FOREARM INTEROSSEOUS MEMBRANE INJURY ACUTE IMAGING

ESSR 2017

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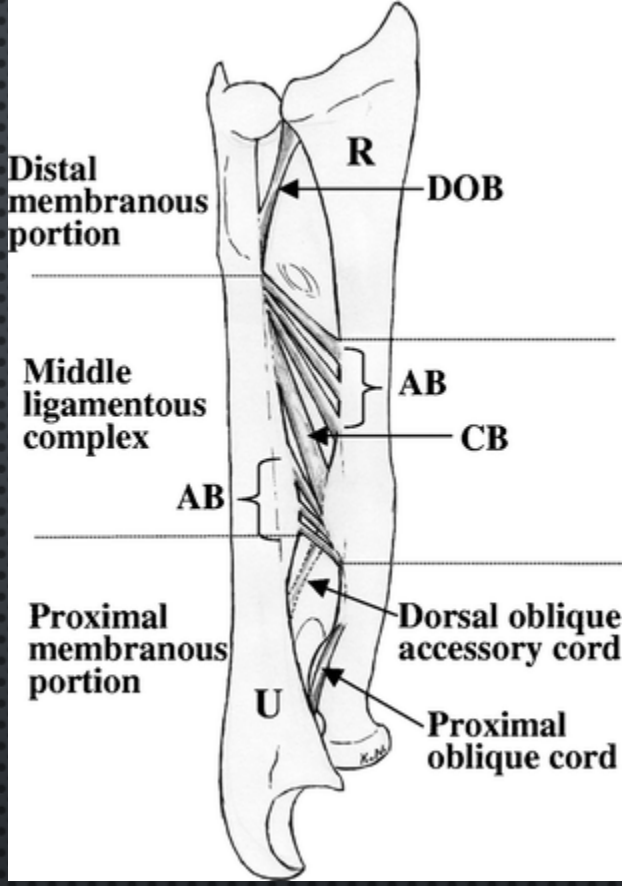
INTEROSSEOUS MEMBRANE (IOM) ANATOMY

- STRETCHED ON 10 CM BETWEEN RADIAL AND ULNAR INTEROSSEOUS CRESTS.
- THE IOM IS DIVIDED IN THREE PARTS:

  PROXIMAL , CENTRAL AND DISTAL

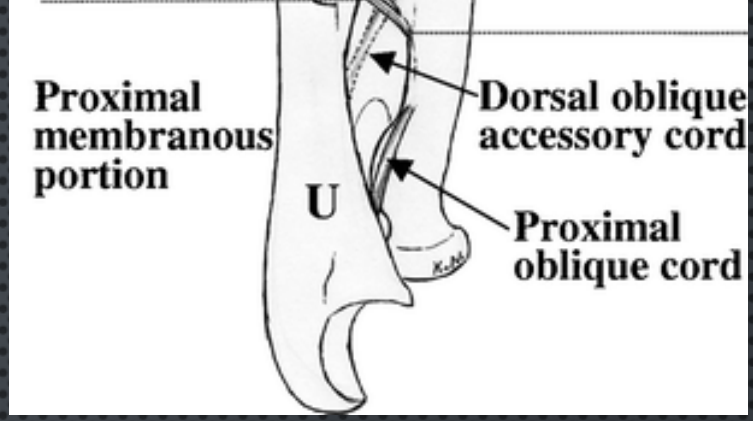
- VASCULARIZATION: COMMON INTEROSSEOUS ARTERY DIVIDED IN ANTERIOR AND POSTERIOR INTEROSSEOUS ARTERIES.
- INNERVATION: ANTERIOR AND POSTERIOR INTEROSSEUS NERVES.



Rodriguez-Martin et al., *Skeletal Radiol* 2011

Wright TW. J Am Soc Surg Hand 2001;1(2):123–34.

PROXIMAL PORTION : 2 PARTS

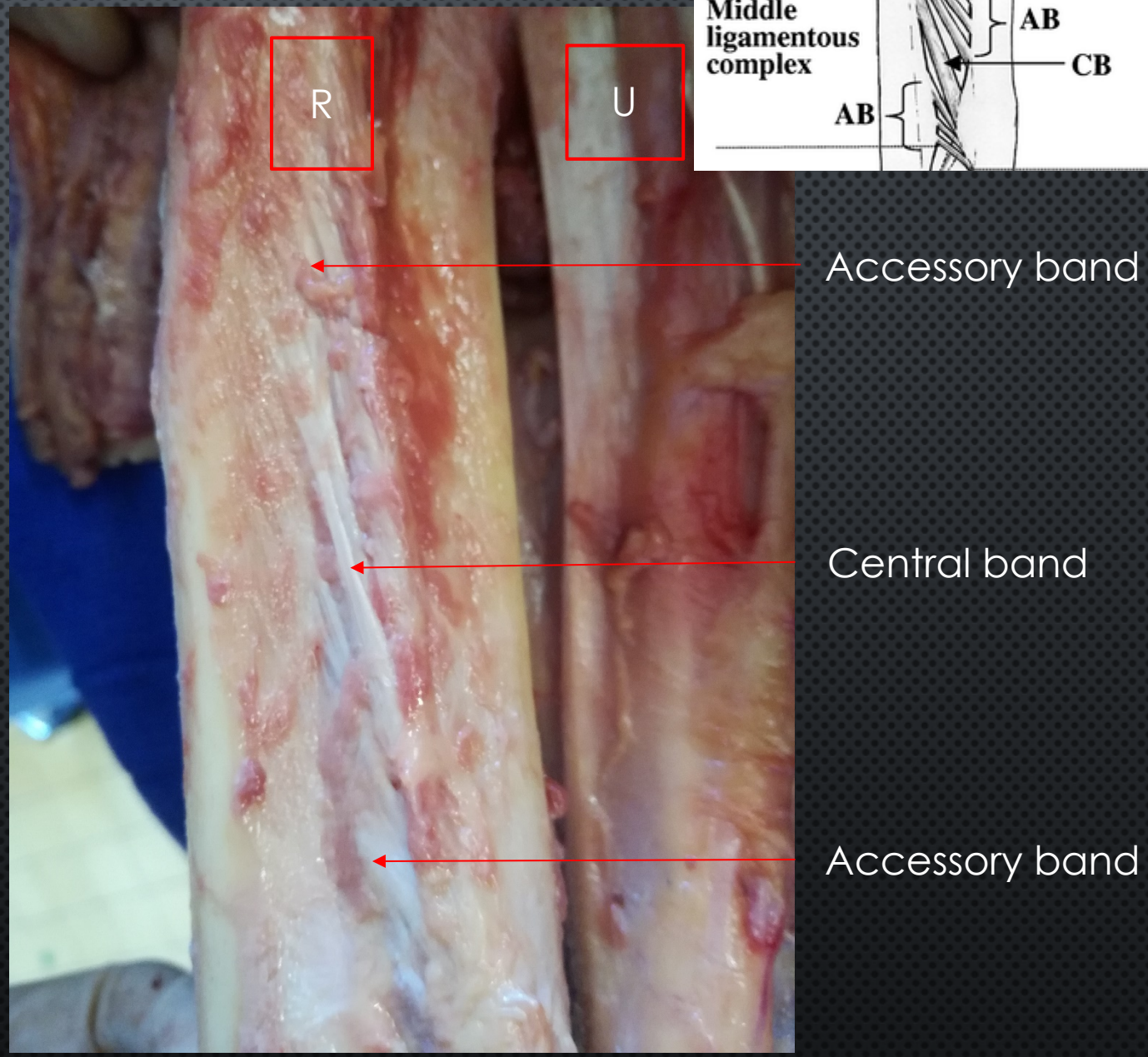


OBLIQUE CORD (WEITBRECHT LIGAMENT): INSERTS ON THE CORONOID PROCESS THEN CROSSES DISTAL BICEPS INSERTION AND ENDS ON RADIAL TUBEROSITY.

ACCESSORY OBLIQUE DORSAL CORD : INSERTS ON THE JUNCTION OF THE PROXIMAL AND MIDDLE THIRDS OF ULNA AND ENDS ON THE RADIUS INTEROSSEOUS CREST.

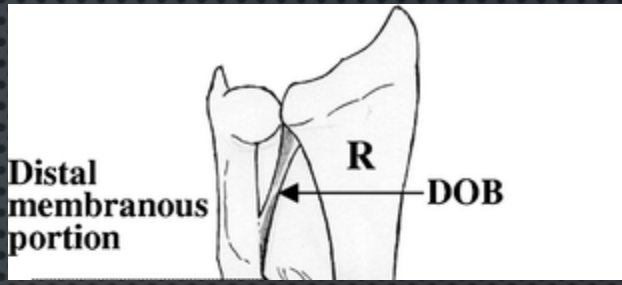
MIDDLE PORTION

- CENTRAL BAND : THE THICKEST AND STRONGEST PORTION. INSERTS ON THE RADIUS INTEROSSEOUS CREST AND ENDS ON THE ULNAR DIAPHYSIS.
- ACCESSORY BAND : NOT CONSTANT. SAME DIRECTION AS THE CENTRAL BAND.



DISTAL PORTION

- OBLIQUE DISTAL CORD : NOT CONSTANT.
- SOME OF ITS FIBERS STRENGHTENED THE DORSAL AND VOLAR SEGMENTS OF TFCC

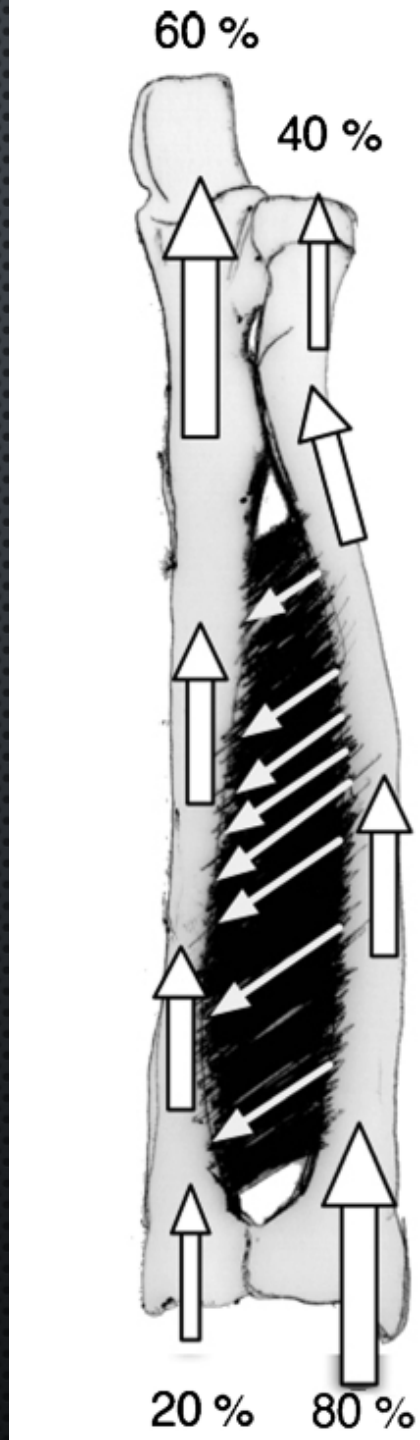


Oblique Distal Cord

LOAD DISTRIBUTION

- LOAD DISTRIBUTION
- 80% OF AXIAL LOAD ARE TRANSMITTED FROM WRIST TO RADIO-CARPIAL JOINT AND 20% TO THE ULNO-CARPIAL JOINT.
- LOAD RECEIVED BY ELBOW IS DIFFERENT : 60-70% TO THE HUMERO-RADIAL JOINT AND 30-40% TO THE HUMERO-ULNAR JOINT.
- INTEROSSEOUS MEMBRANE ALLOWS AN HOMOGENEIZATION OF LOAD IN FOREARM UNIT.

Soubeyrand et al (2007). *Chirurgie de la main*, *26*, 255-277.
Markolf, K. L.et al . (2000).. *The Journal of hand surgery*, *25*(4), 674-682.



LOCK CONCEPT

- PROXIMAL LOCK:

PROXIMAL RADIO-ULNAR JOINT : RADIAL HEAD, ULNA RADIAL NOTCH, ANNULAR LIGAMENT AND DENUCE LIGAMENT.

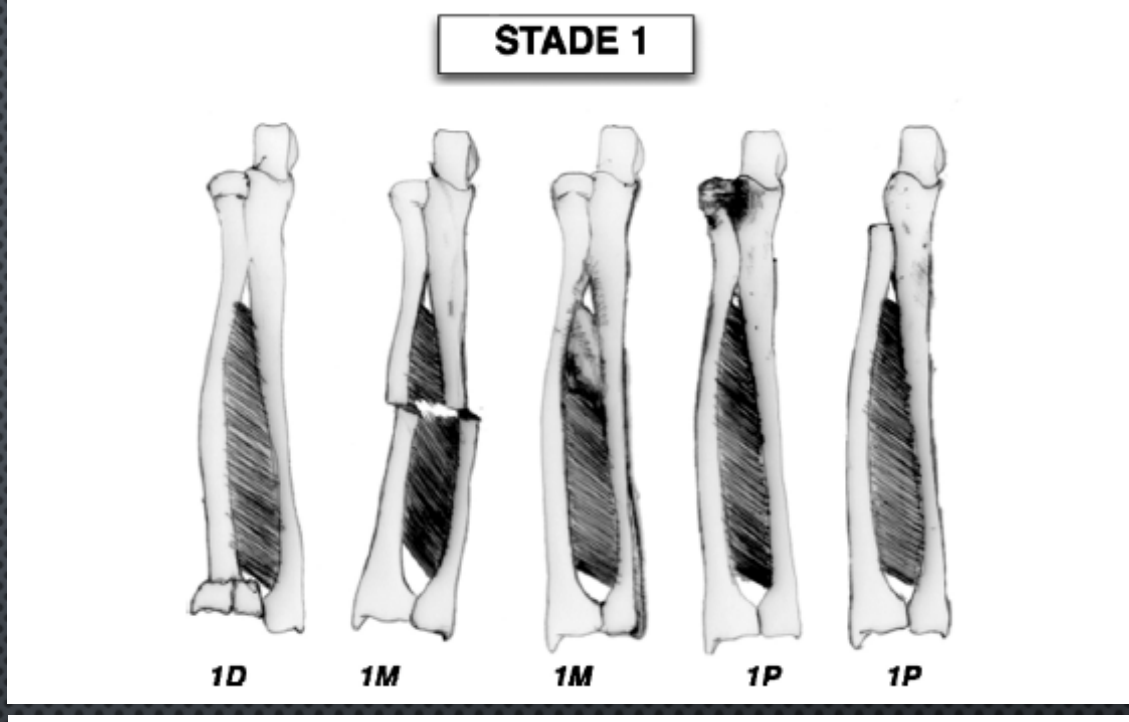
- MIDDLE LOCK: INTEROSSEOUS MEMBRANE

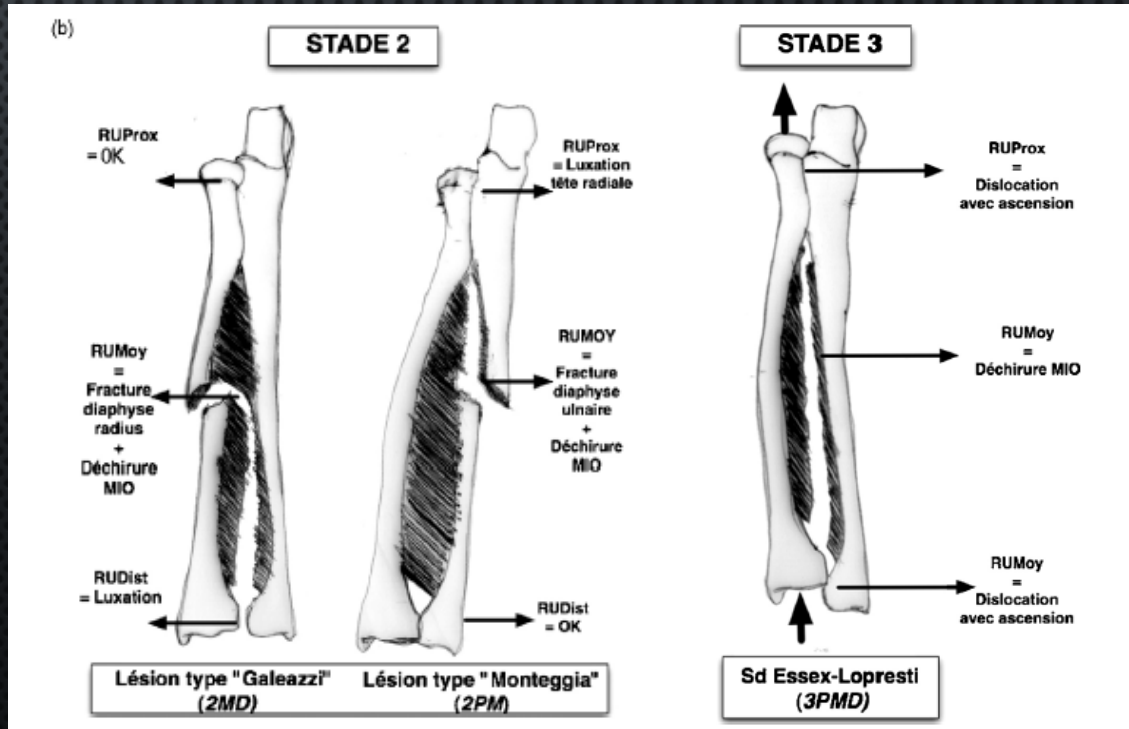
- DISTAL LOCK:

DISTAL RADIO-ULNAR JOINT: ULNAR HEAD, RADIO ULNAR NOTCH, TFCC

THE LOSS OF TWO LOCKS CANNOT BE OFFSET.

Kapandji A. Chir Main 1998;17(4):348–61.





PURPOSE

- To evaluate feasability of interosseus forearm membrane evaluation in management of an acute forearm trauma.

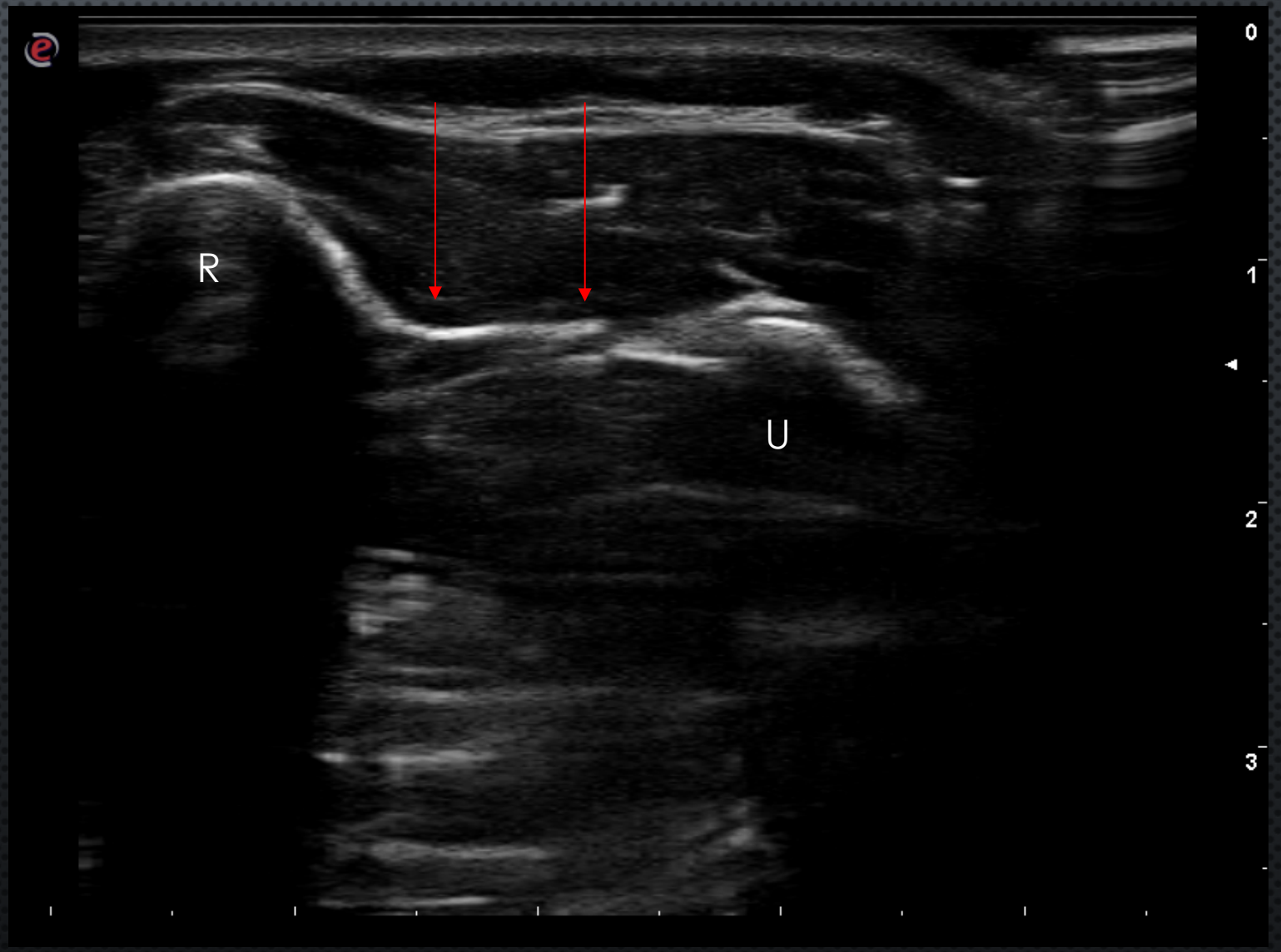
EXPLORATION TECHNICS

- MRI gold standard
- US

McGinley et al (2006). Forearm interosseous membrane trauma: MRI diagnostic criteria and injury patterns. *Skeletal radiology*, *35*(5), 275-281.

Fester, E et al (2002). The efficacy of magnetic resonance imaging and ultrasound in detecting disruptions of the forearm interosseous membrane: a cadaver study. *The Journal of hand surgery*, *27*(3), 418-424.

US



- Technic : neutral rotation of the arm. The probe must be placed on the dorsal side of the forearm to deliver axial slides

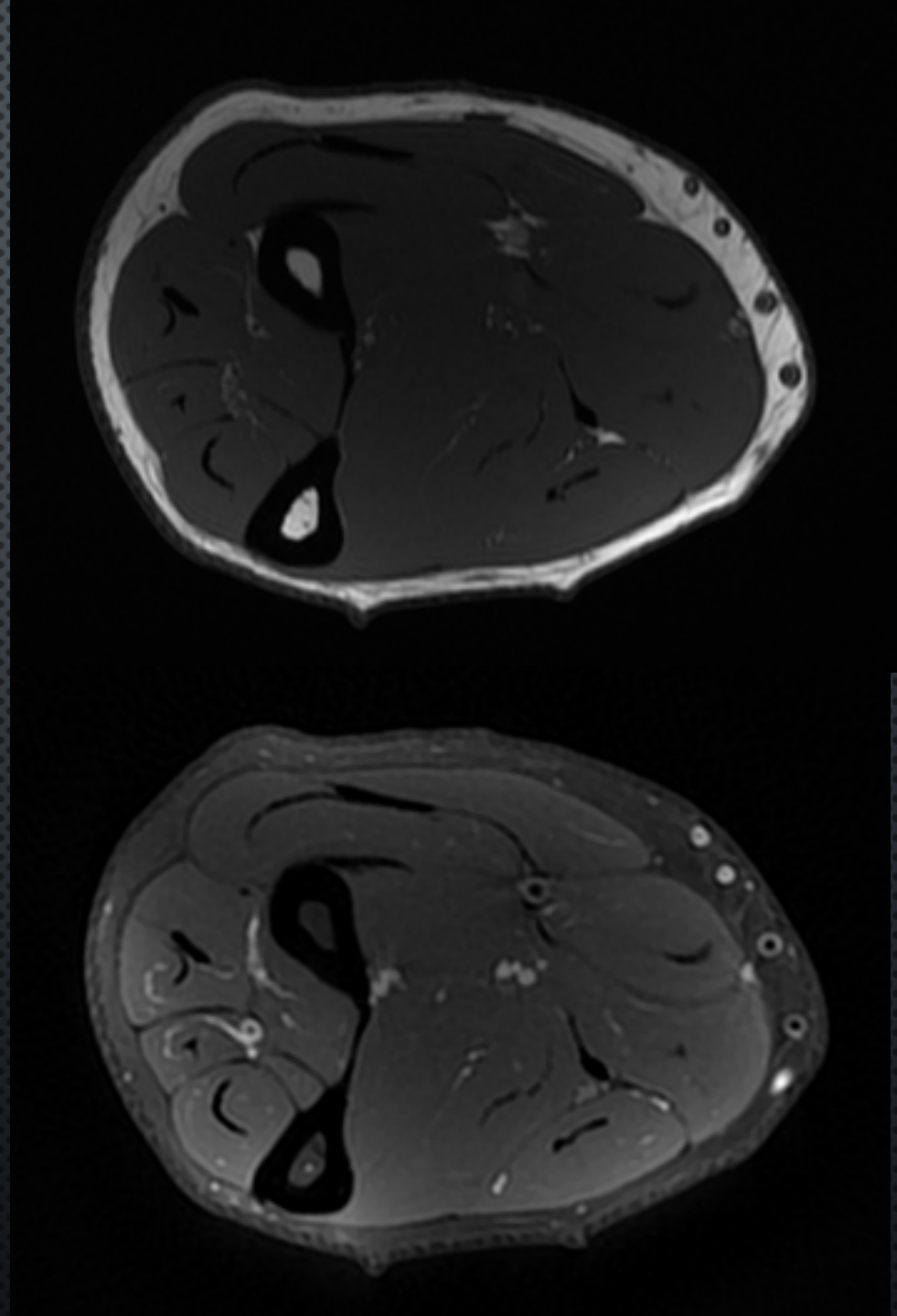
US

- Dynamic US: Muscular hernia sign

Soubeyrand, M et al(2006). The "muscular hernia sign": an original ultrasonographic sign to detect lesions of the forearm's interosseous membrane. *Surgical and Radiologic Anatomy, 28*(4), 372-378.

MRI

- Protocole : AX T1, AX T2FS
- Arm placed over the shoulder or alongside the body, the position must be painless for the patient.

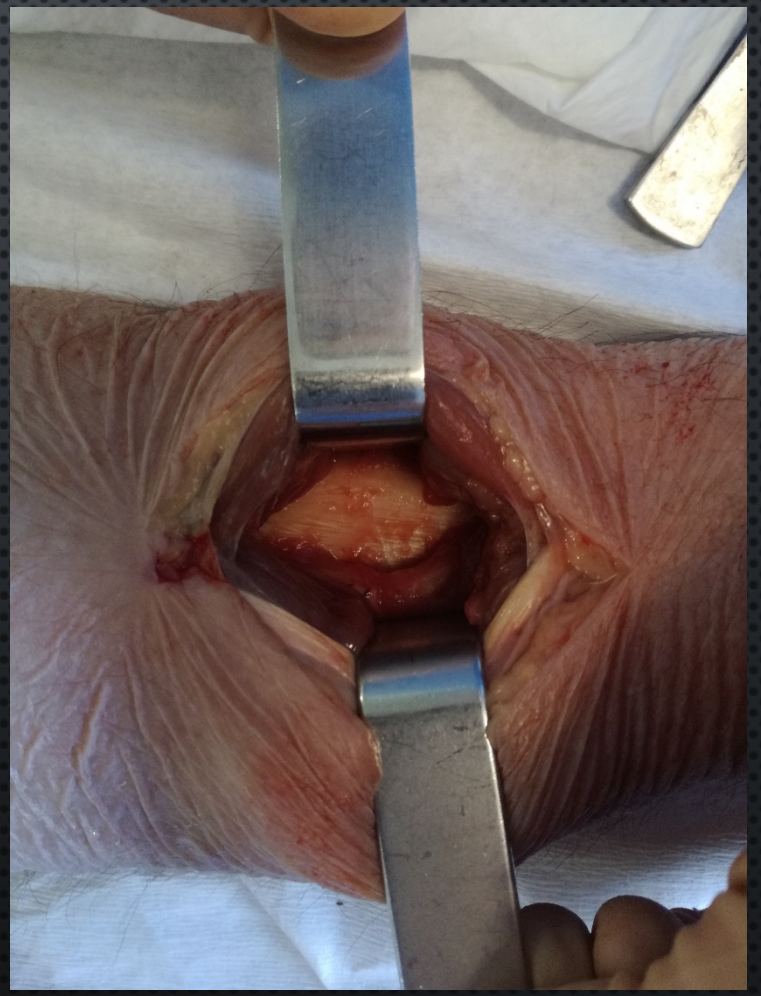


McGinley et al (2006). Forearm interosseous membrane trauma: MRI diagnostic criteria and injury patterns. *Skeletal radiology*, *35*(5), 275-281.

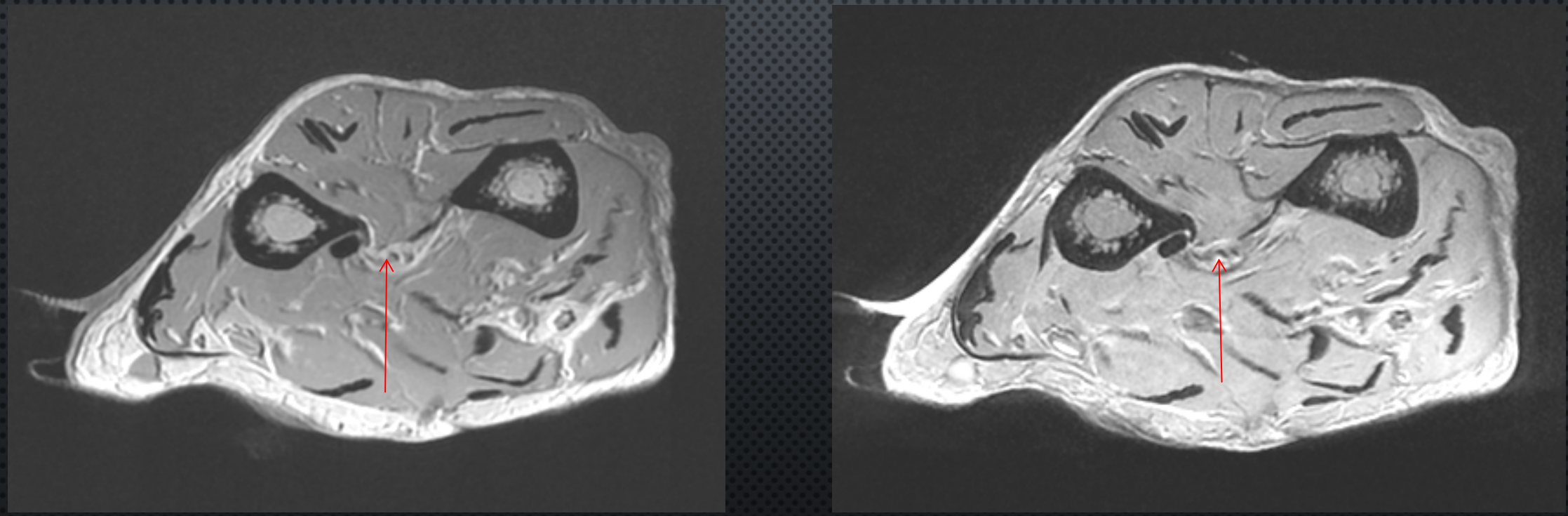
DIAGNOSTIC CRITERIA

ONLY CADAVER STUDIES IN THE LITERATURE

- « Henry » surgical approach avoids muscular injury.
We performed surgical wounds on forearm cadavers.

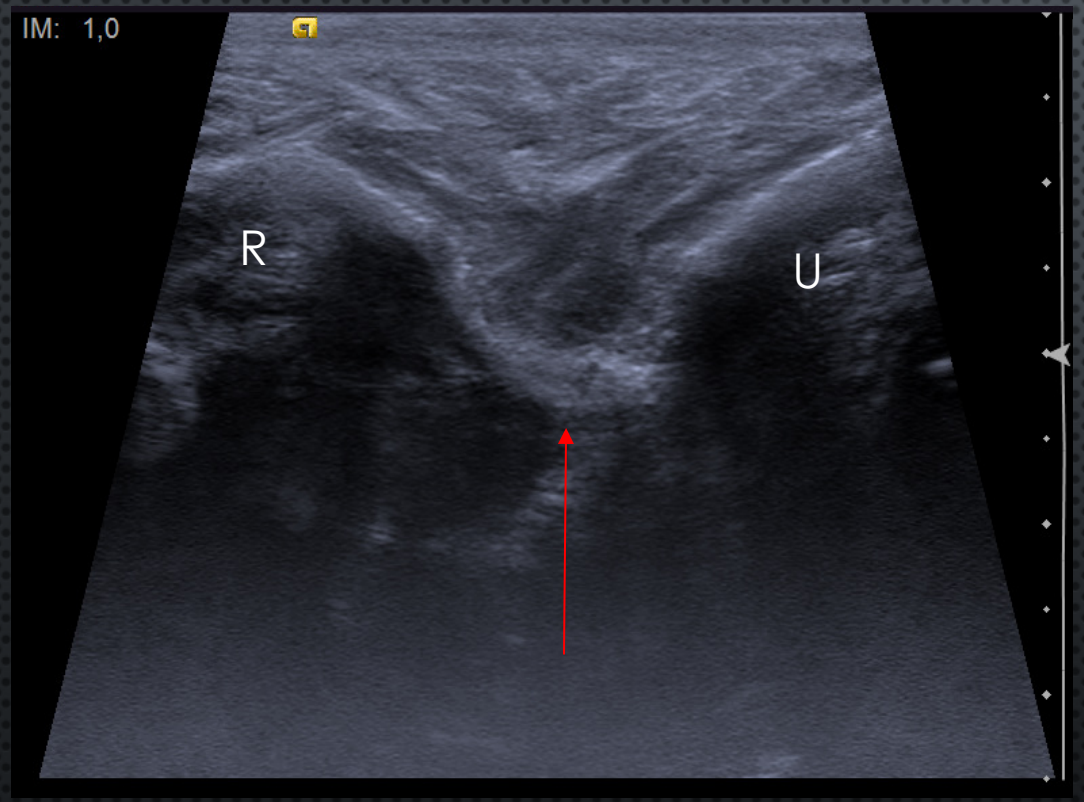


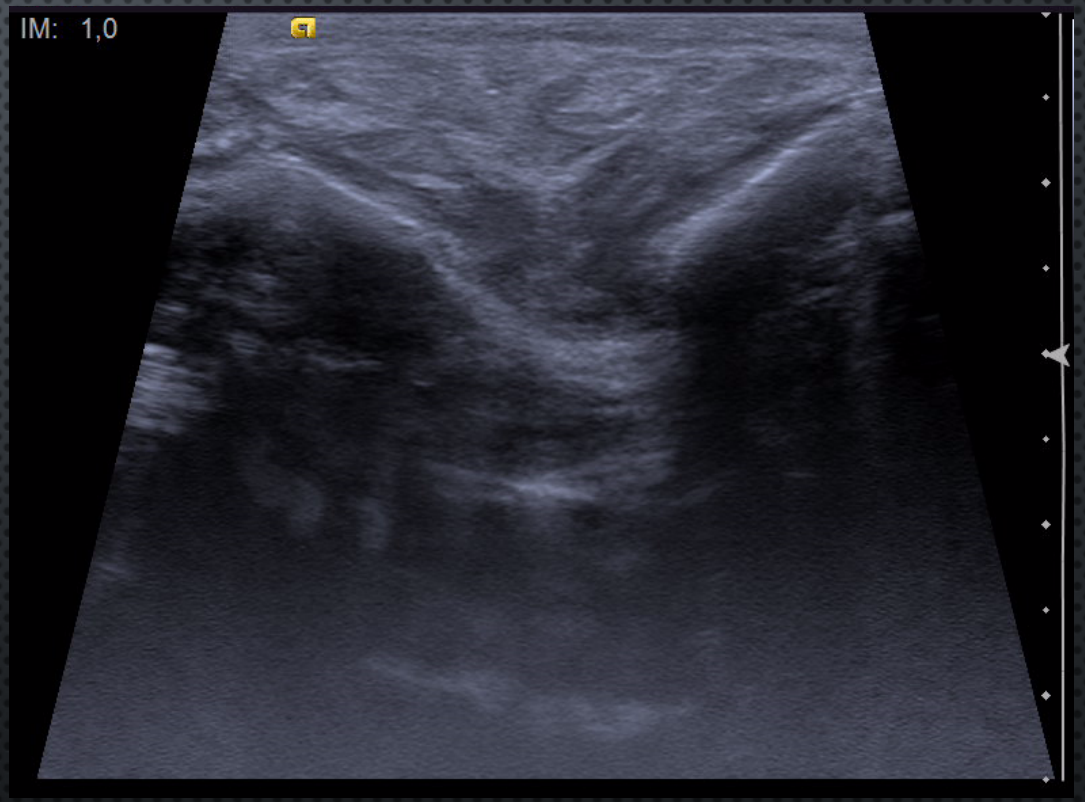
DIAGNOSTIC CRITERIA



Surgical wound on a cadaver forearm MRI 3T

DIAGNOSTIC CRITERIA

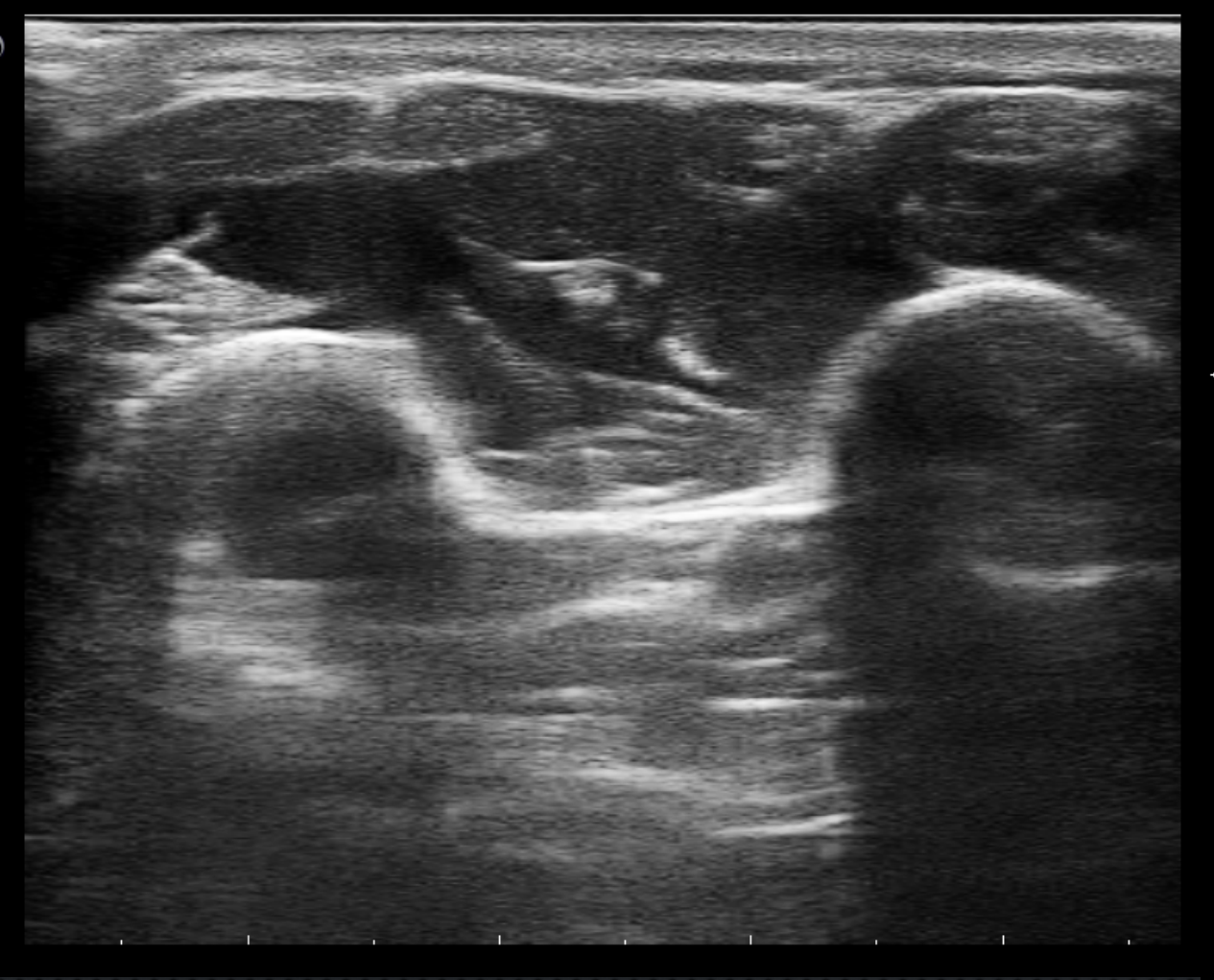


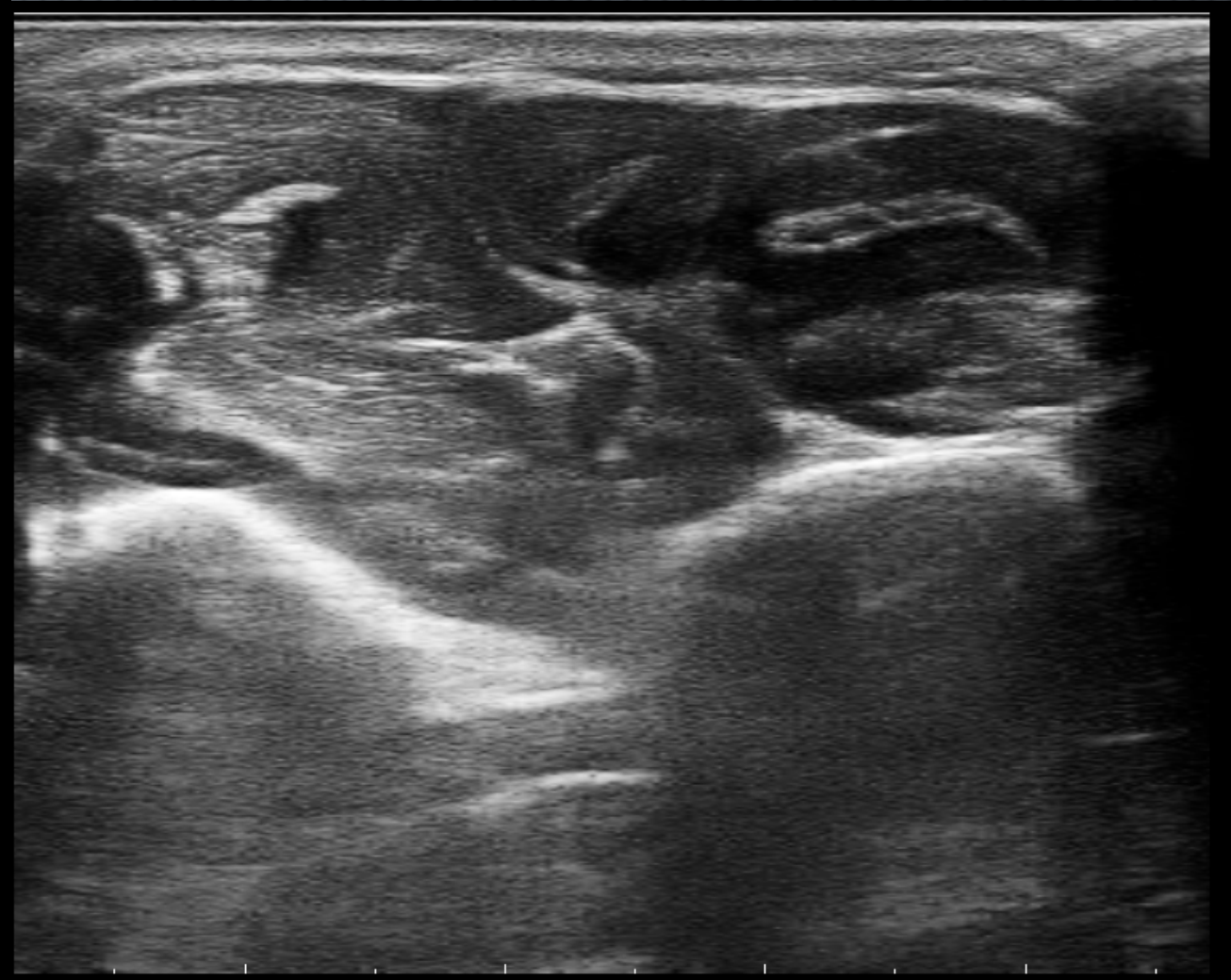


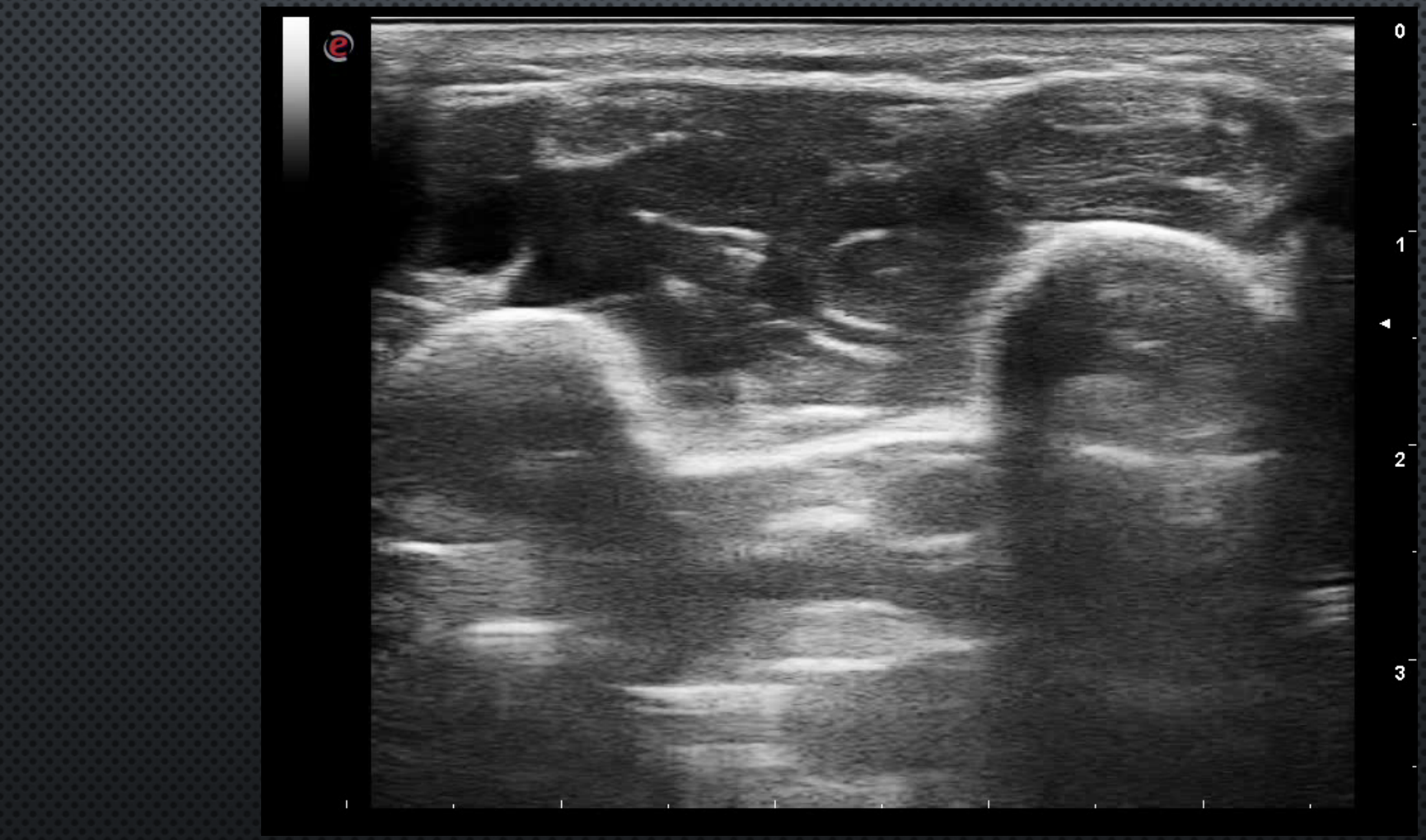
Surgical wound on cadaver forearm

EXAMPLE

Monteggia fracture, right-handed, 45 years old, manual worker.
Must search for a membrane wound and more specifically for a central band wound.
Important for surgical approach and immobilsation.



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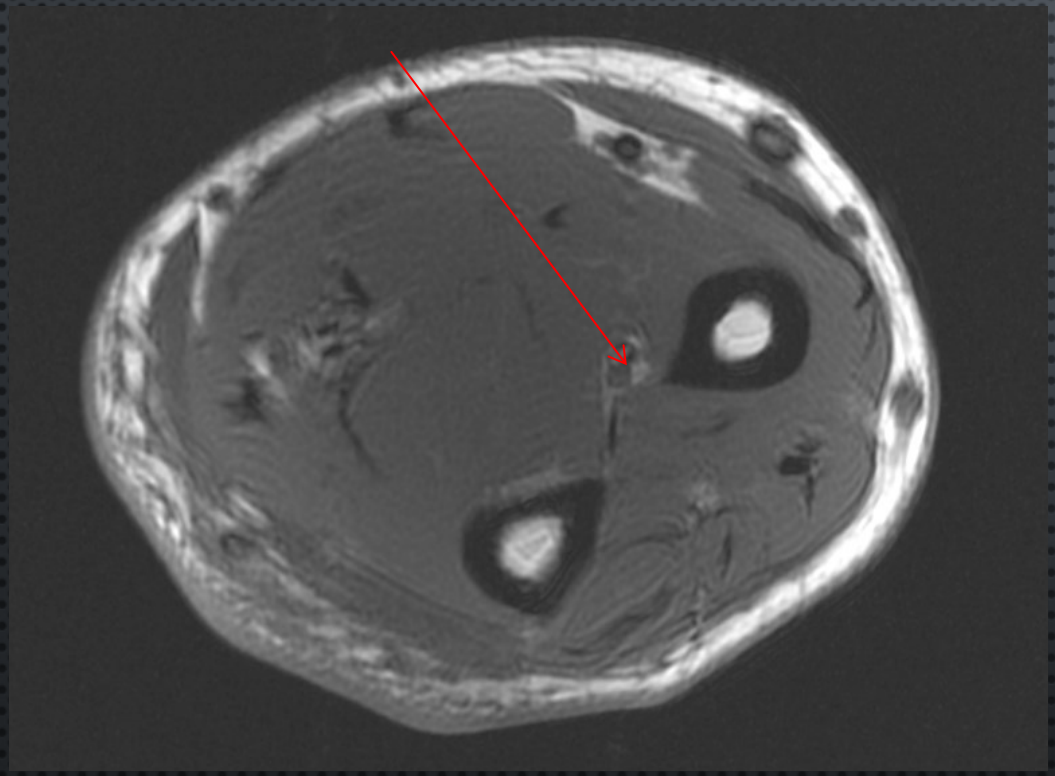
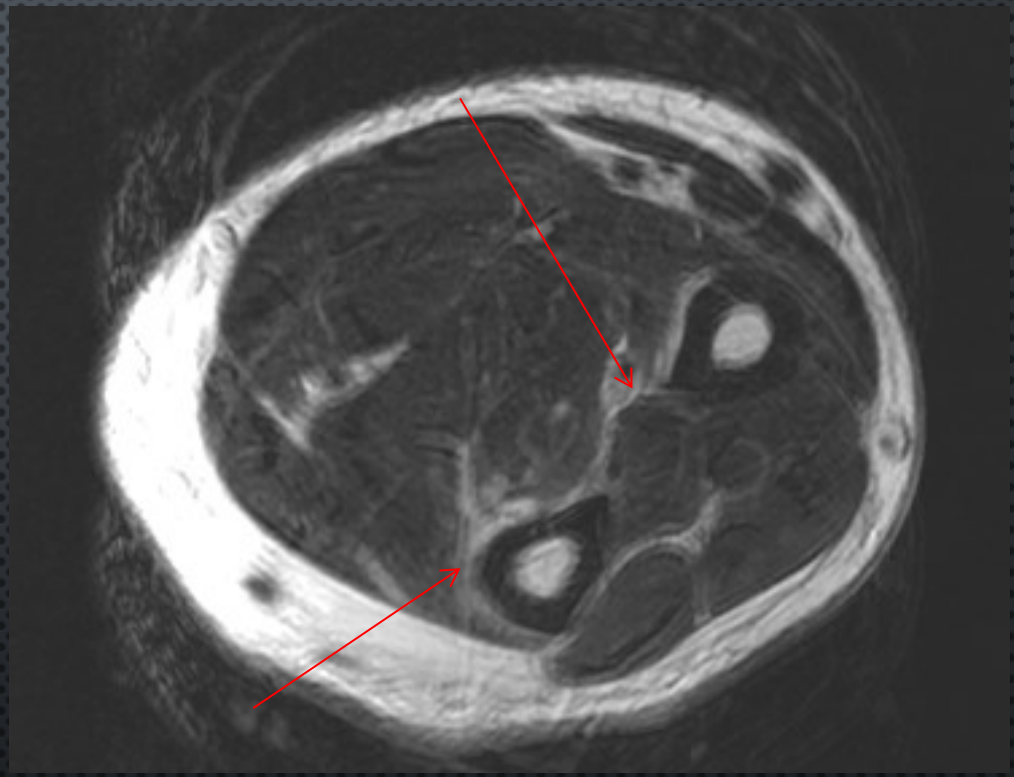
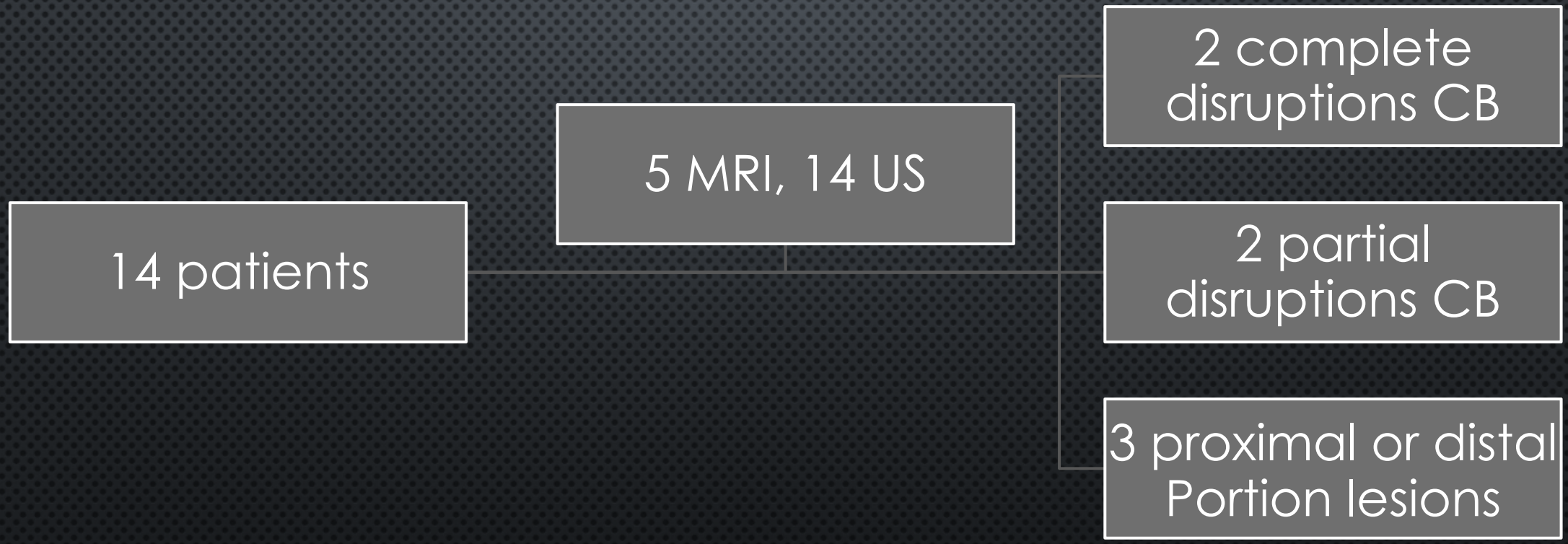
Distal radio-ulnar joint disjonction. 40 years old physiotherapist.
MRI performed 5 hours after the trauma.





COHORT

From december 2015 to november 2016

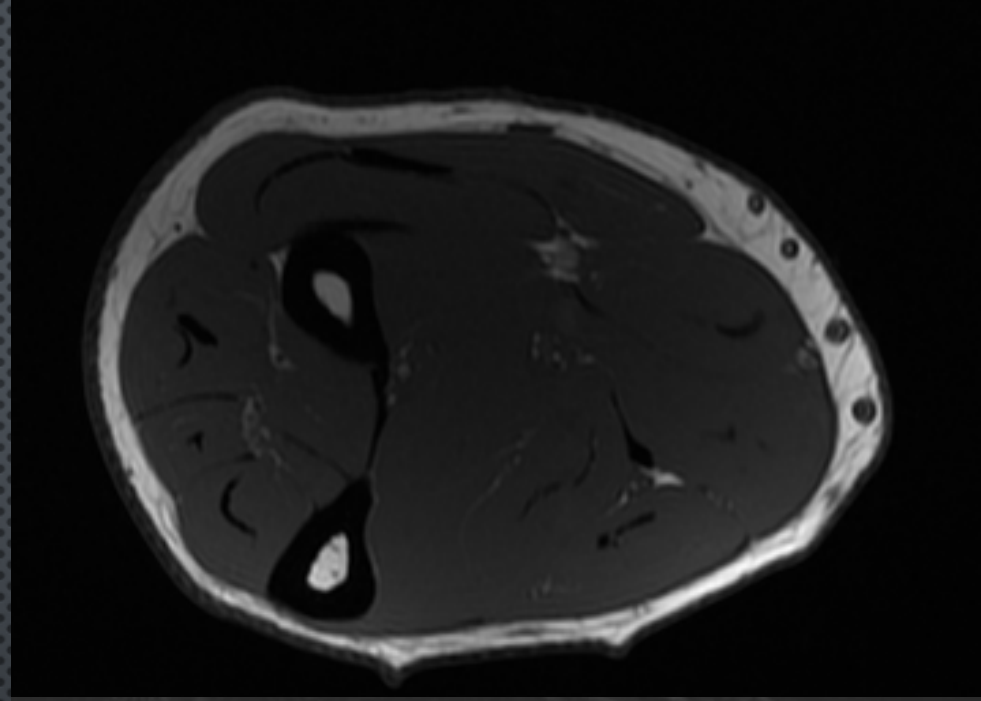


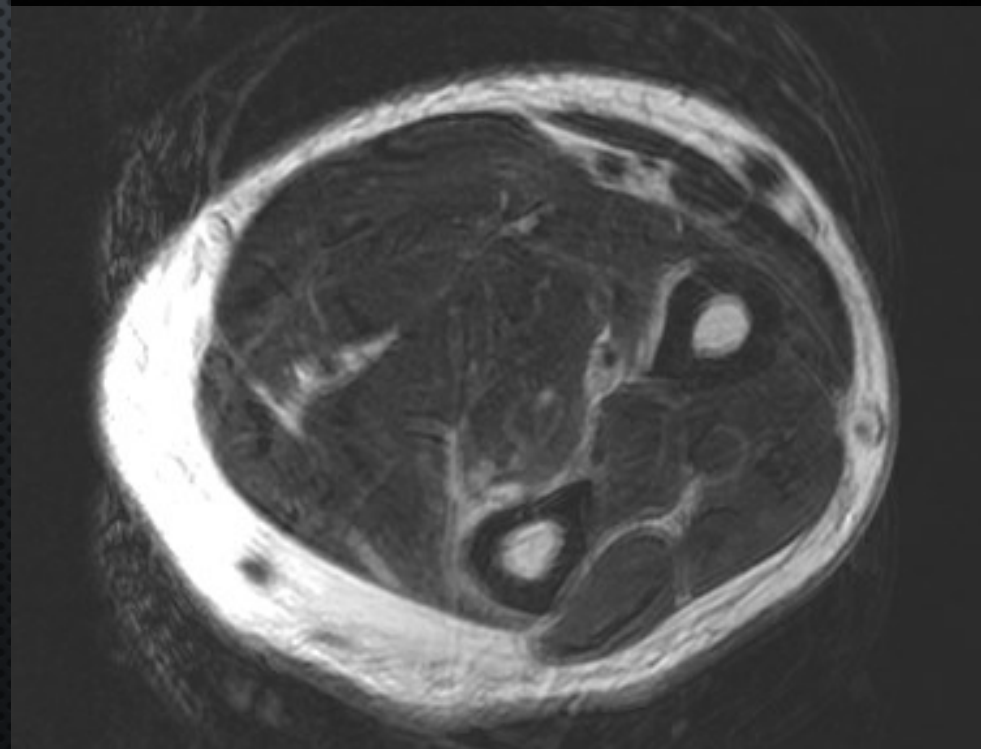
DISCUSSION

- Few patients included in our study but to our knowledge the largest cohort existing.
- Difficulty to perform an MRI at the acute phase.
- No surgical correlation
- No surgical reference technic to treat the tear

#1 CONCLUSION

- Tear well visualized in MRI but MRI is hard to perform at the acute phase



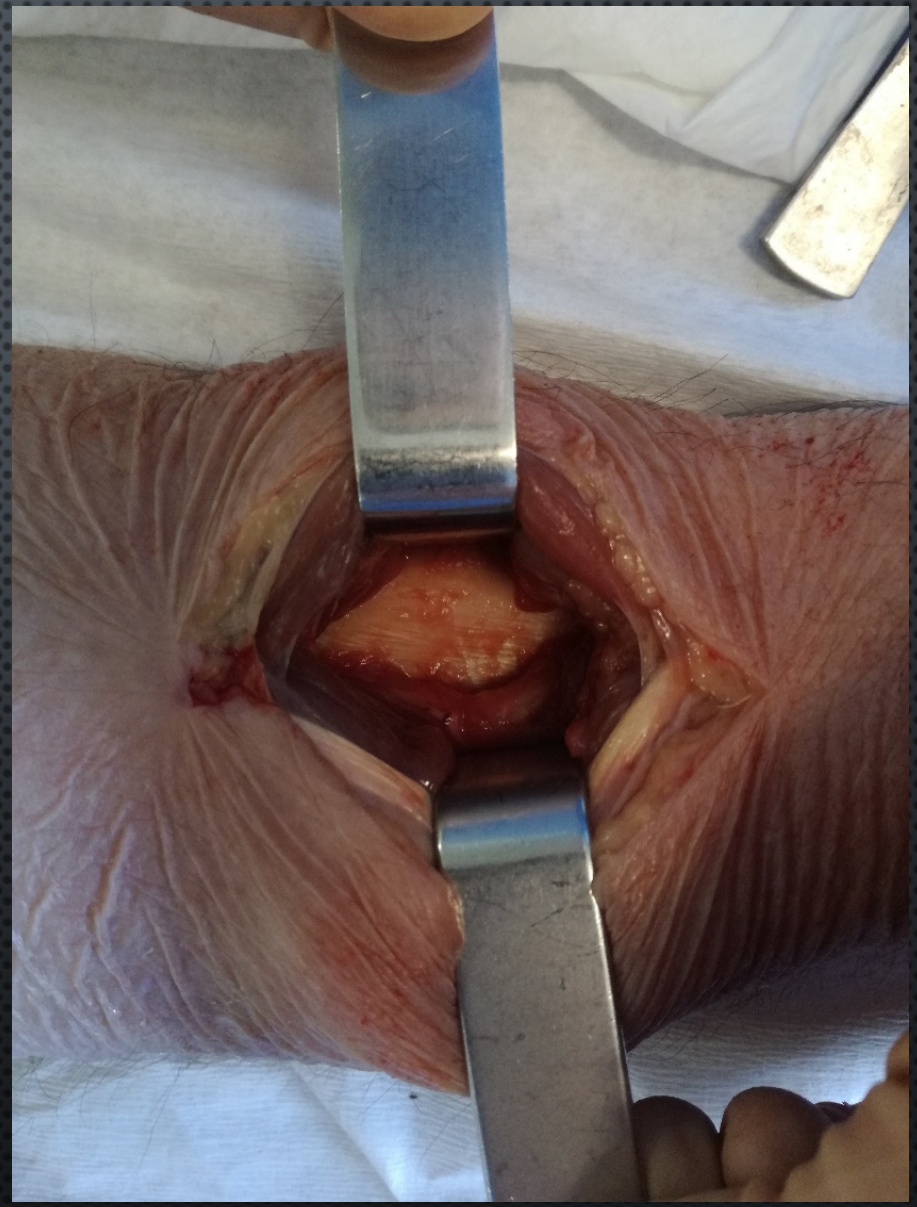


#2 CONCLUSION

- Interosseous membrane is easily visualized with US particularly in operating room after loco regional axillary anesthesia.

#3 CONCLUSION

- Diagnosis of traumatic interosseous disruption seems to be useful at the acute phase particularly for young manual workers.



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THANKS FOR YOUR ATTENTION