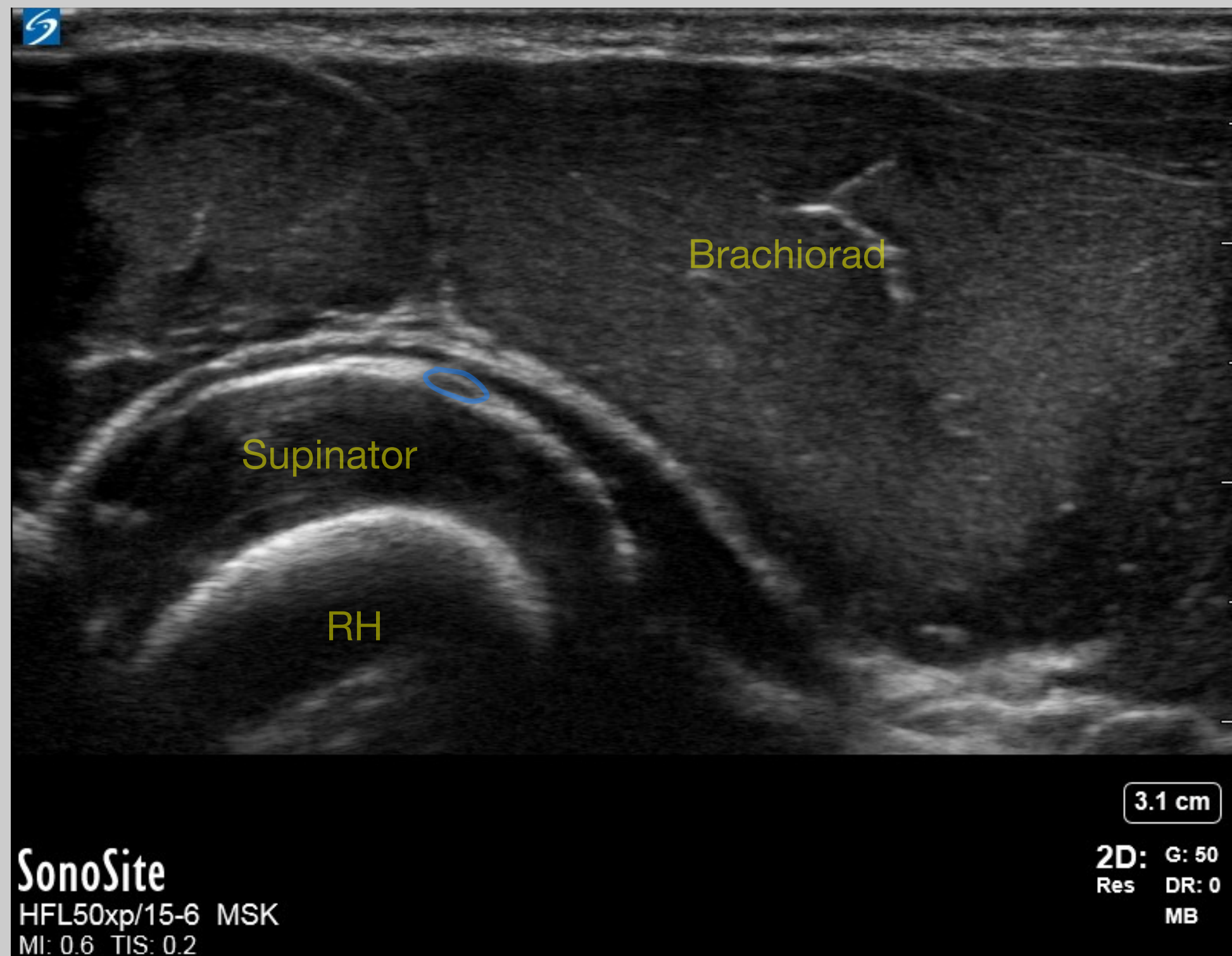
Short Axis



Radial nerve splits around level of radial head into PIN (laterally) and superficial branch (initially deep, and medially).

SONOANATOMY LATERAL ELBOW

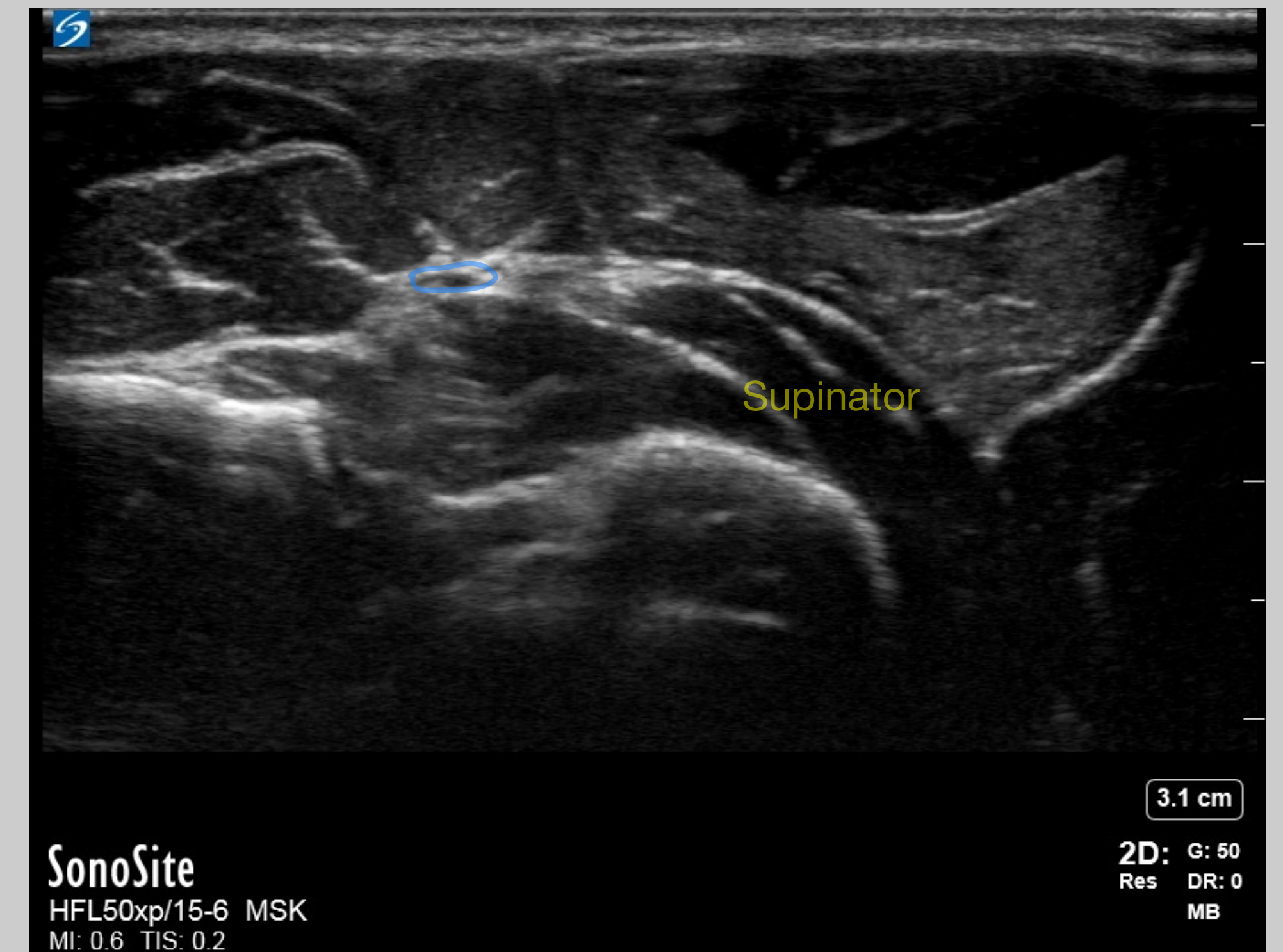
Radial Nerve and Posterior Interosseus Nerve (PIN)



Short Axis

<- Within supinator

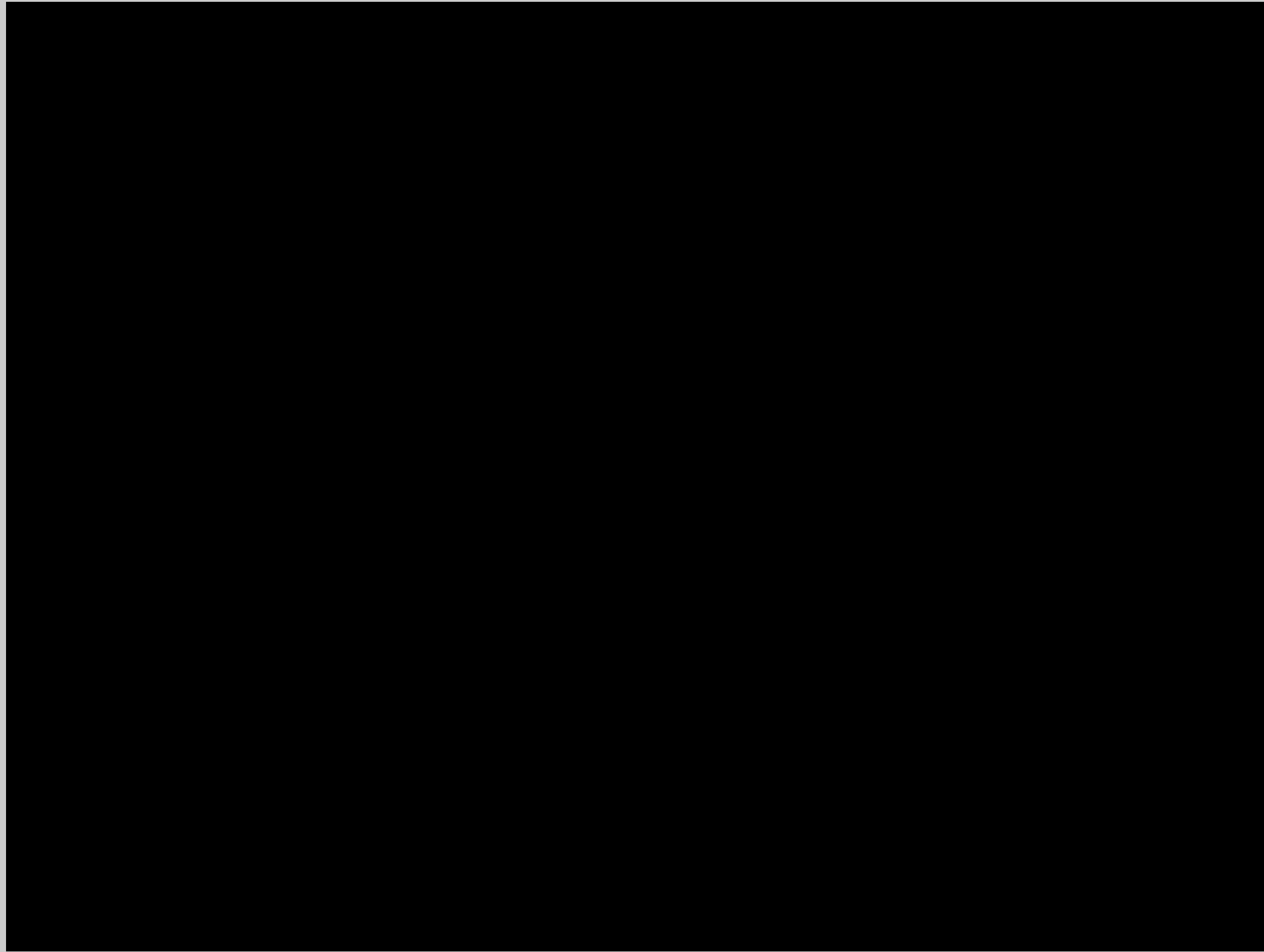
Leaving tunnel ->



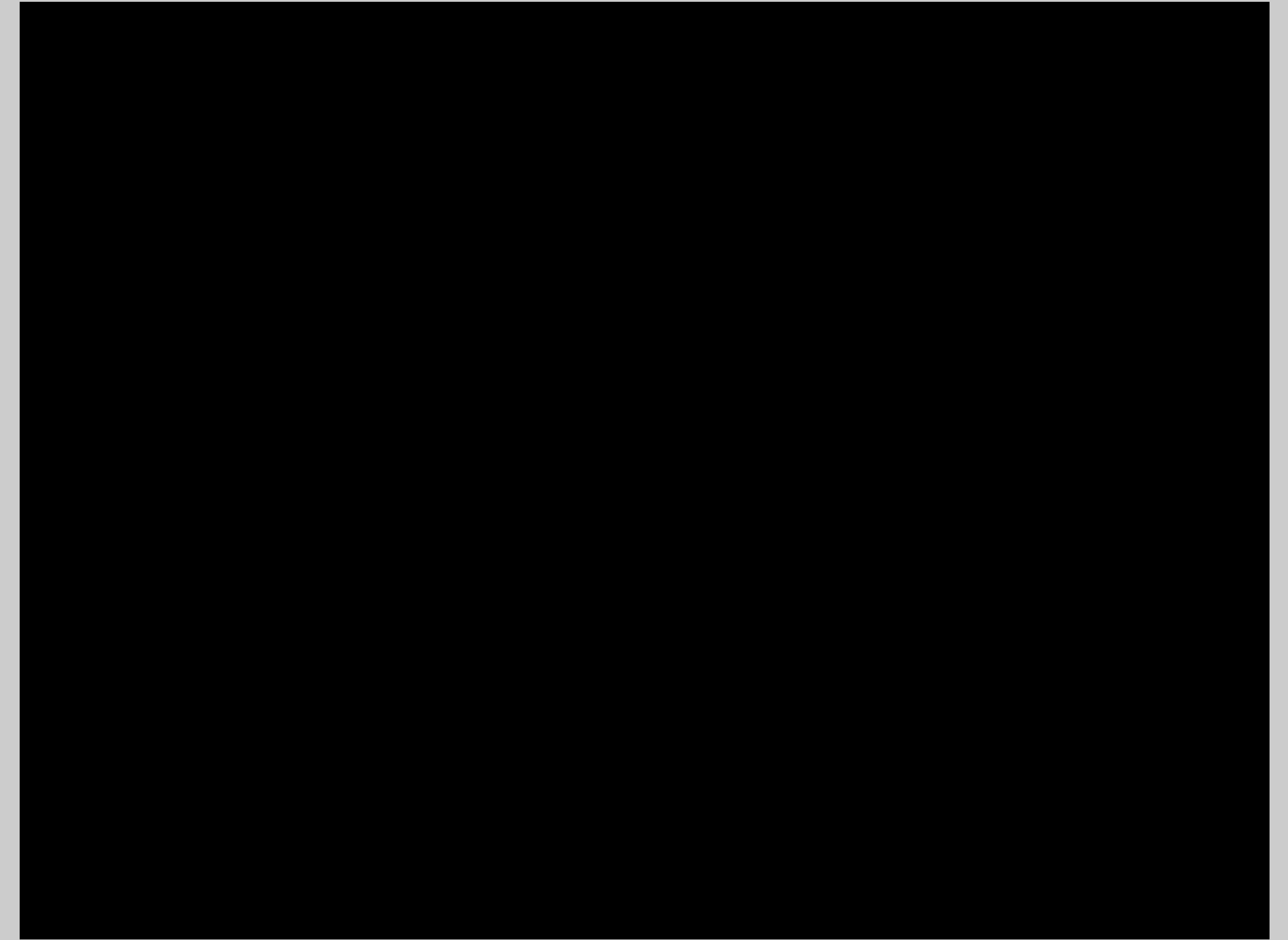
SONOANATOMY LATERAL ELBOW

Posterior Interosseus Nerve (PIN)

Arcade of Frohse. Entering Supinator Canal



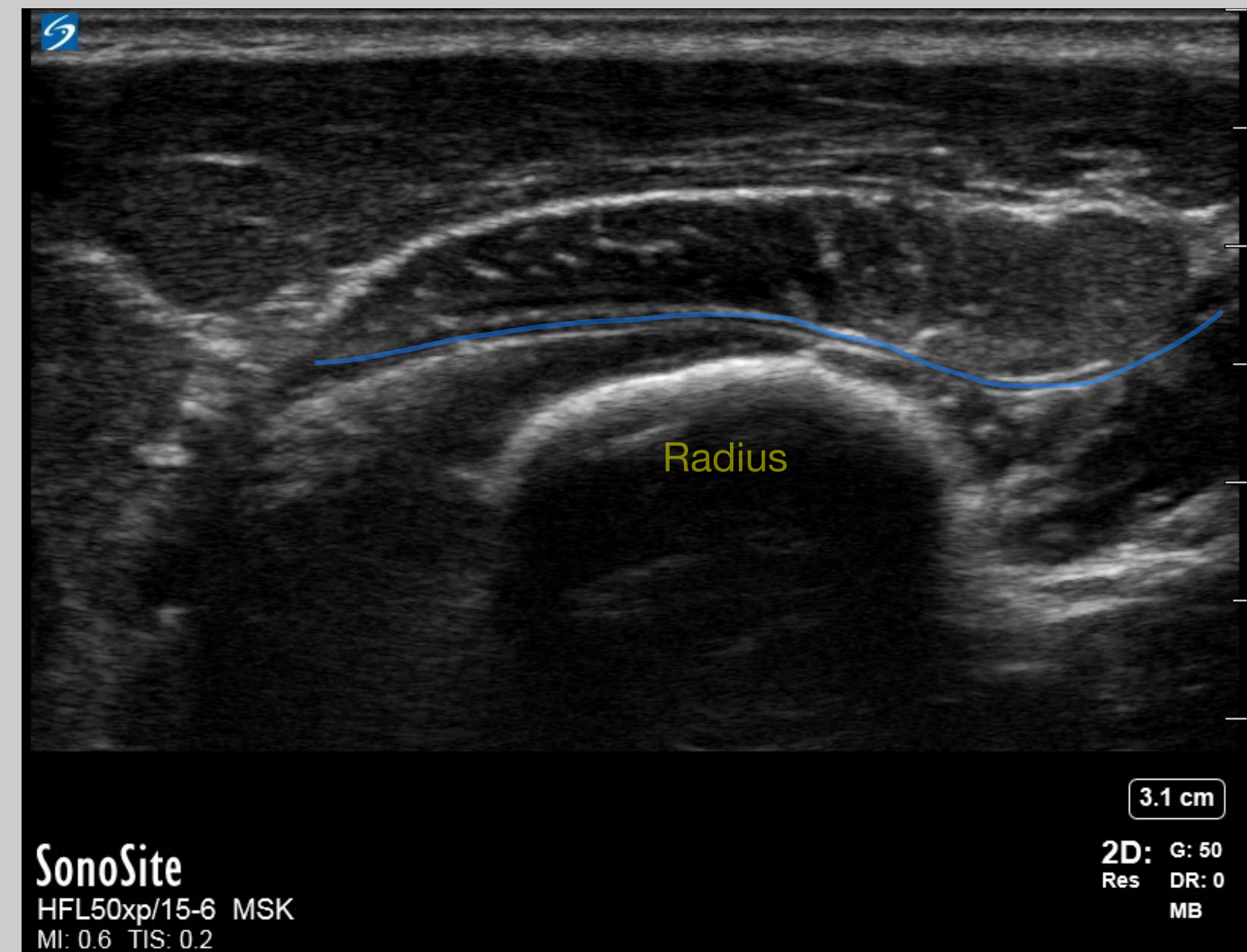
Exiting Supinator Canal



SONOANATOMY LATERAL ELBOW

Posterior Interosseus Nerve (PIN)

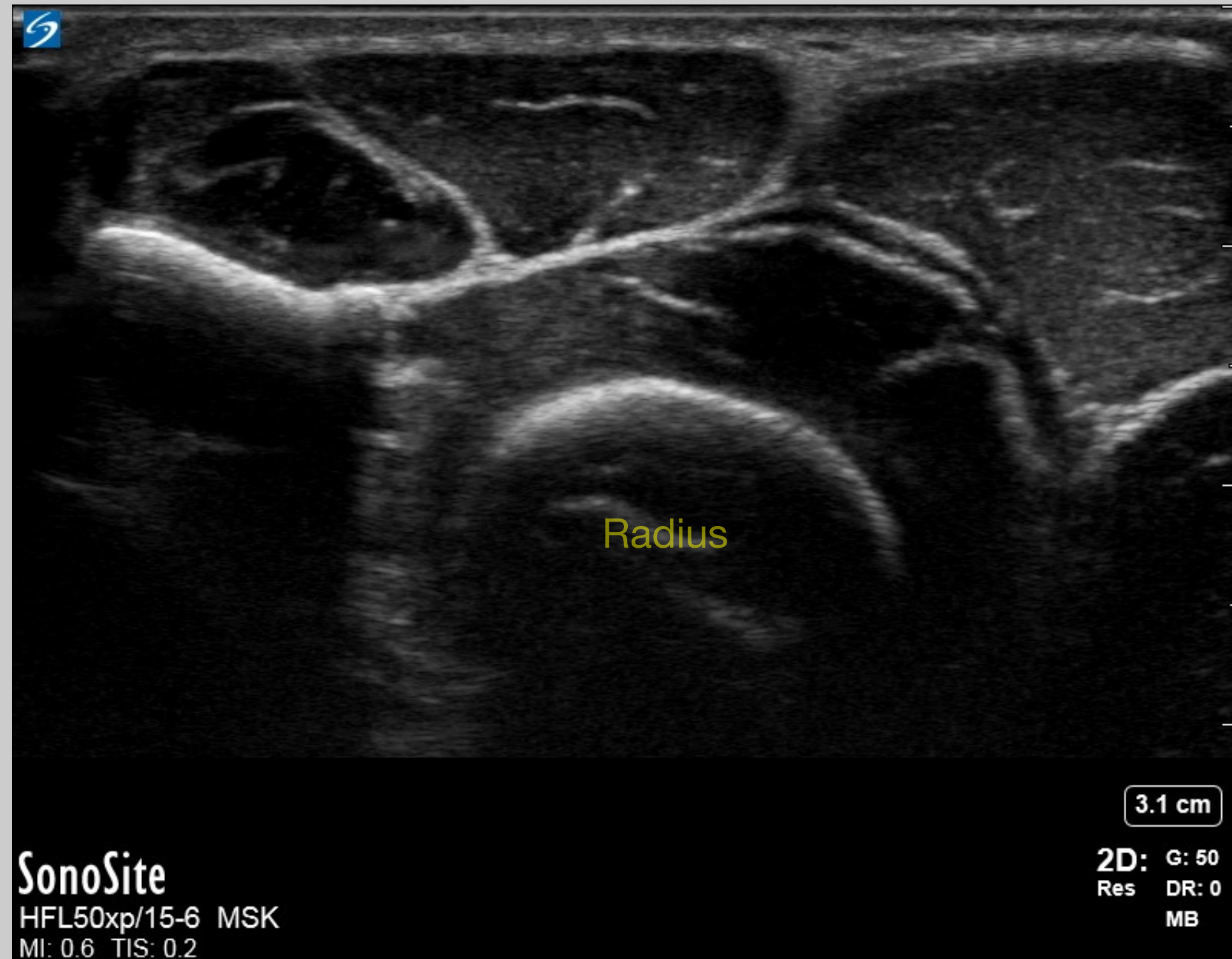
Long Axis



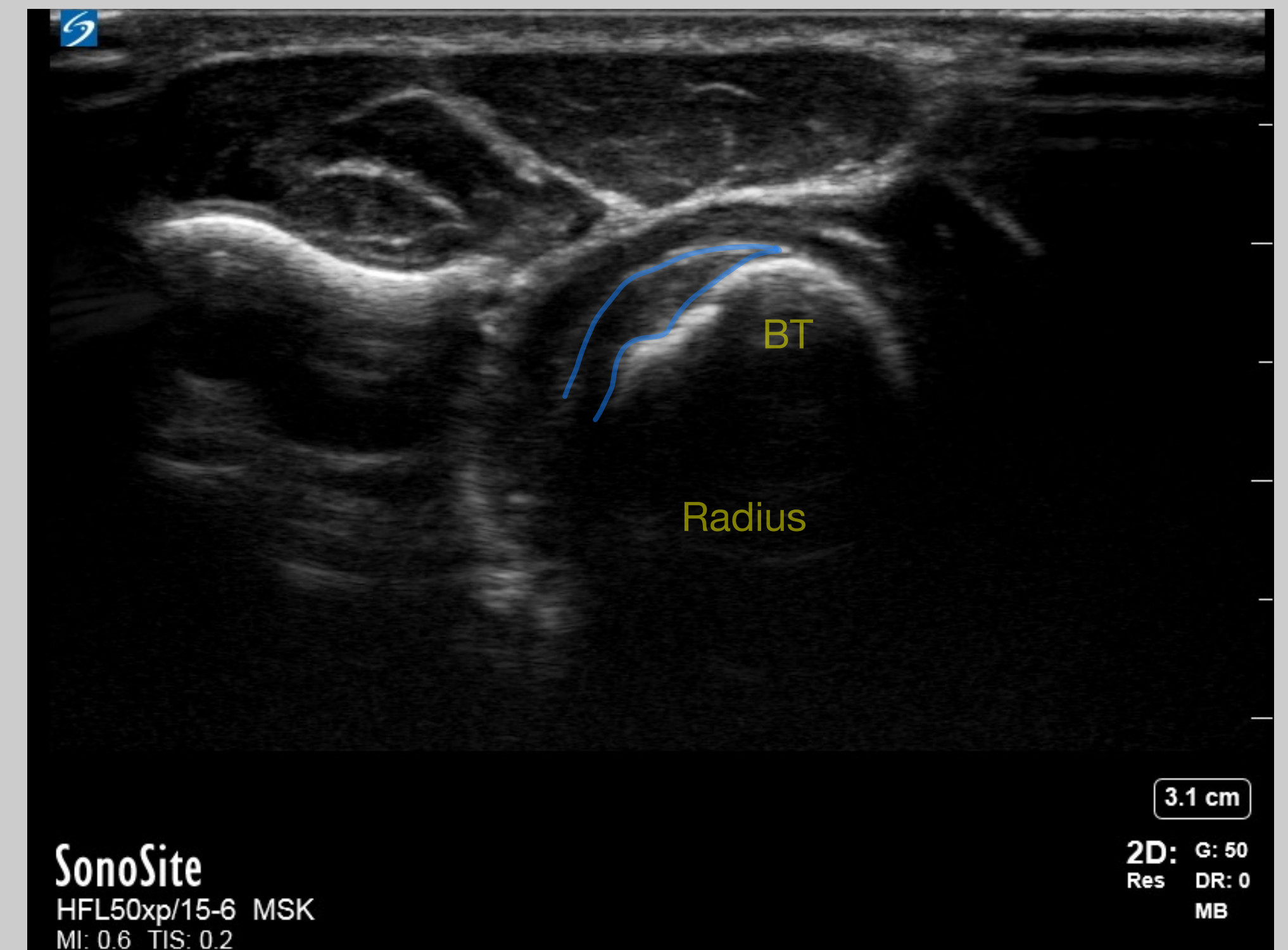
SONOANATOMY LATERAL ELBOW

Biceps Tendon

Supinated



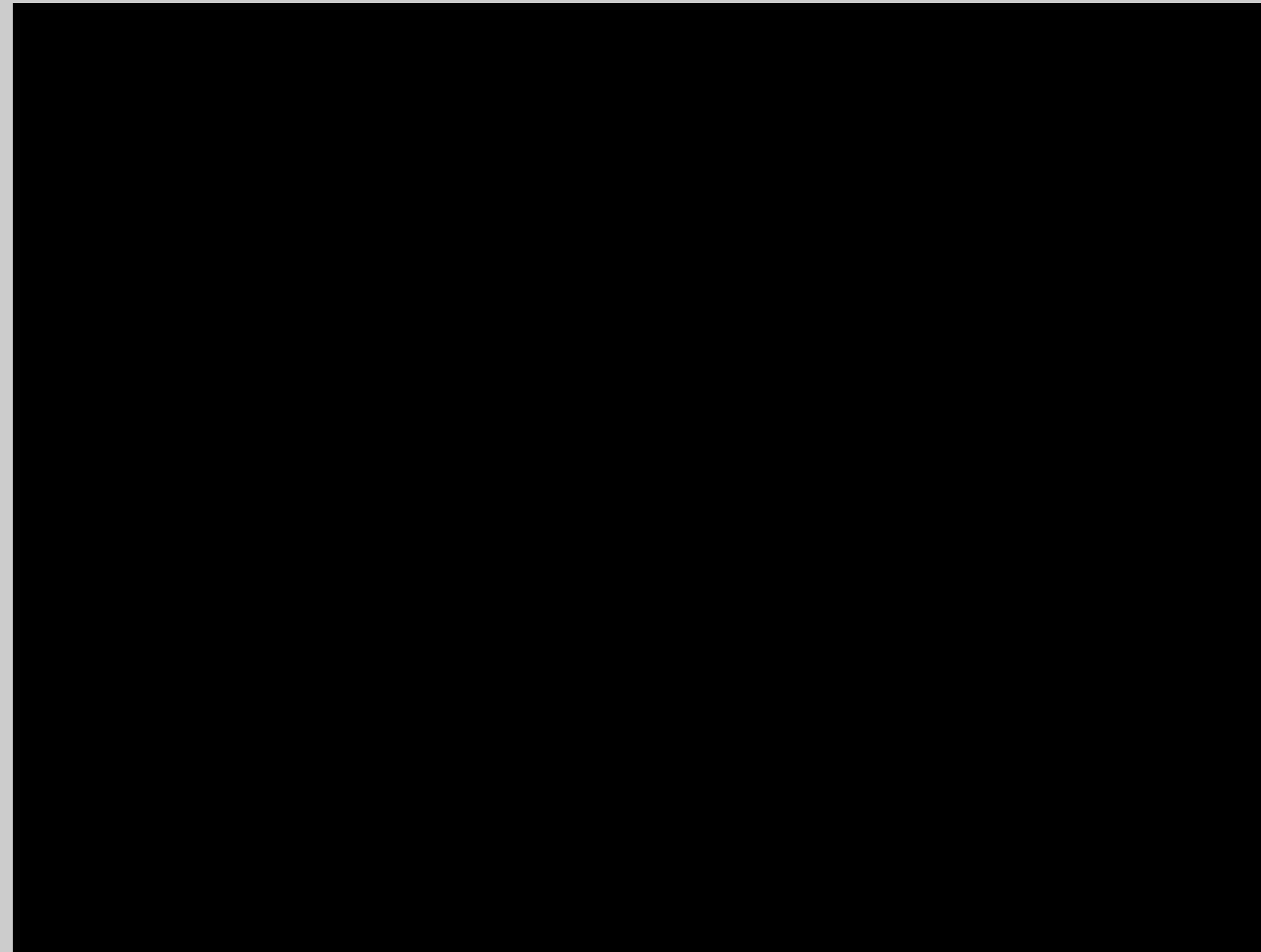
Pronated



SONOANATOMY LATERAL ELBOW

Biceps Tendon

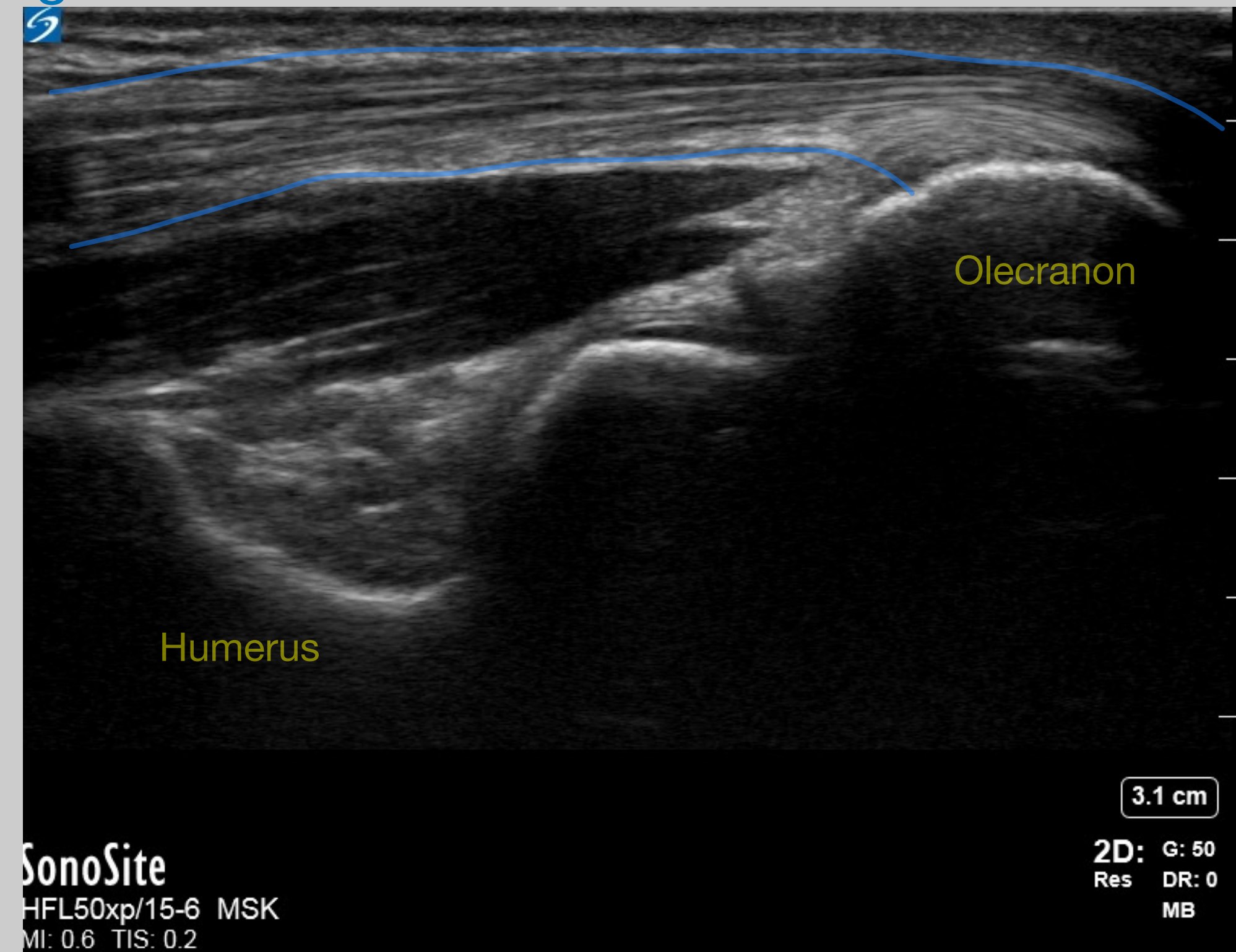
Short Axis
Distal Insertion on Coronoid
Supination-Pronation



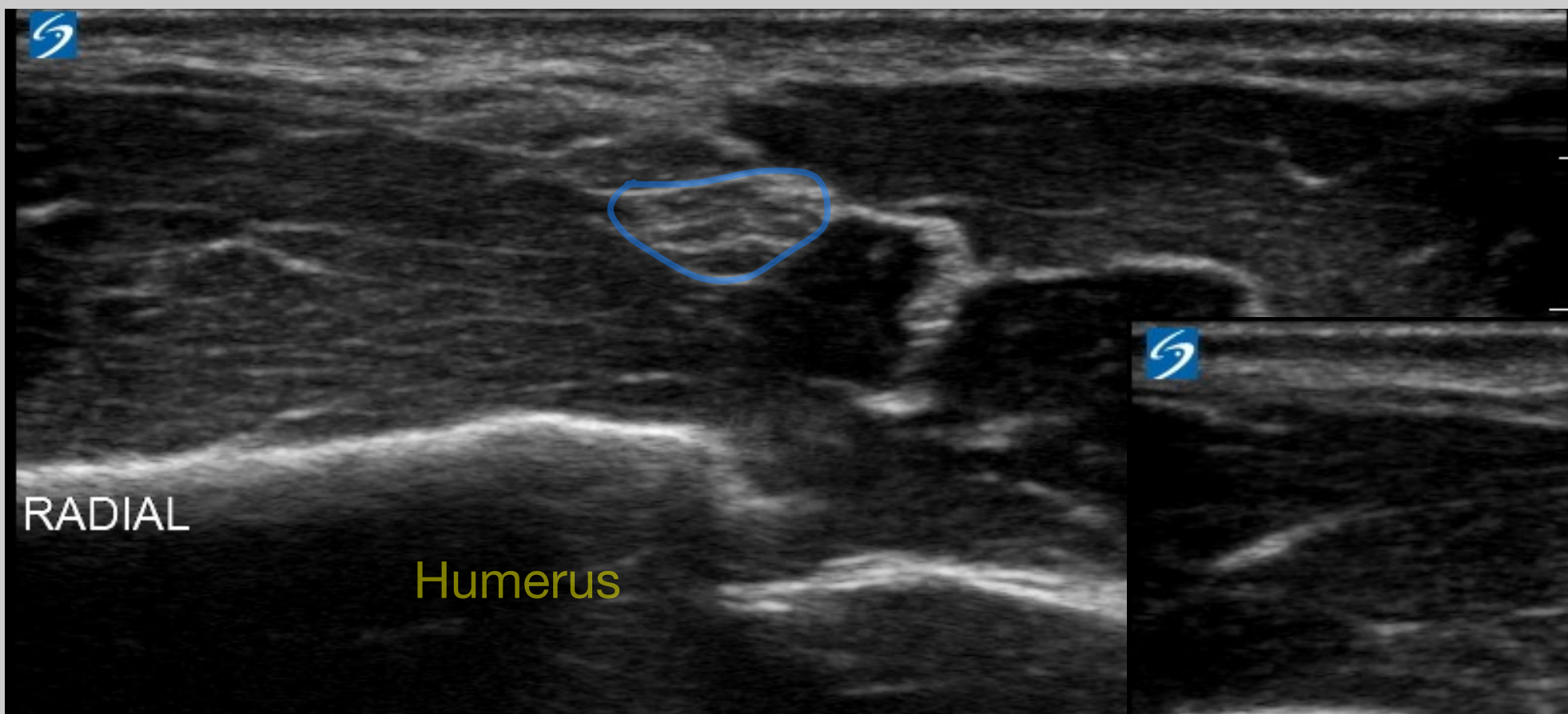
SONOANATOMY POSTERIOR ELBOW



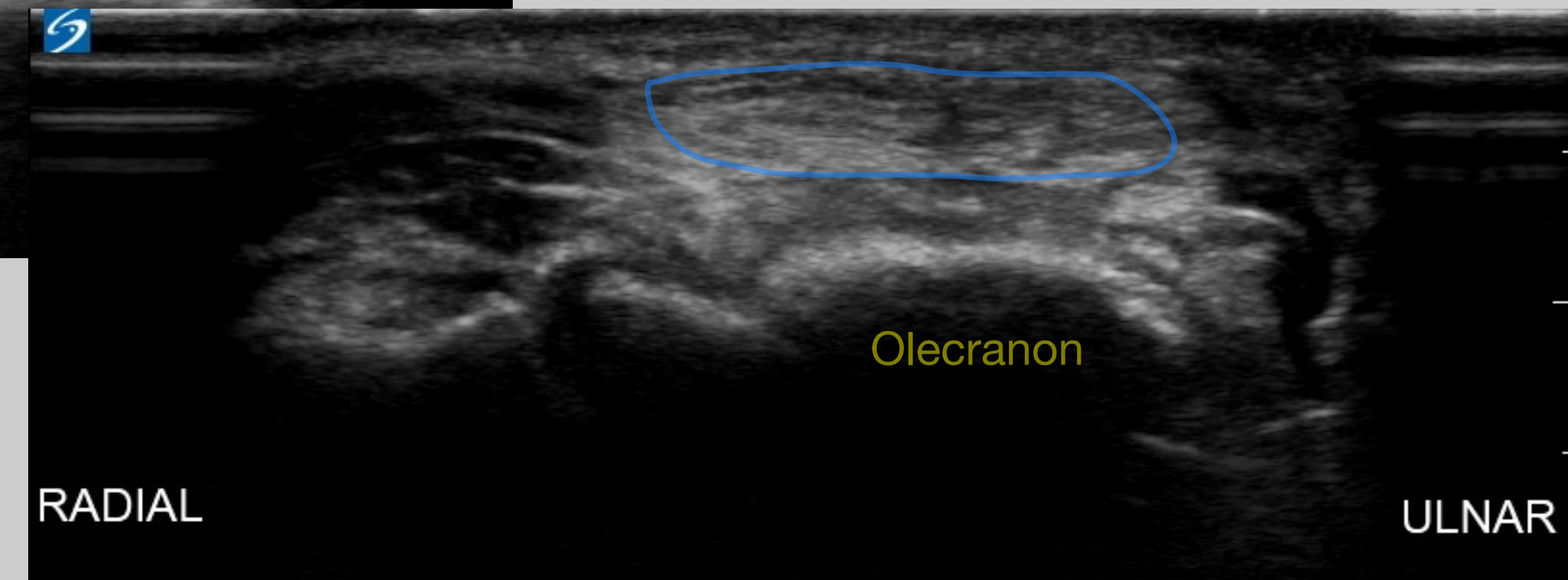
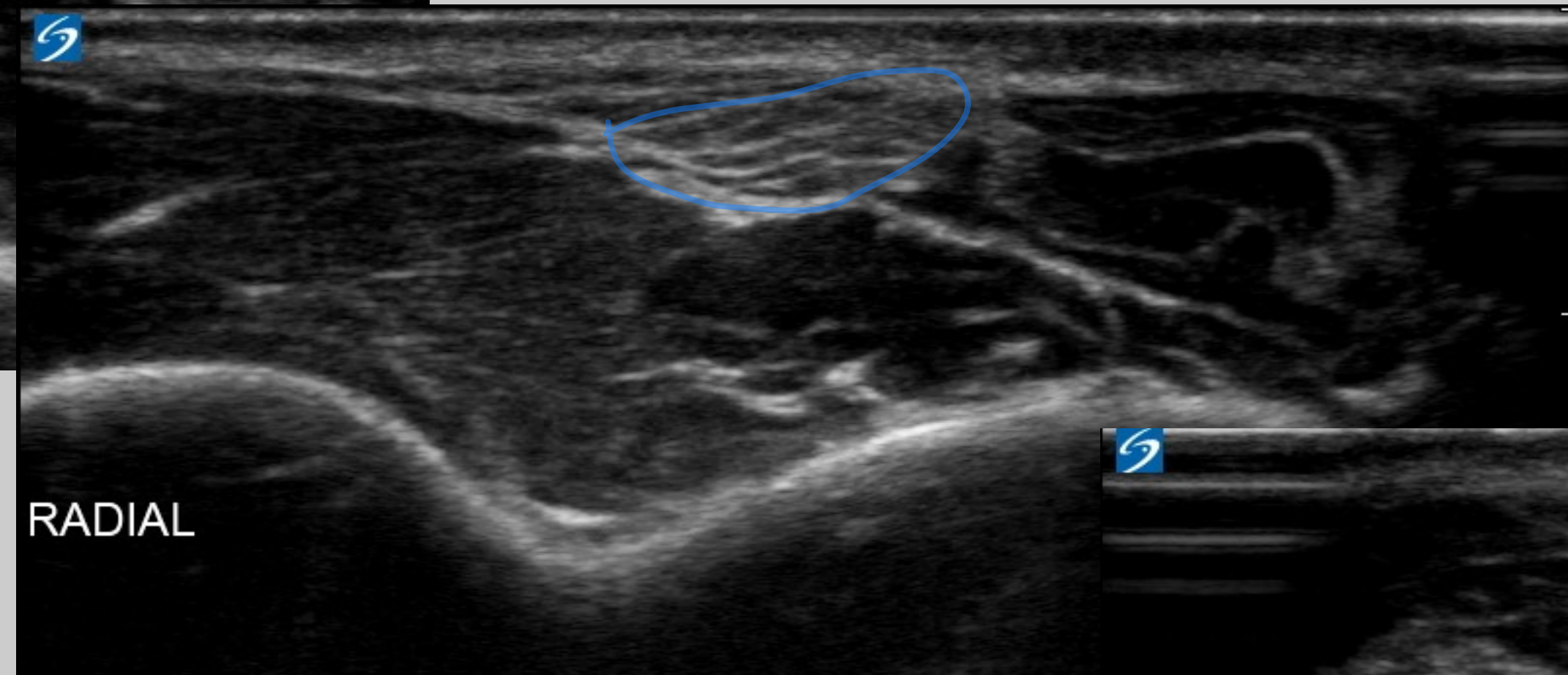
Triceps Tendon
Long Axis



SONOANATOMY POSTERIOR ELBOW

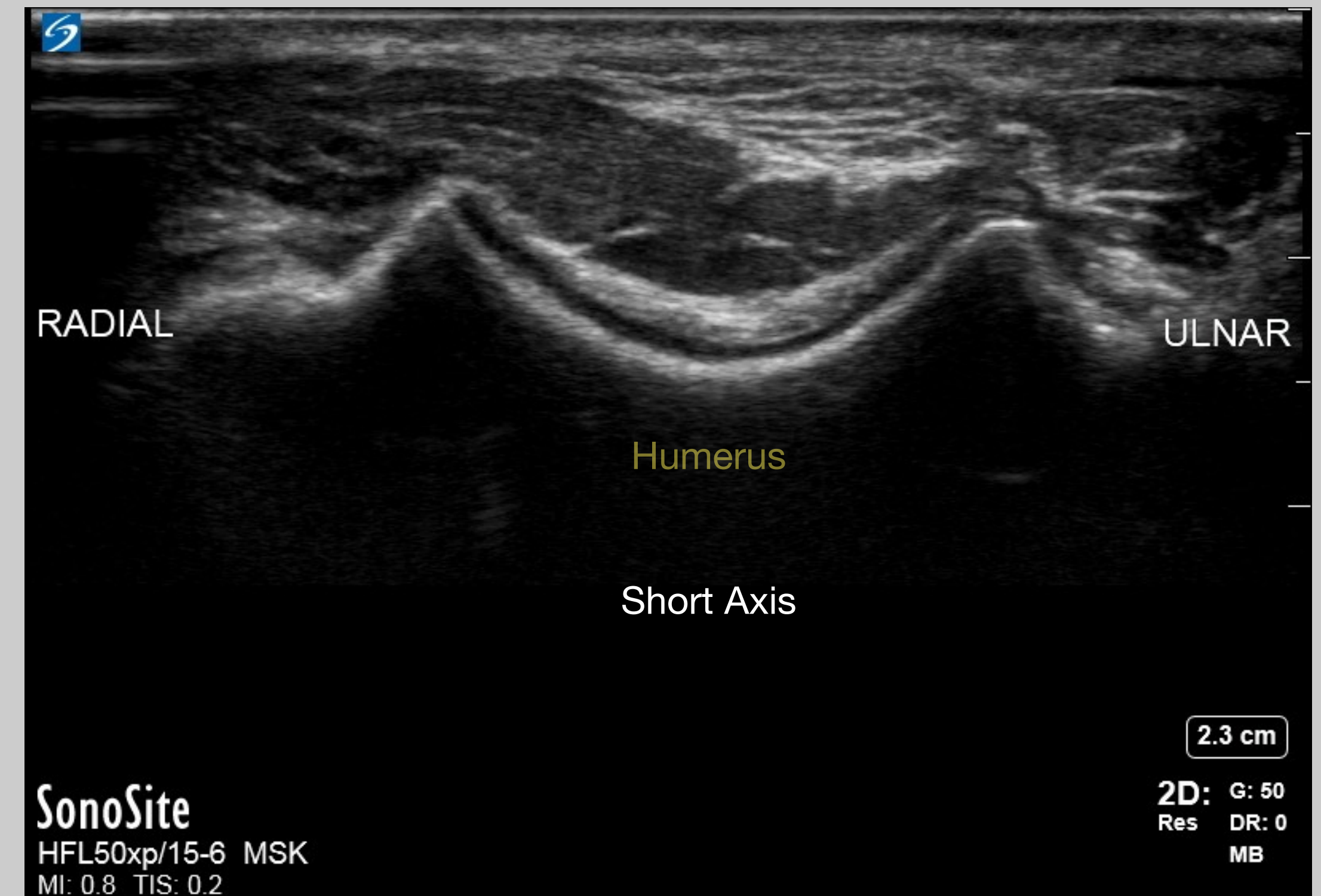
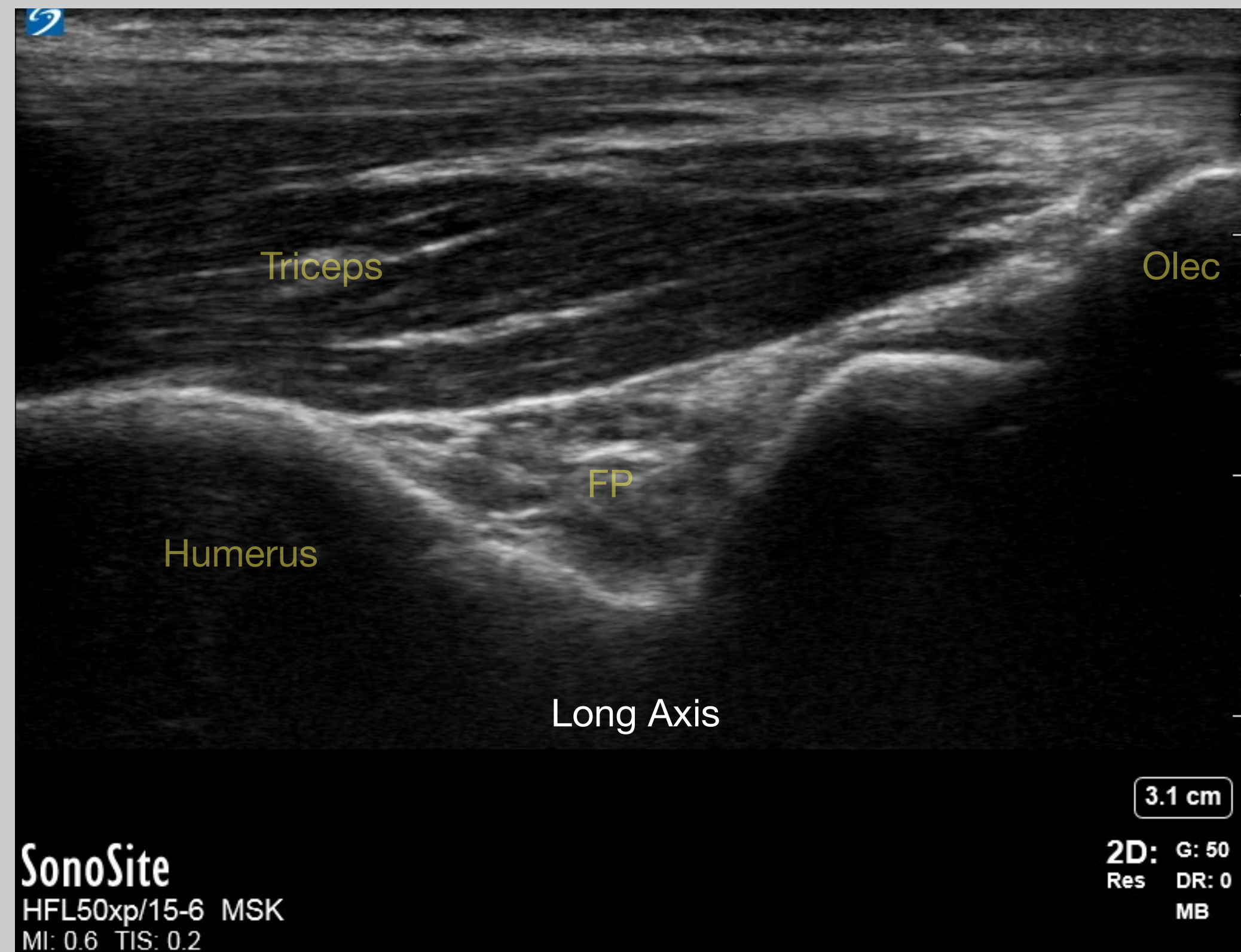


Triceps Tendon
Short Axis

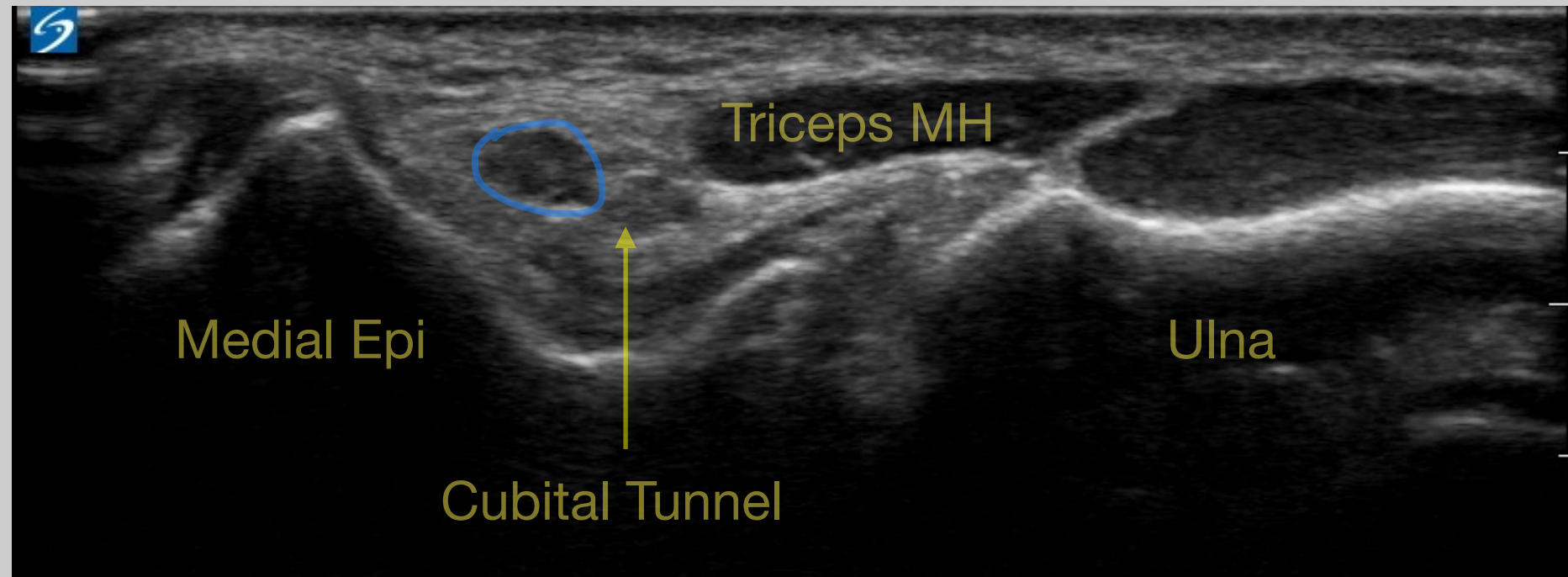


SONOANATOMY POSTERIOR ELBOW

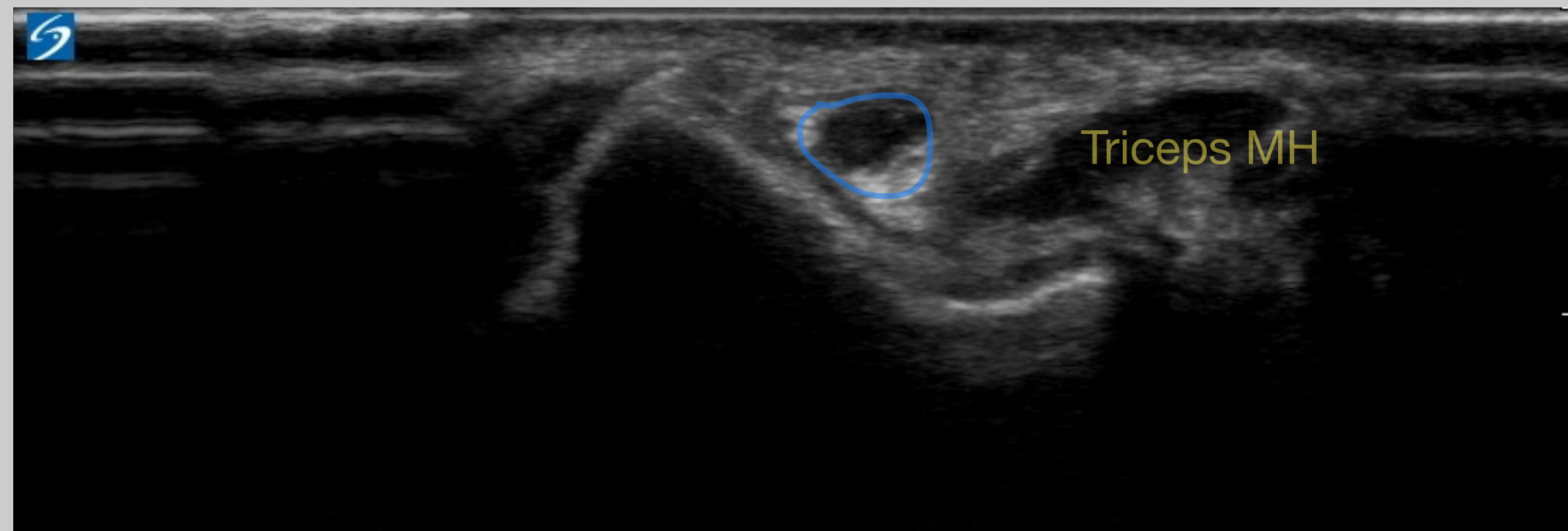
Humerus, Olecranon, Fossa, and Bursa



SONOANATOMY POSTERIOR ELBOW

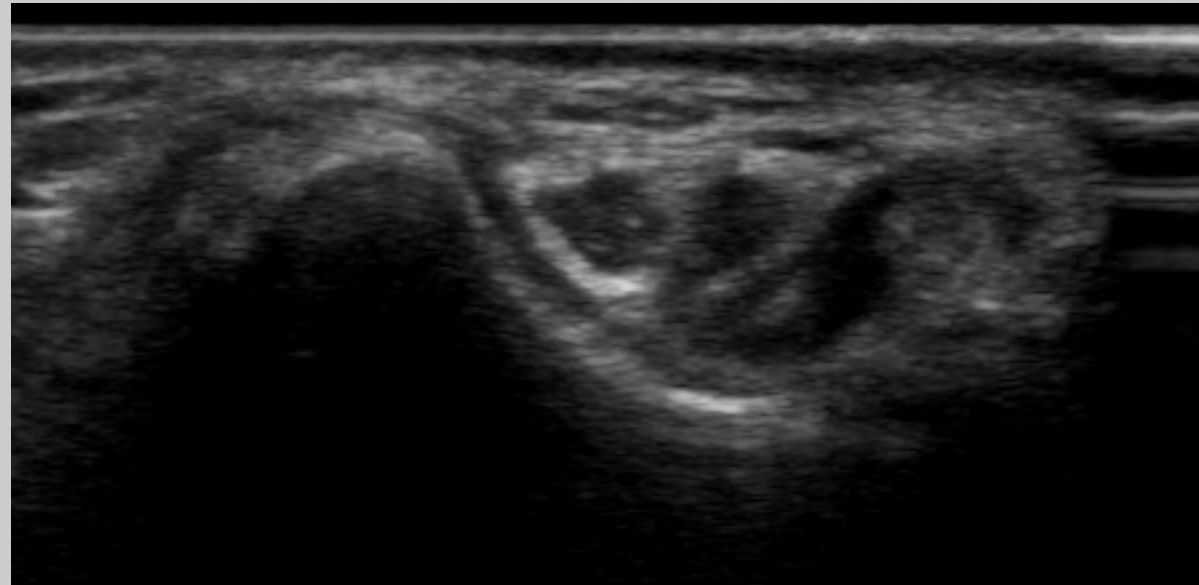


Ulnar Nerve

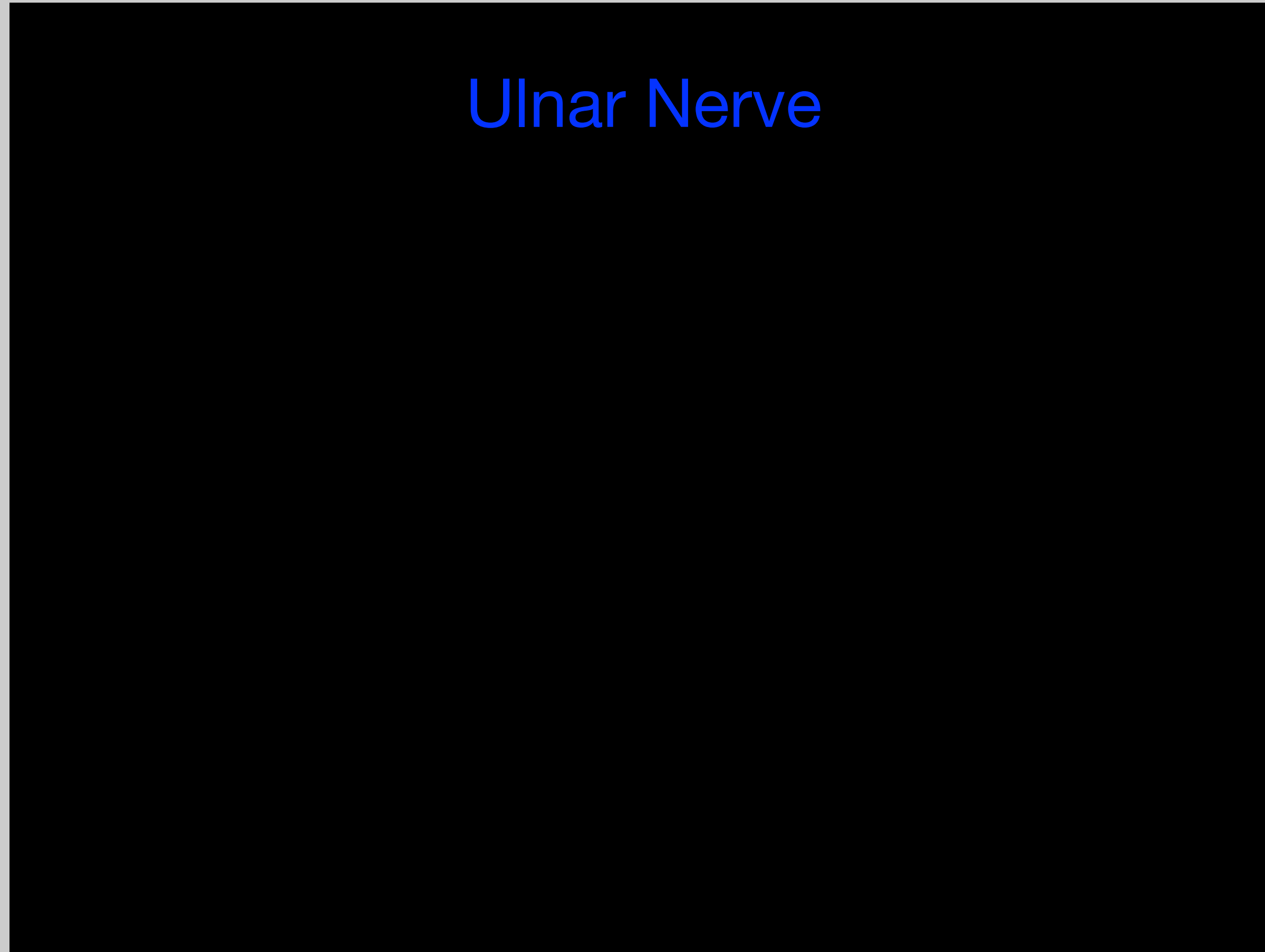


SONOANATOMY POSTERIOR ELBOW

Short Axis
Proximal to Distal



Ulnar Nerve



SONOANATOMY POSTERIOR ELBOW

Ulnar Nerve

Snapping / Subluxing
Ulnar Nerve

ULTRASOUND GUIDED INTERVENTIONS: OVERVIEW

Intra-Articular: Radiocapitellar
Common Flexor Tendon
Common Extensor Tendon
Olecranon Bursa aspiration
Trigger Points

Aside from radiocapitellar joint, most injections are done in-plane and can then be checked out of plane.

Use clean technique!

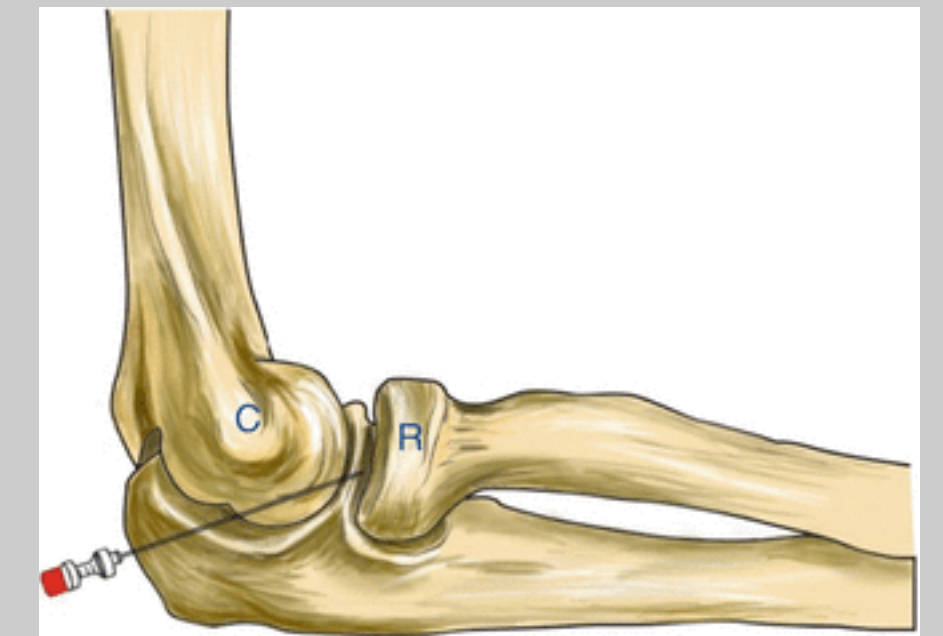
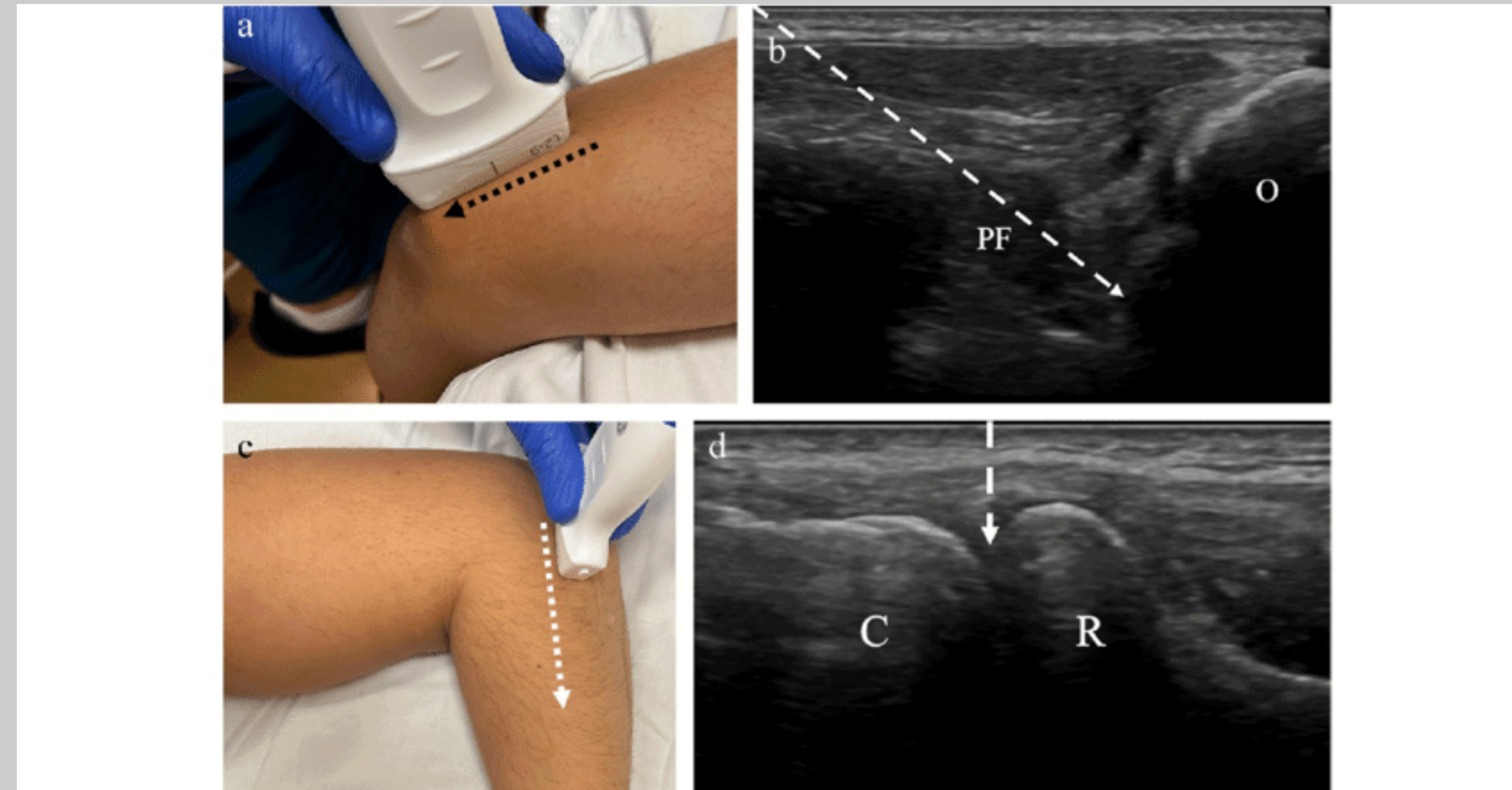
Needle Sizes

- 27g x 1.25"
- 25g x 1-2"
 - Effusions 18g x 1-1.5"



ULTRASOUND GUIDED INTERVENTIONS

Elbow/Radiocapitellar Joint Injection



Ultrasound-guided interventions of the upper extremity joints - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Technique-for-elbow-joint-injection-a-Image-of-a-healthy-volunteer-shows-transducer_fig6_362679373
[accessed 24 Sep, 2023]

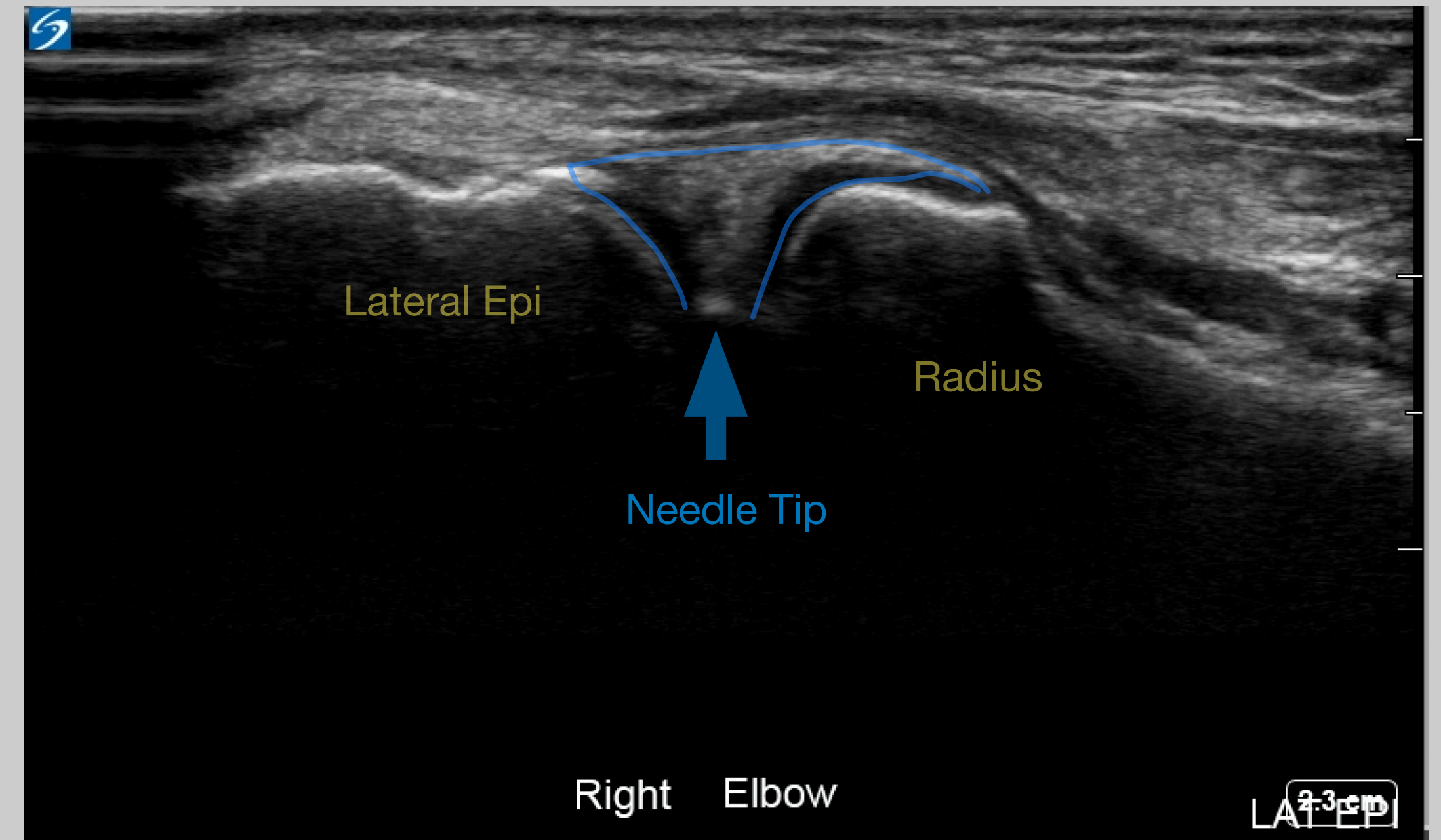
ULTRASOUND GUIDED INTERVENTIONS



Elbow/Radiocapitellar Joint Injection

- Long axis to tendon, out of plane to joint
- Anesthetize to depth
- Observe flow, no distention
- Needle: 25g x 1-1.5"
- Volume: 2-3cc therapeutic soln

Out of plane



NOMA

ULTRASOUND GUIDED INTERVENTIONS

Common Flexor Tendon Injection



- Long axis to tendon, in plane
- Anesthetize to depth
- Caudal to cranial
- Needle: 25g x 2"
- Volume: 1-2.5cc therapeutic soln

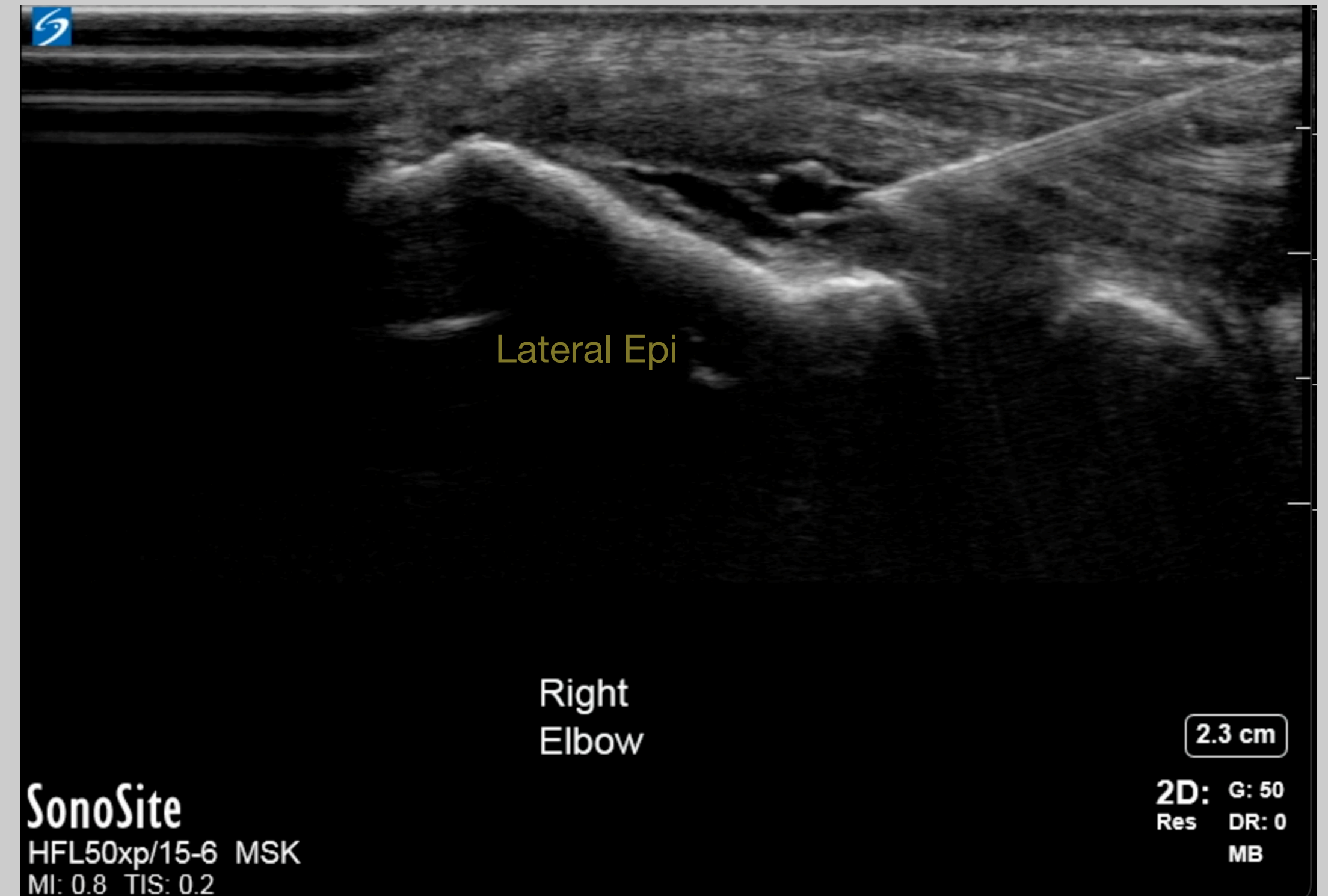
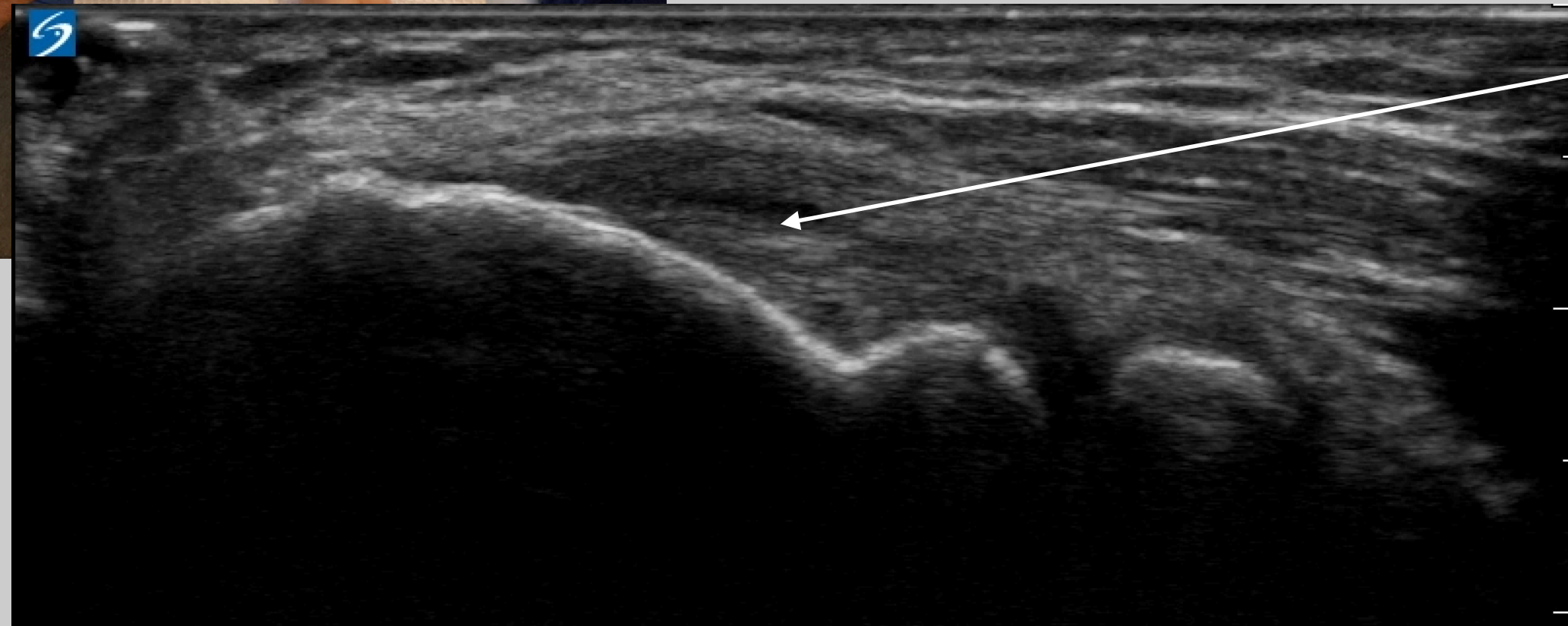


ULTRASOUND GUIDED INTERVENTIONS

Common Extensor Tendon Injection Long Axis



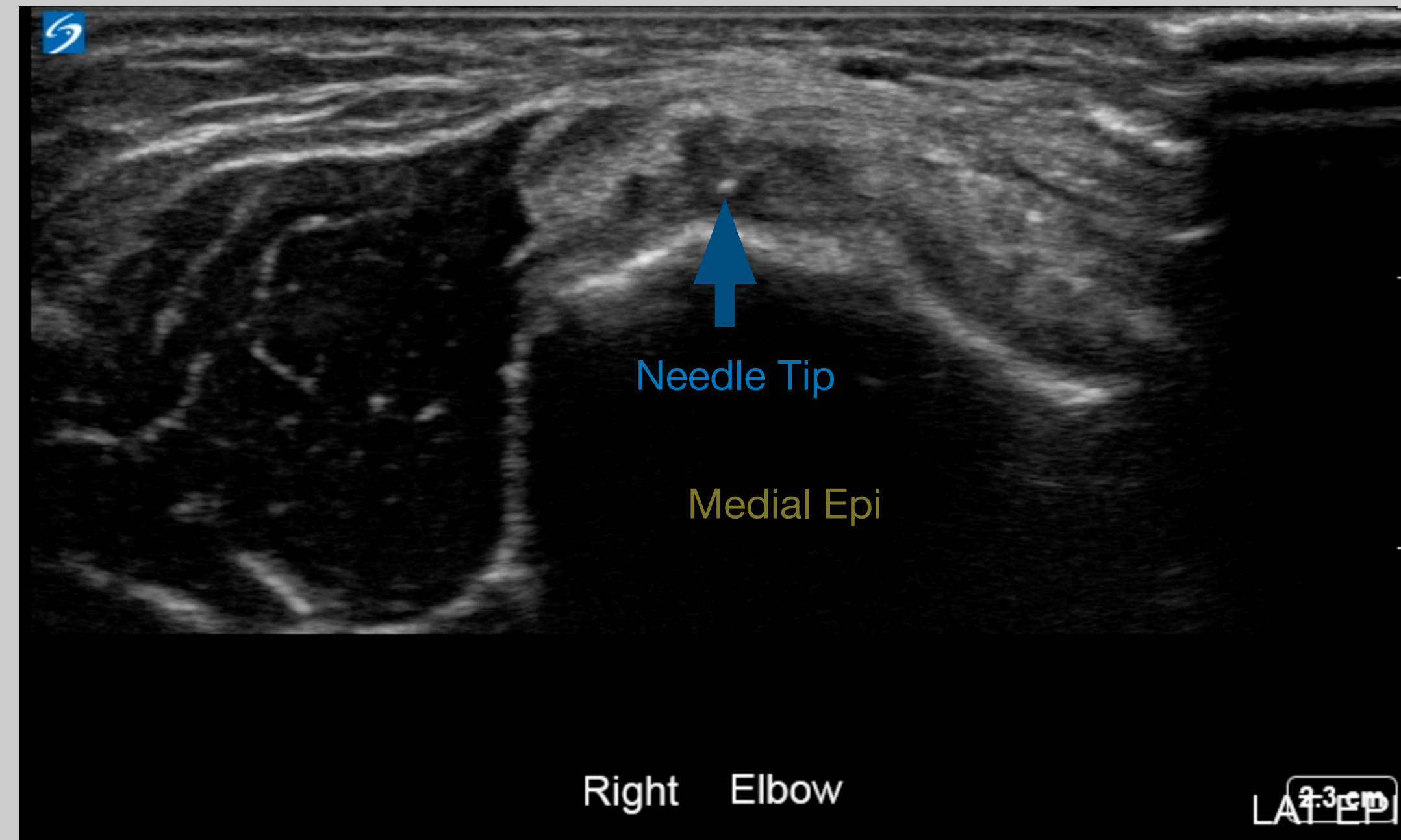
- Long axis to tendon, in plane
- Anesthetize to depth
- Caudal to cranial
- Needle: 25g x 2"
- Volume: 1-2.5cc therapeutic soln



ULTRASOUND GUIDED INTERVENTIONS

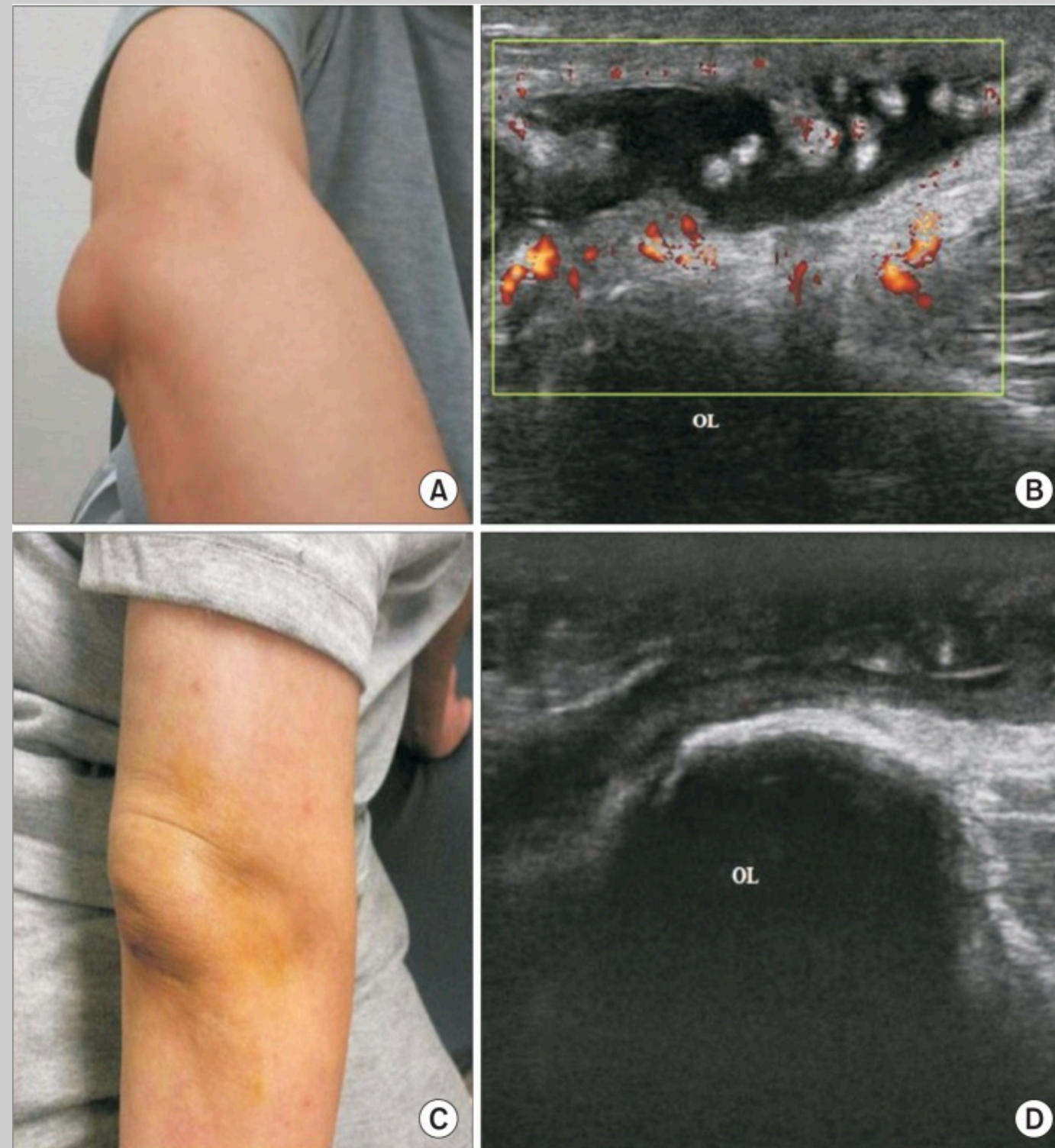
Common Extensor Tendon Injection

Short Axis



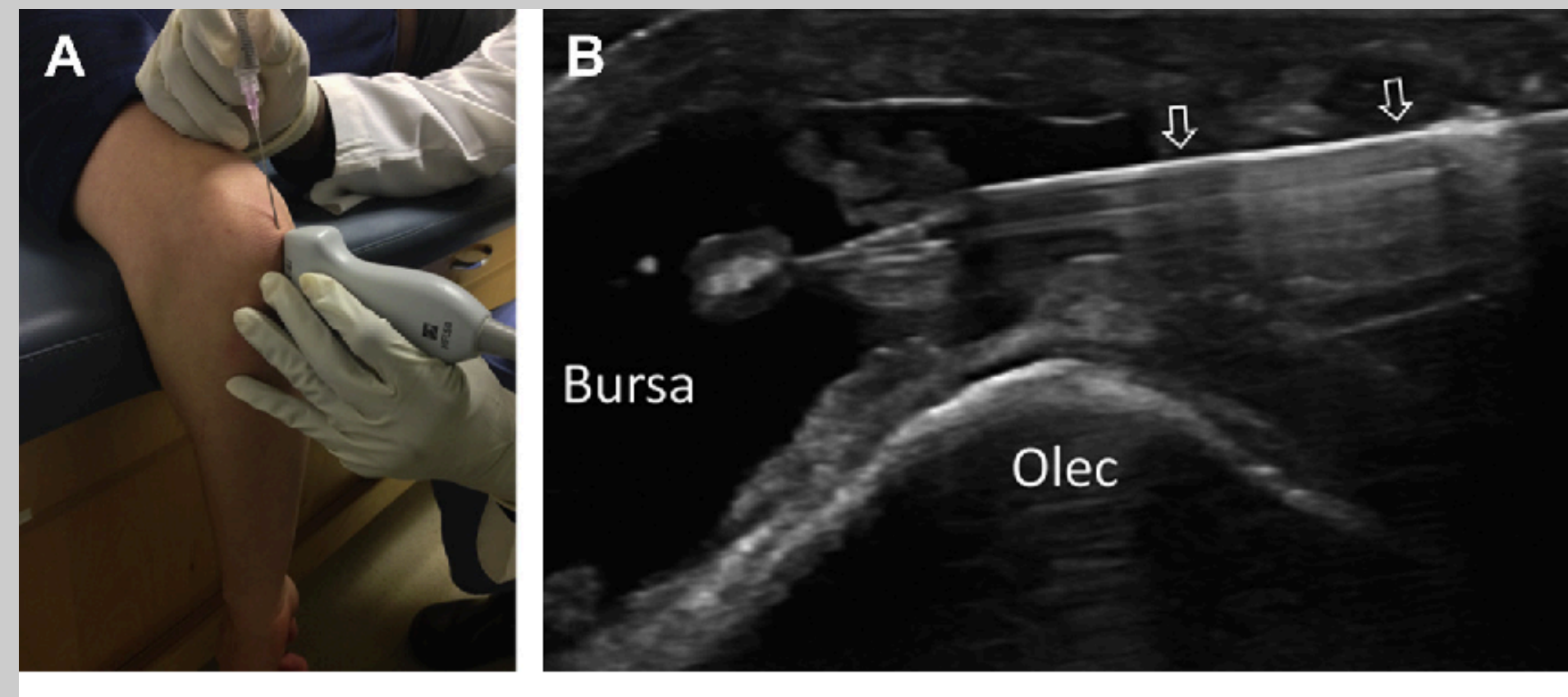
ULTRASOUND GUIDED INTERVENTIONS

Olecranon Bursa Aspiration



<https://www.e-arm.org/journal/Figure.php?xn=arm-40-310.xml&id=>

- Long or short axis, in plane
- Anesthetize to depth
- Needle: 18g x 1-1.5"
- Use doppler to assess for inflammation
- Sterile!

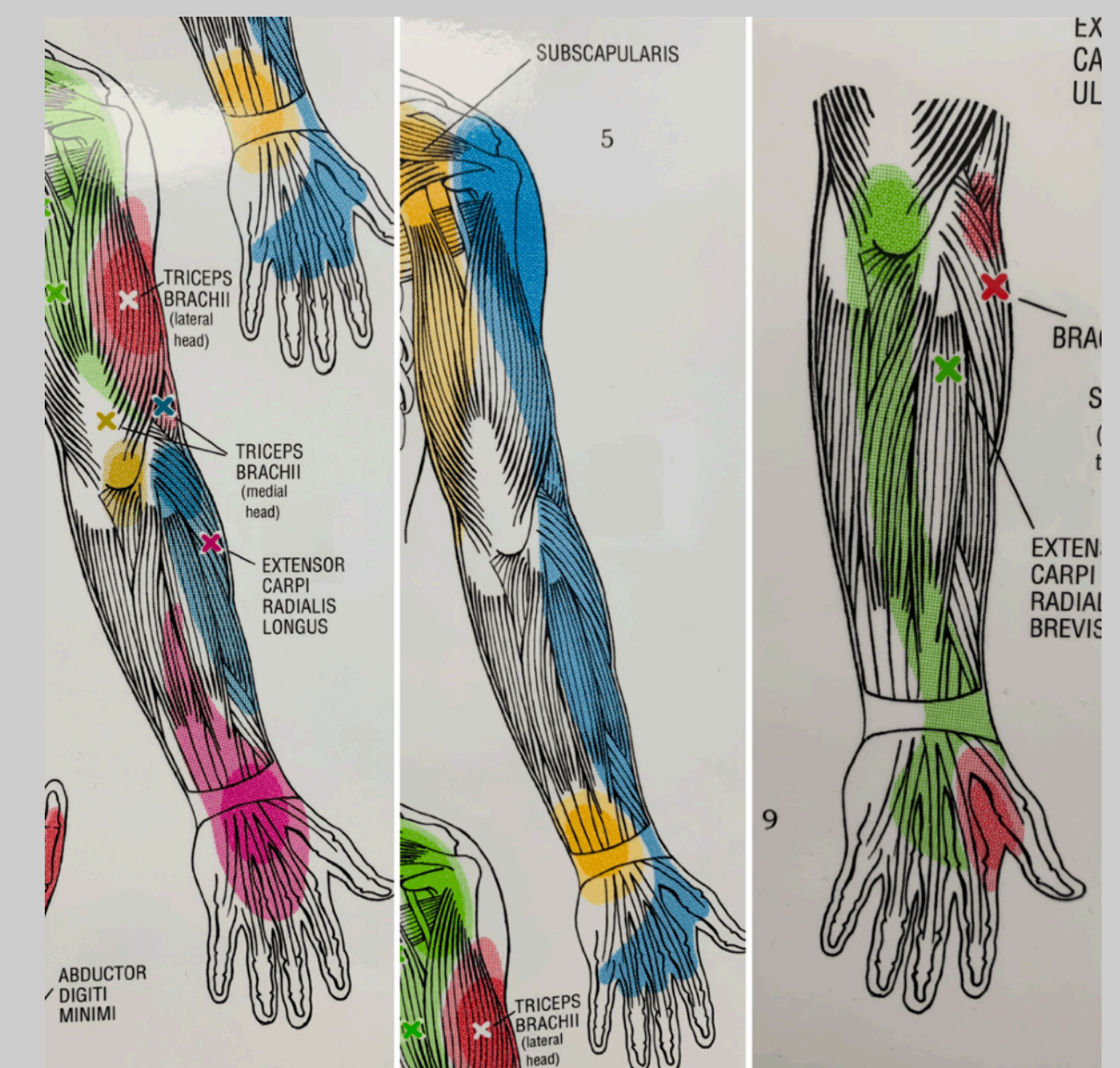


Sussman, Walter I. et al. "Ultrasound-Guided Elbow Procedures." *Physical medicine and rehabilitation clinics of North America* 27 3 (2016): 573-87 .

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Trigger Points

Ultrasound not typically needed. Dry needling can work as well as injections.
Can use around ECRB, ECRL if concern over radial nerve



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Thank You!

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