

# MSK Trauma

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[uwmst.org/arsenic](http://uwmst.org/arsenic)

set WiFi to:

Richardson

169.254.73.176/  
arsenic

<http://169.254.73.176/>  
arsenic

# Case 1

18 M

low speed MVC  
→ high speed MVC

?

*R<sub>KS</sub>*



18 M

low speed MVC  
→ high speed MVC



fibular fracture

18 M

low speed MVC  
→ high speed MVC



satisfaction of  
search

18 M

low speed MVC  
→ high speed MVC



assess the  
joint above  
**and** the joint  
below

18 M

low speed MVC  
→ high speed MVC

assess the  
joint above  
**and** the joint  
**below**



gravity stress view

what structure gave  
its life to allow this?



gravity stress view

**not** the deltoid  
complex...



gravity stress view

**Not due to:**

tibia & talus  
moving apart



gravity stress view

**important  
concept:**

**tibia & fibula  
moving apart**



gravity stress view

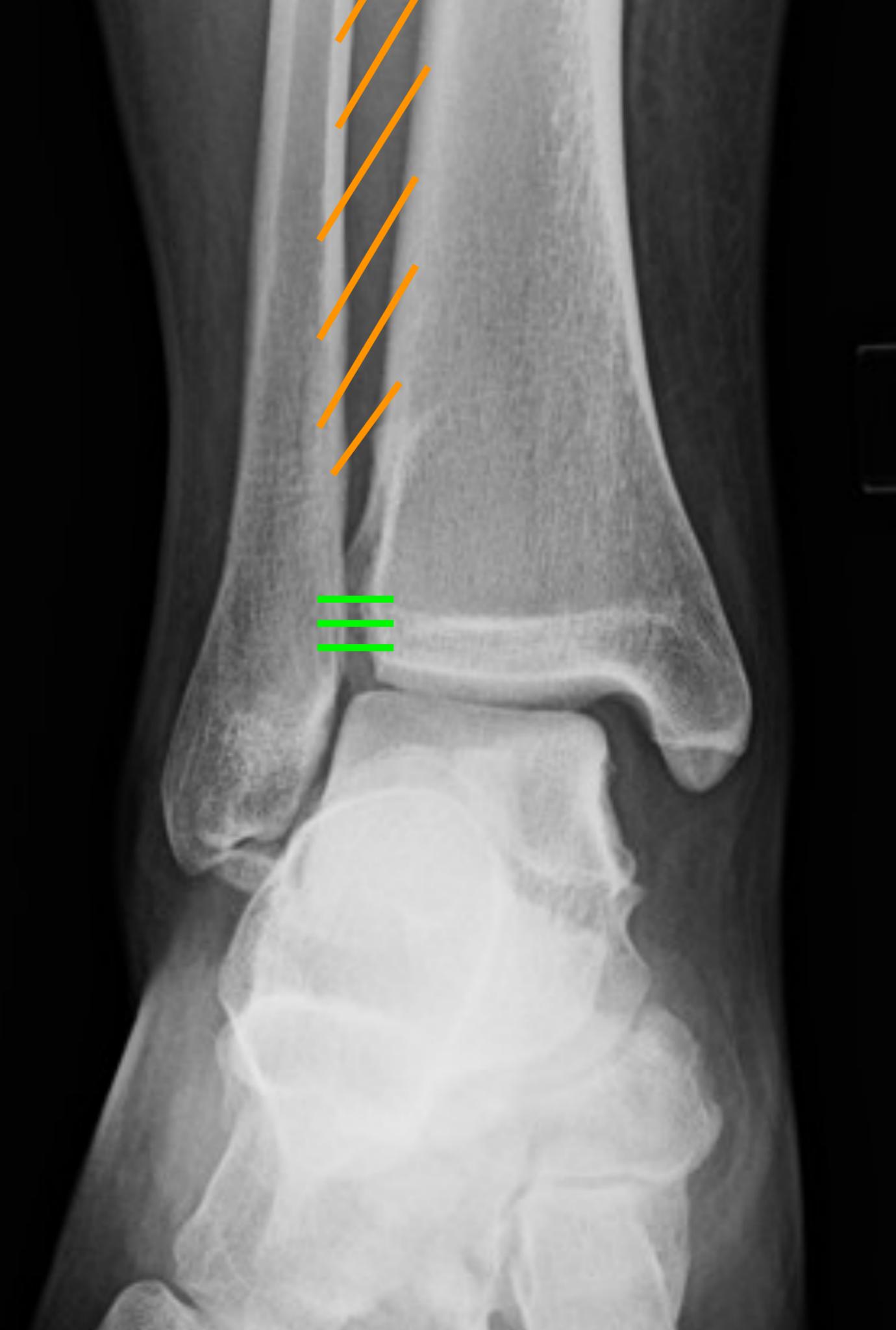
syndesmosis  
ligaments



gravity stress view

syndesmosis  
ligaments

**and** interosseous  
membrane

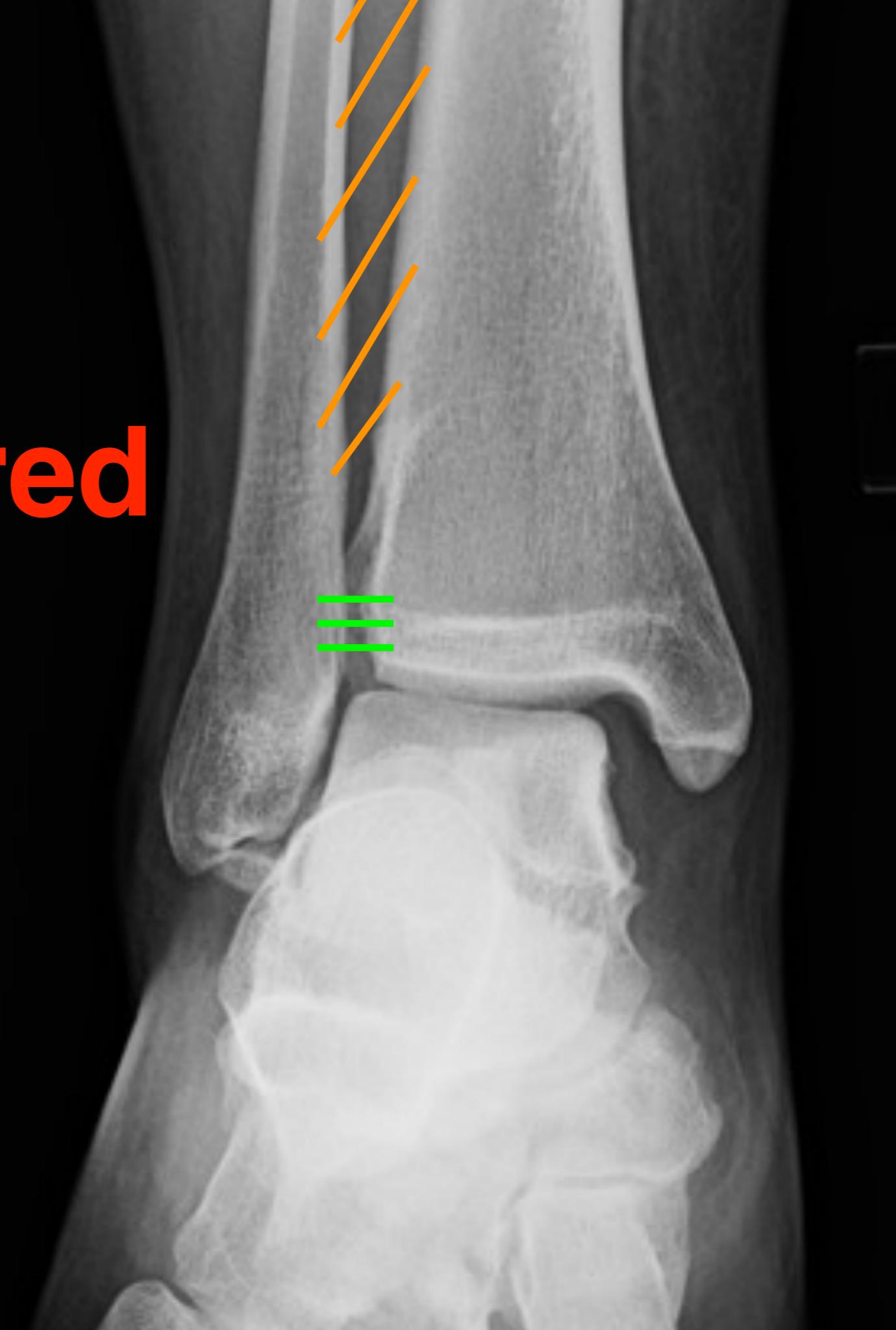


gravity stress view

**surgery required**

syndesmosis  
ligaments

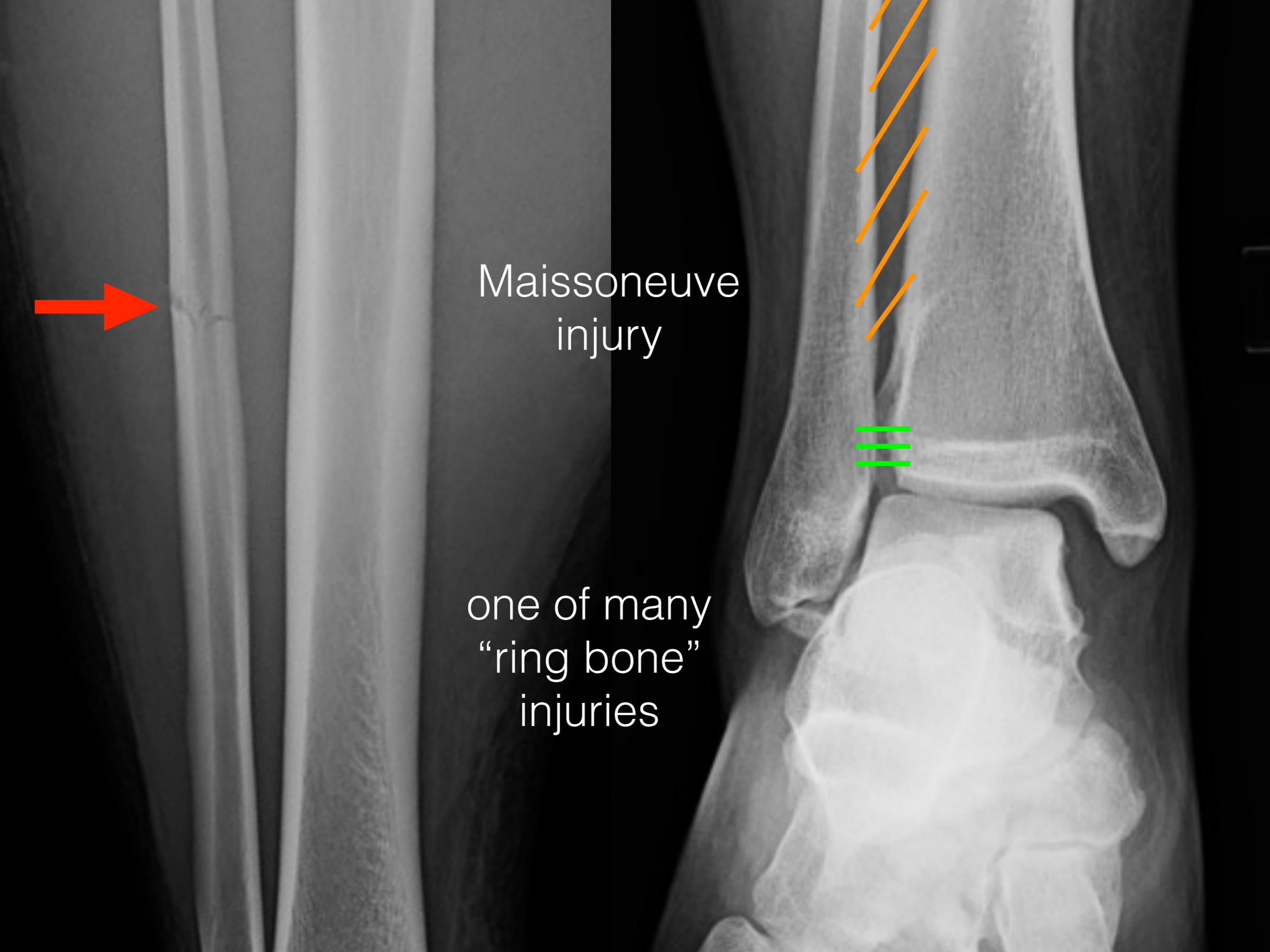
and interosseous  
membrane





Maisonneuve  
injury



An anteroposterior (AP) radiograph of a human knee joint. The femur is on the left and the tibia is on the right. The patella is visible at the bottom center. A red arrow points to the medial side of the femur. Three orange diagonal lines are drawn on the femur shaft, and three green horizontal lines are drawn on the distal femur near the knee joint.

Maisonneuve  
injury

one of many  
“ring bone”  
injuries

18 M

low speed MVC  
→ high speed MVC



assess the  
joint above  
**and** the joint  
below

18 M

low speed MVC  
→ high speed MVC



?

18 M

low speed MVC  
→ high speed MVC



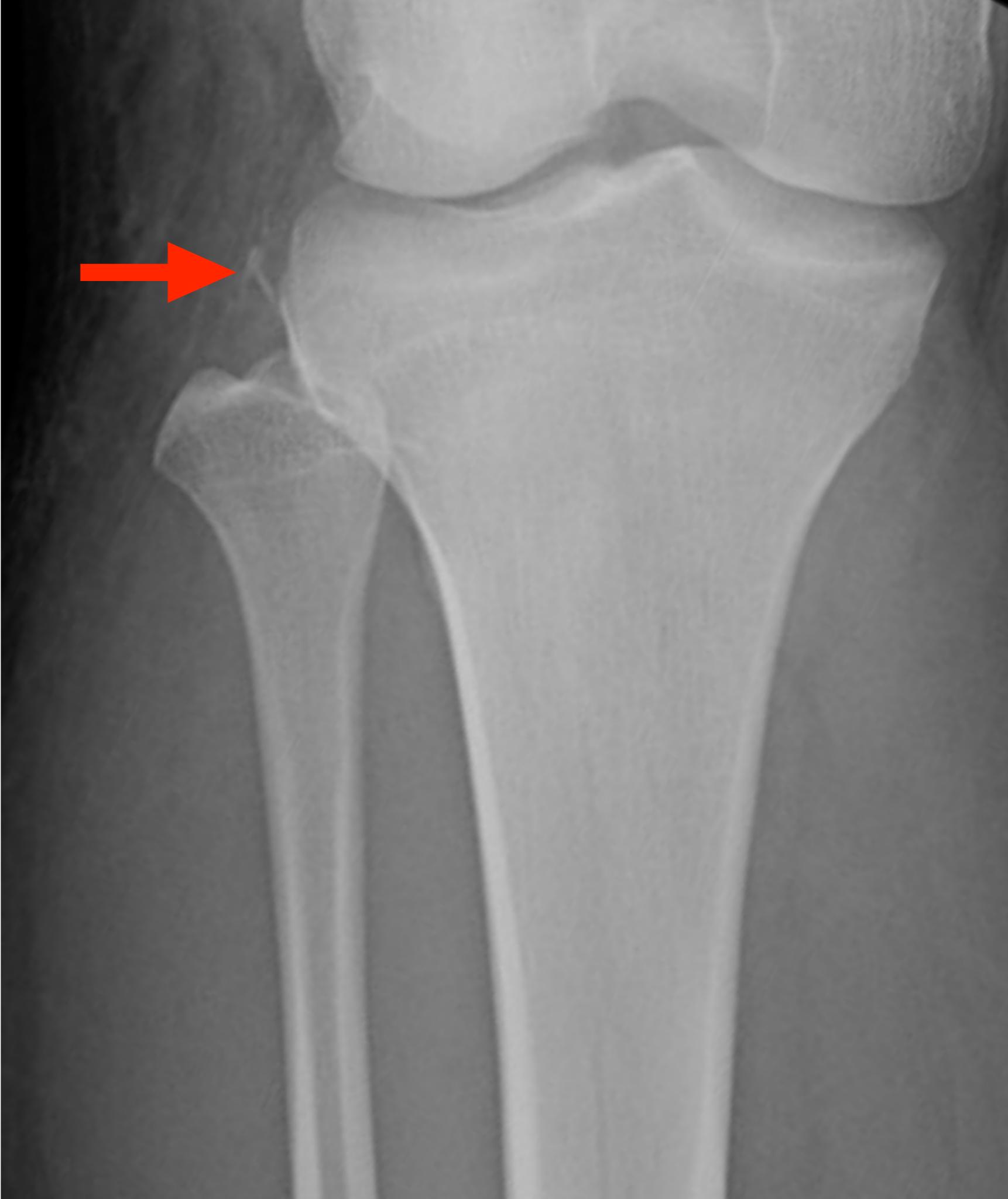
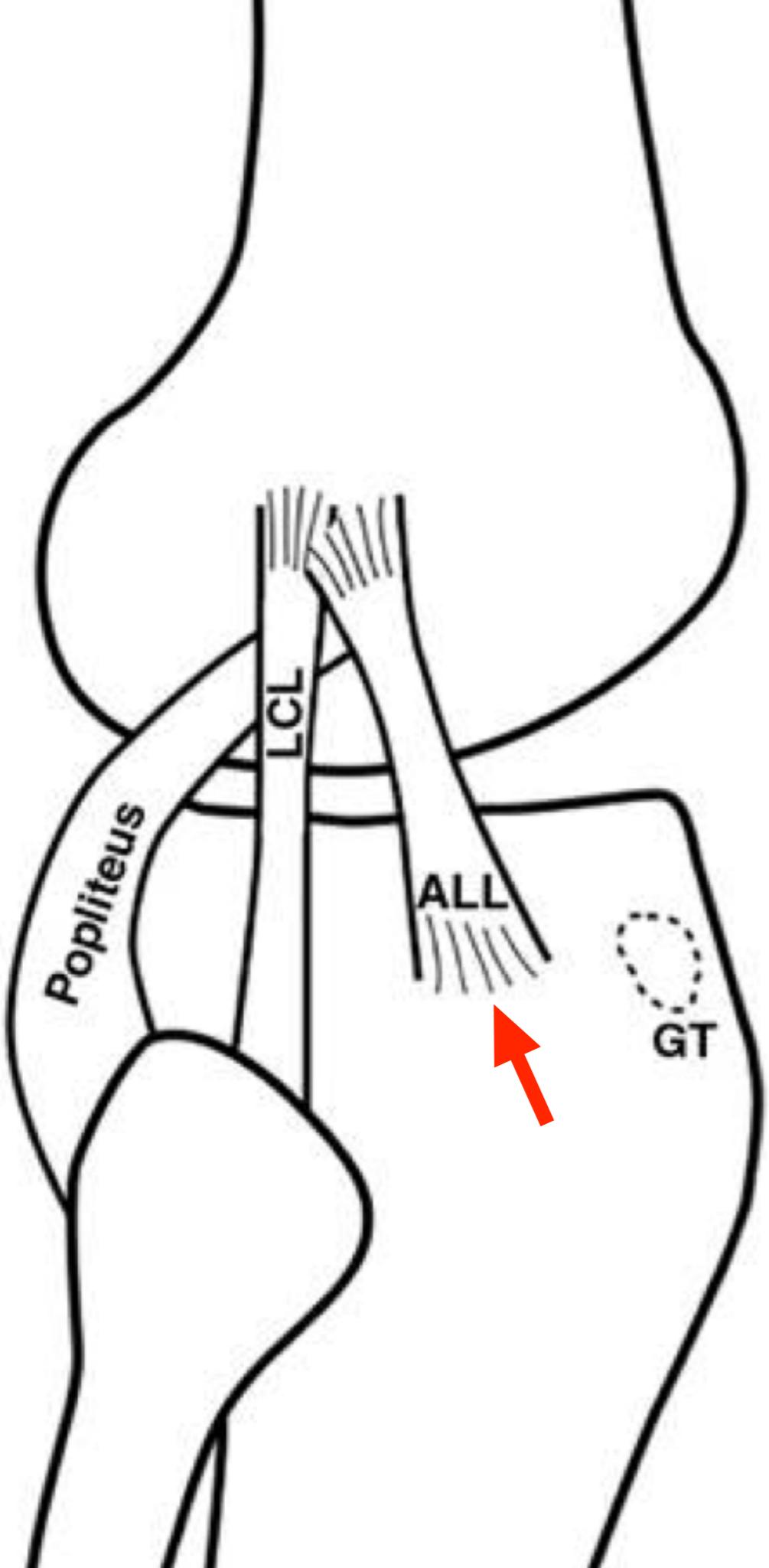
Segond  
fracture

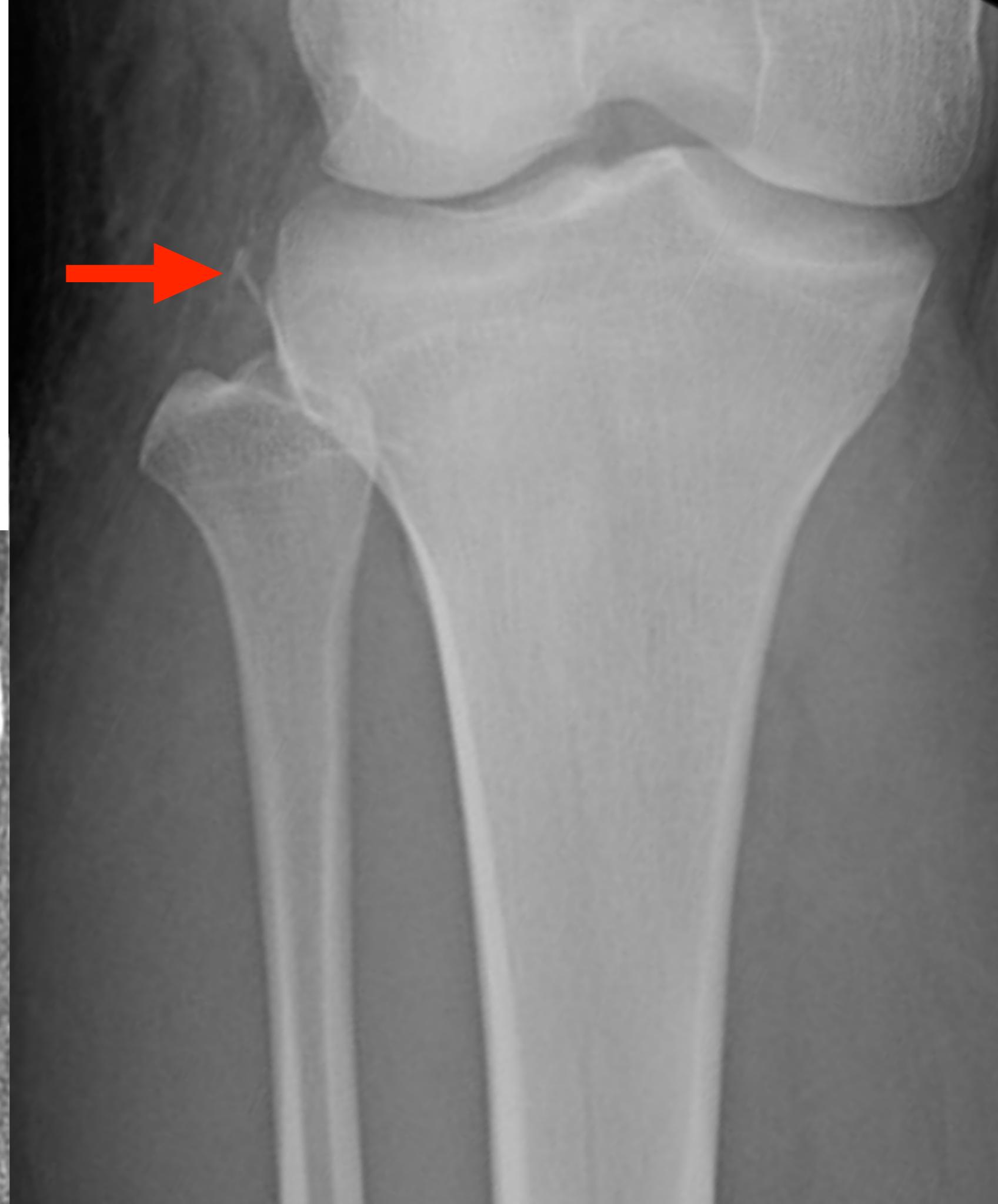
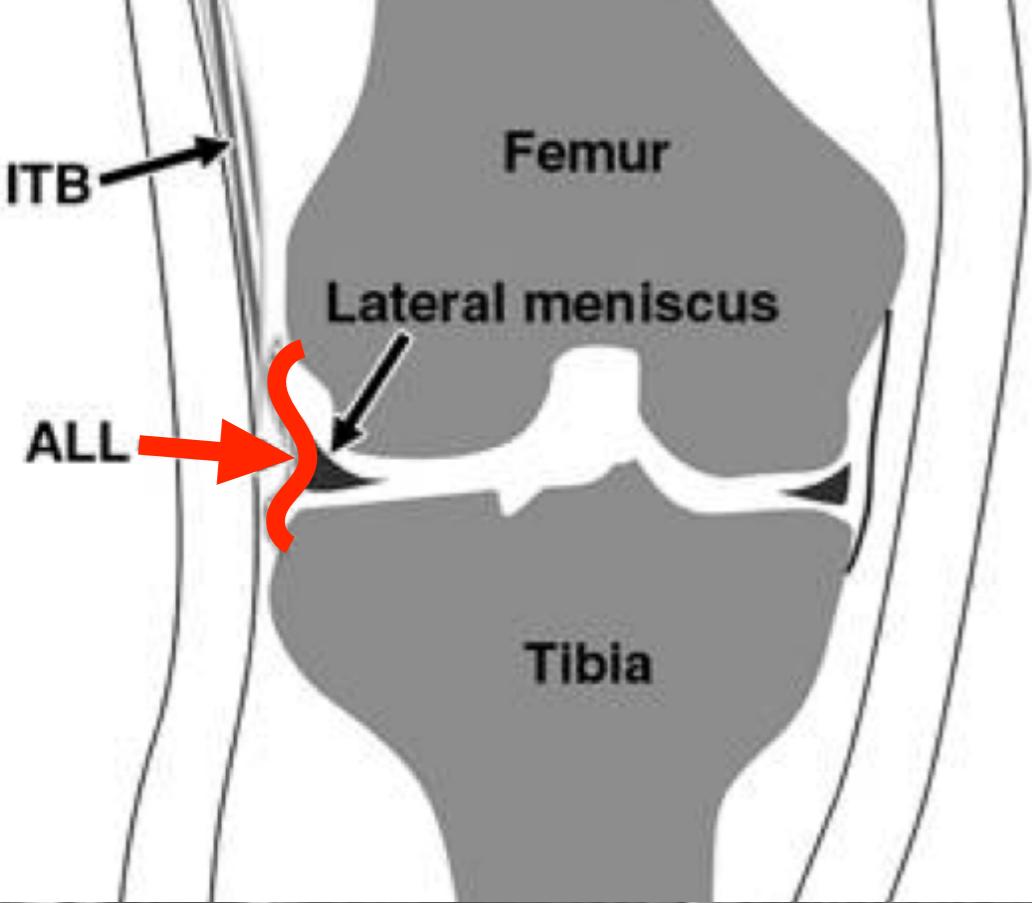
18 M

low speed MVC  
→ high speed MVC



Porrino et al.  
AJR 2015 ;  
204 : 367







ACL tear

# Case 2

A black and white lateral cervical spine radiograph. The image shows the alignment of the cervical vertebrae from a side-on perspective. There are several bright, irregularly shaped areas of bone, likely representing fractures or displaced fragments, visible along the posterior elements of the vertebrae. The overall image quality is somewhat grainy.

47 F

pedestrian  
hit by car



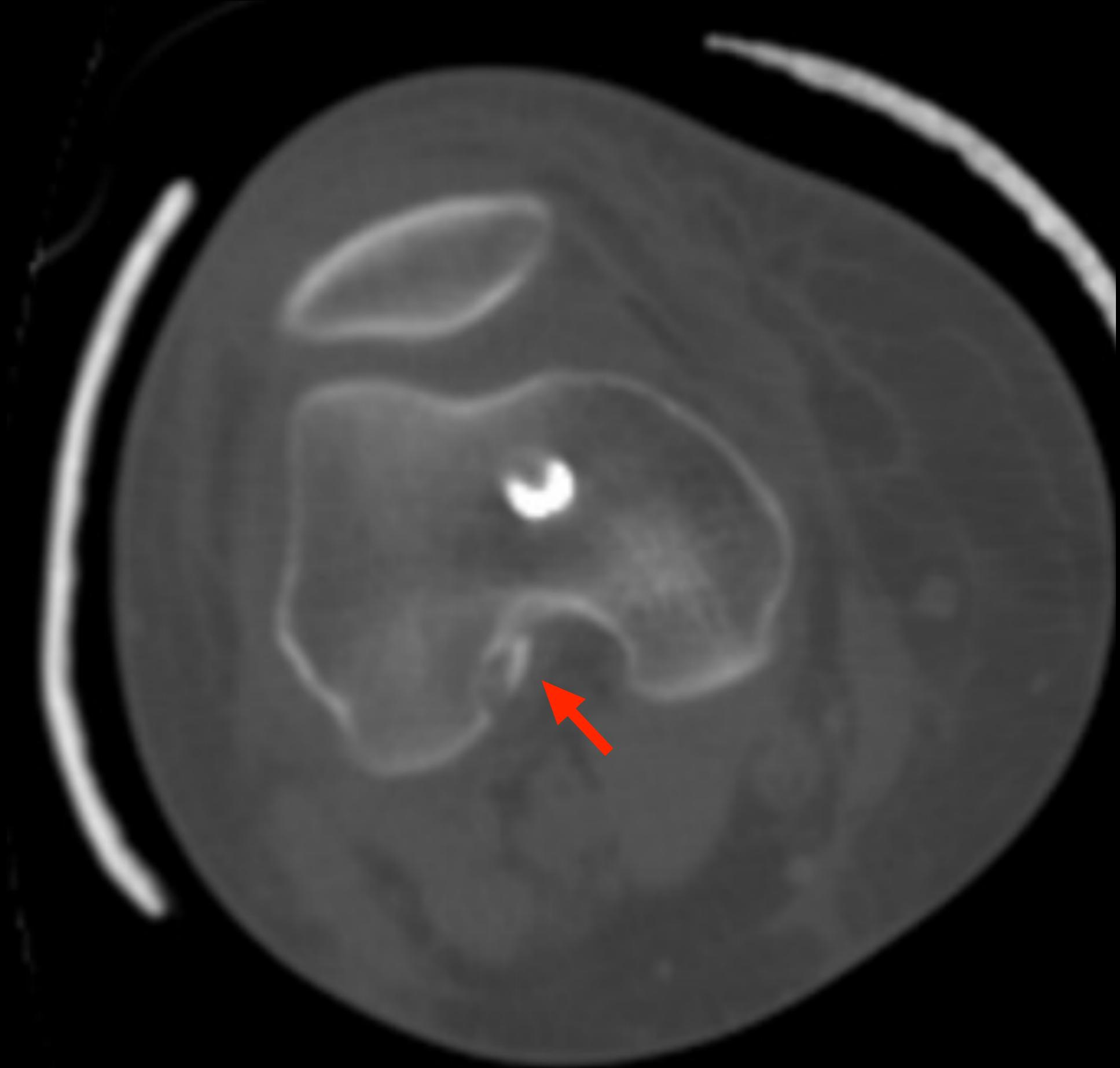
47 F

pedestrian  
hit by car

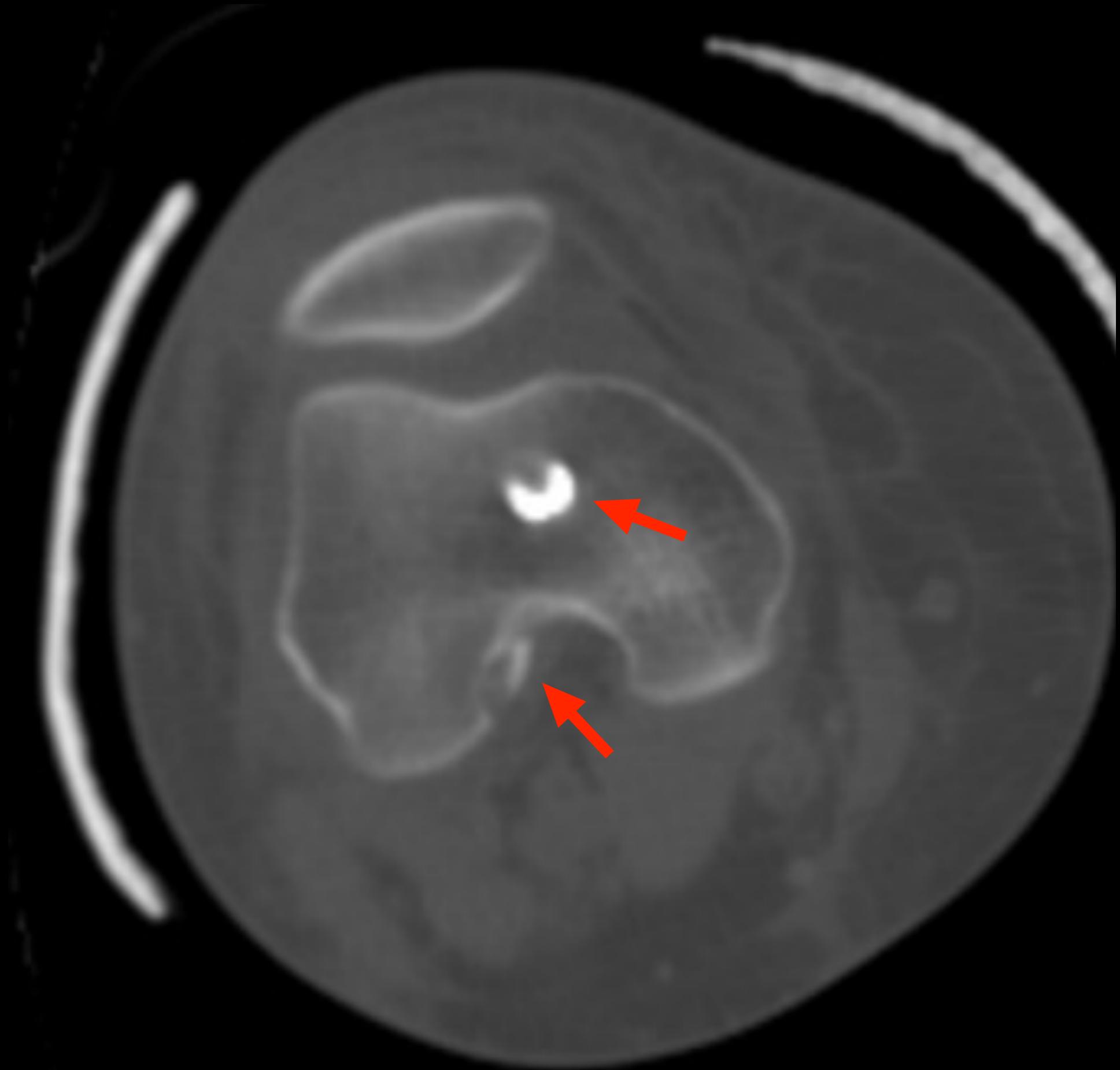


satisfaction  
of search

avulsion of  
proximal  
attachment  
of ACL



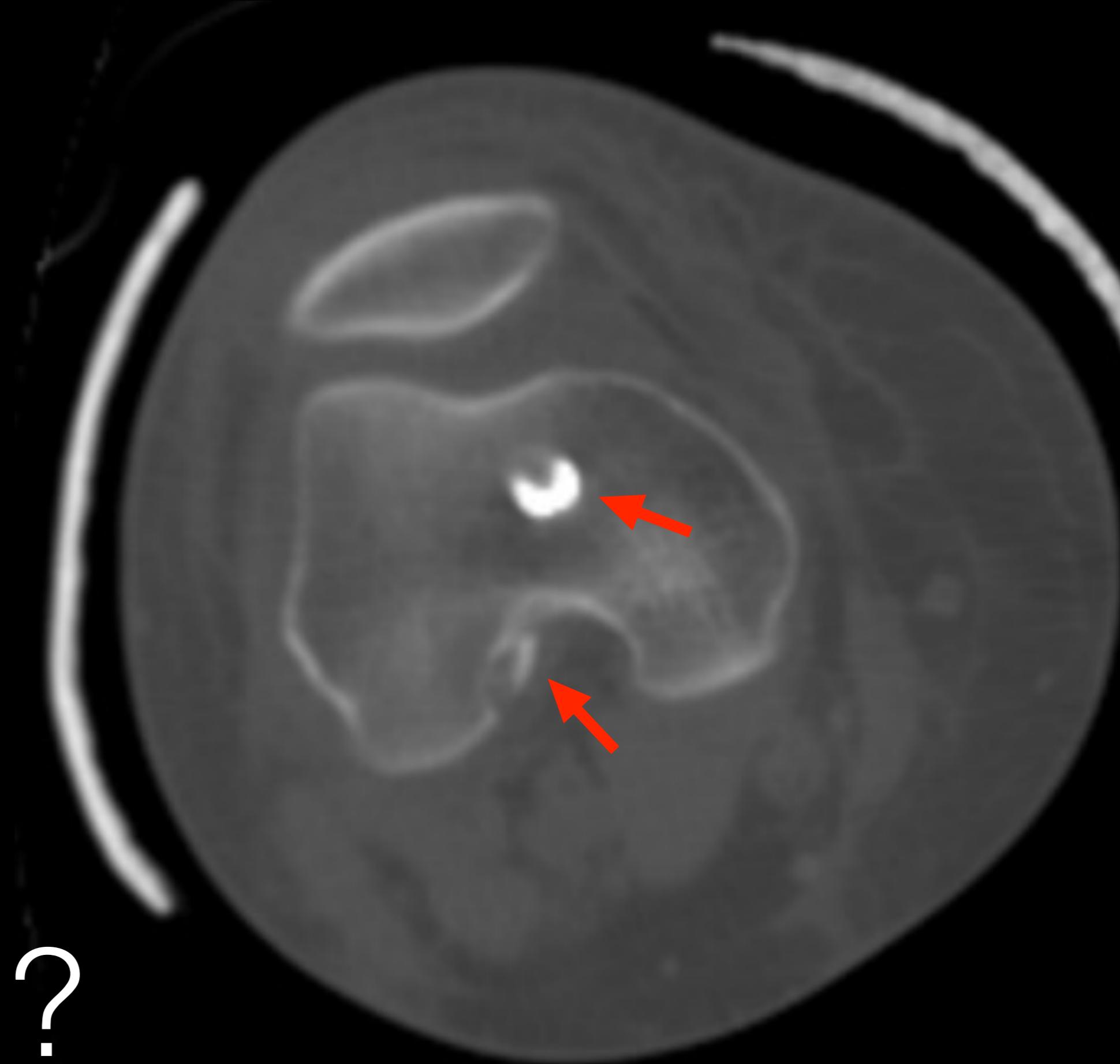
cross-  
sectional  
imaging in  
the presence  
of metal



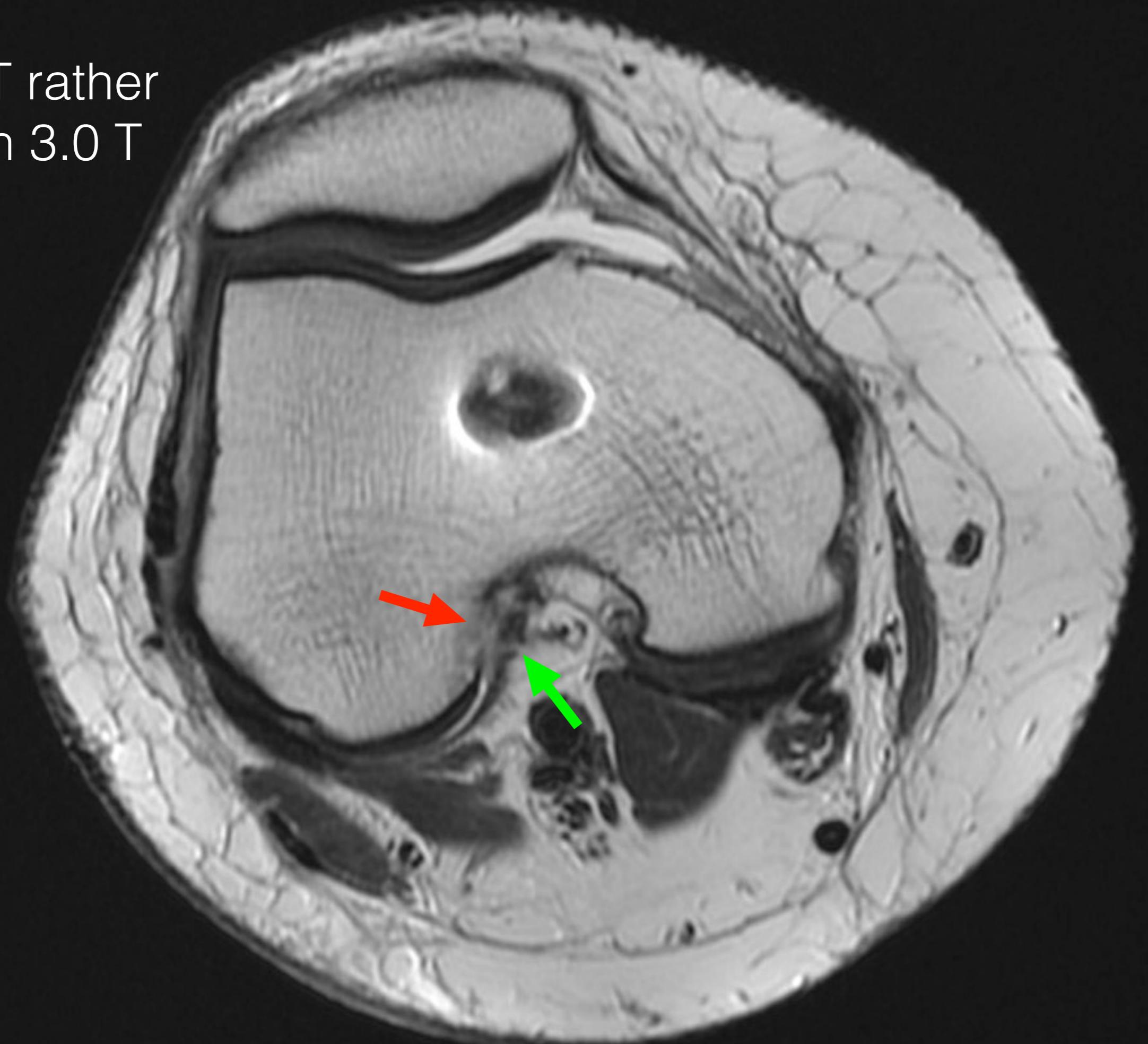
cross-  
sectional  
imaging in  
the presence  
of metal

which can  
we do to  
reduce metal  
artifacts on  
MR?

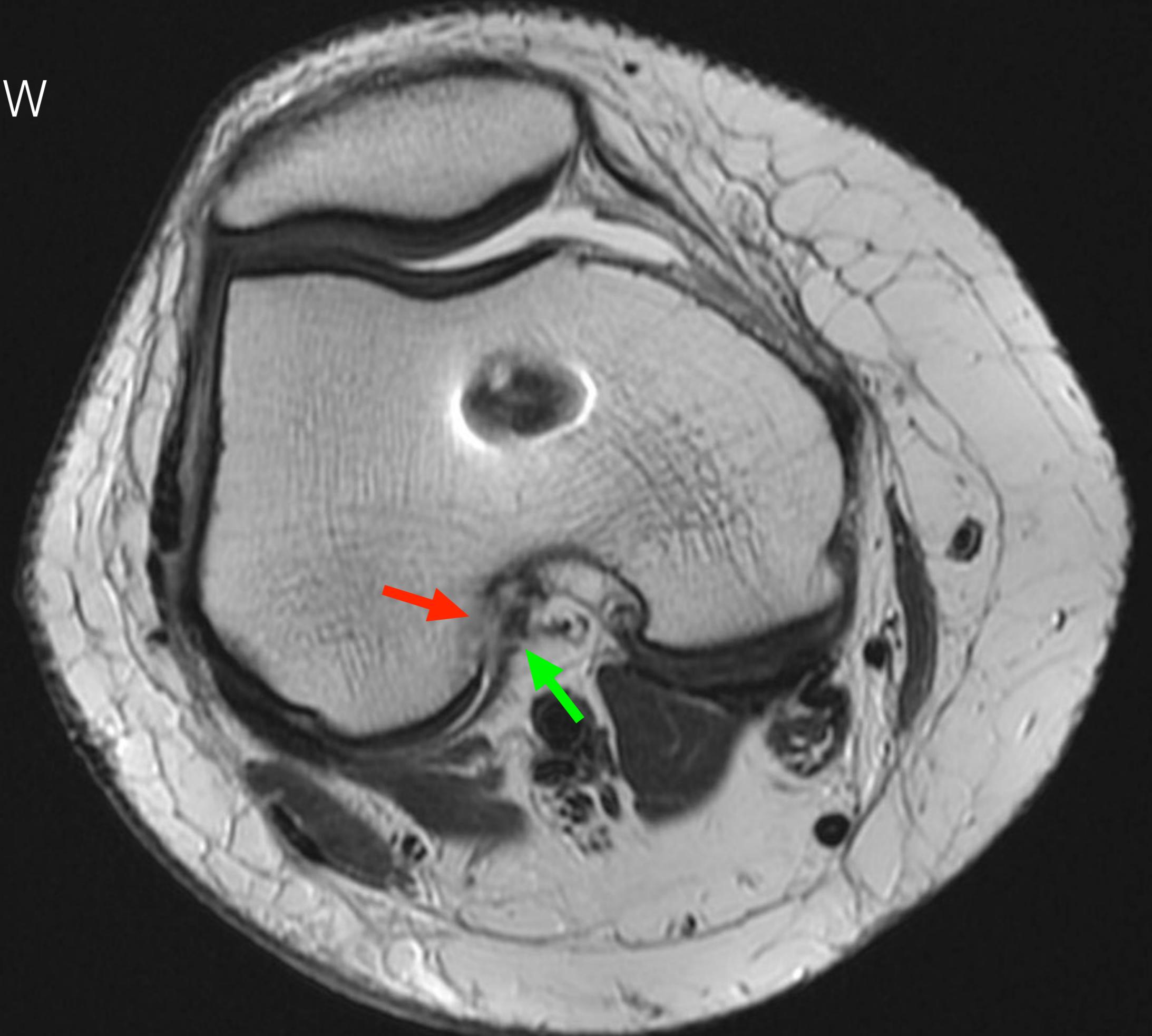
?

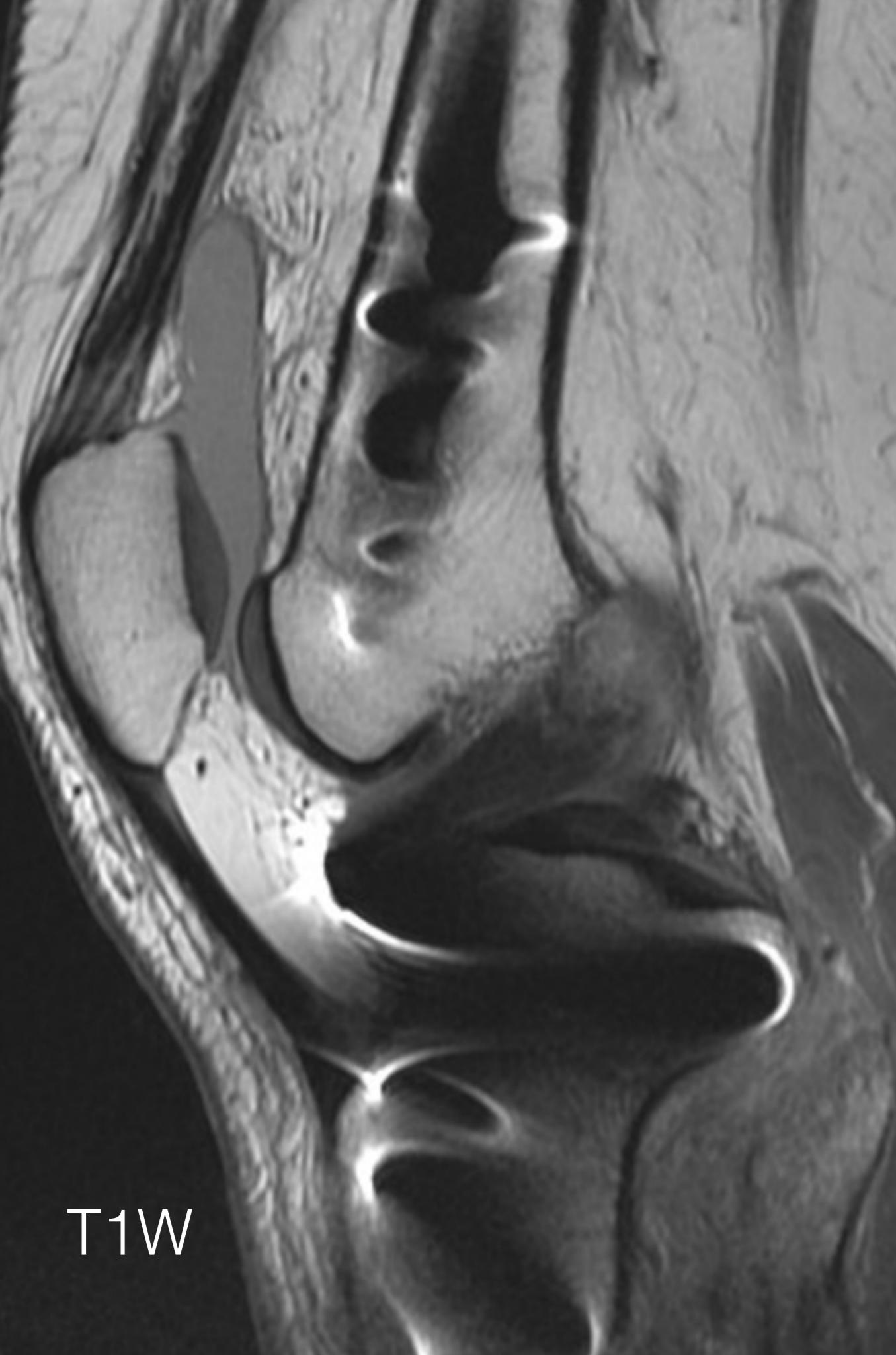


1.5 T rather  
than 3.0 T



T1W

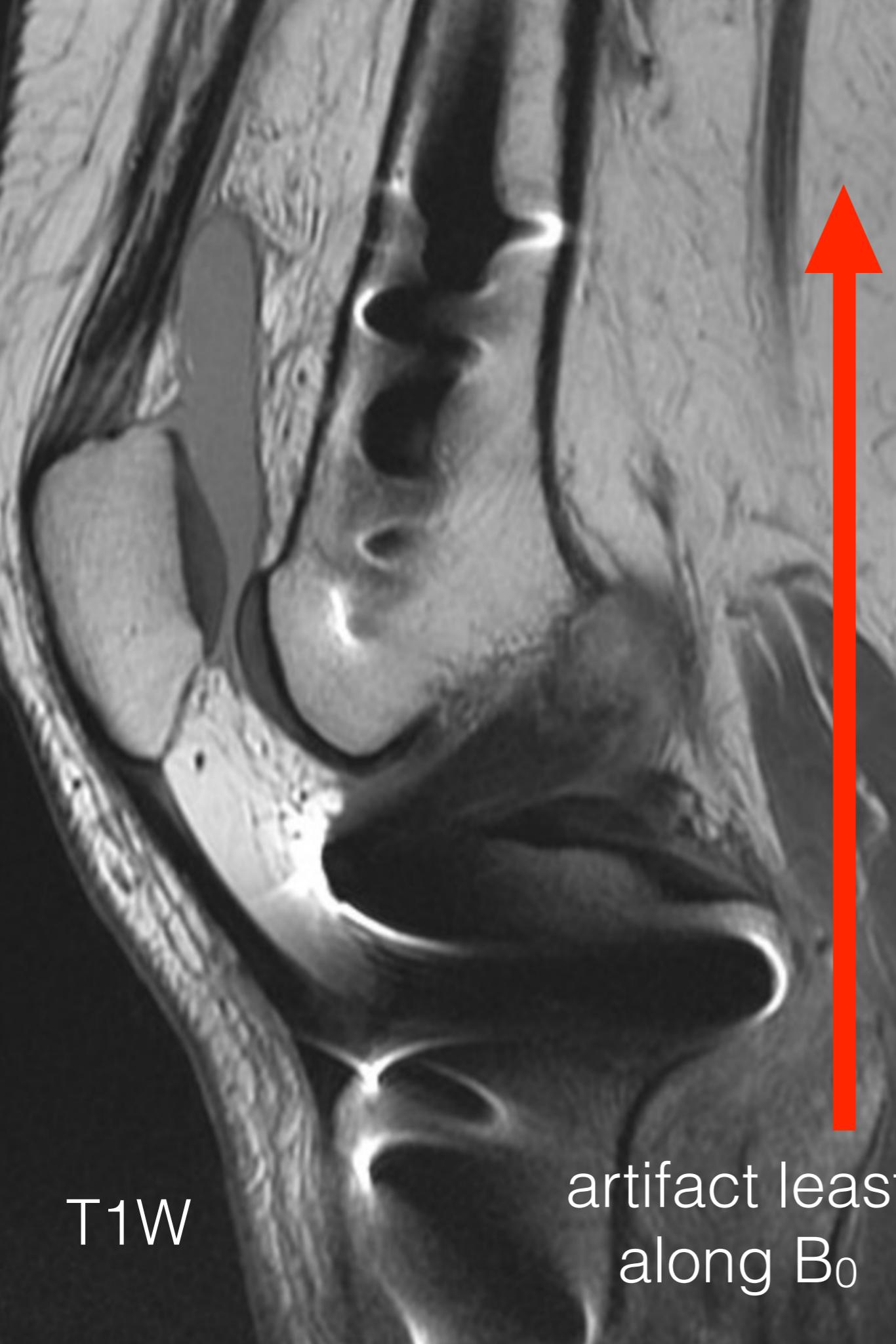




T1W



STIR



T1W

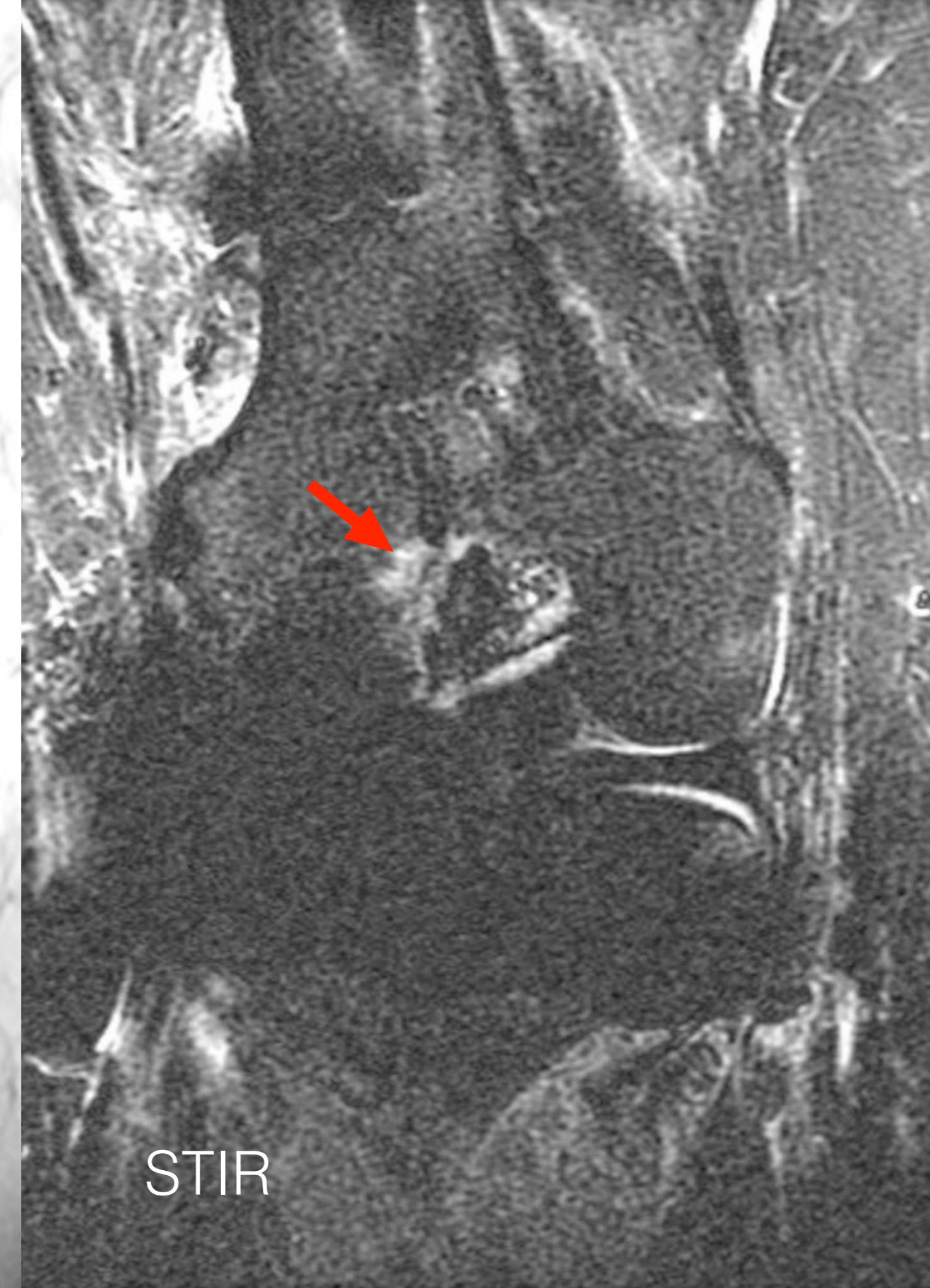
artifact least  
along  $B_0$



STIR



T1W



STIR

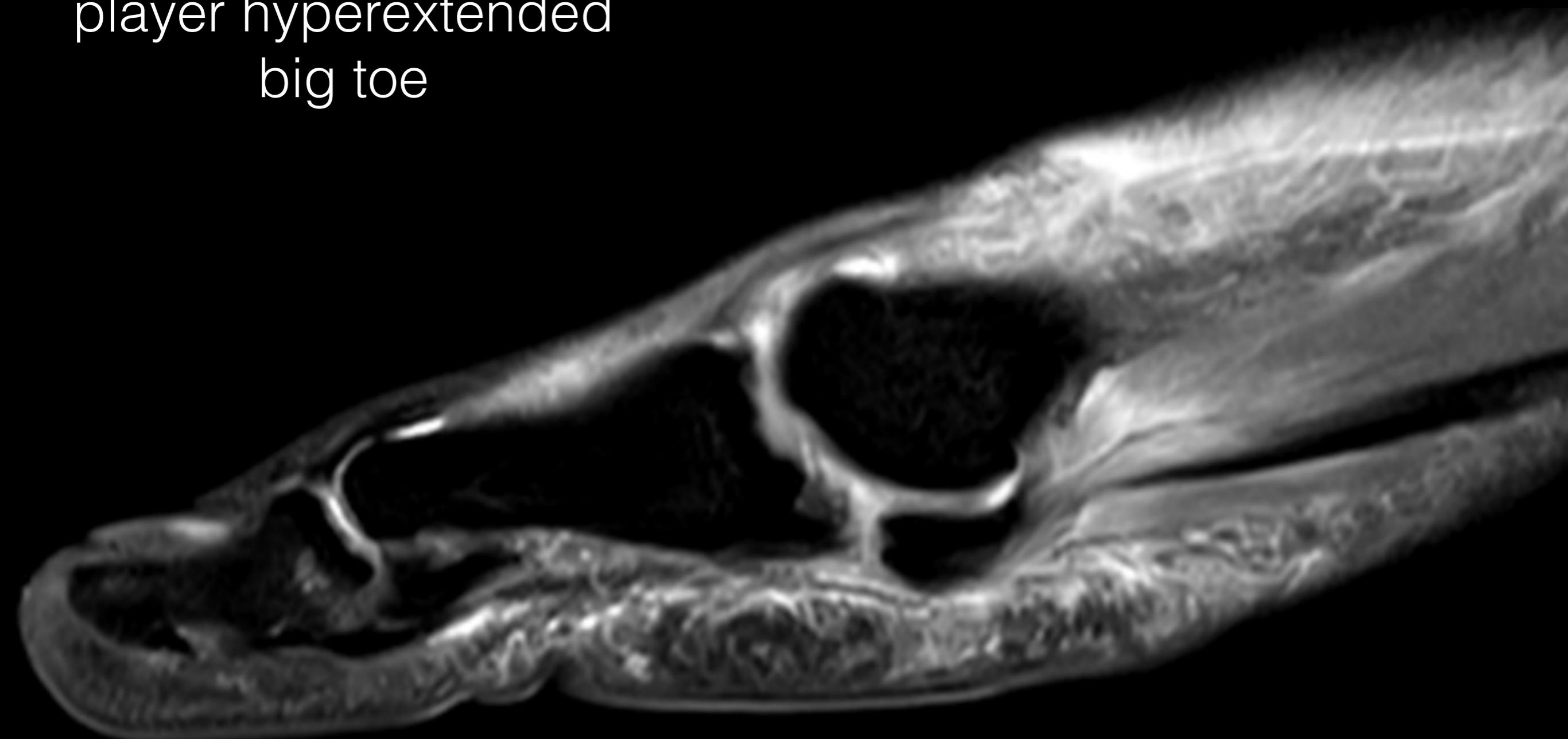


really glad to  
have CT in  
this case...

# Case 3

18 F

collegiate soccer  
player hyperextended  
big toe



18 F

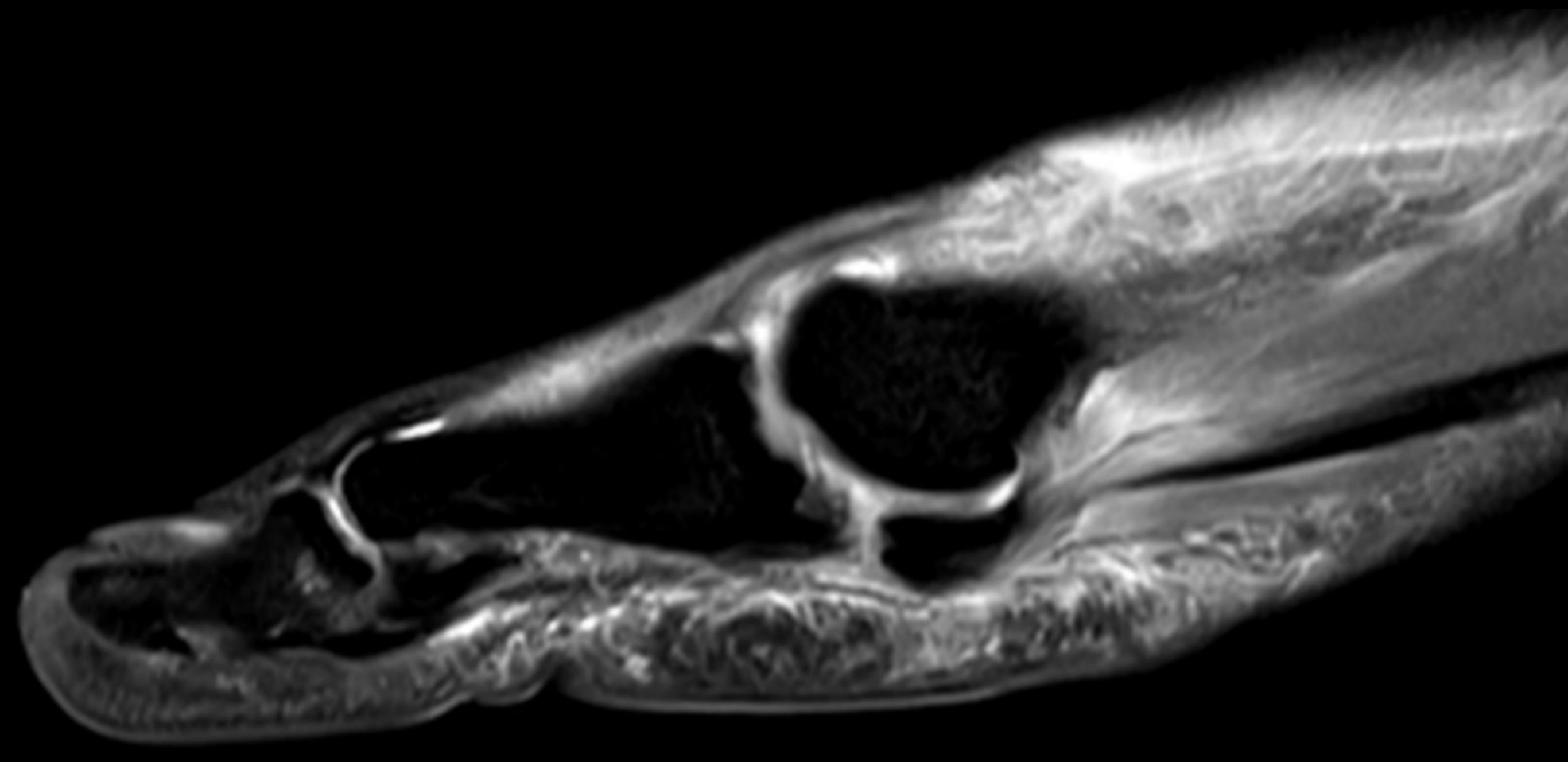
collegiate soccer  
player hyperextended  
big toe

?



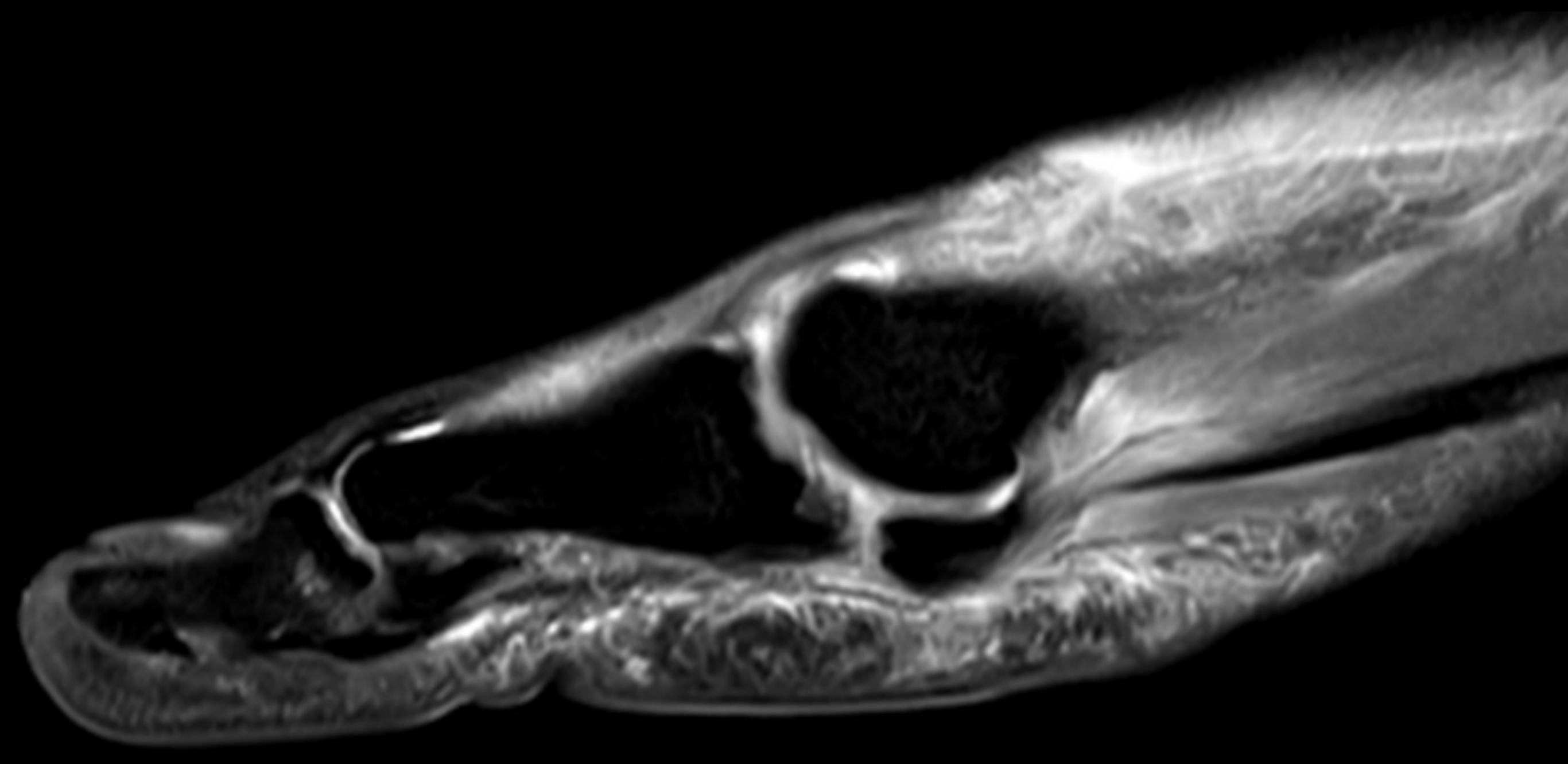
# “turf toe”

an injury to the  
tarsal plate



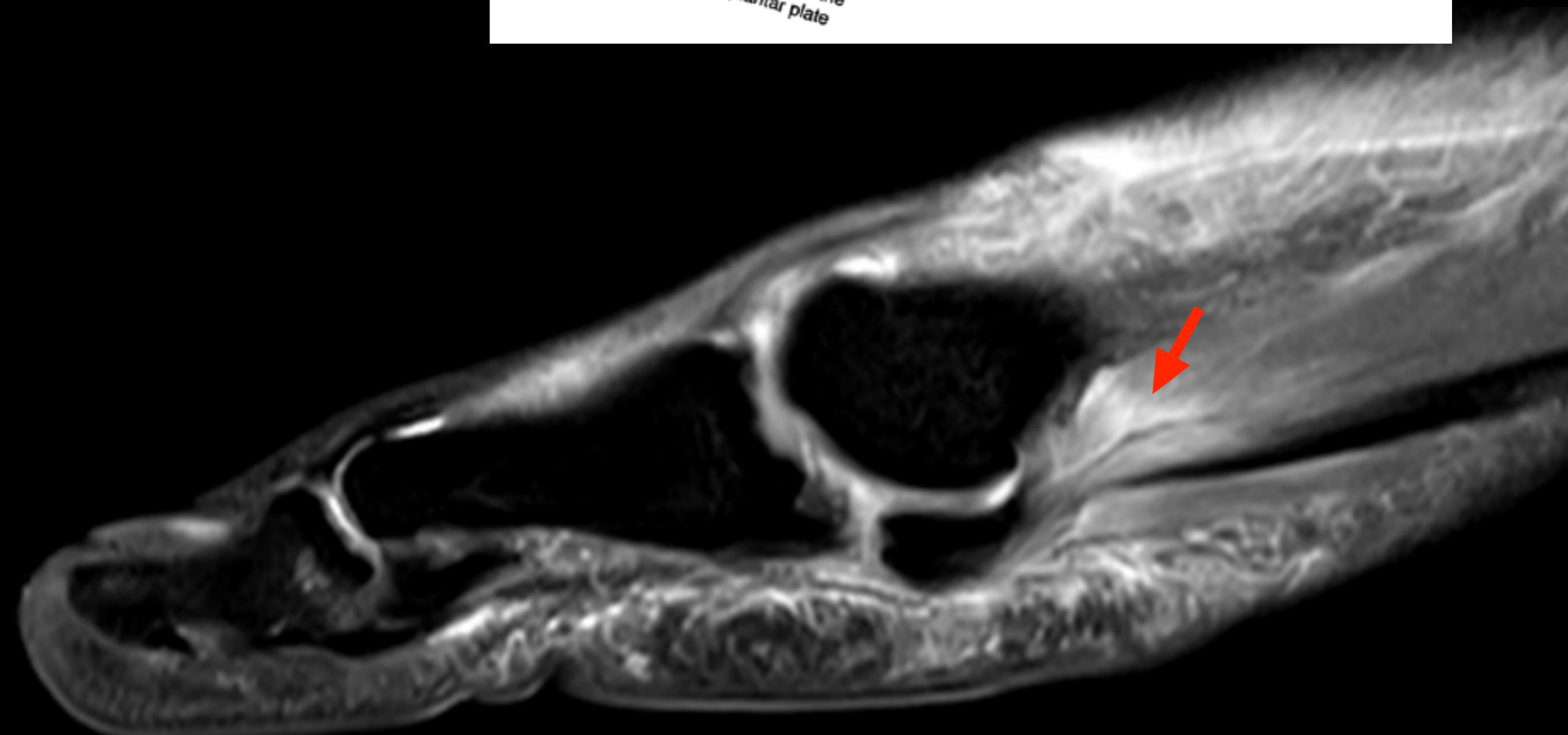
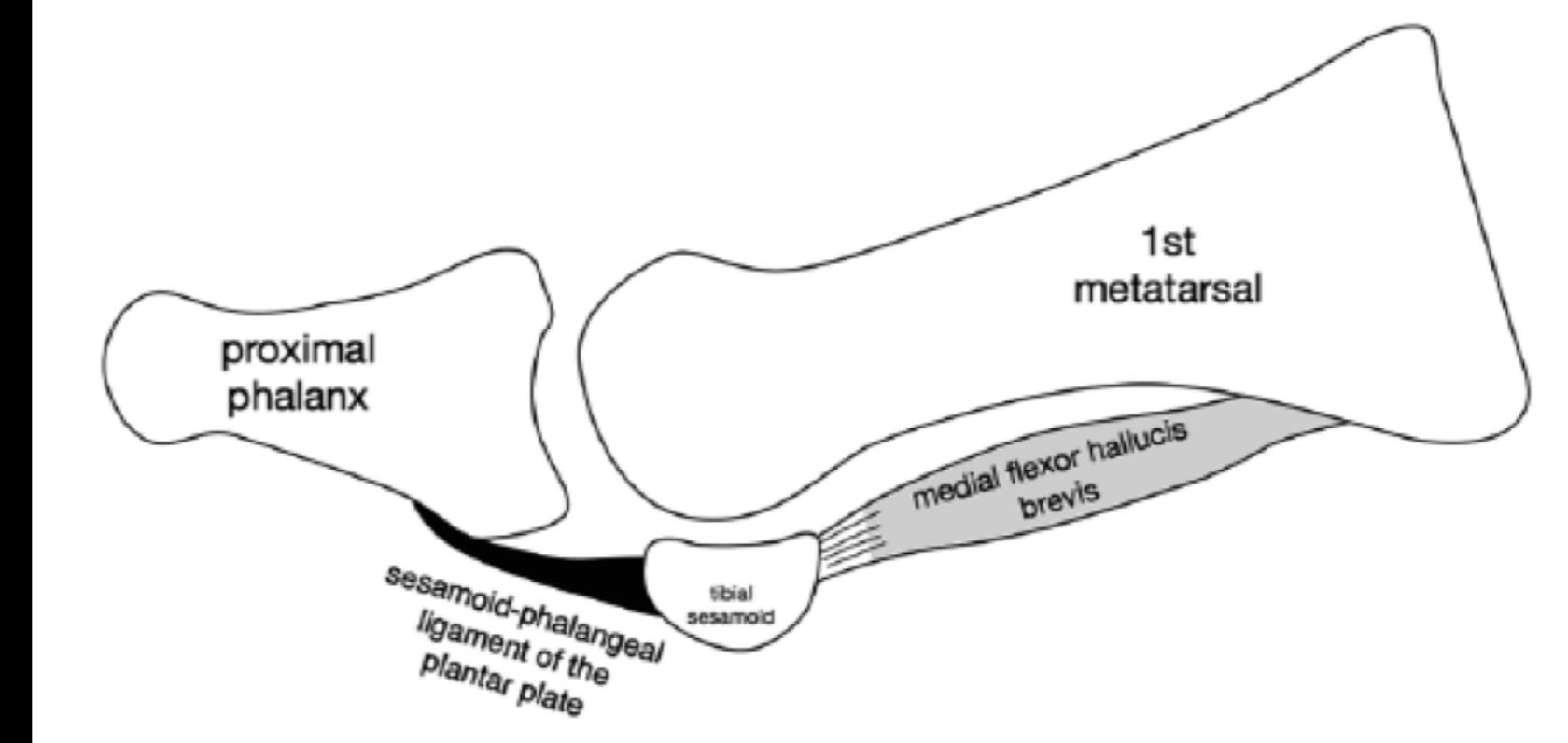
# “turf toe” ?

just what is the  
tarsal plate?



# “turf toe”

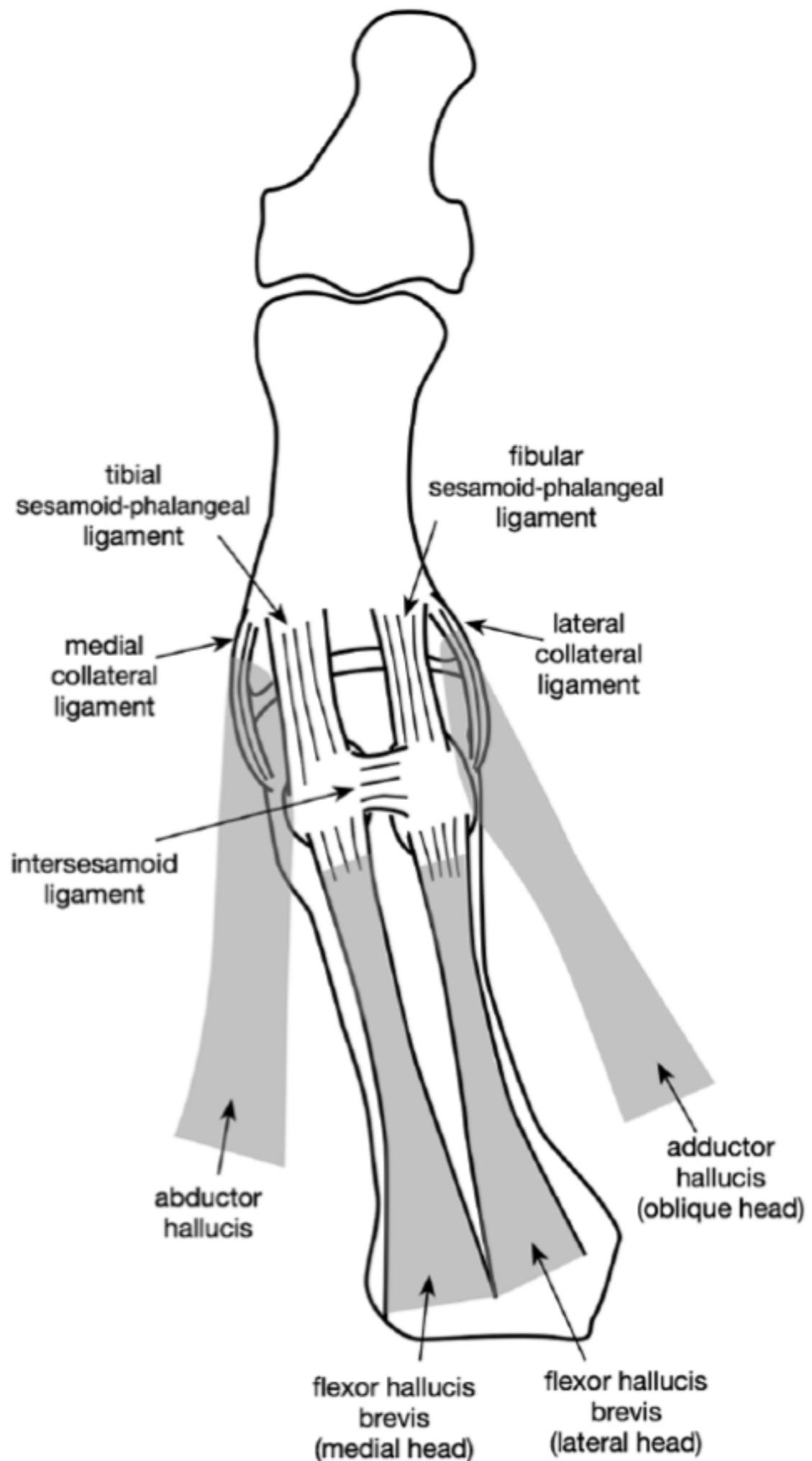
an injury to the tarsal plate

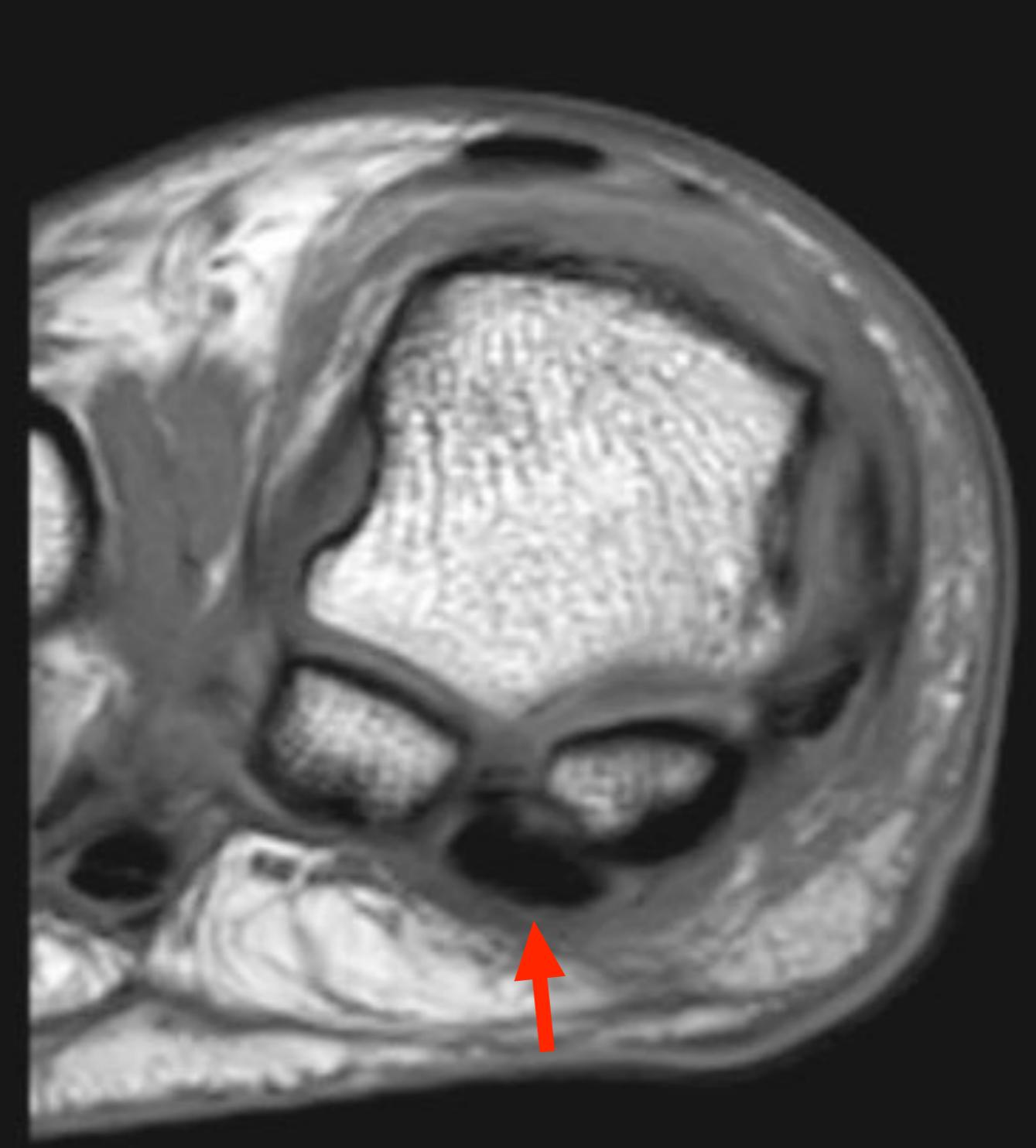
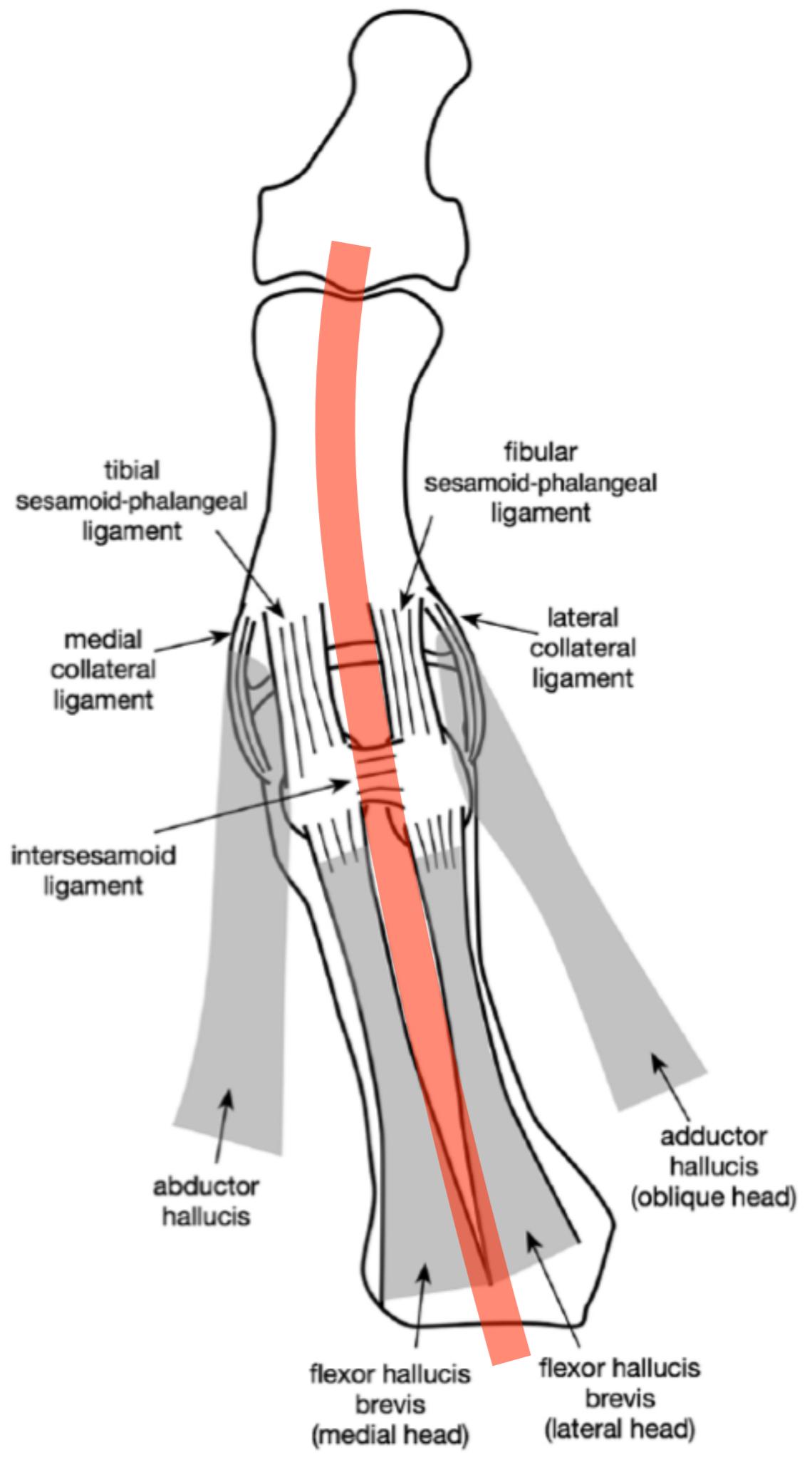


Favinger et al.

Epidemiology and  
Imaging Appearance of  
the Normal Bi-/  
multipartite Hallux  
Sesamoid Bone.

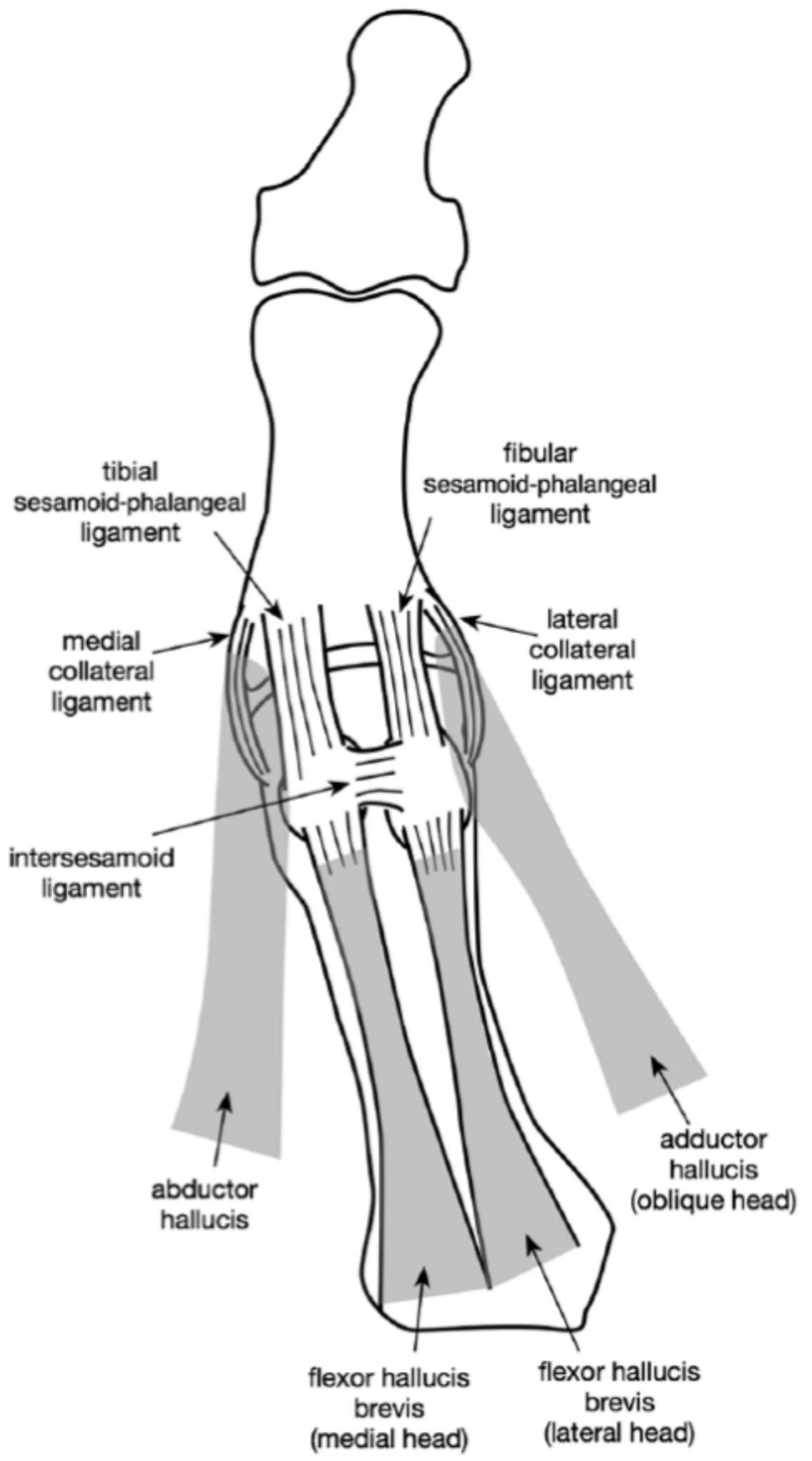
Foot Ankle Int. 2014 Sep  
18 ; 36(2) : 197–202





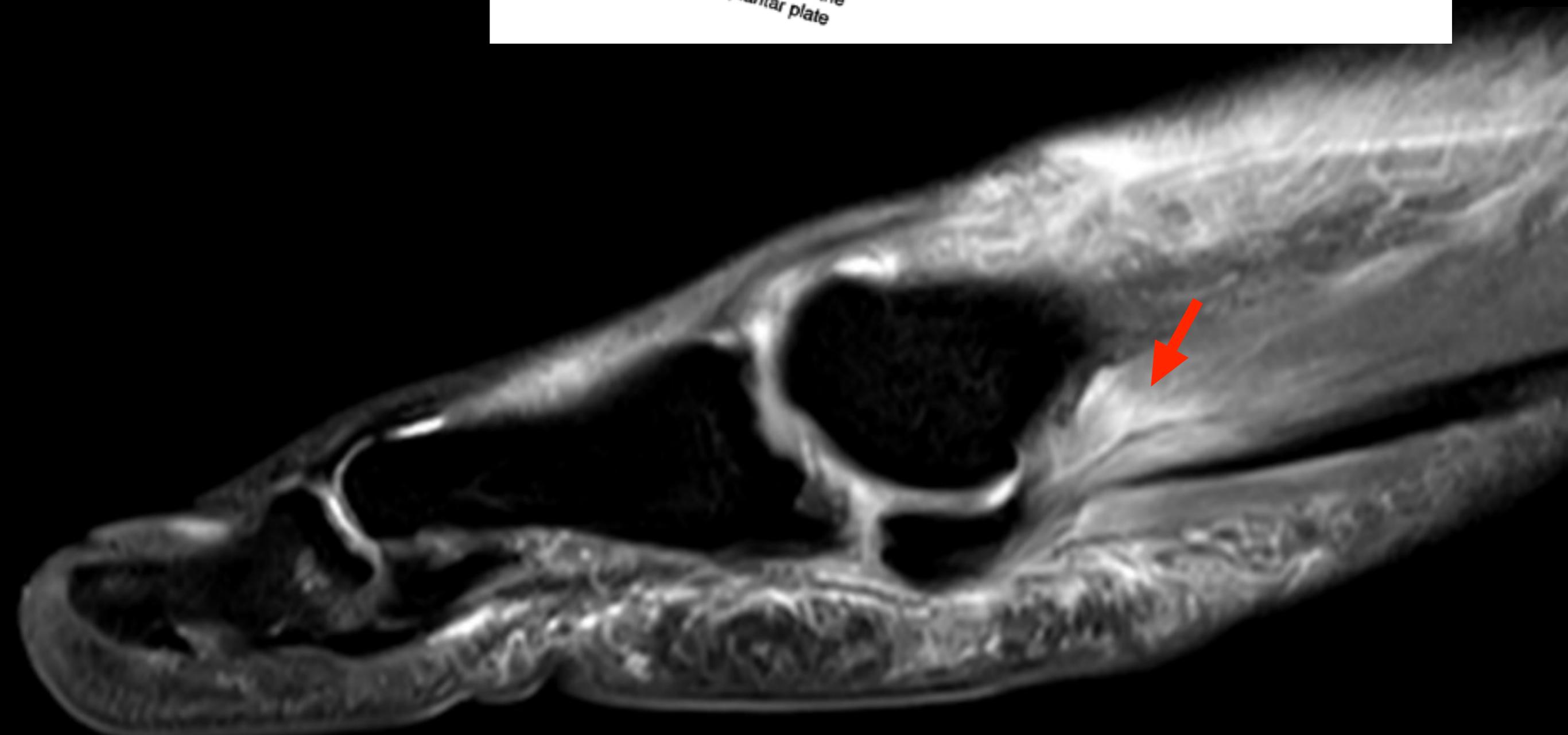
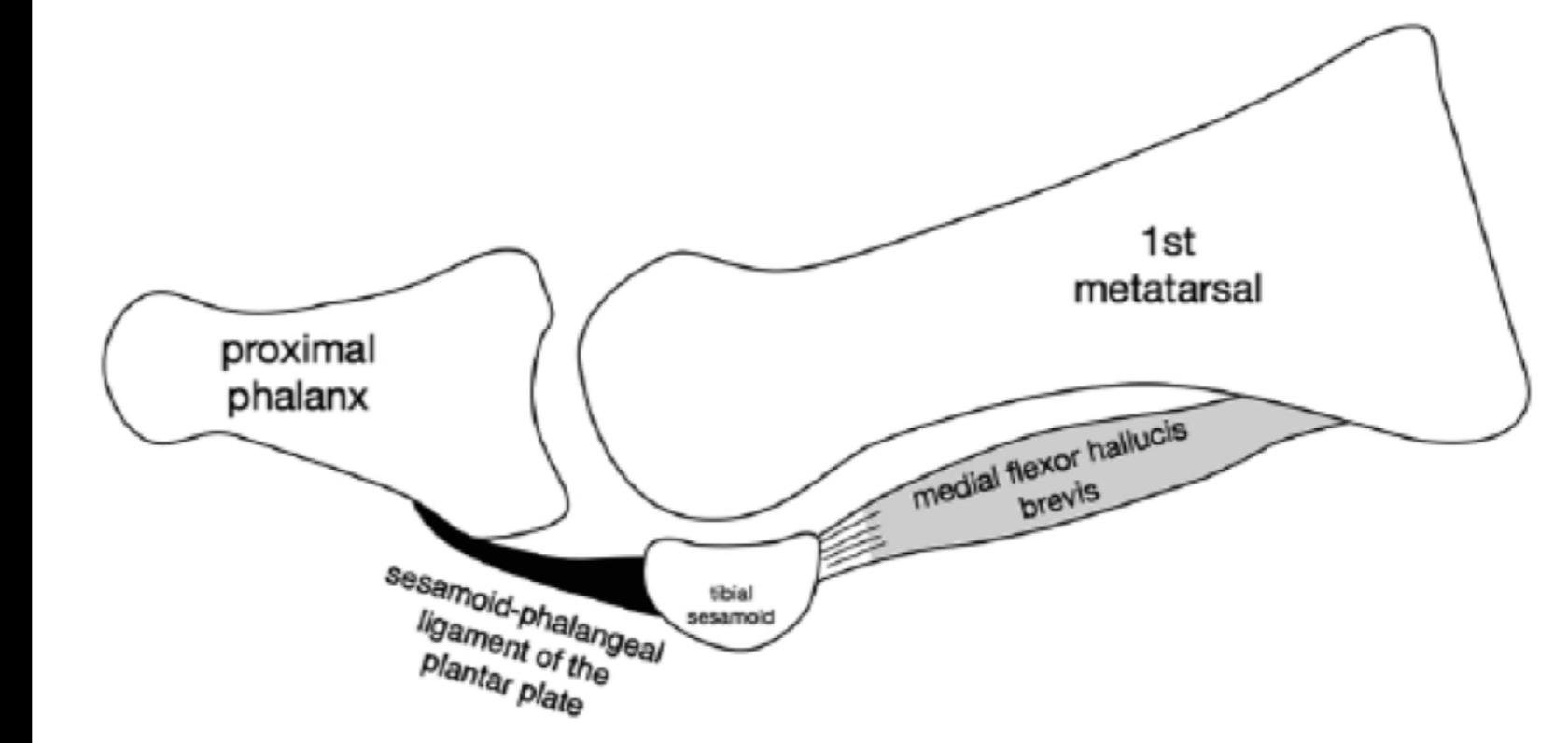
flexor hallucis  
longus

tear of  
lateral  
(fibular)  
collateral  
ligament



# “turf toe”

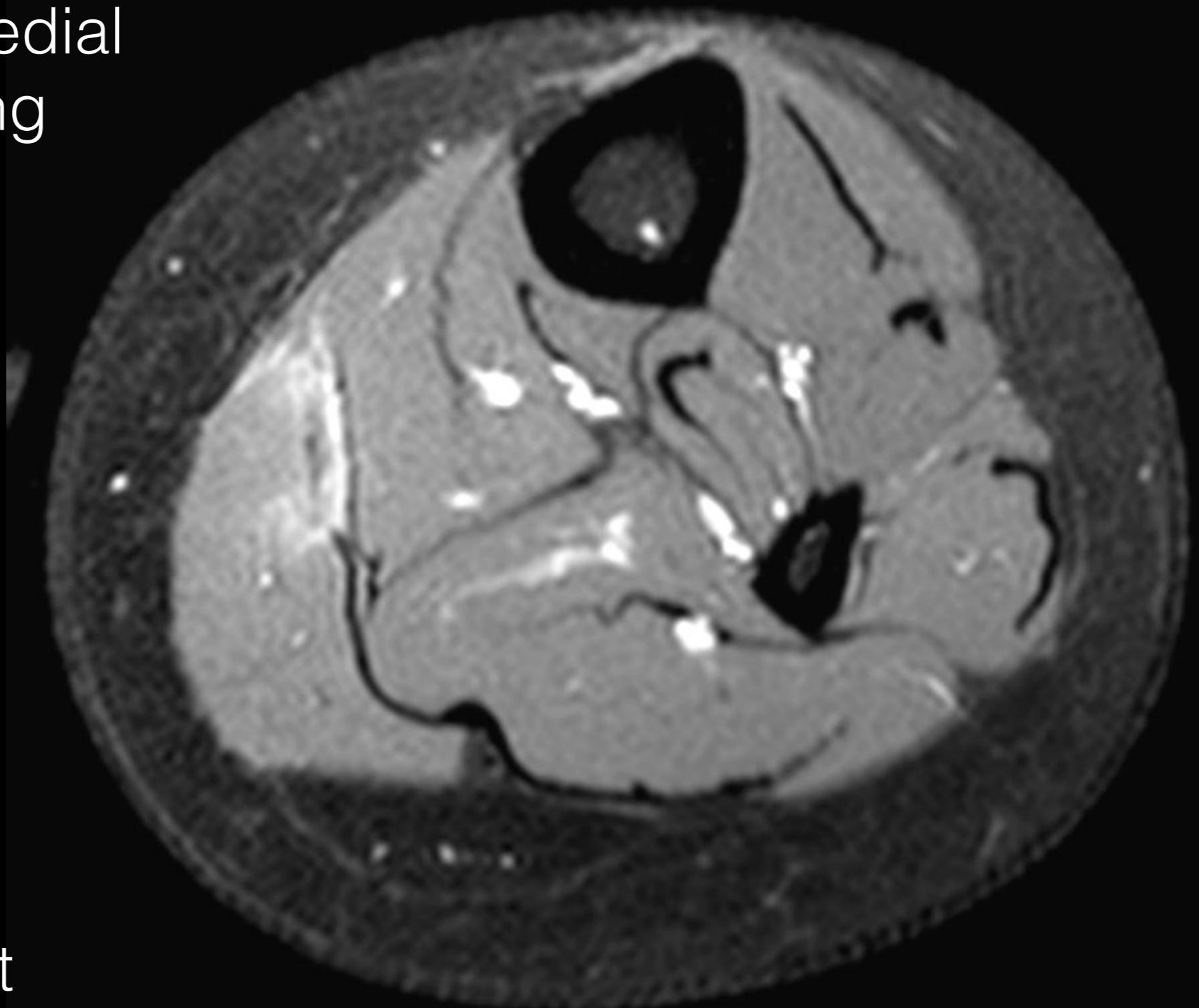
an injury to the tarsal plate



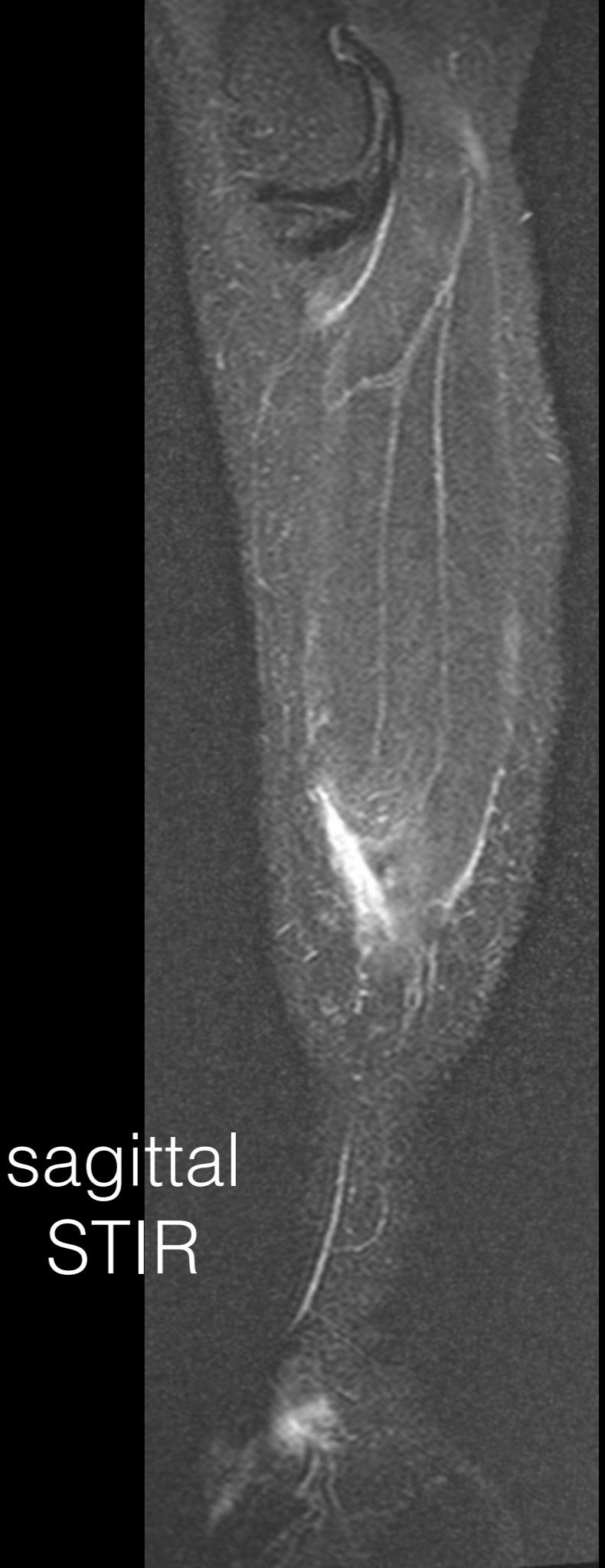
# Case 4

46 F

felt “pop” in left medial  
calf while playing  
basketball



axial PD fat sat

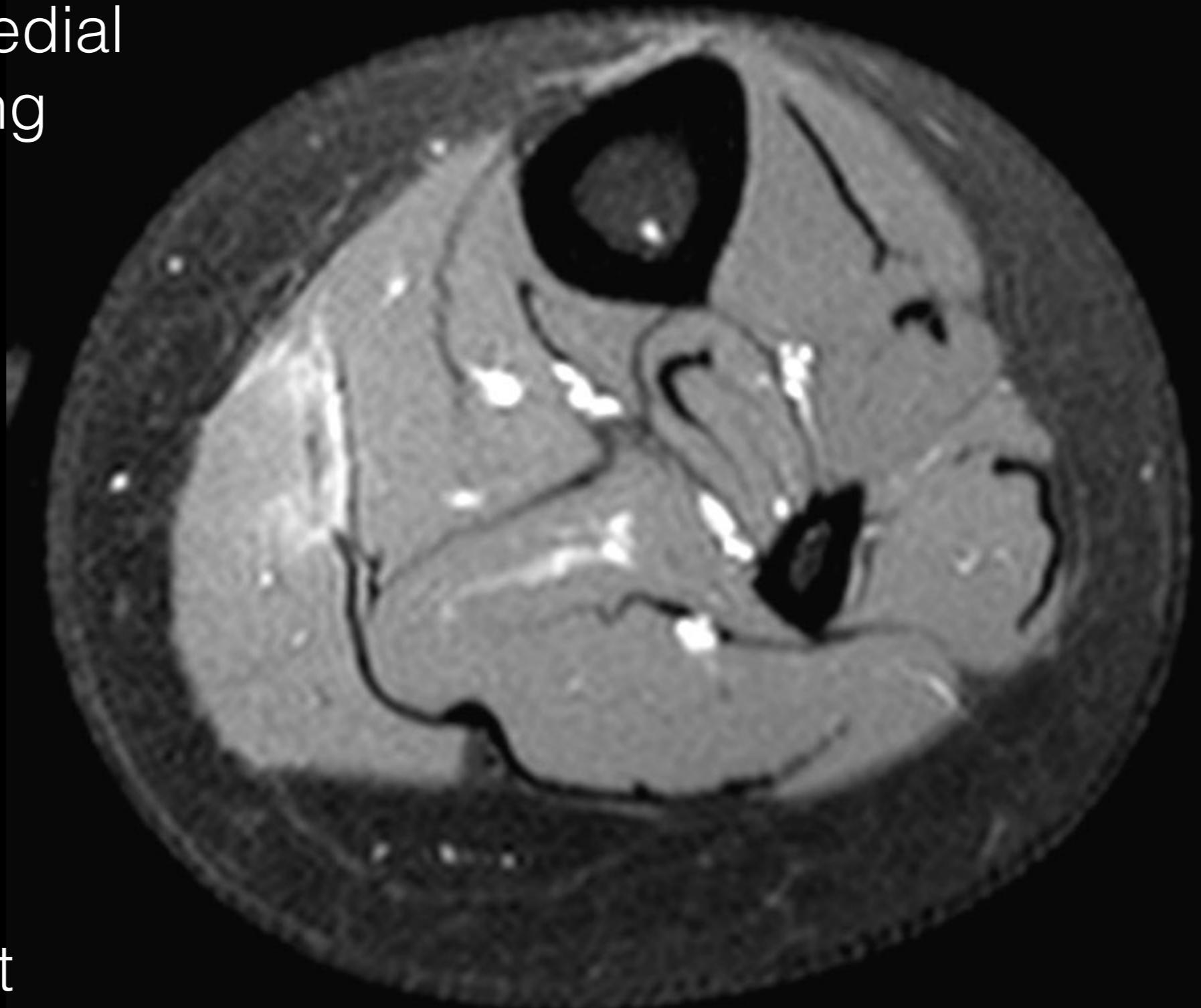


46 F

felt “pop” in left medial  
calf while playing  
basketball

?

axial PD fat sat

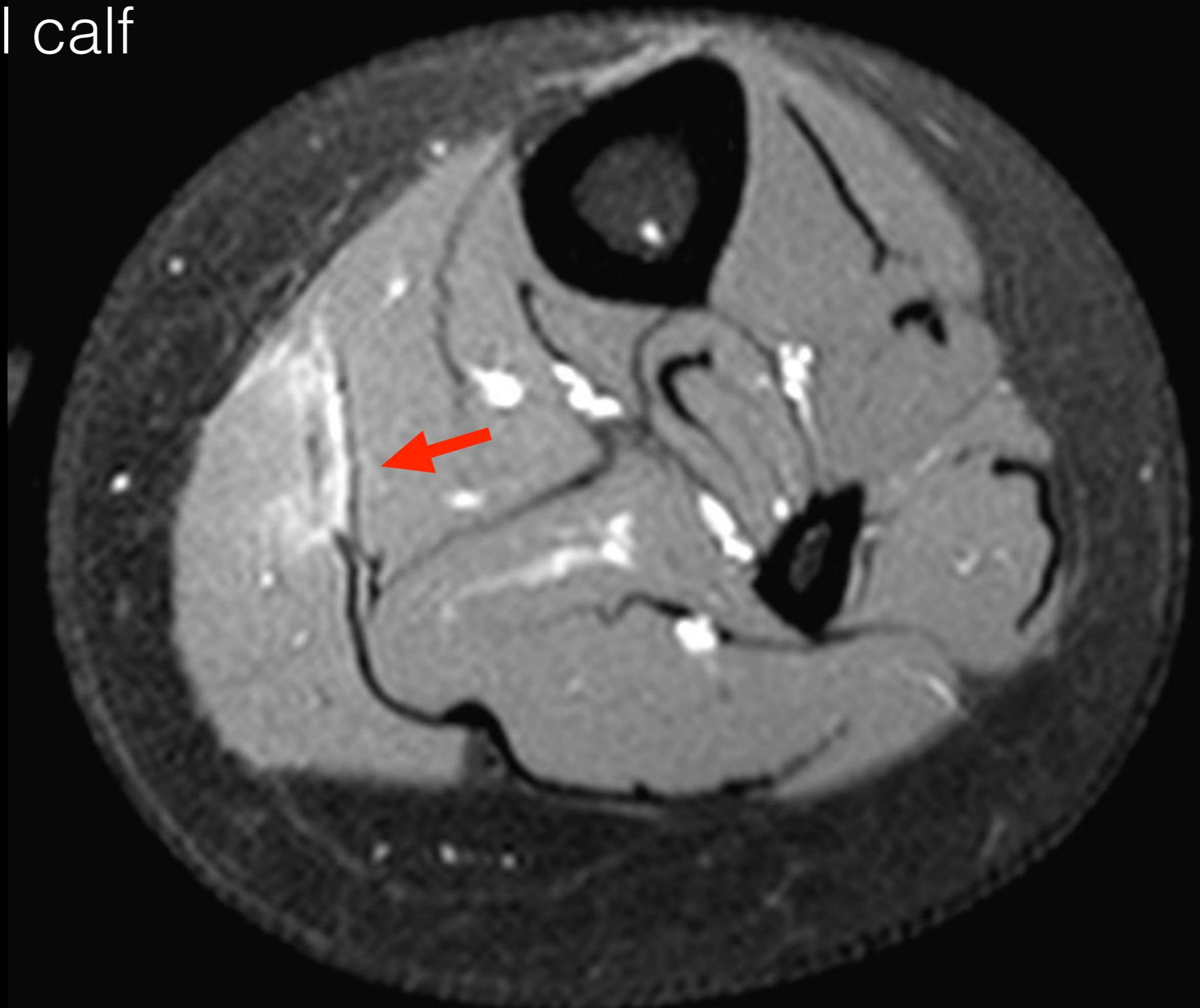


46 F

felt “pop” in medial calf  
while playing  
basketball

**“tennis leg”**

focal tear, medial  
head of  
gastrocnemius



coronal  
STIR



right

left

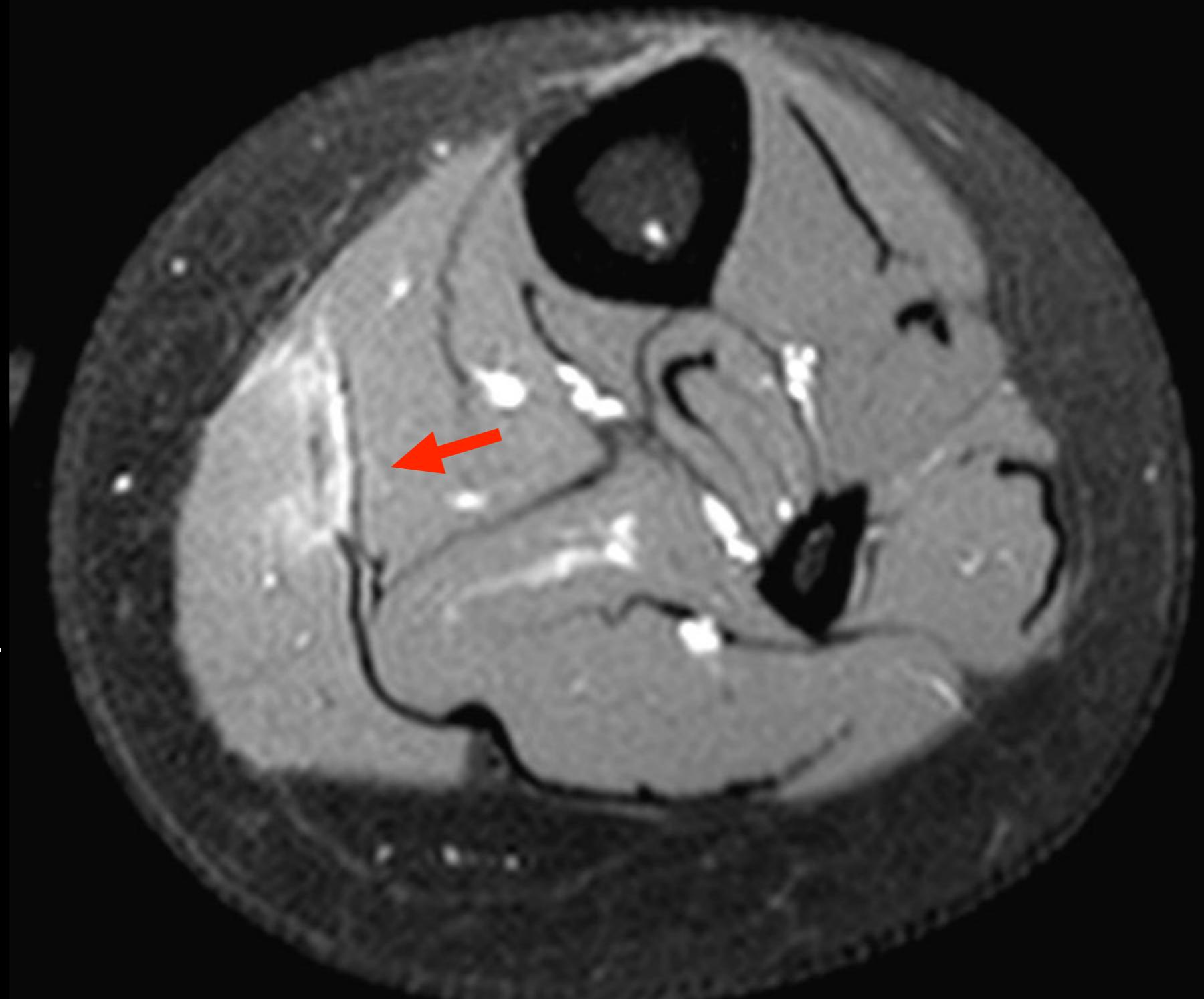
sagittal  
STIR



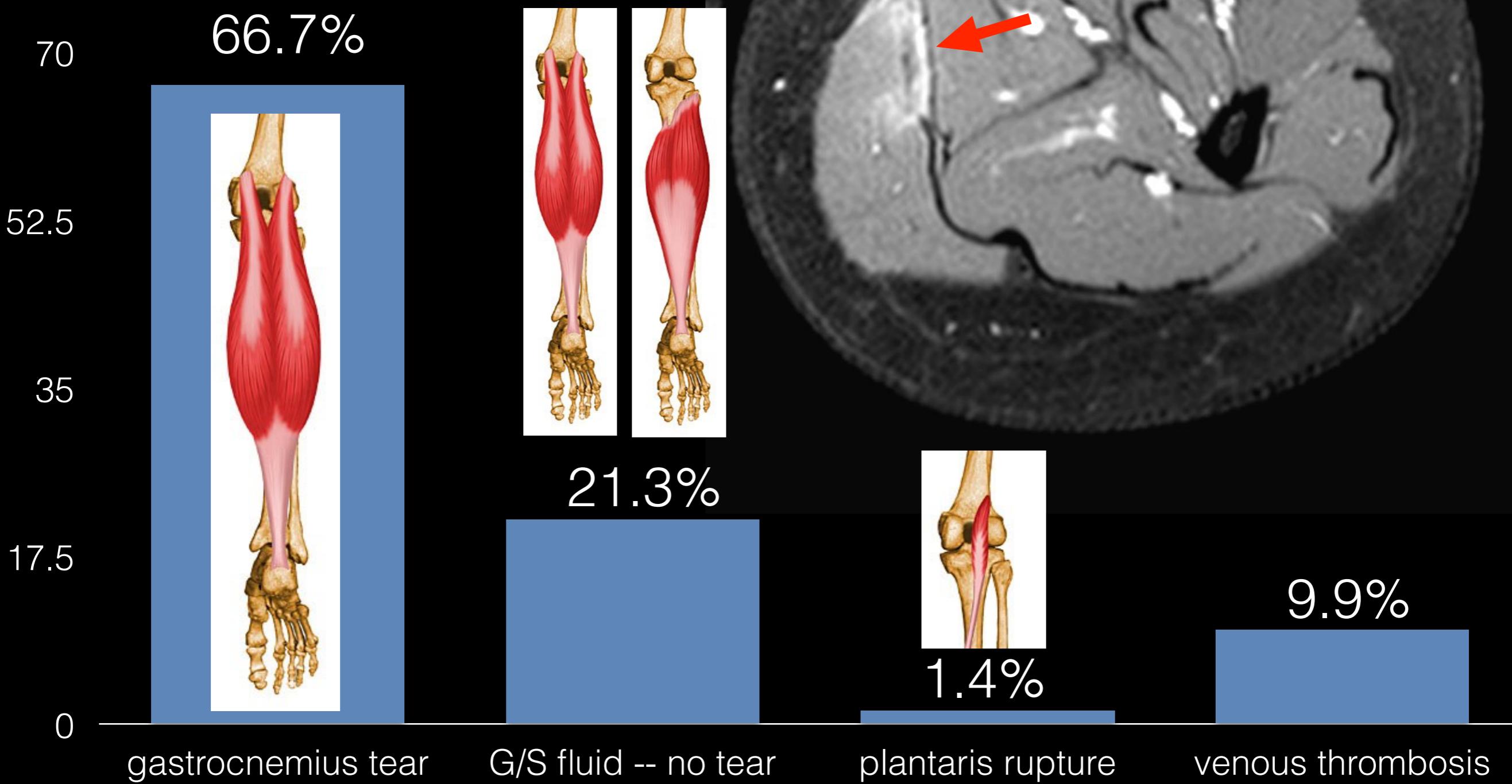
Delgado et al.  
Radiology. 2002 Jul;  
224(1):112–9.

**“tennis leg”**

middle-aged  
person who  
complains of sport-  
related acute pain  
in the middle  
portion of the calf,  
associated with a  
snapping sensation



*n* = 141



# Case 5

48 F

ring finger injury 10  
days ago — now  
cannot flex well



48 F

ring finger injury 10  
days ago — now  
cannot flex well

?



48 F

ring finger injury 10  
days ago — now  
cannot flex well



48 F

ring finger injury 10  
days ago — now  
cannot flex well



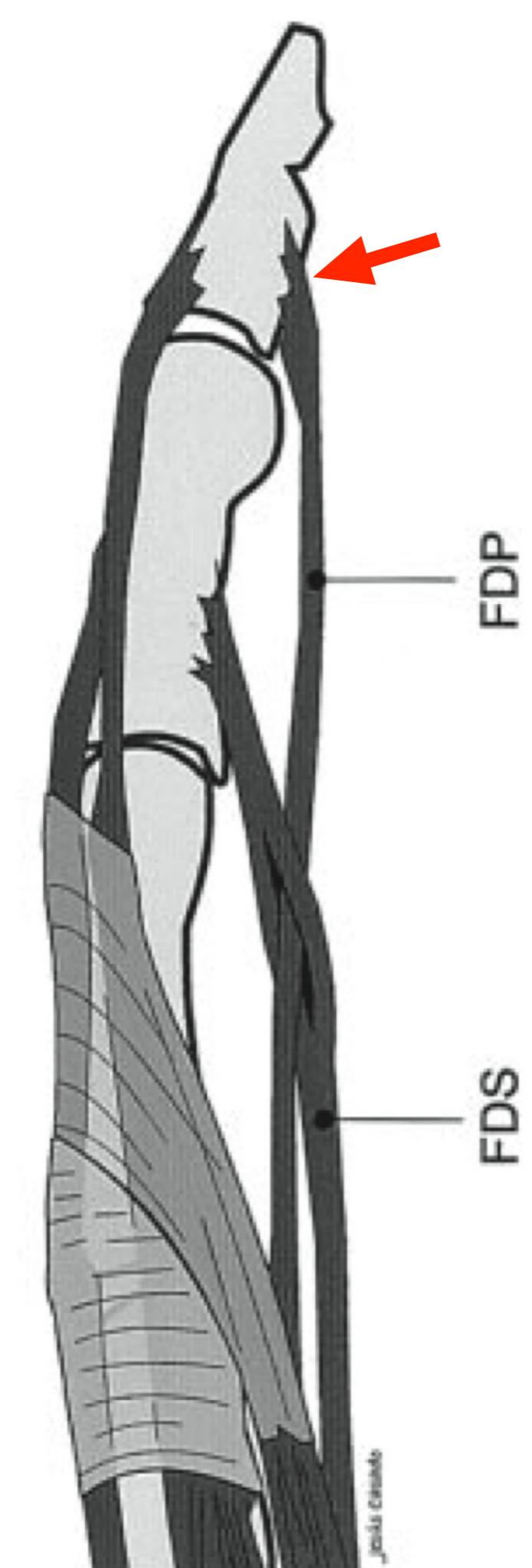
48 F

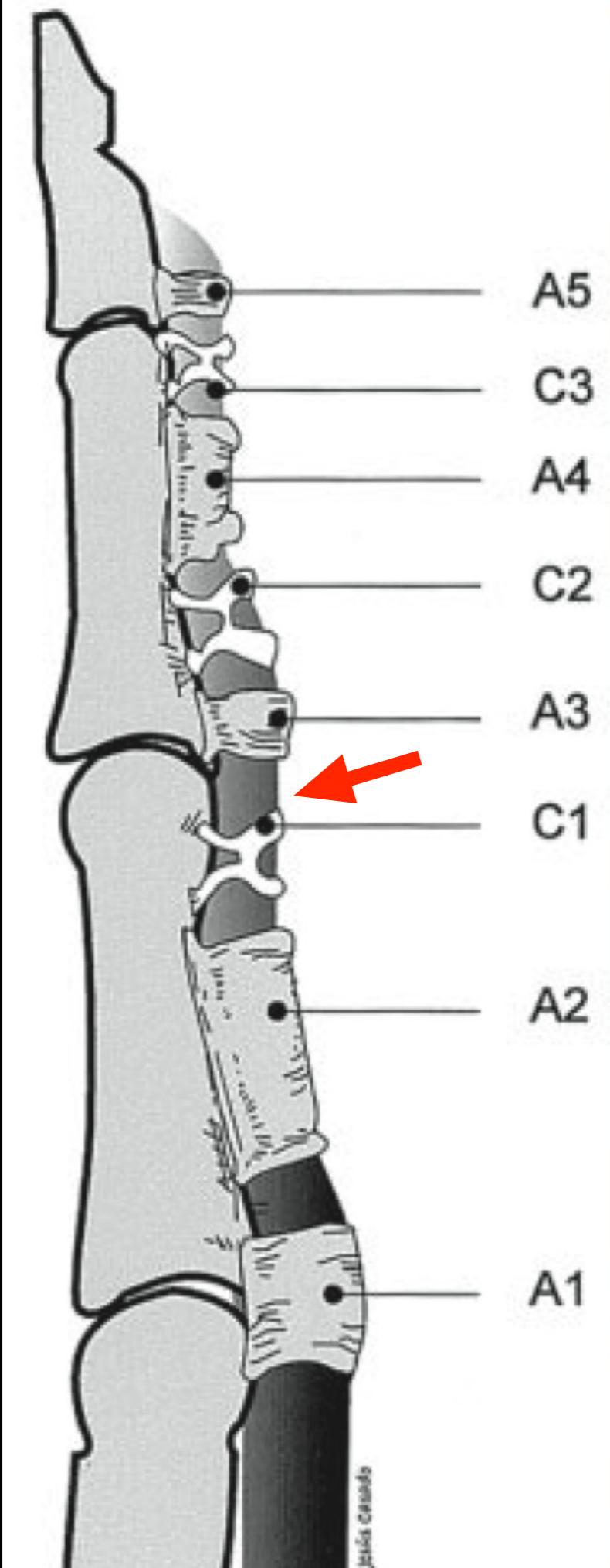
ring finger injury 10  
days ago — now  
cannot flex well

**“jersey finger”**

avulsion of flexor  
digitorum profundus  
insertion







retraction of  
flexor  
digitorum  
profundis  
tendon below  
A3 pulley



Clavero et al.  
Radiographics. 2002  
Mar;22(2):237–56.

## “jersey finger”

sudden  
hyperextension during  
active flexion

usually ring finger



# Case 6

56 F

shoulder trauma  
and pain



56 F

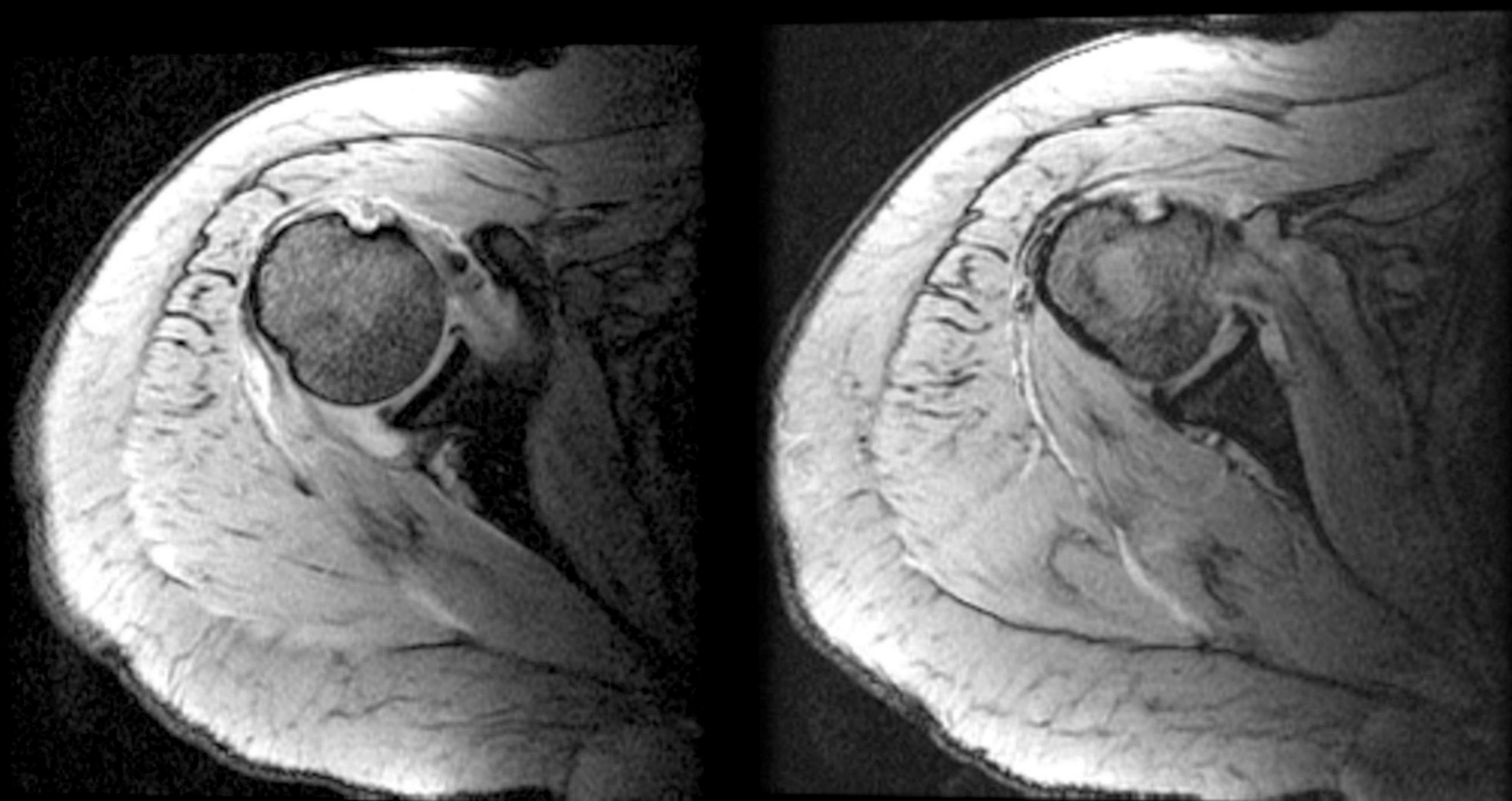
shoulder trauma  
and pain



56 F

?

shoulder trauma  
and pain



56 F

shoulder trauma  
and pain

a hint



56 F

shoulder trauma  
and pain

?



56 F

shoulder trauma  
and pain

dislocation of  
biceps tendon

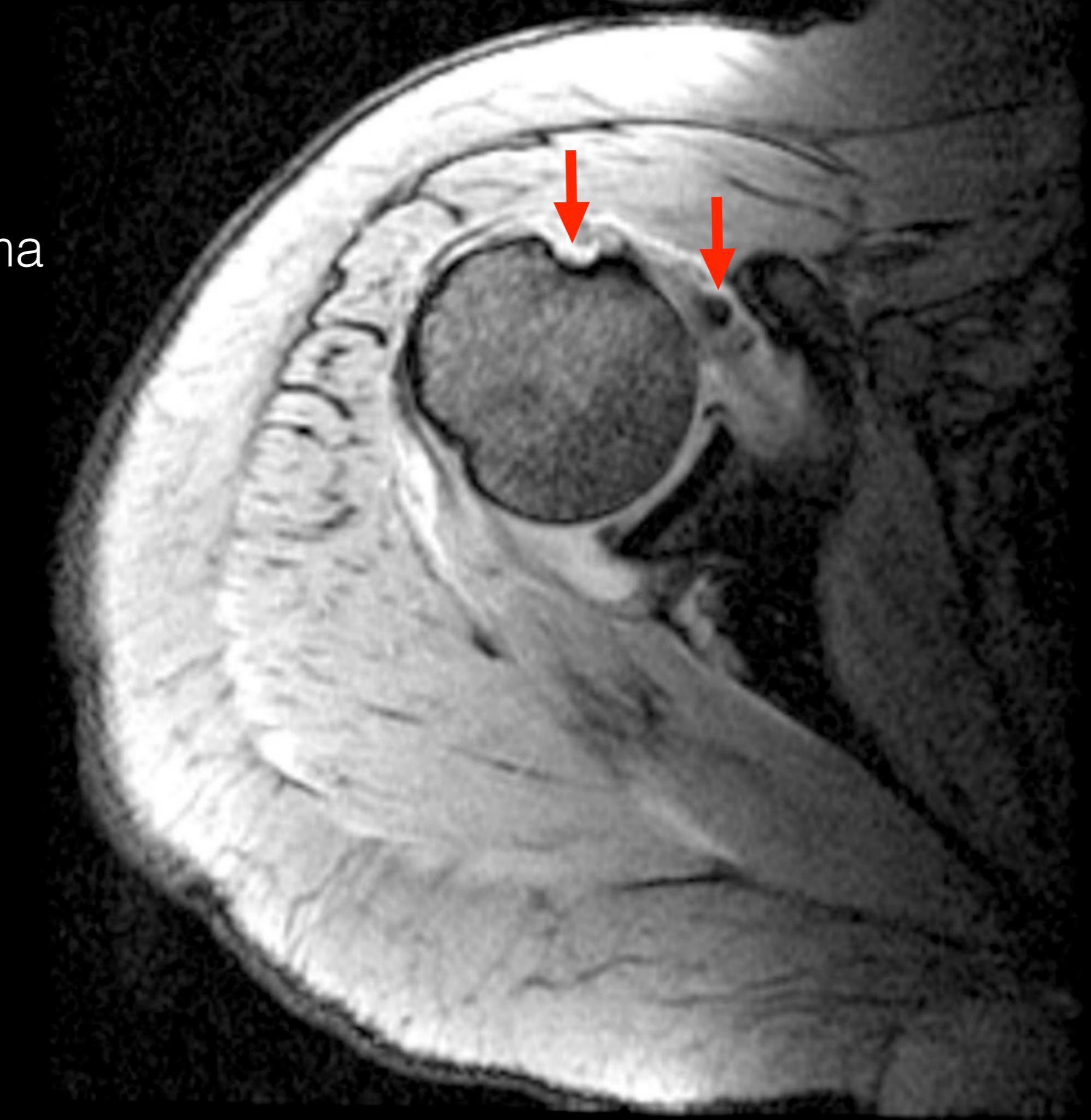


56 F

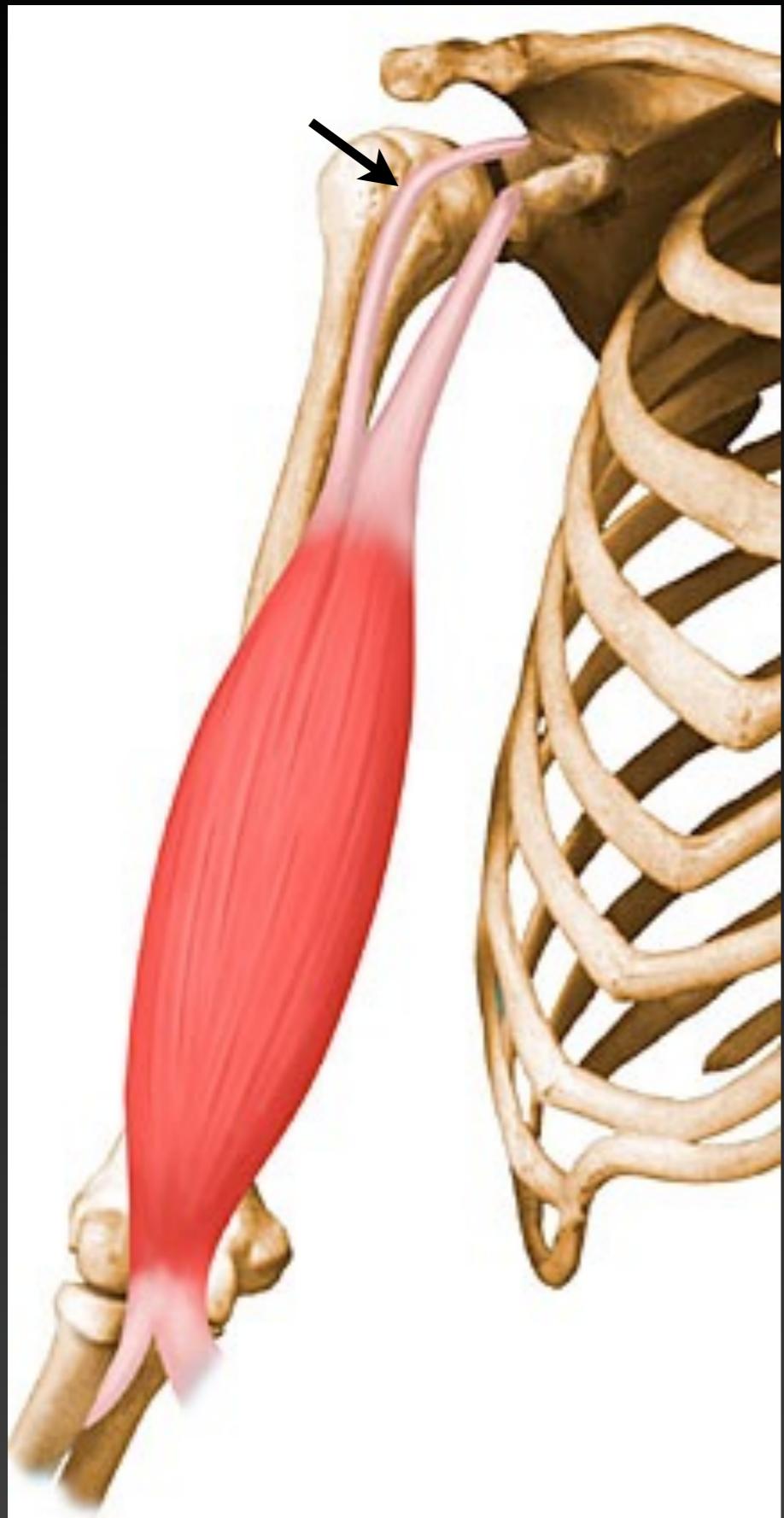
shoulder trauma  
and pain

?

what structure  
gave its life to  
allow this to  
happen?

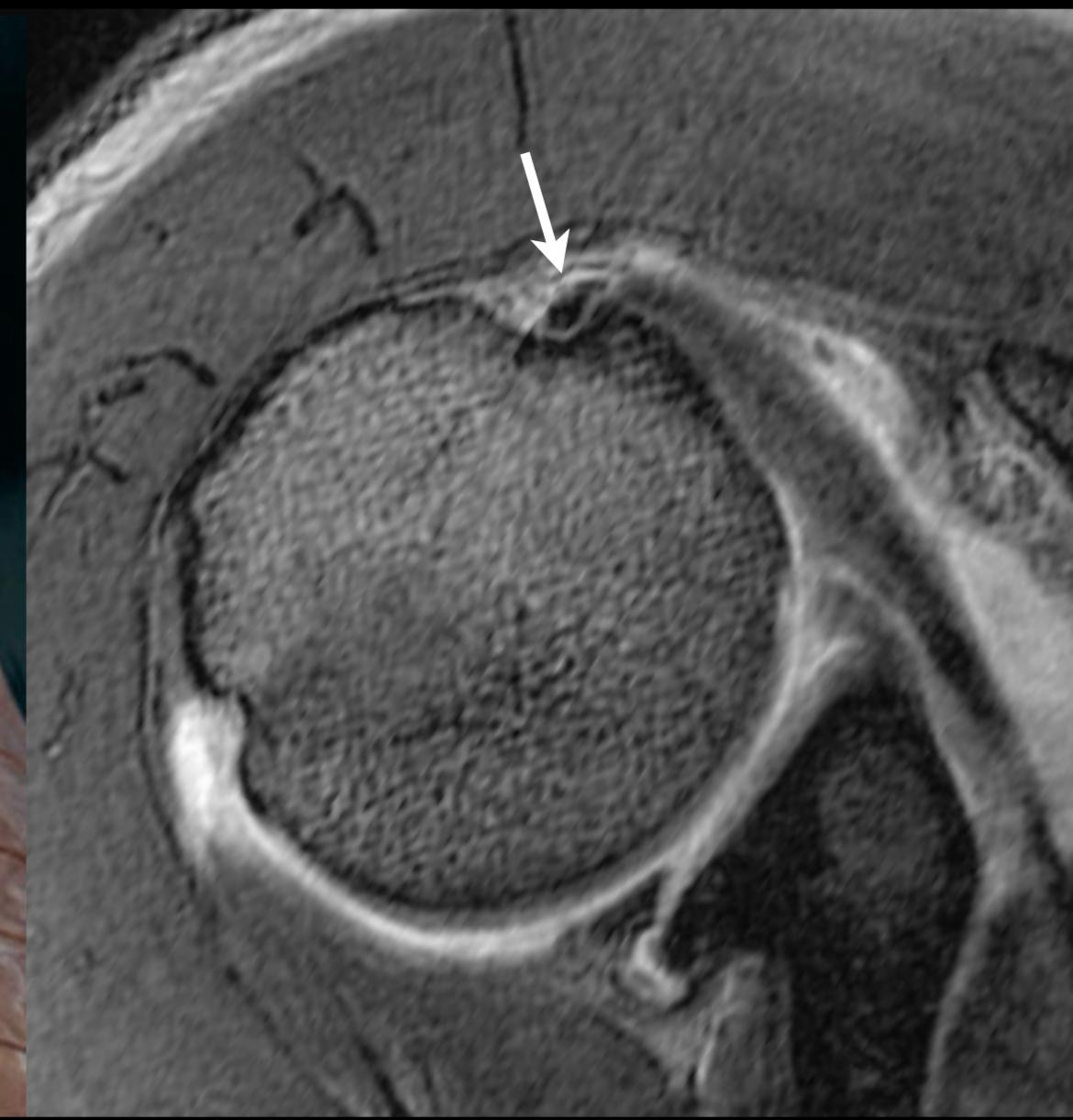


long head of biceps  
tendon

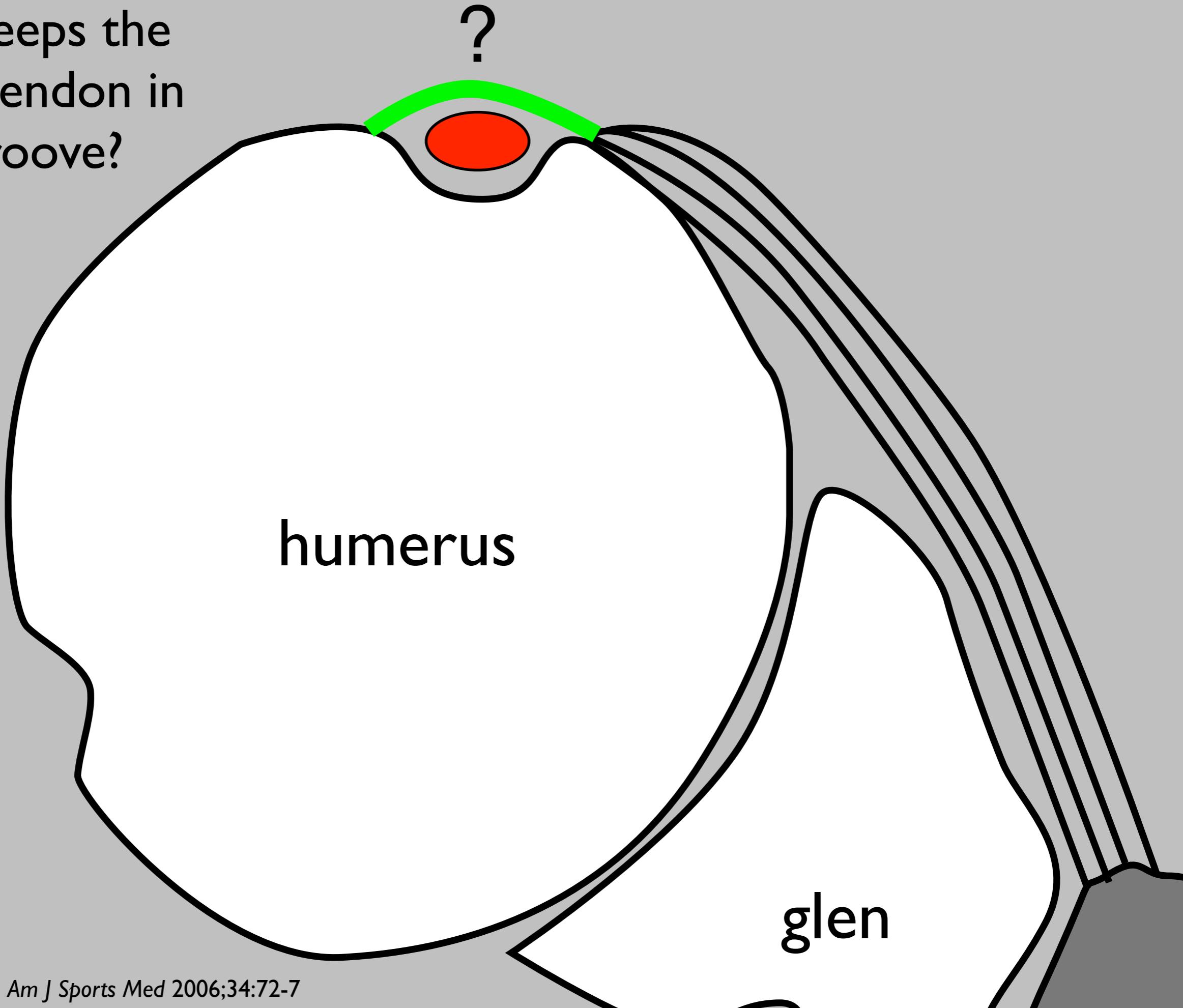




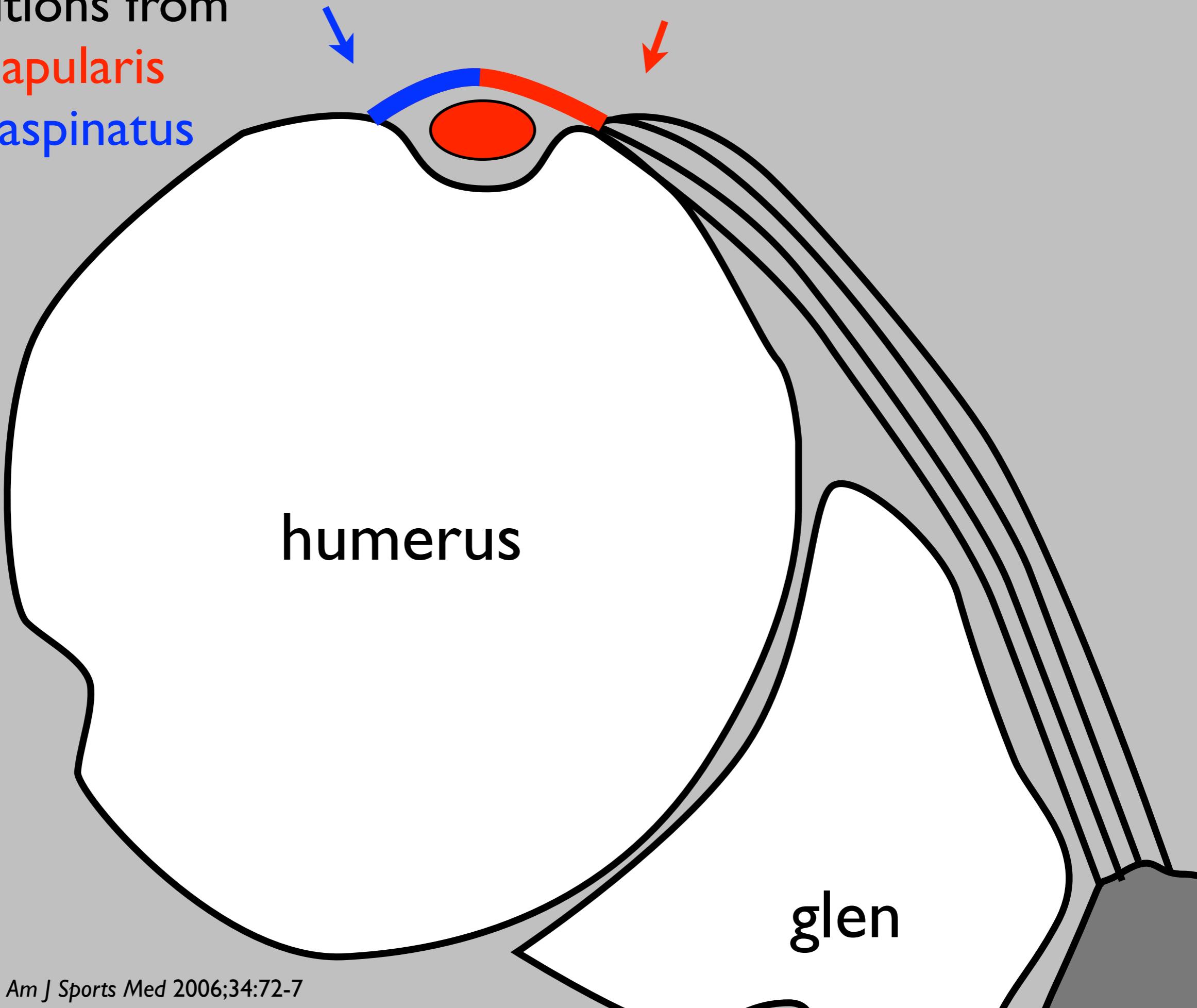


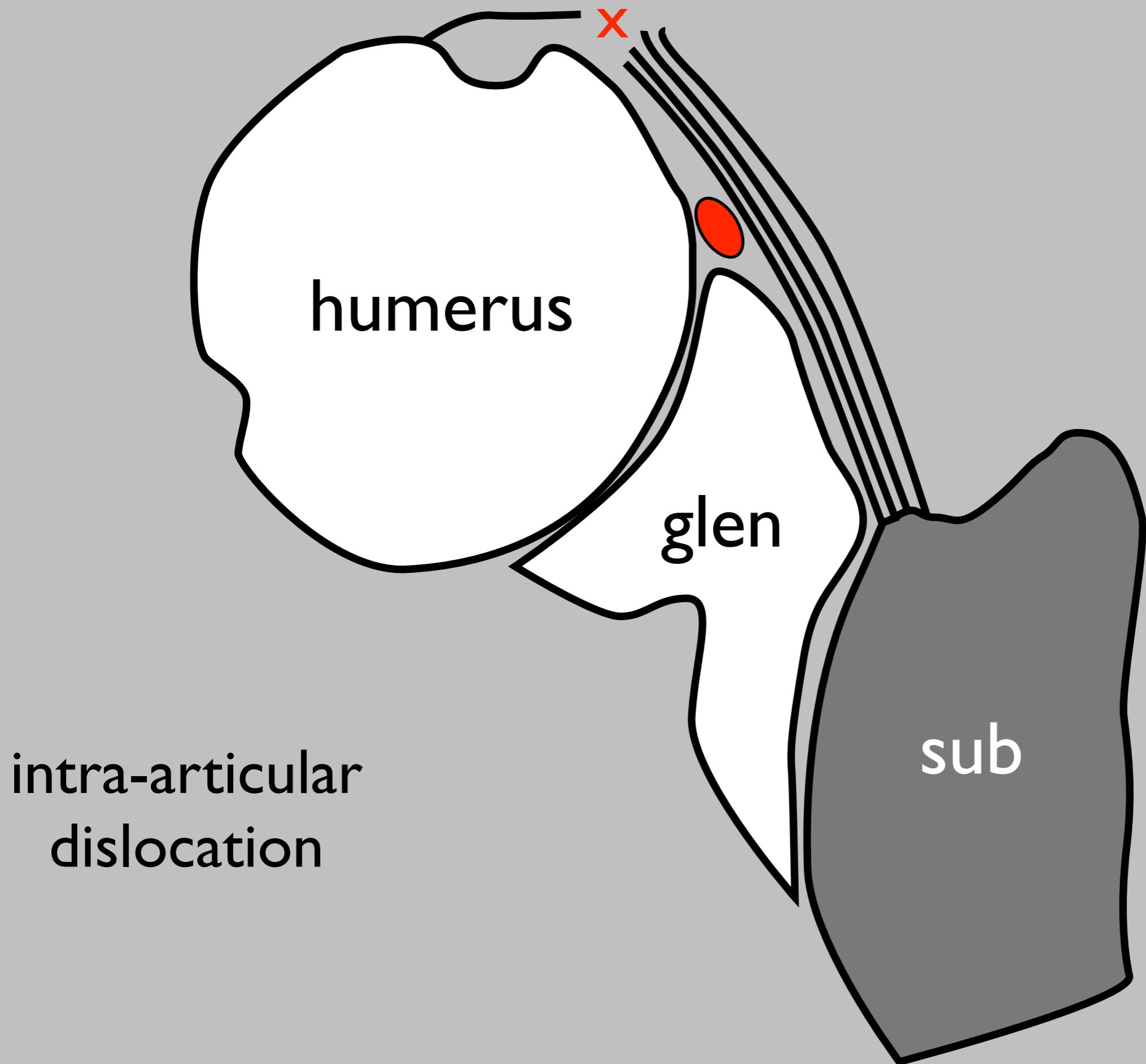


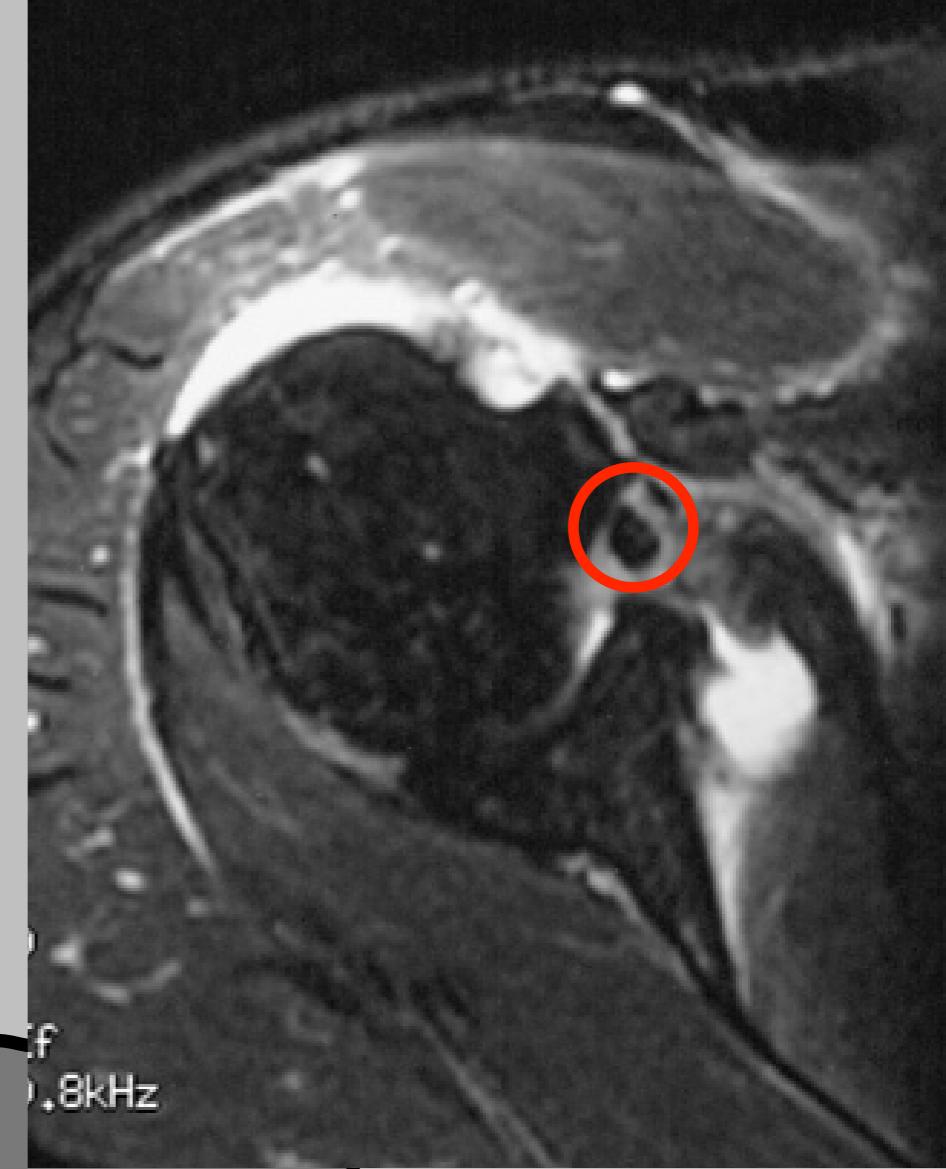
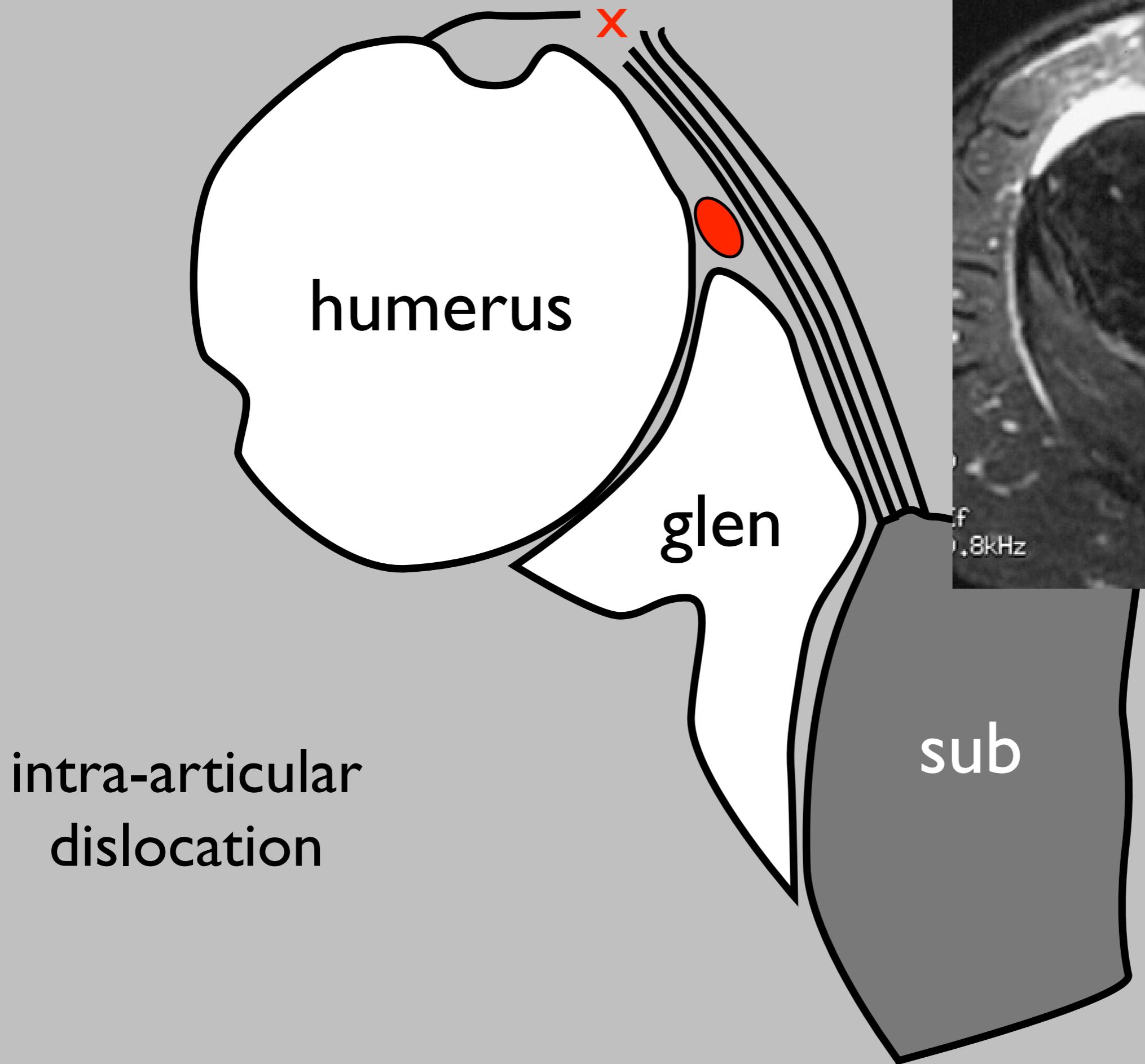
what keeps the  
biceps tendon in  
its groove?

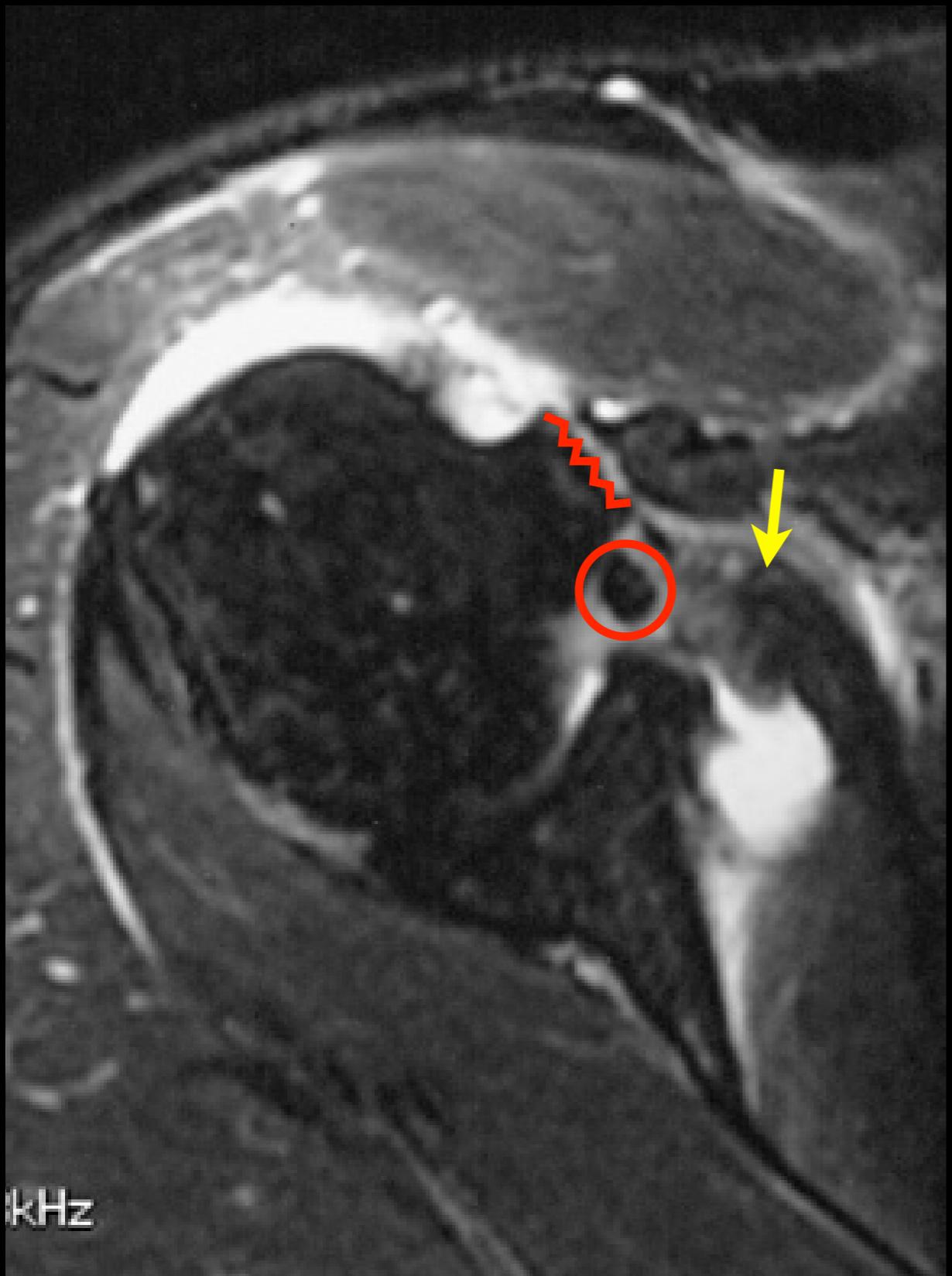


contributions from  
**subscapularis**  
& **supraspinatus**

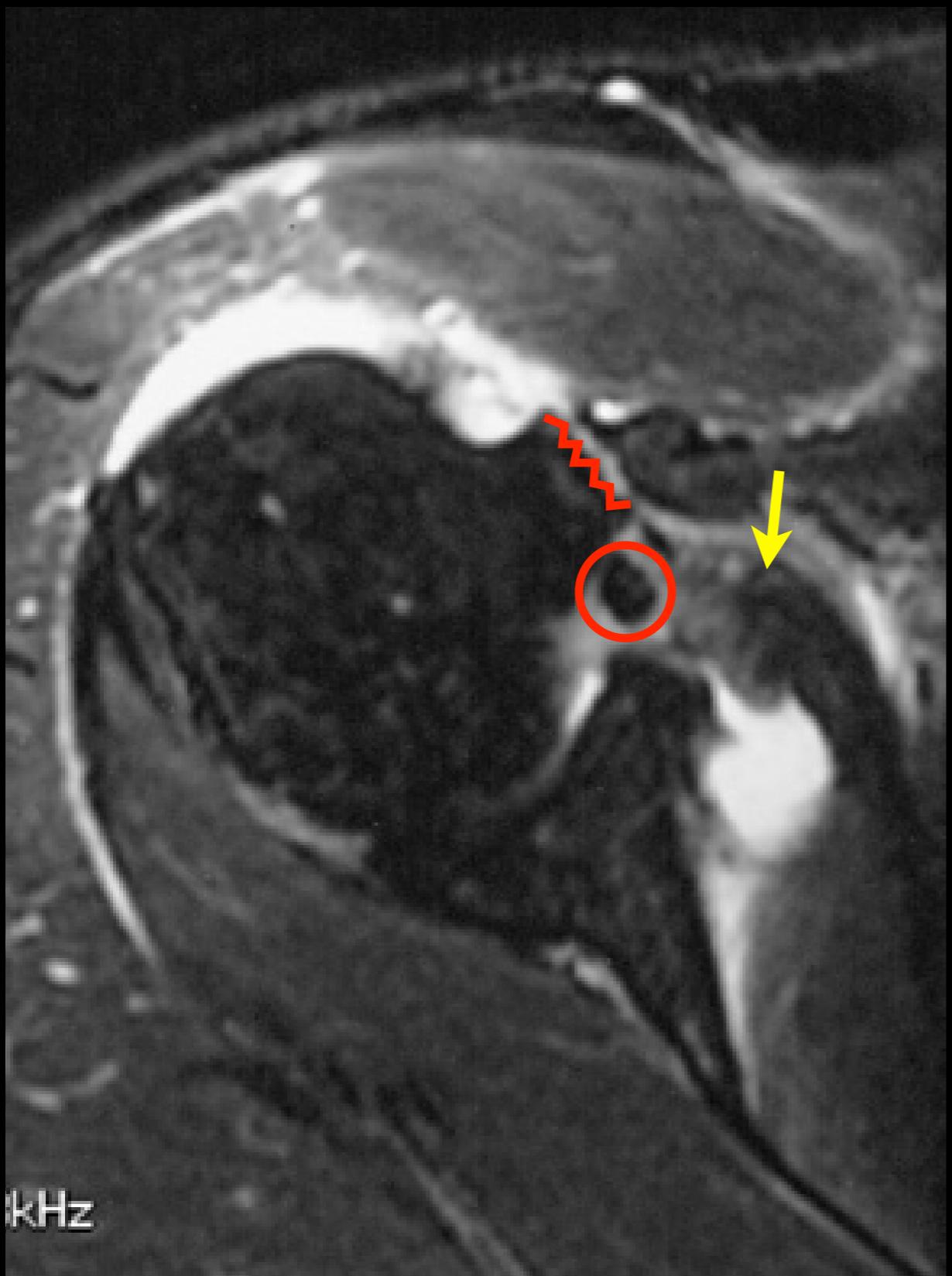




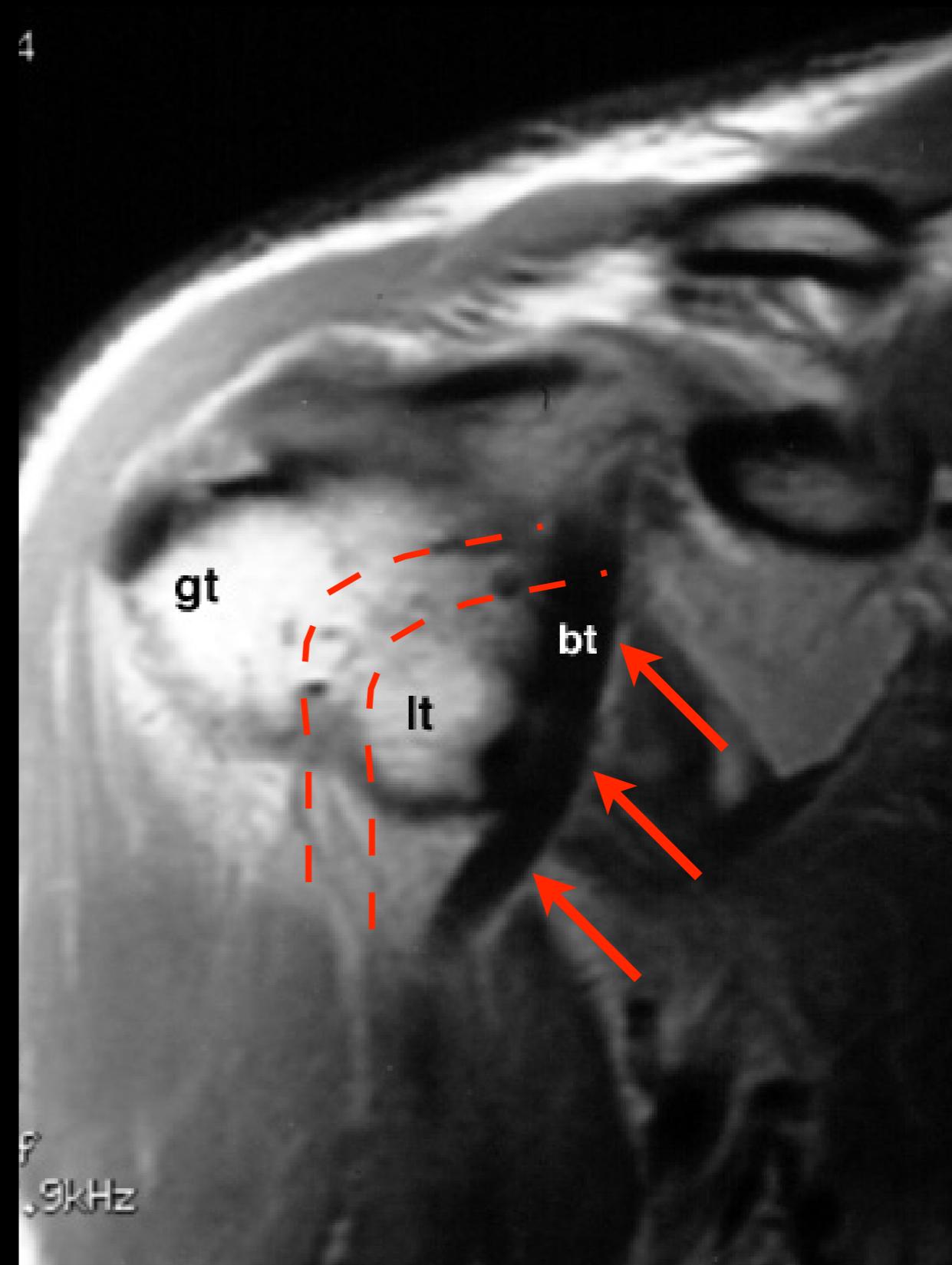




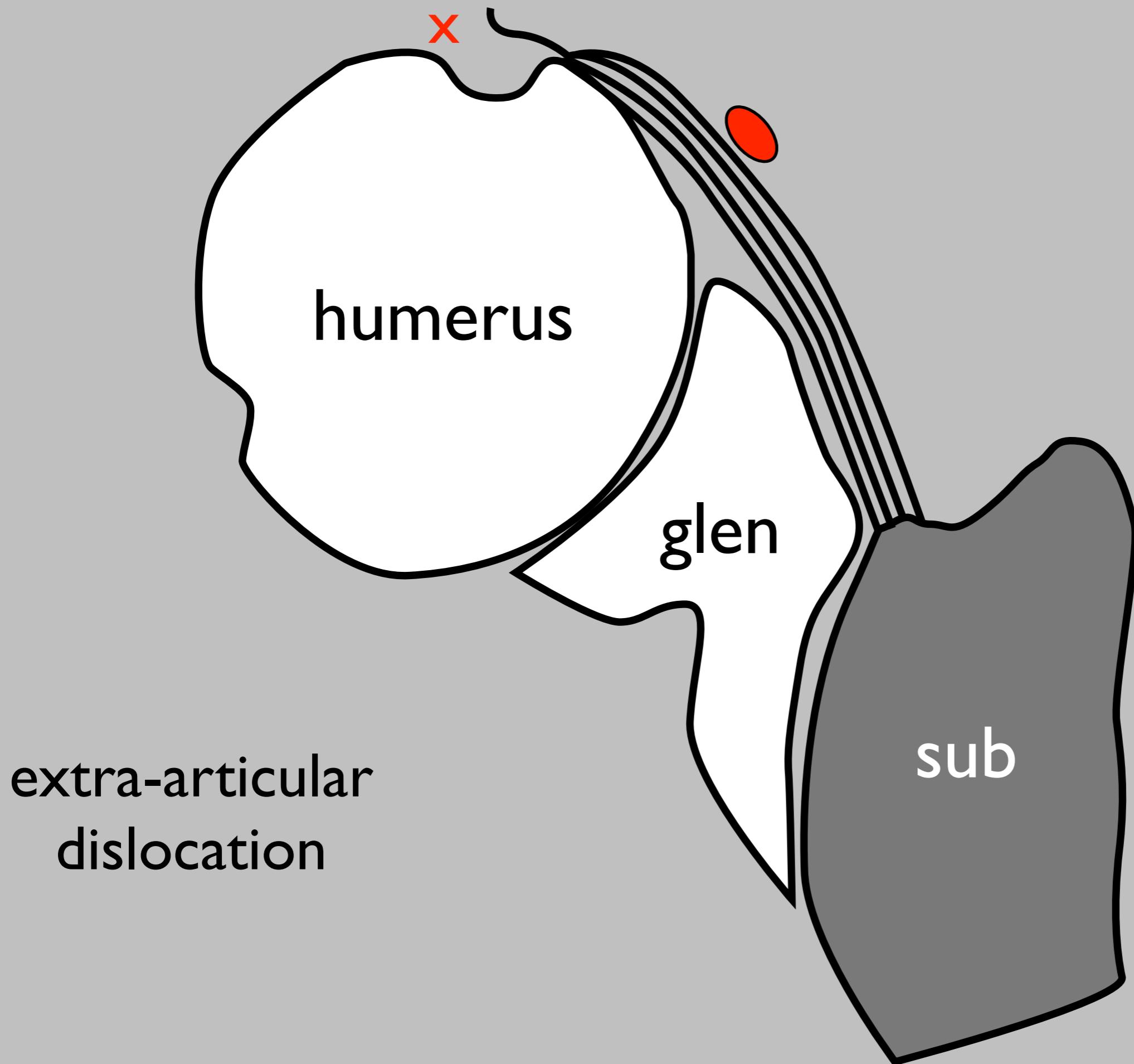
Axial T2W FS

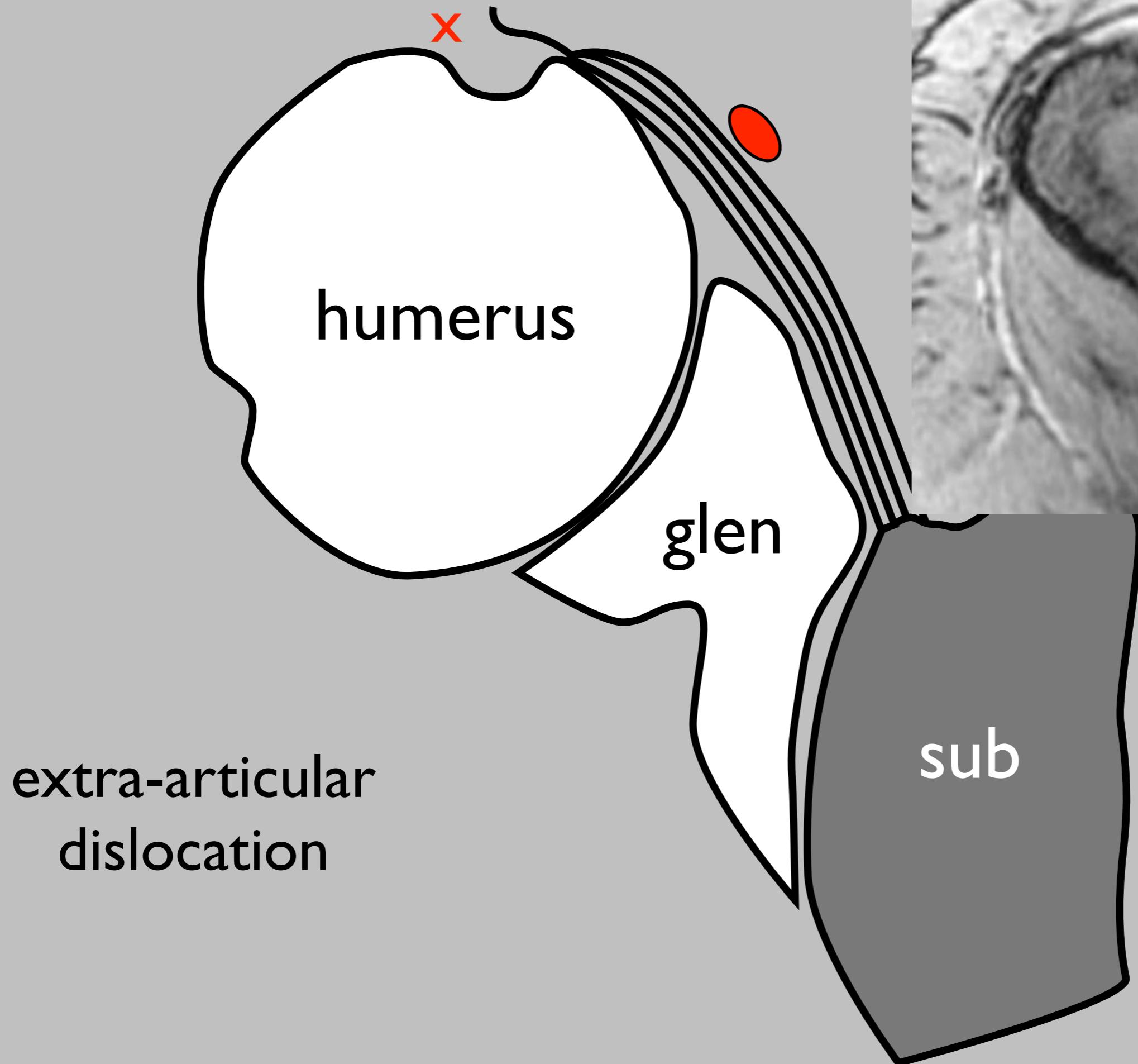


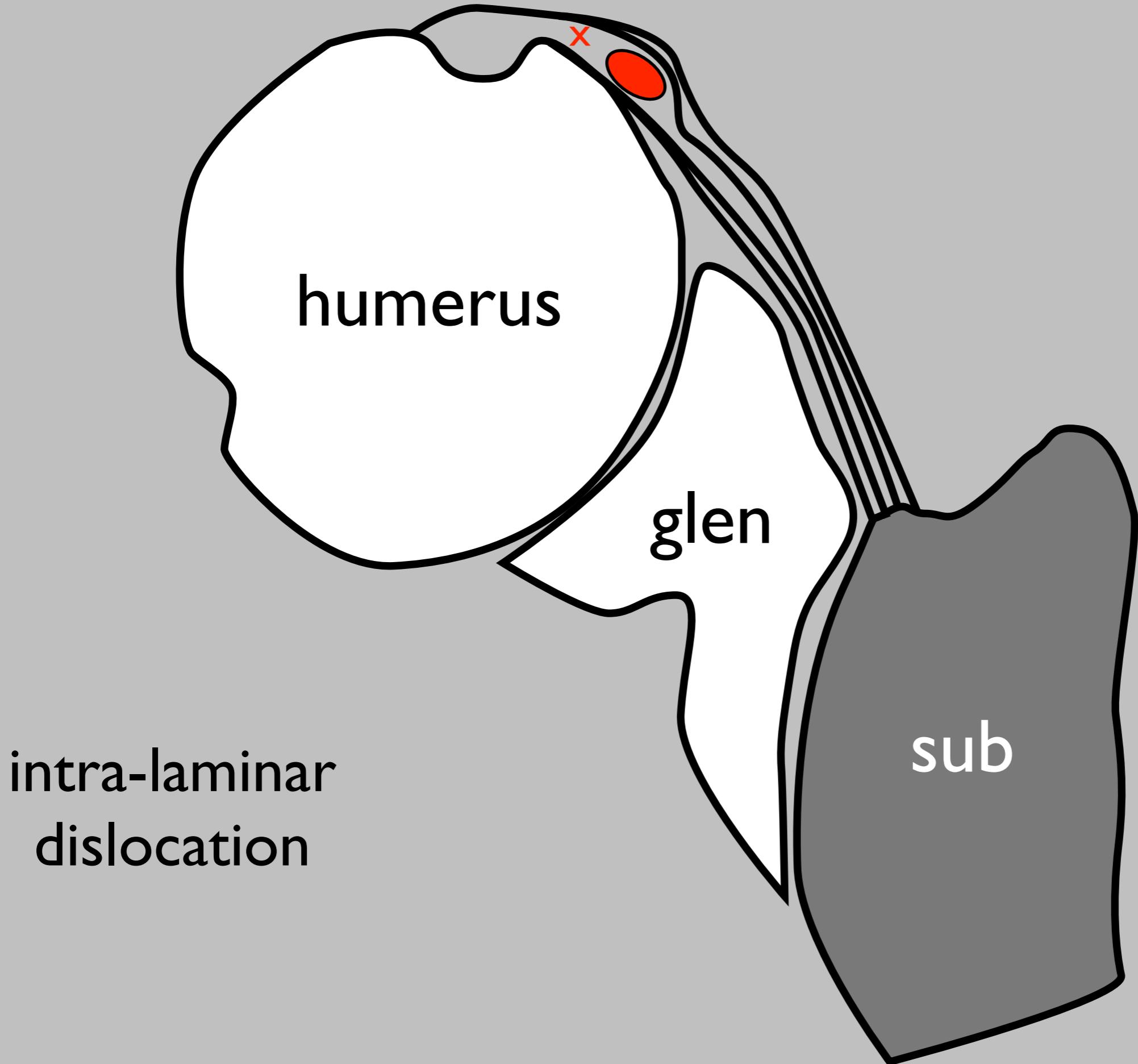
Axial T2W FS

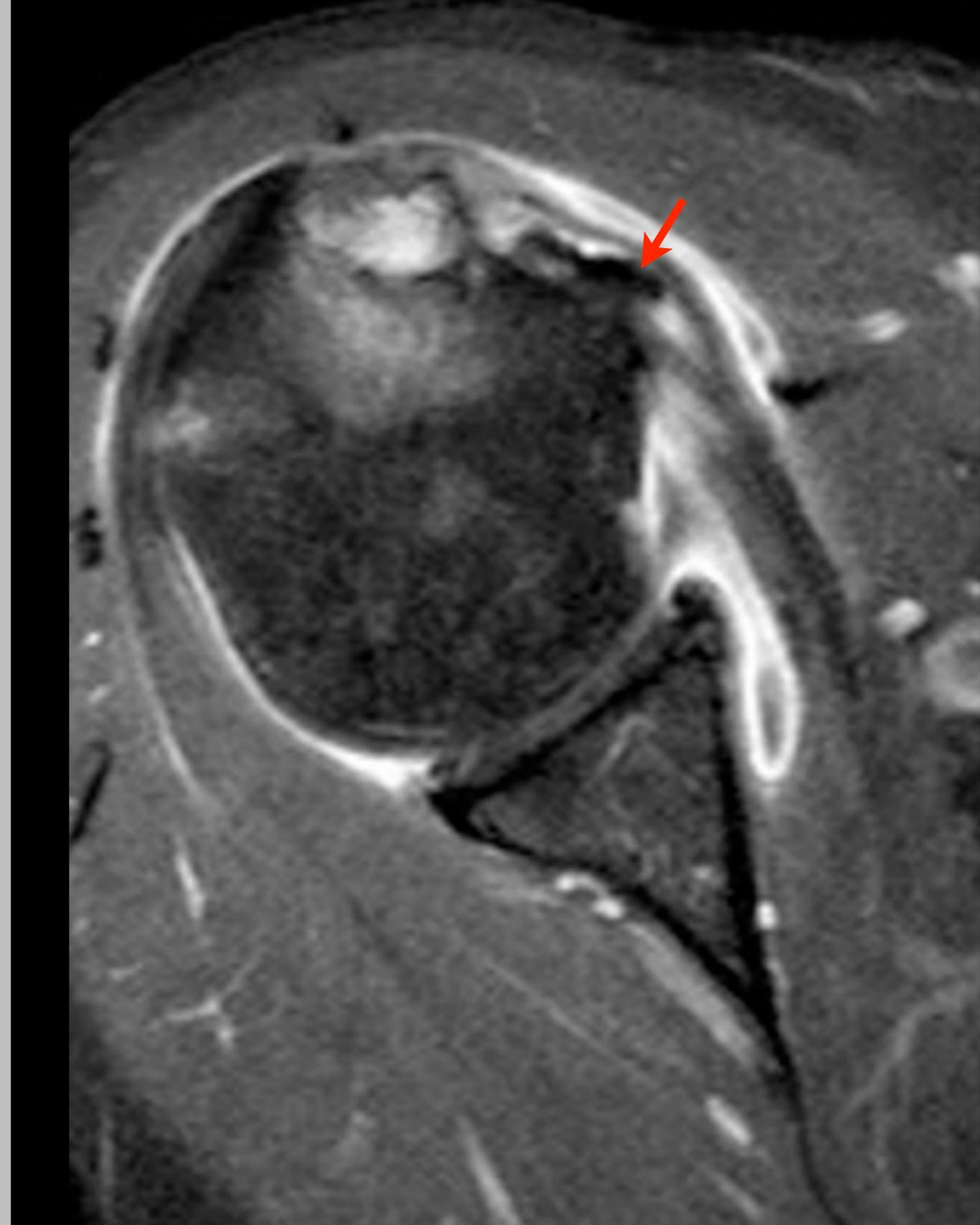
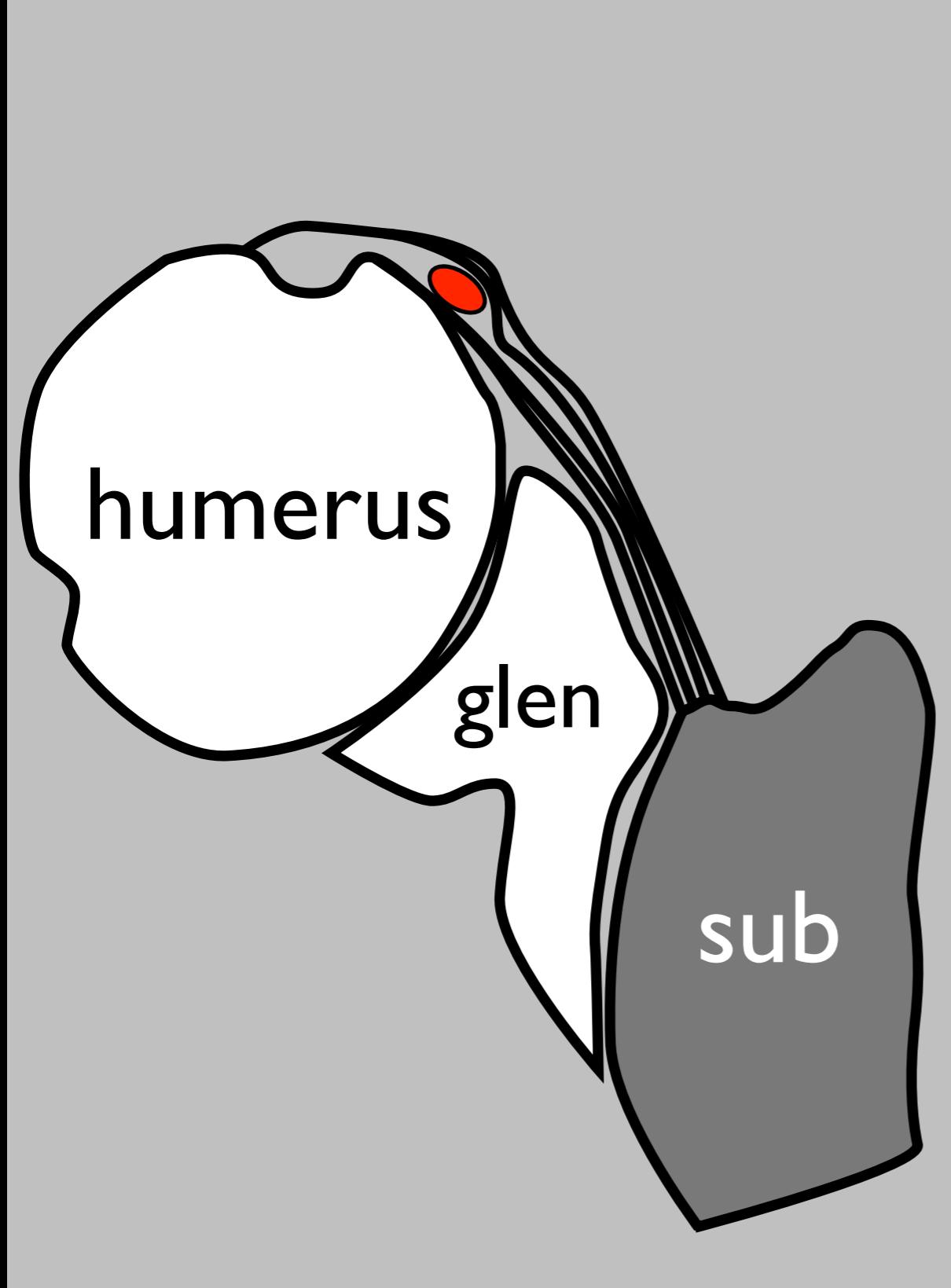


Coronal T2W FS







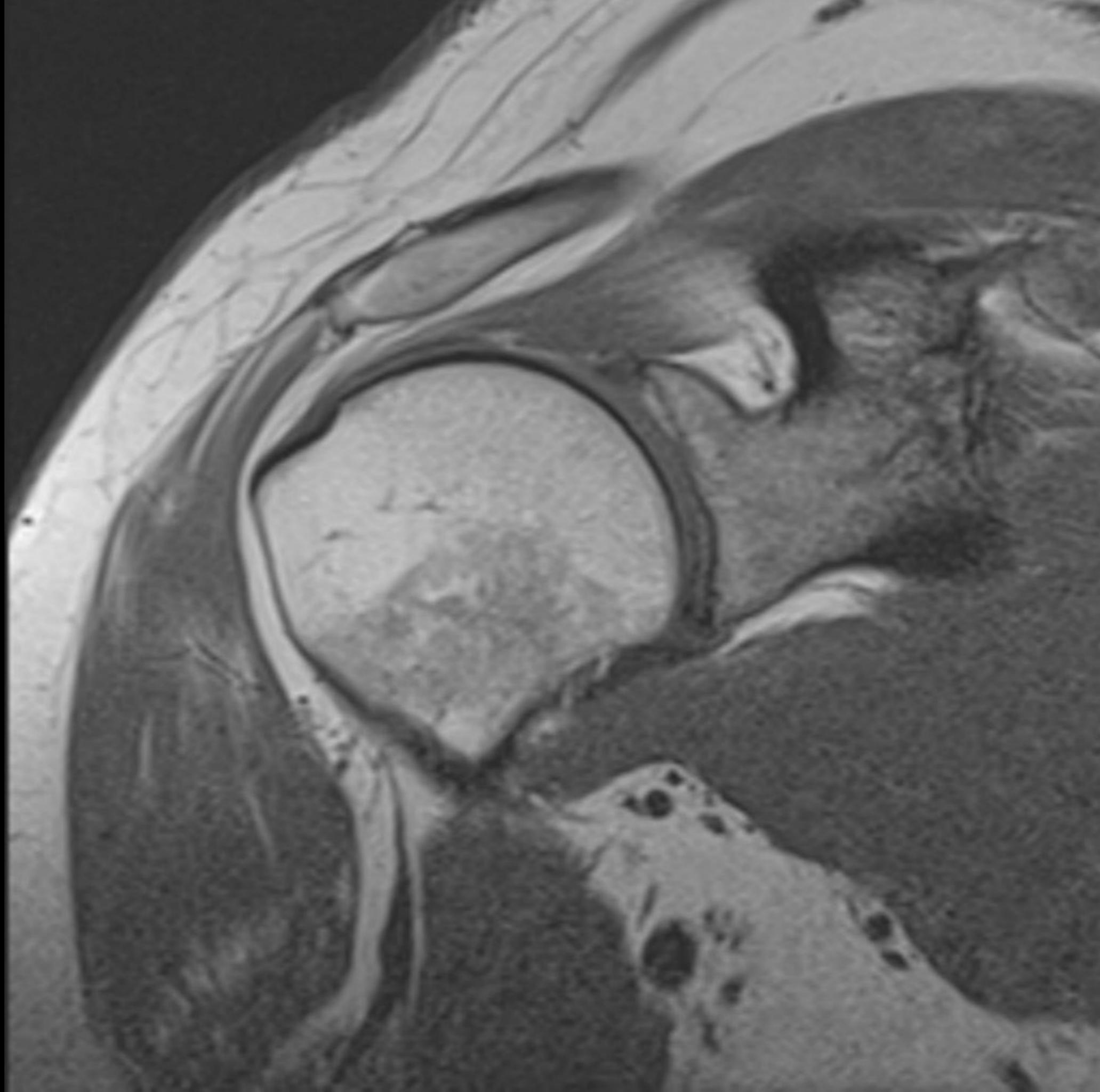


intra-laminar dislocation of biceps tendon

# Case 7

47 M

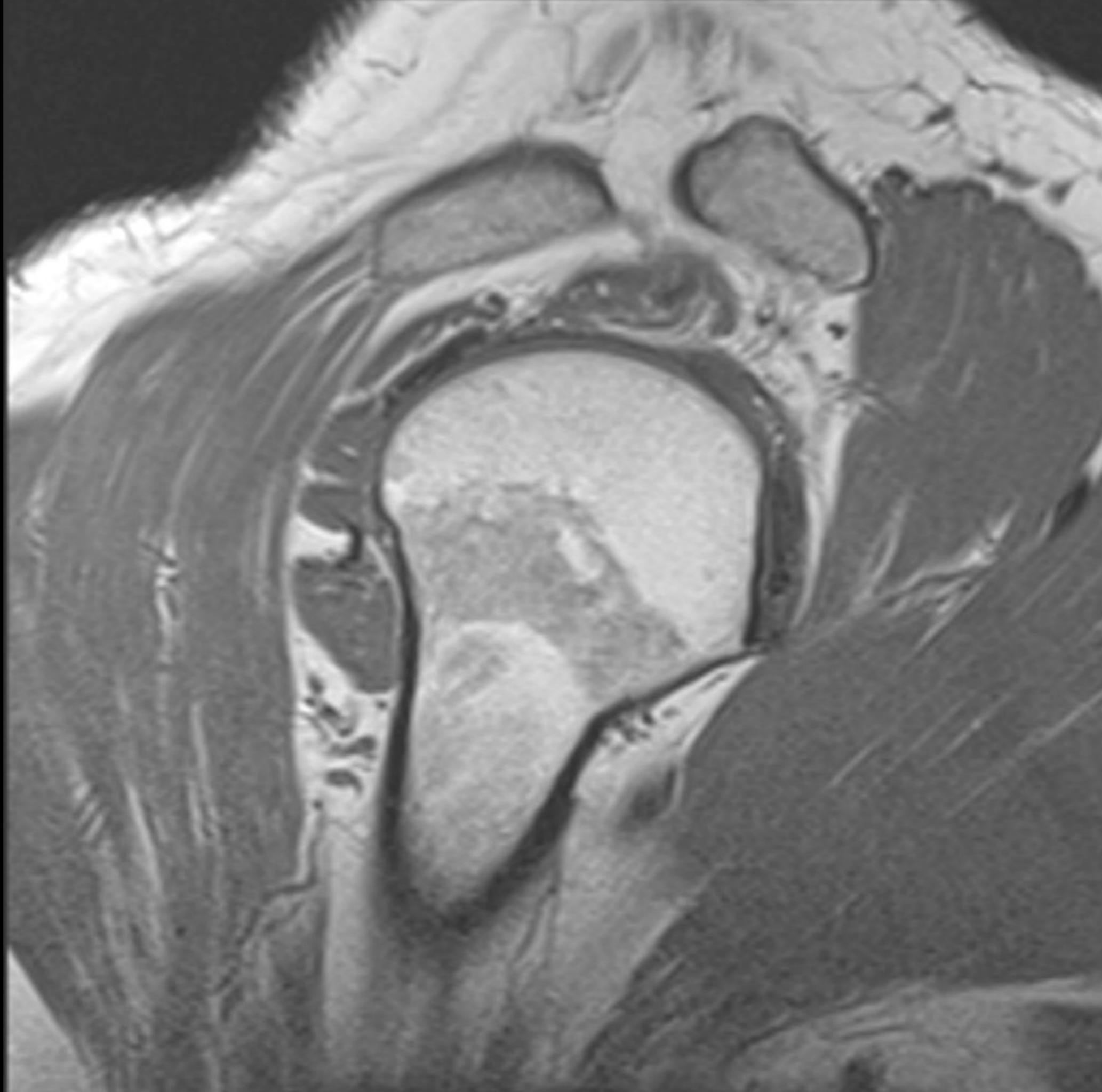
shoulder  
pain and  
weakness



47 M

shoulder  
pain and  
weakness

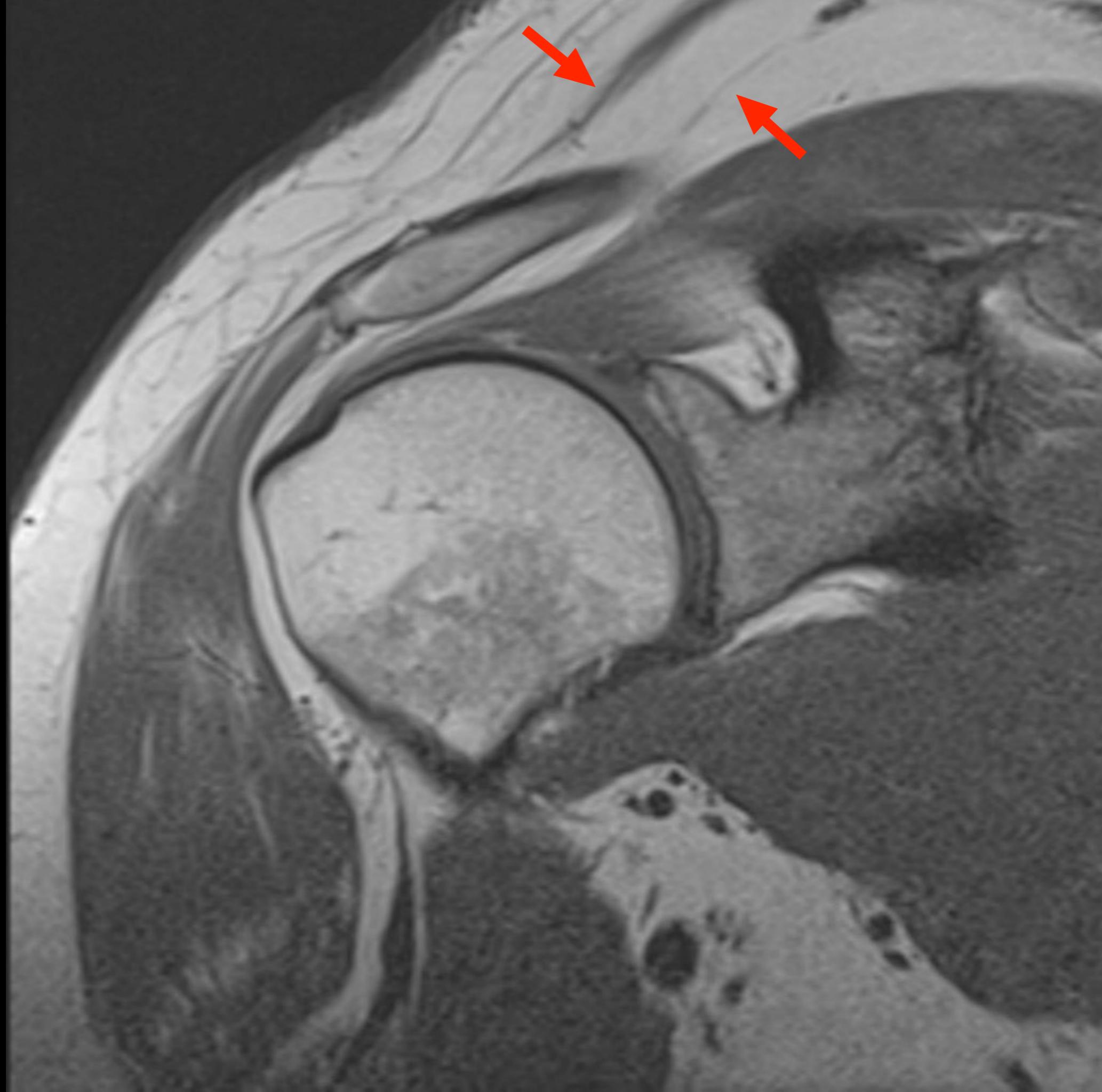
?



47 M

shoulder  
pain and  
weakness

a hint

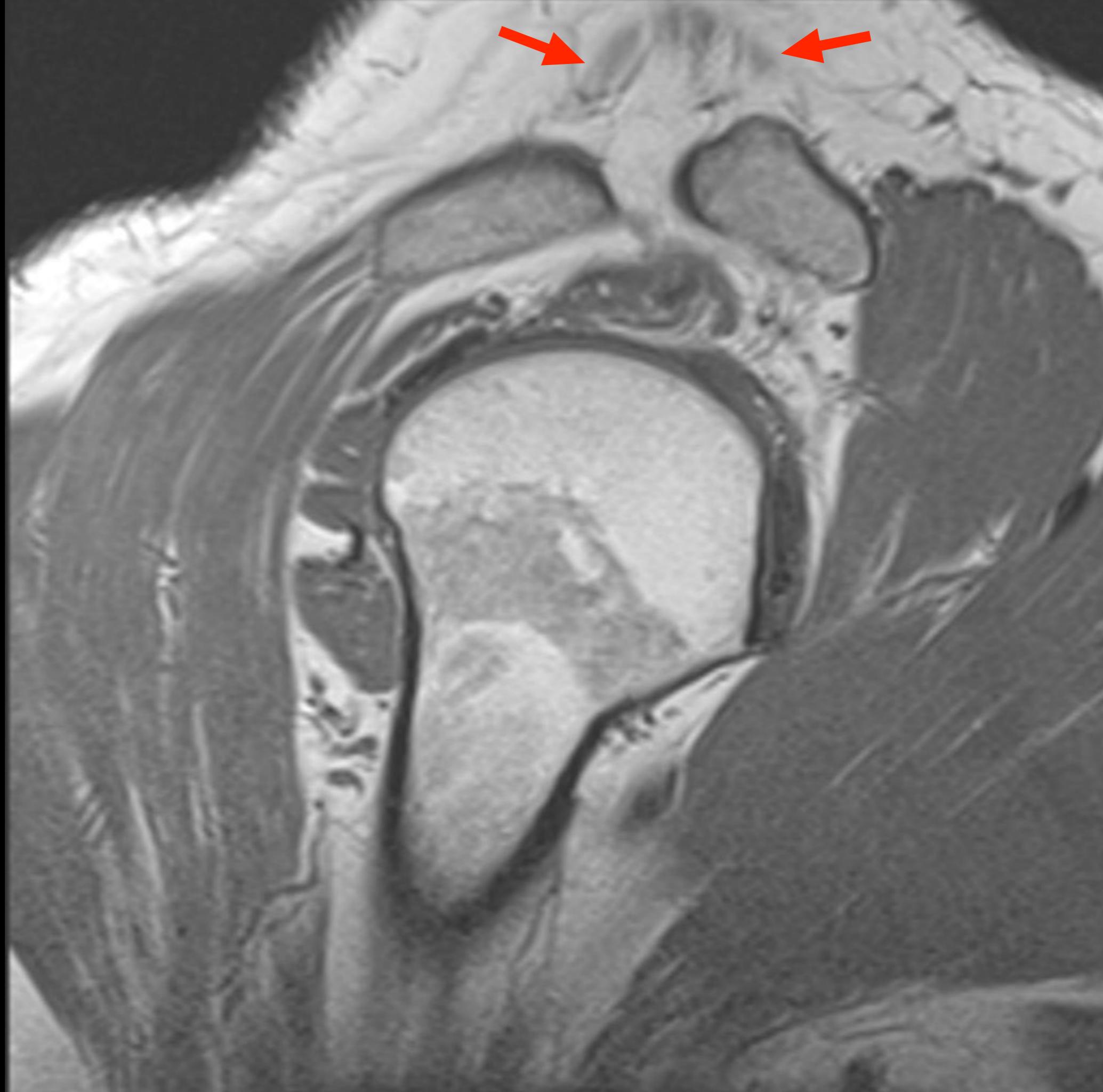


47 M

shoulder  
pain and  
weakness

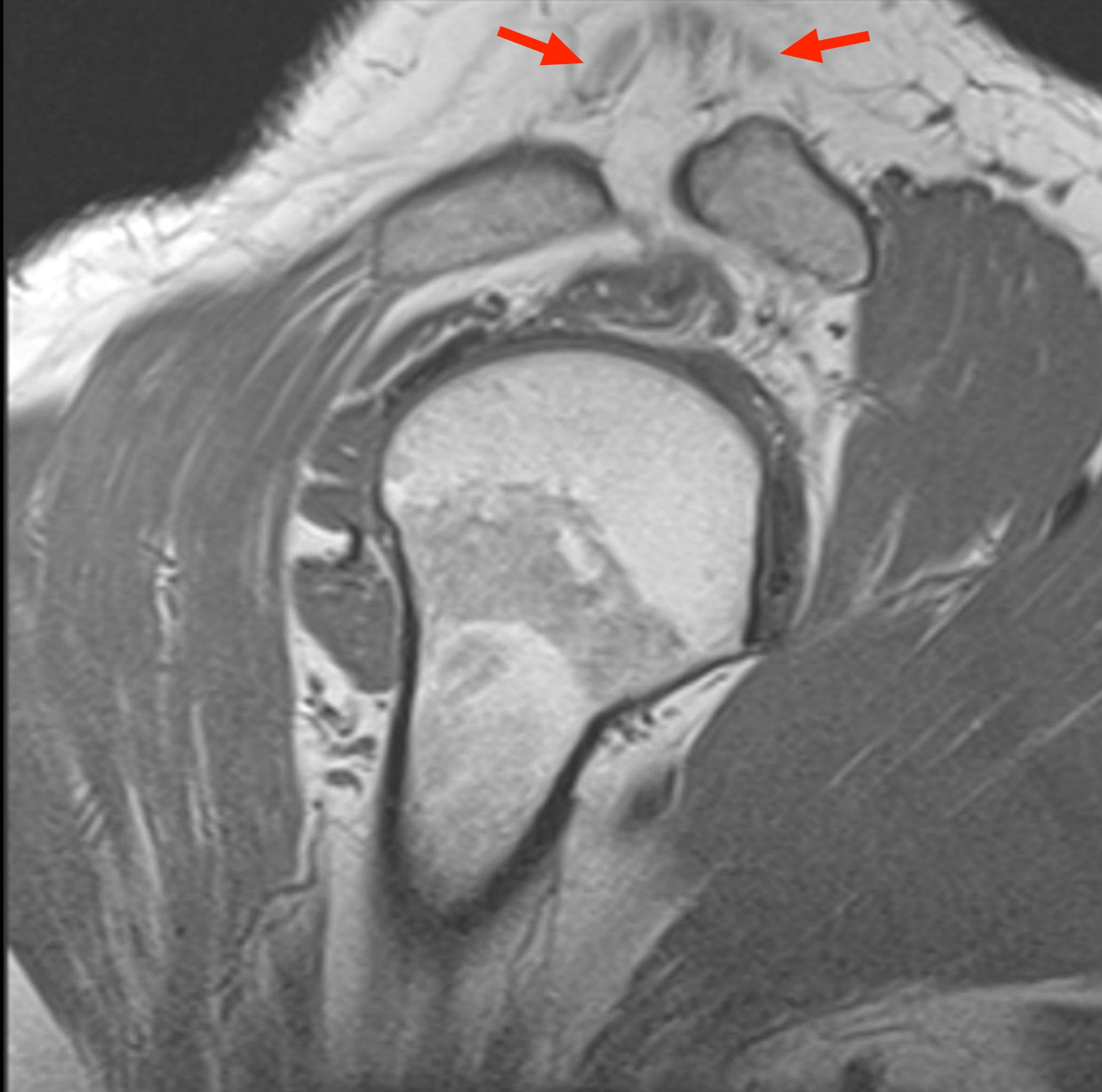
?

another  
hint



denervation  
patterns  
about the  
shoulder

Yanny et al.  
AJR 2010  
1;195:W157

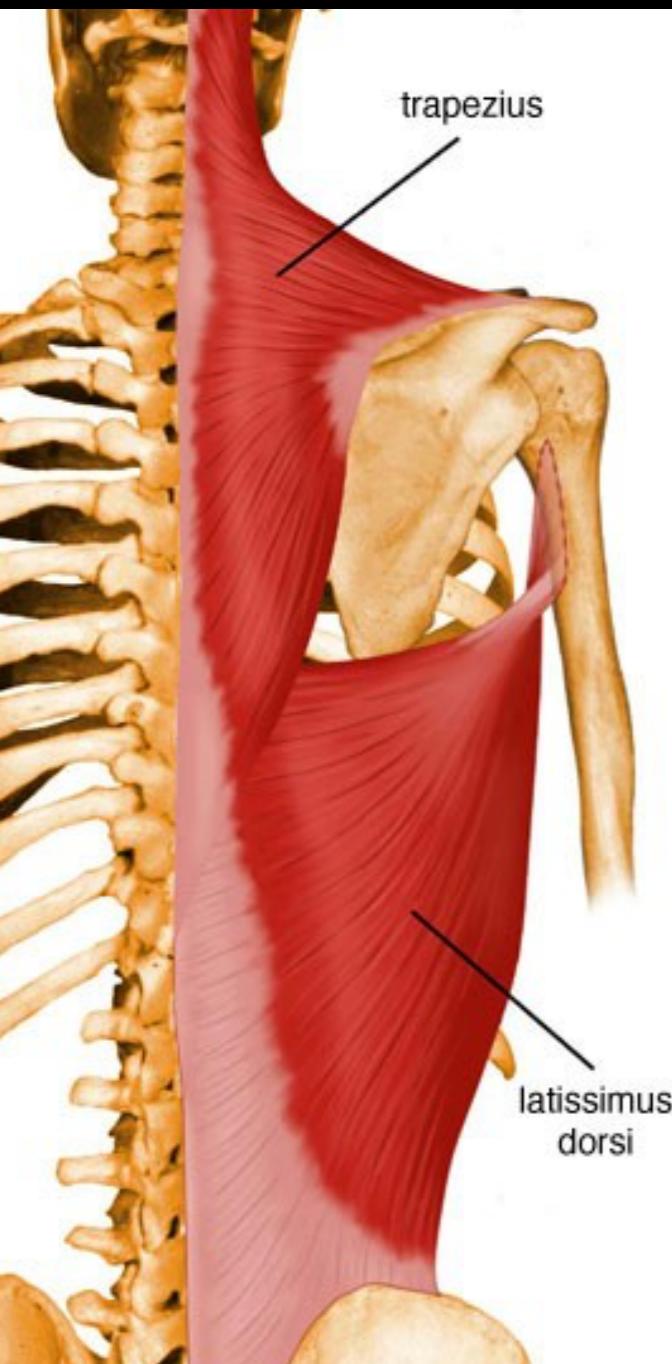


pattern 1.

47 M

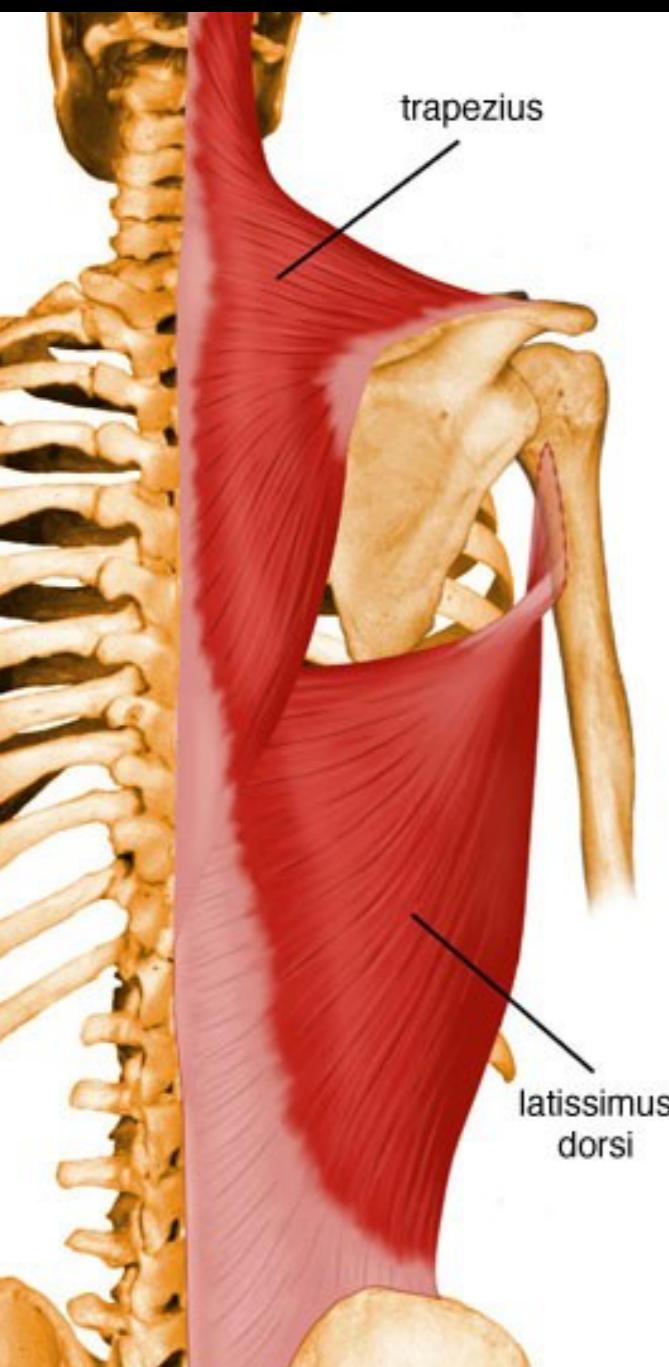
trapezius

shoulder  
pain and  
weakness

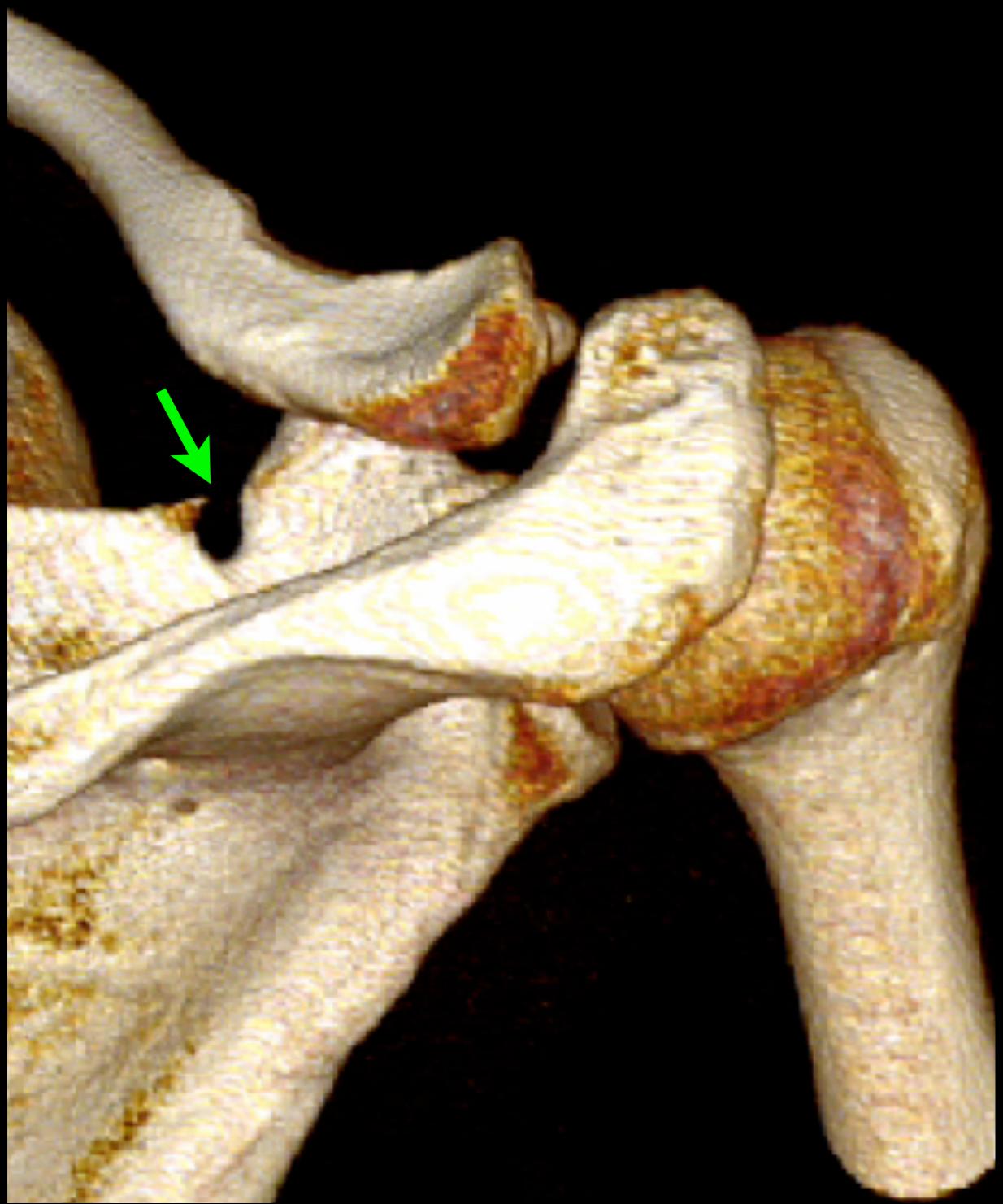


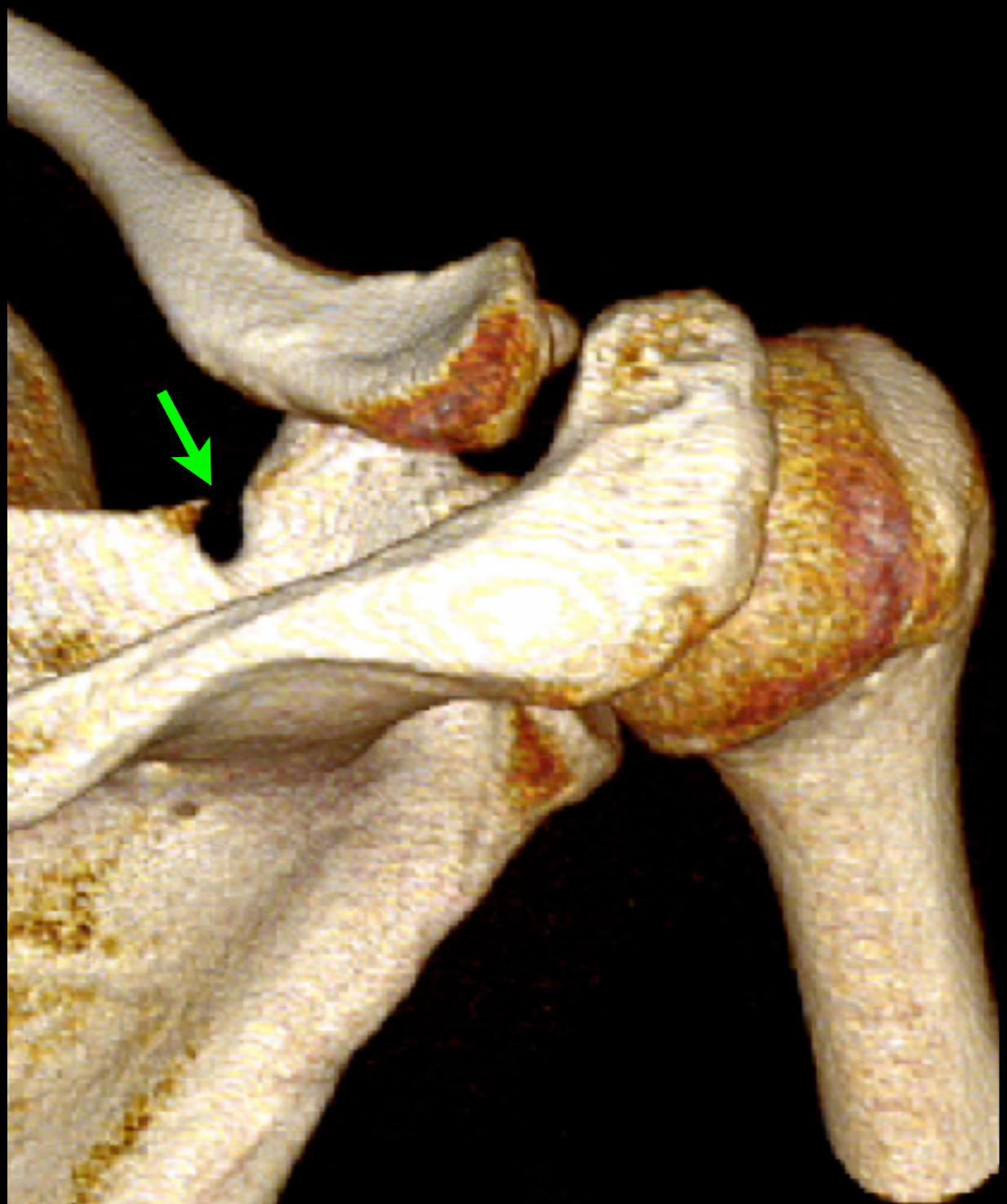
47 M

shoulder  
pain and  
weakness

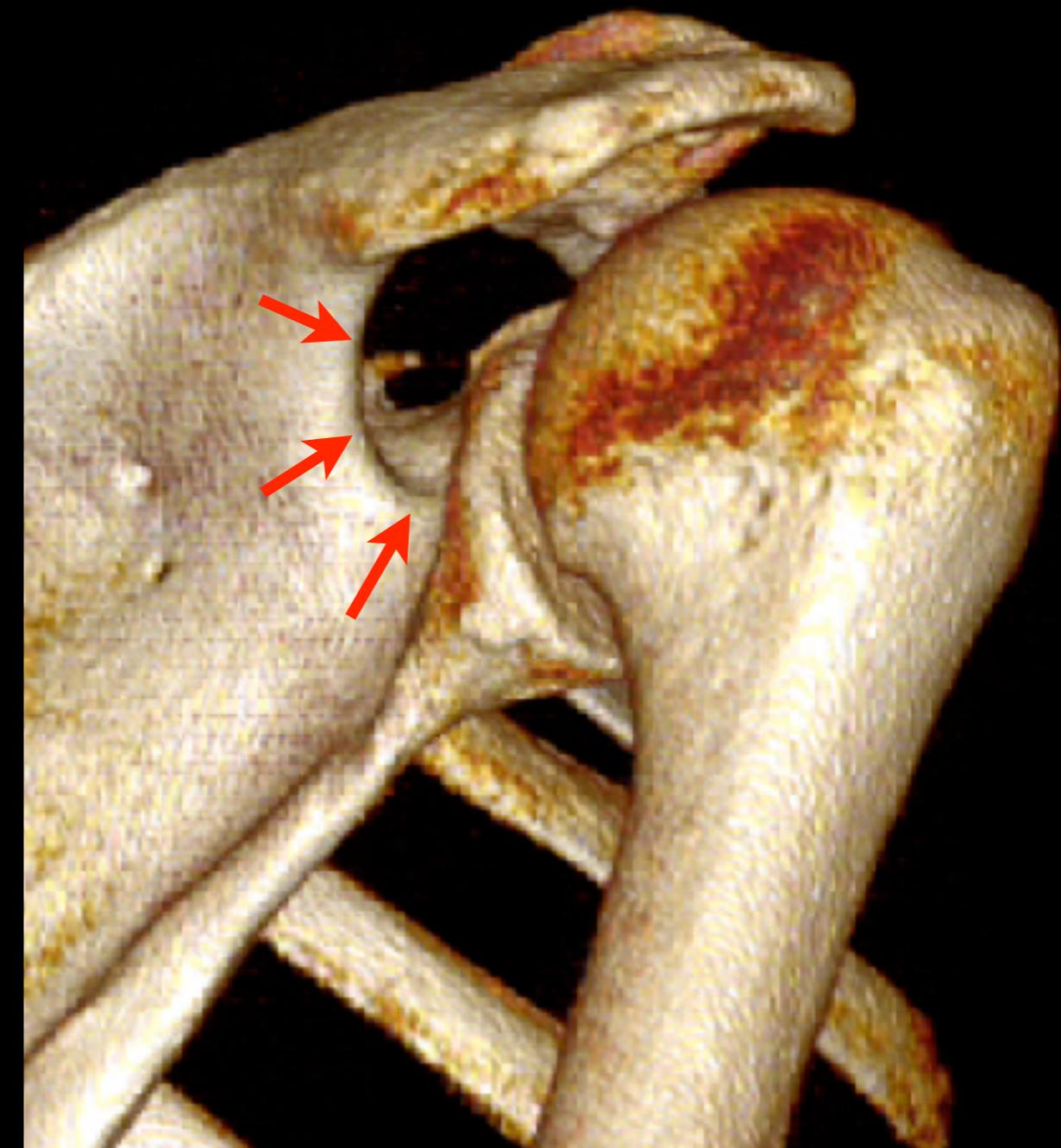
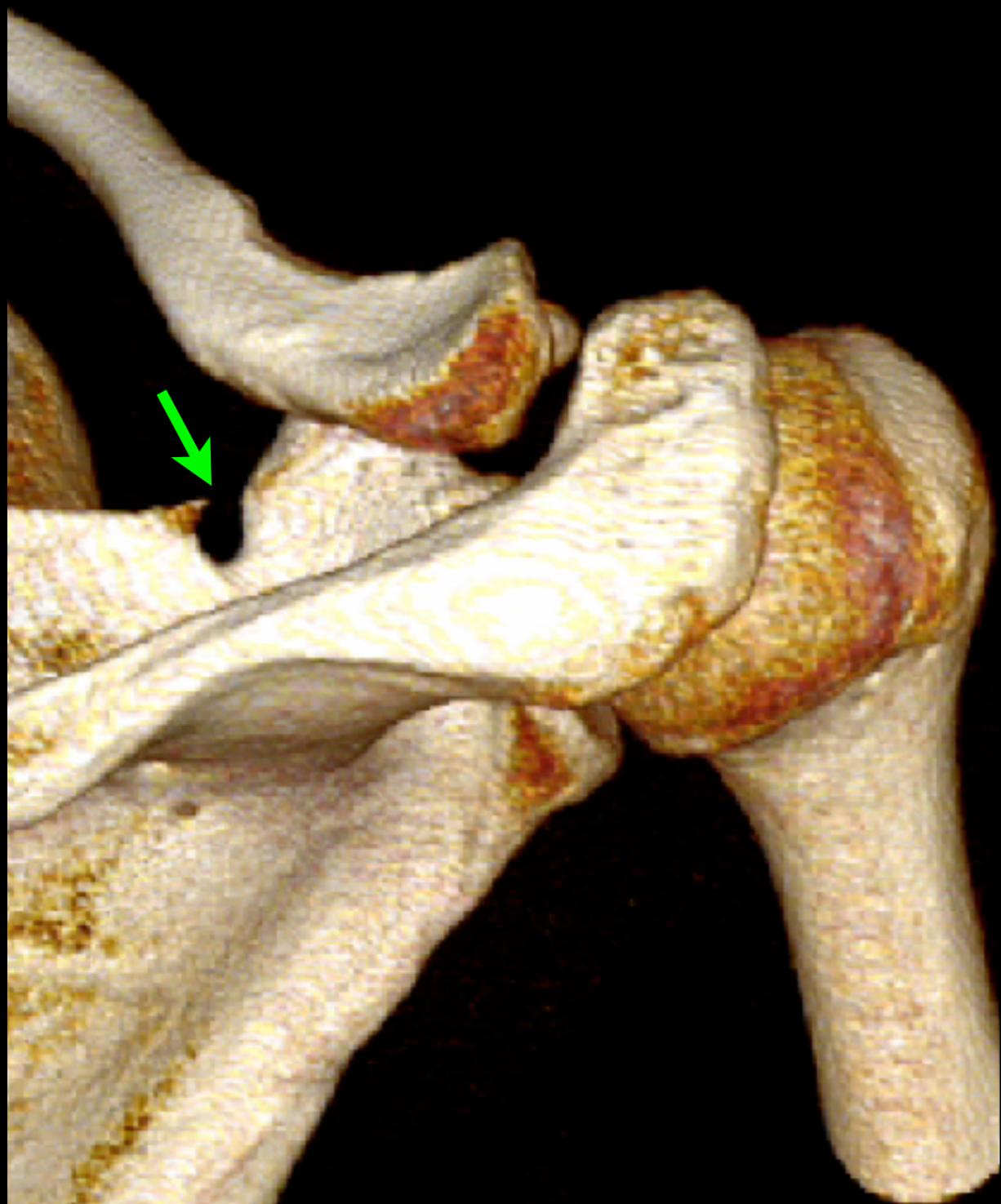


pattern 2.

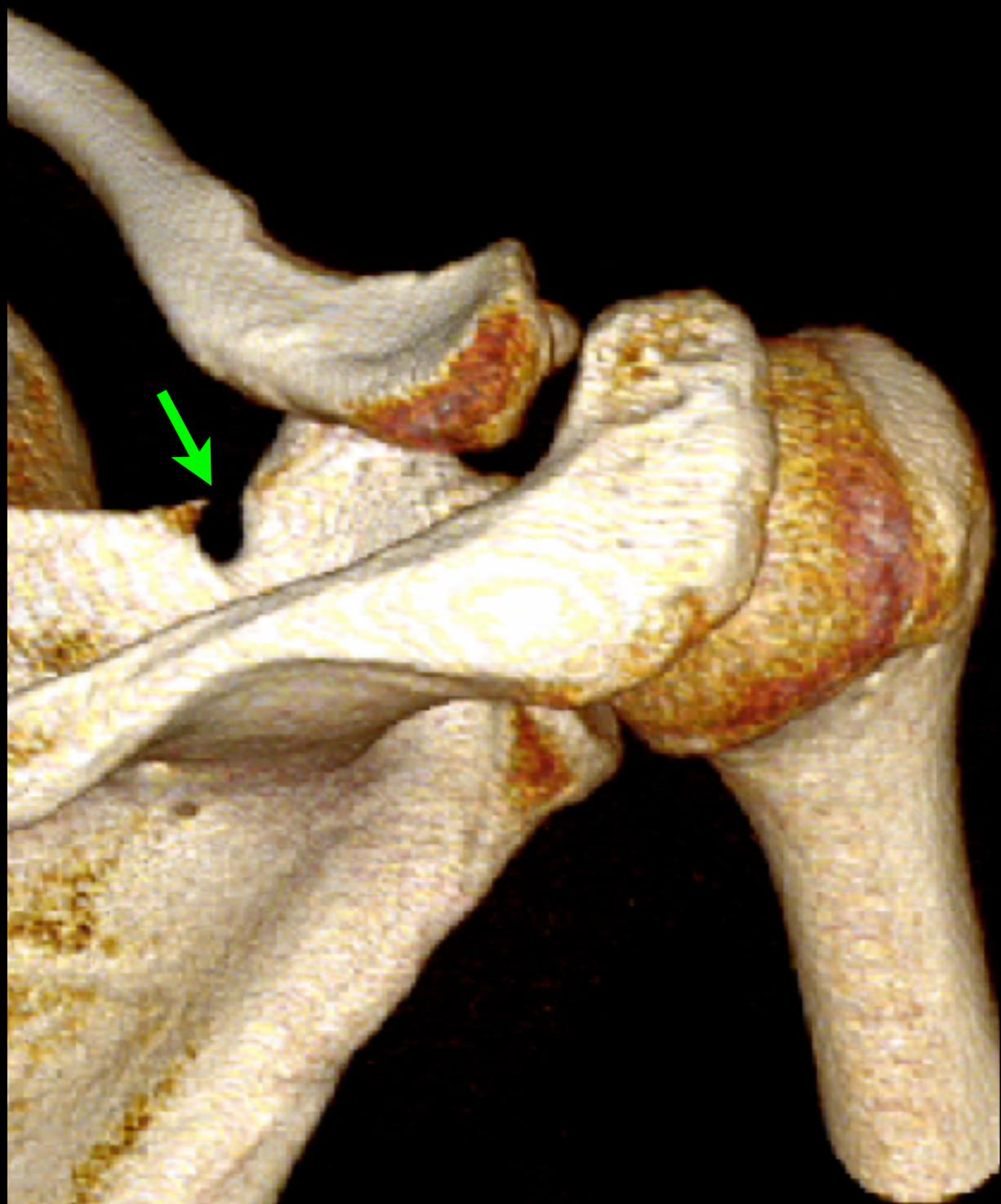




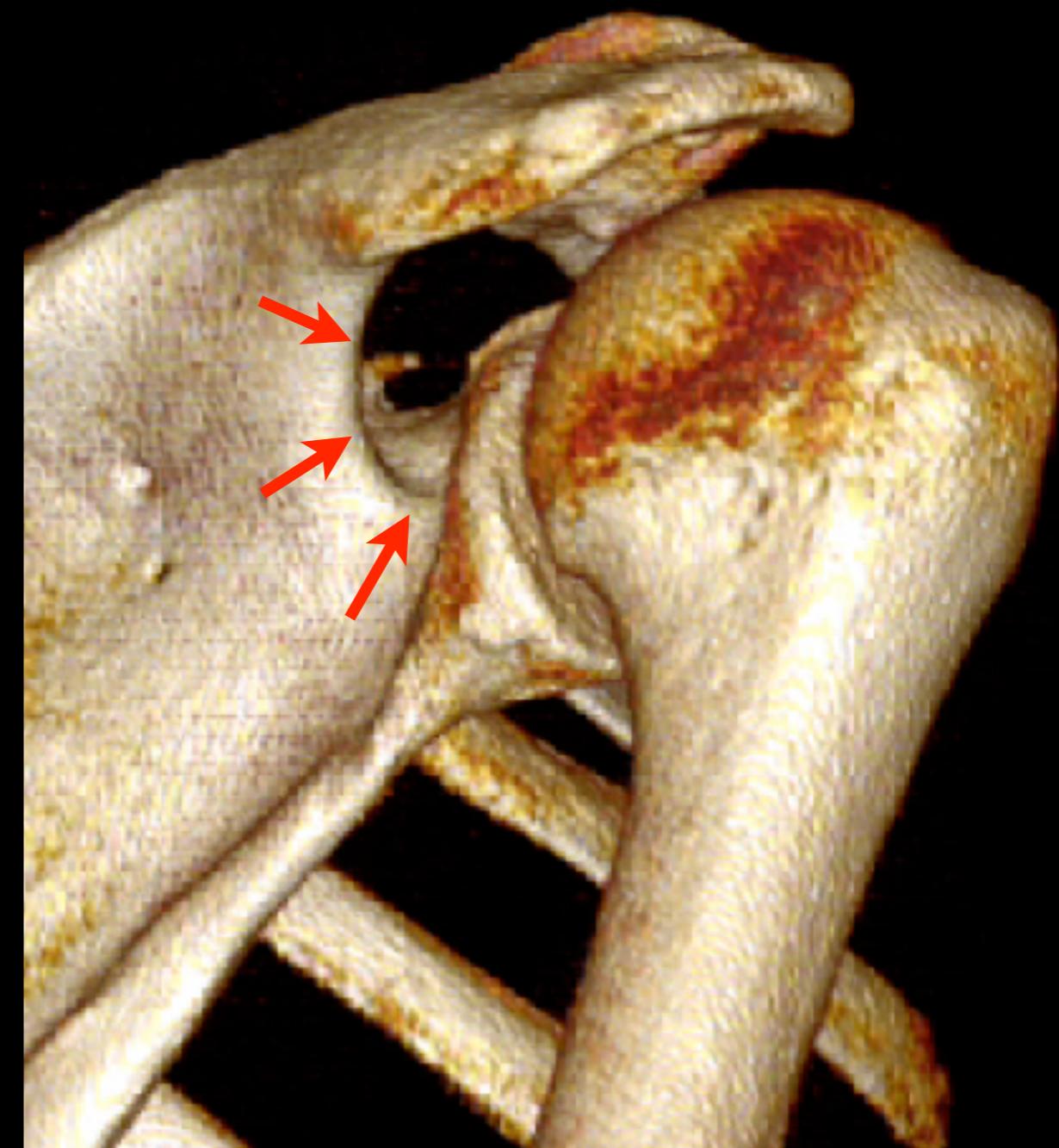
suprascapular notch



suprascapular notch

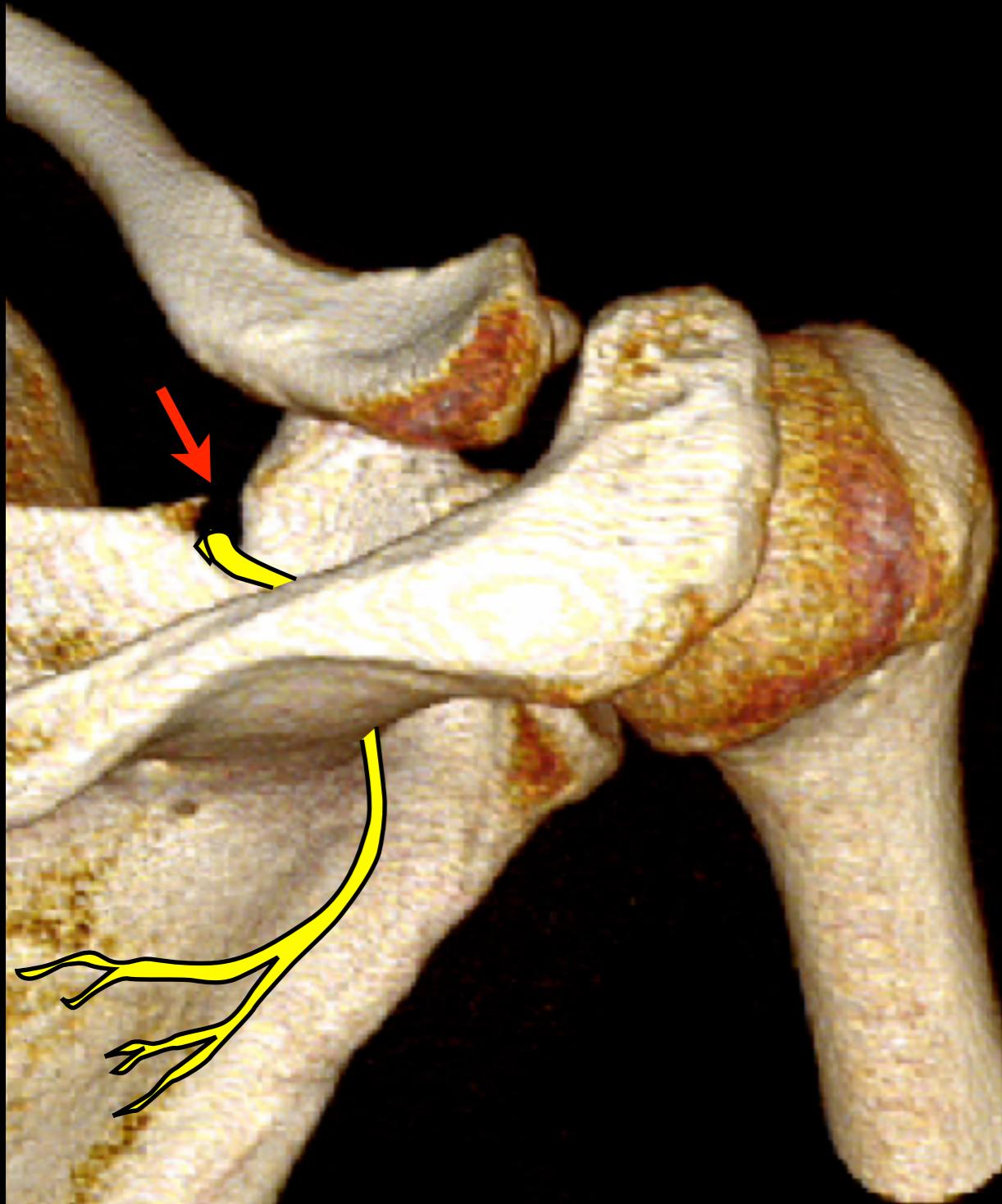


suprascapular notch

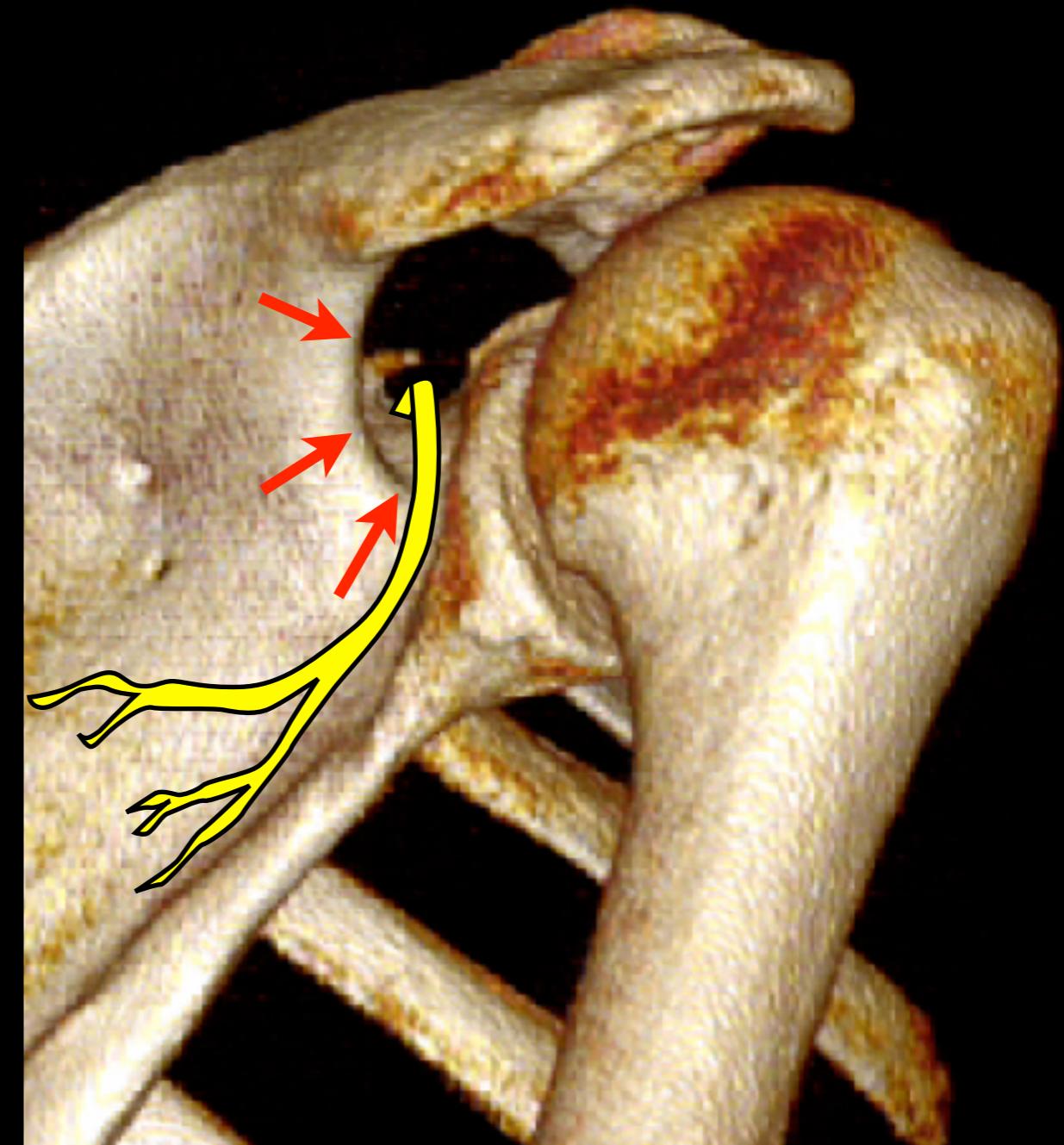


spinoglenoid notch

# Suprascapular nerve

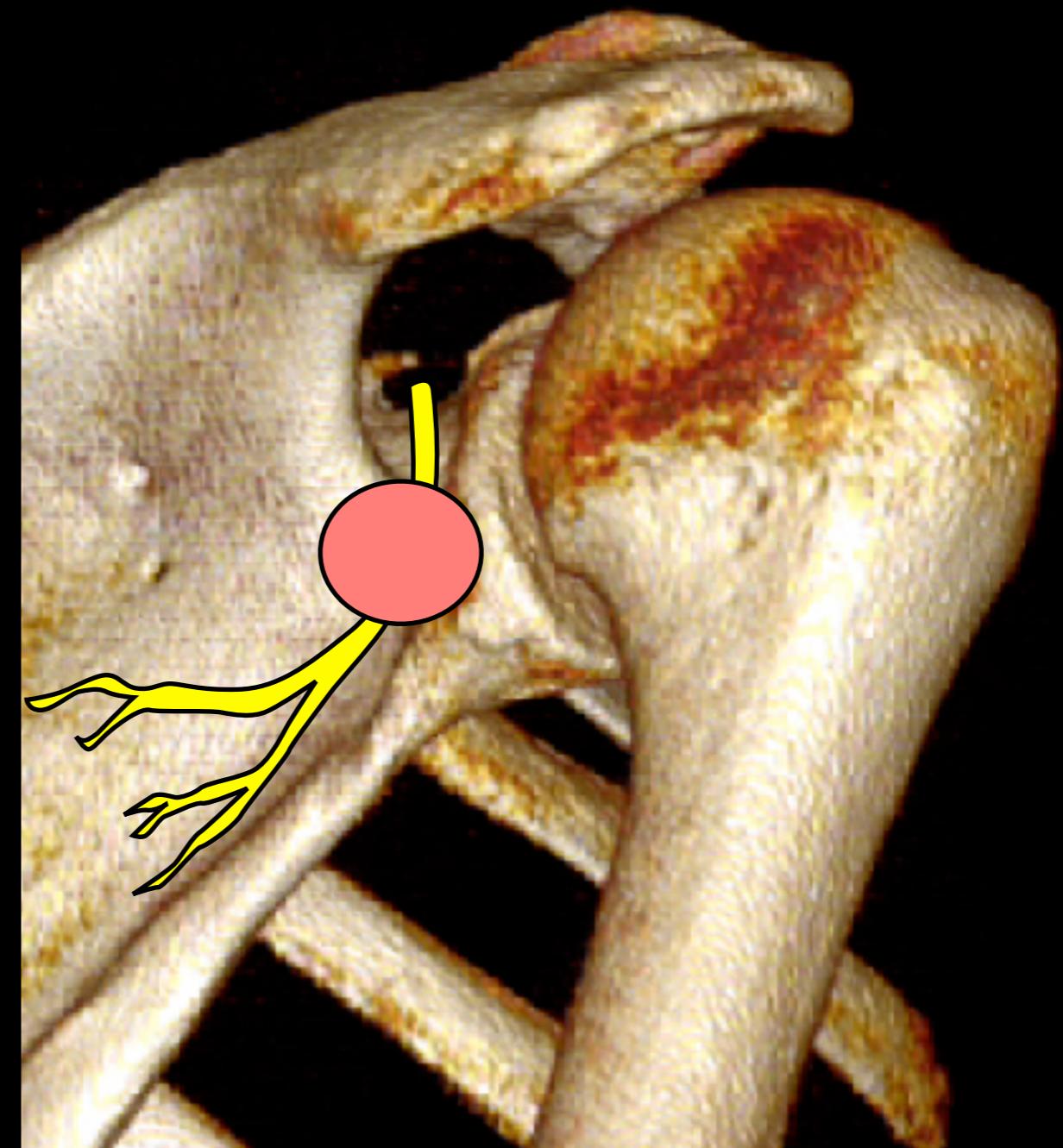
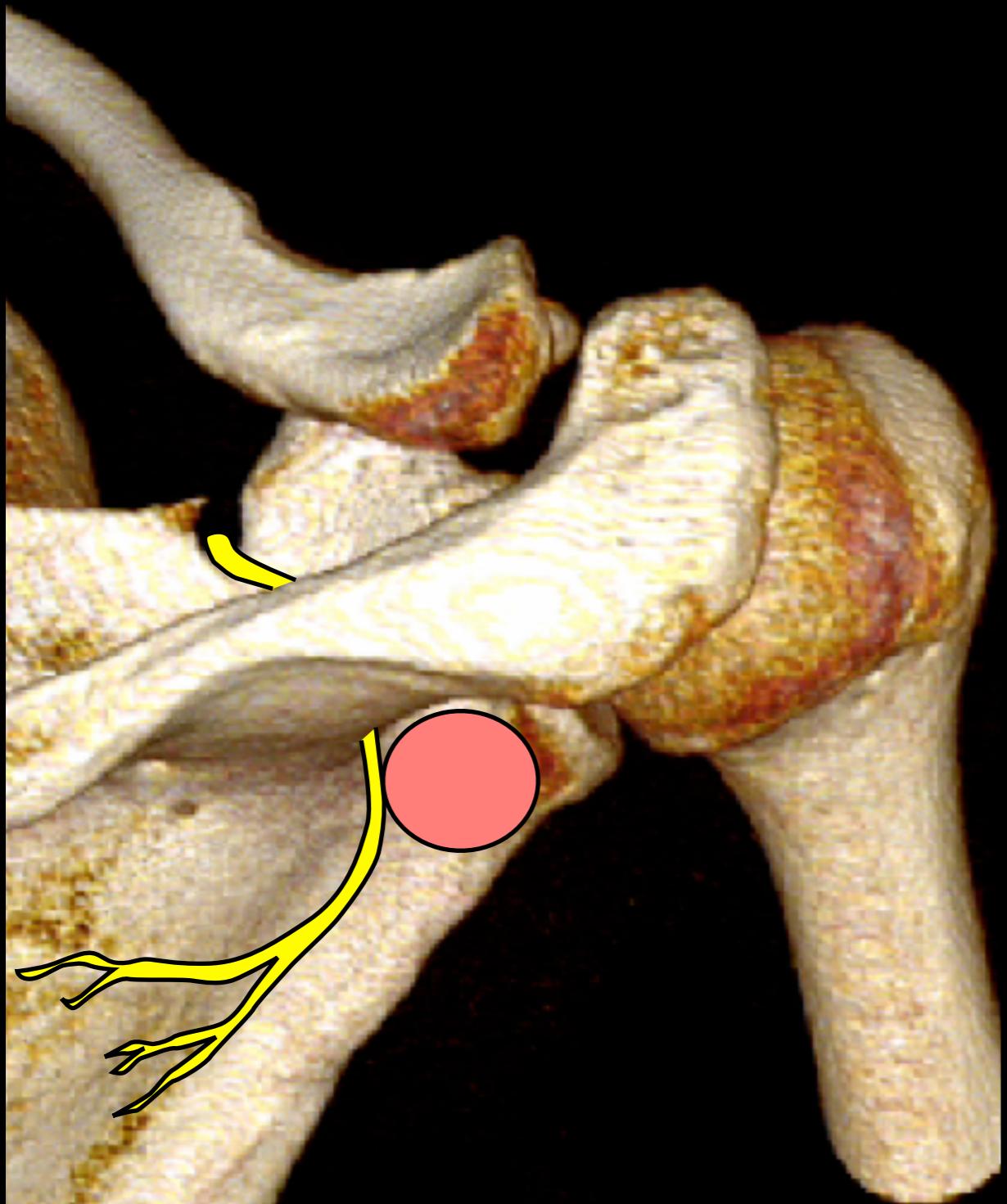


suprascapular notch



spinoglenoid notch

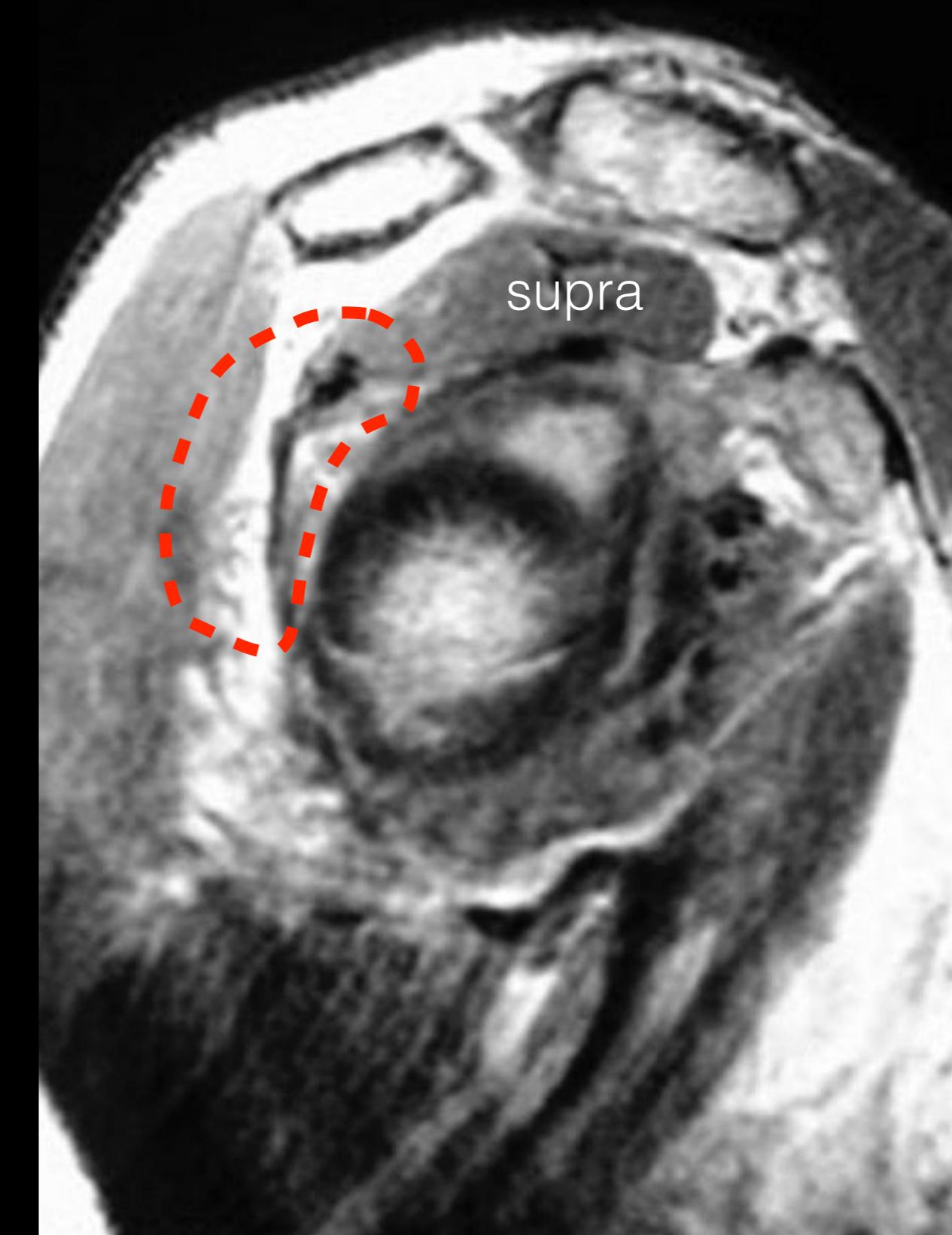
# Paralabral ganglion cyst



Ludig T et al. *Eur Radiol* 2001;11:2161-9.  
Carroll KW et al. *Skeletal Radiol* 2003;32:72-7



Spinoglenoid notch cyst with infraspinatus denervation atrophy

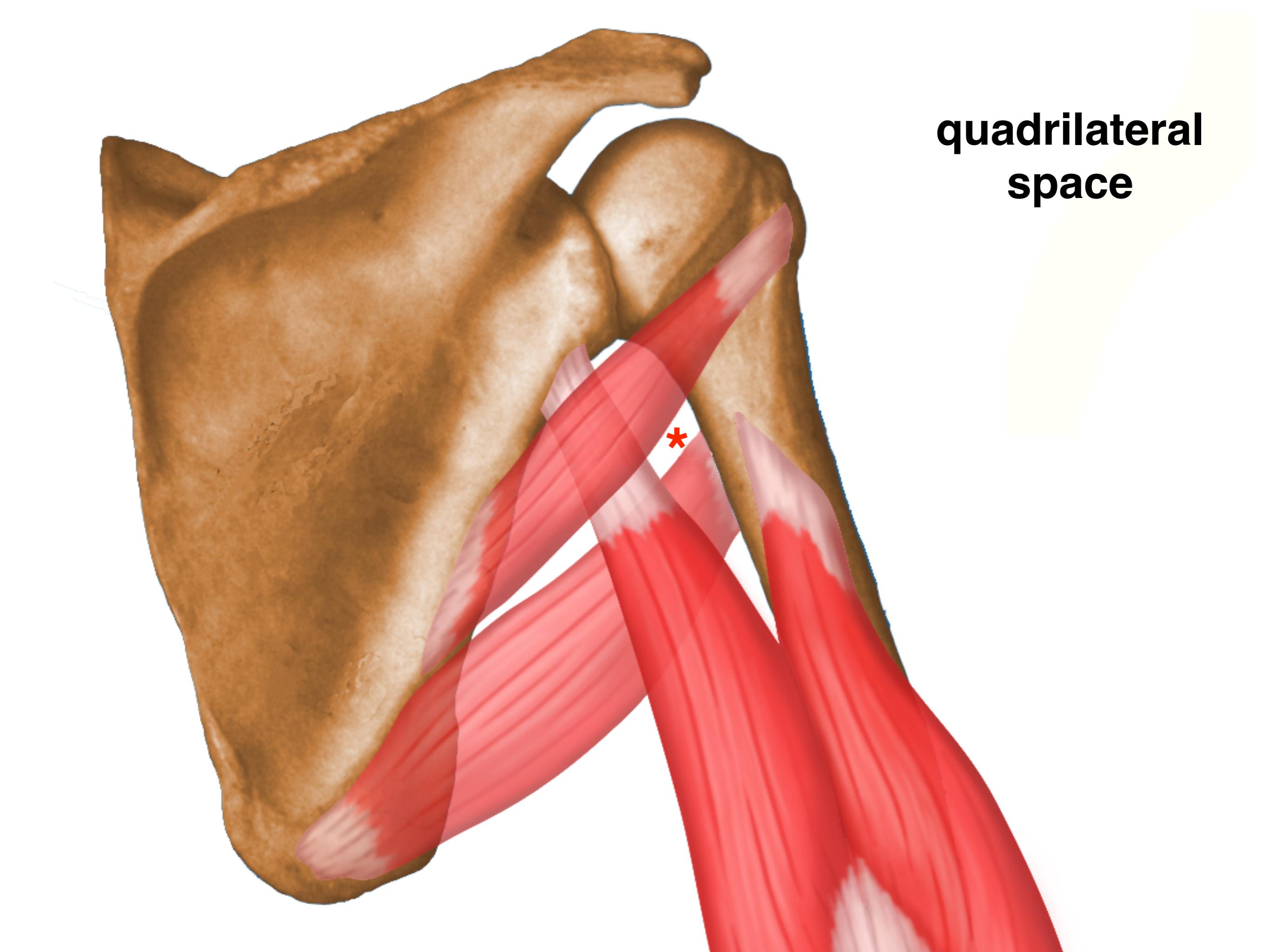


Spinoglenoid notch cyst with infraspinatus denervation atrophy



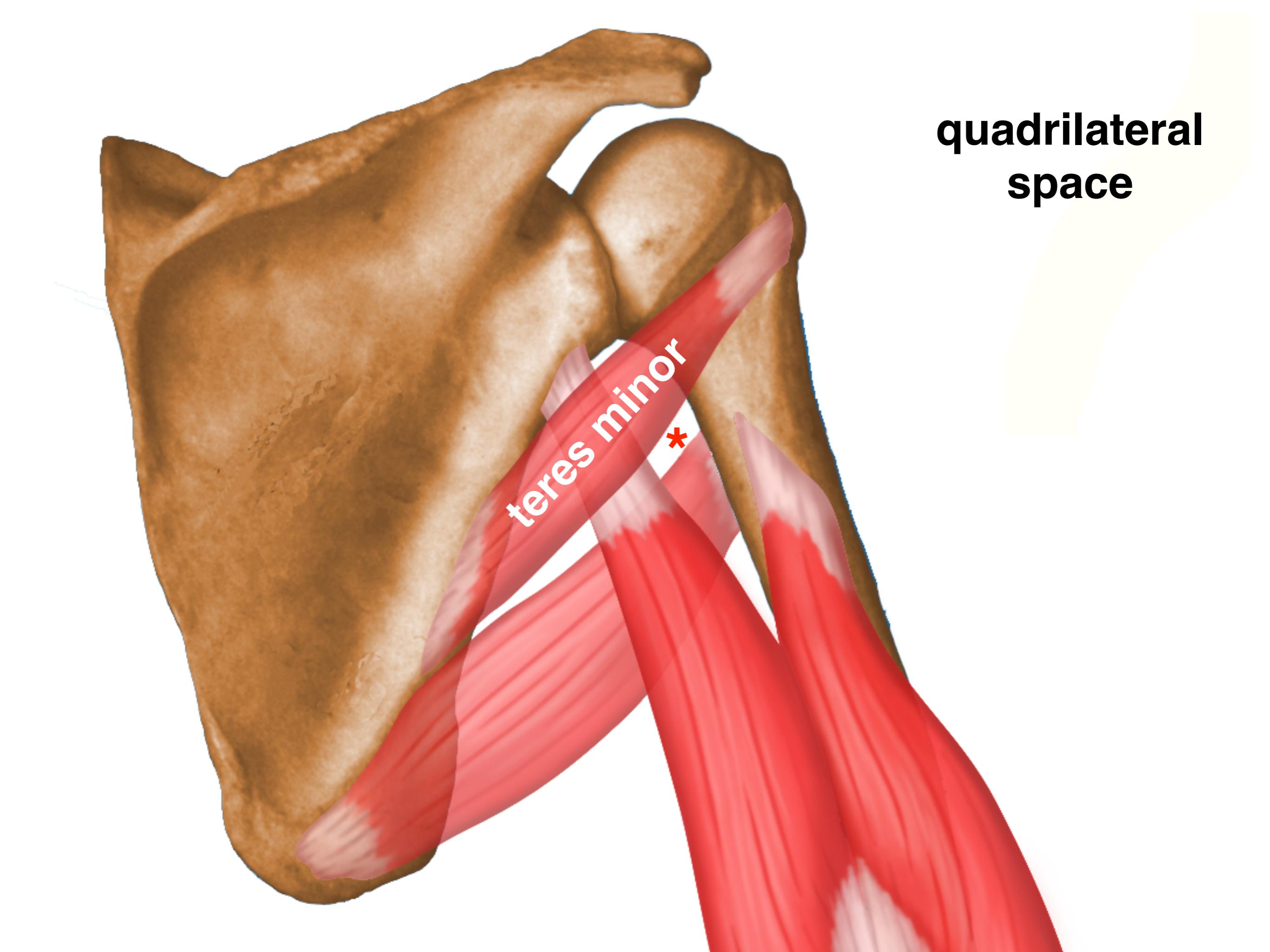
Spinoglenoid notch cyst with infraspinatus denervation atrophy

pattern 3.



A 3D anatomical model of the posterior aspect of a human right arm. The trapezius muscle is shown in orange, and the underlying latissimus dorsi muscle is shown in red. A white line traces the border of the trapezius, and a pink shaded area indicates the quadrilateral space. A small red asterisk (\*) marks the inferior angle of the scapula where the line from the trapezius border meets the latissimus dorsi.

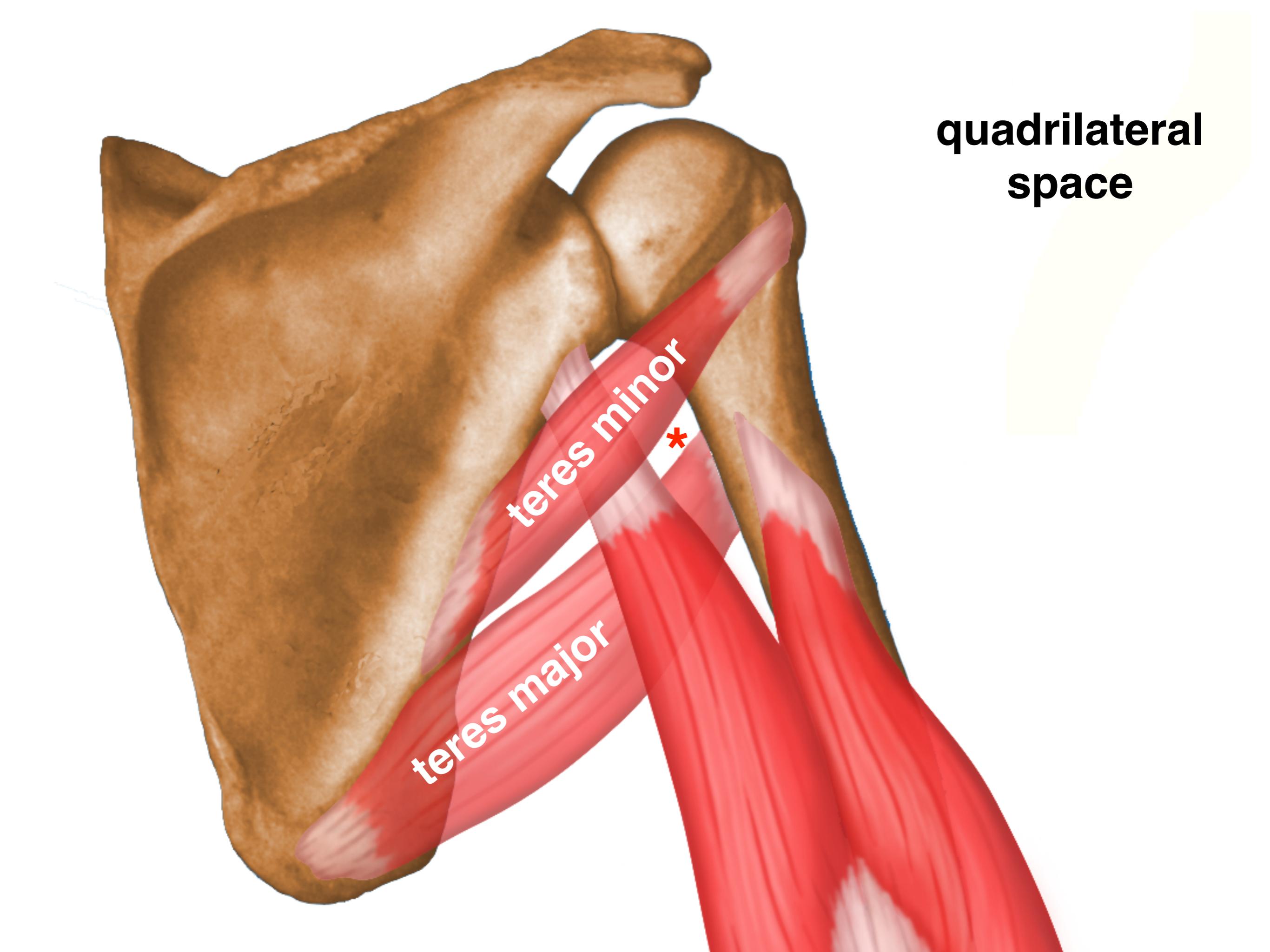
**quadrilateral  
space**



A 3D anatomical model of the posterior aspect of a human right arm. The trapezius muscle is shown in a light tan color. A red translucent muscle, the teres minor, is visible on the lateral side of the arm. The quadrilateral space is a diamond-shaped area bounded by the latissimus dorsi, teres major, teres minor, and infraspinatus muscles. A white line traces the boundary of this space. The text 'quadrilateral space' is positioned in the upper right corner of the image.

quadrilateral  
space

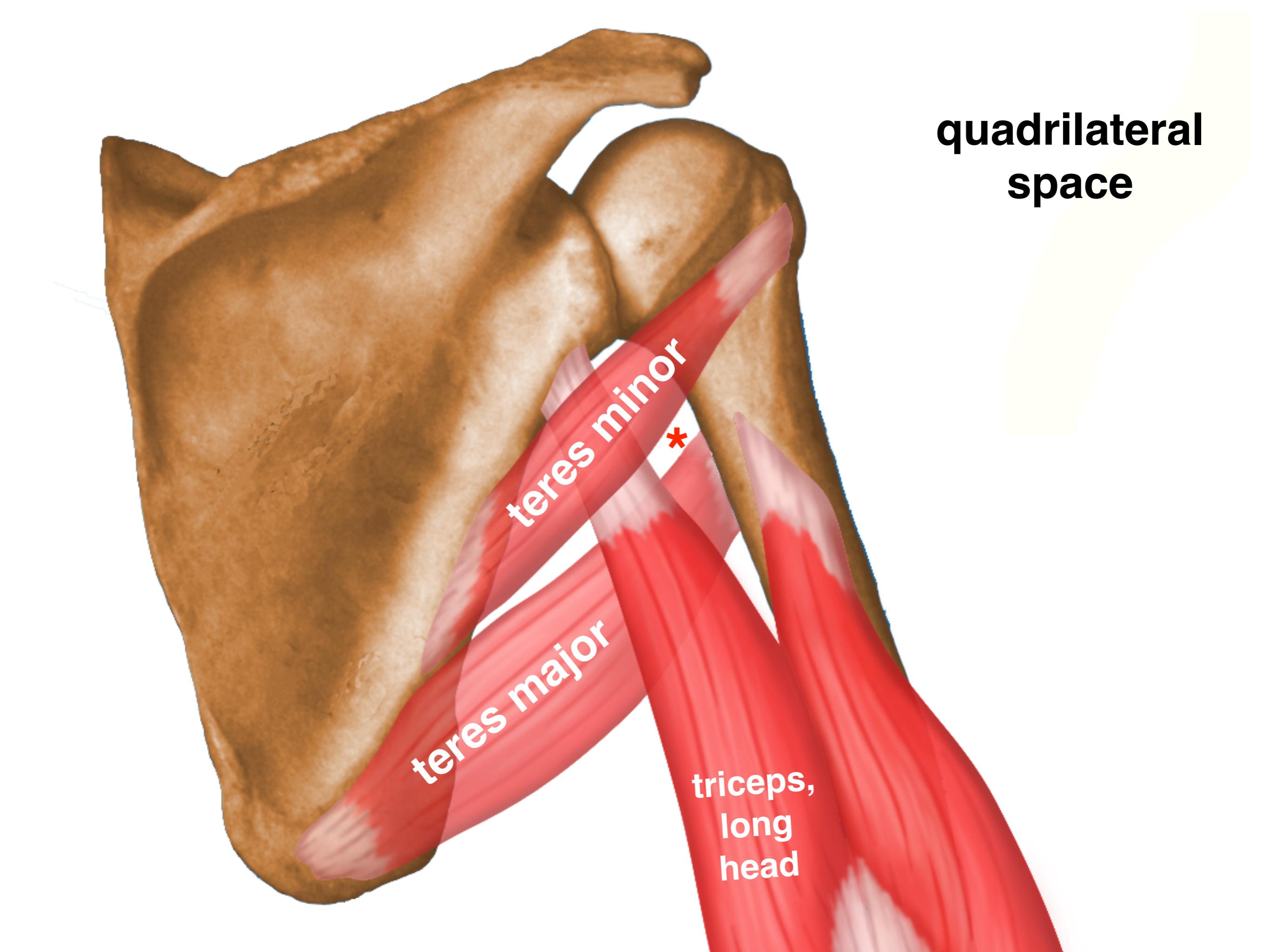
teres minor \*



A 3D anatomical model of the right shoulder joint. The humerus bone is shown in light brown, and the glenoid cavity is in white. A red muscle, the teres major, originates from the medial epicondyle of the humerus and the adjacent femoral shaft. It passes posterior to the elbow joint and inserts into the medial border of the olecranon process of the ulna. A second red muscle, the teres minor, originates from the lateral epicondyle of the humerus and the adjacent femoral shaft. It passes posterior to the elbow joint and inserts into the lateral border of the olecranon process of the ulna. The quadrilateral space is a triangular area bounded by the teres major, teres minor, infraspinatus, and latissimus dorsi muscles. The posterior circumflex artery and vein pass through this space. The posterior circumflex artery is labeled with a red asterisk (\*).

**quadrilateral  
space**

teres minor  
\*  
teres major



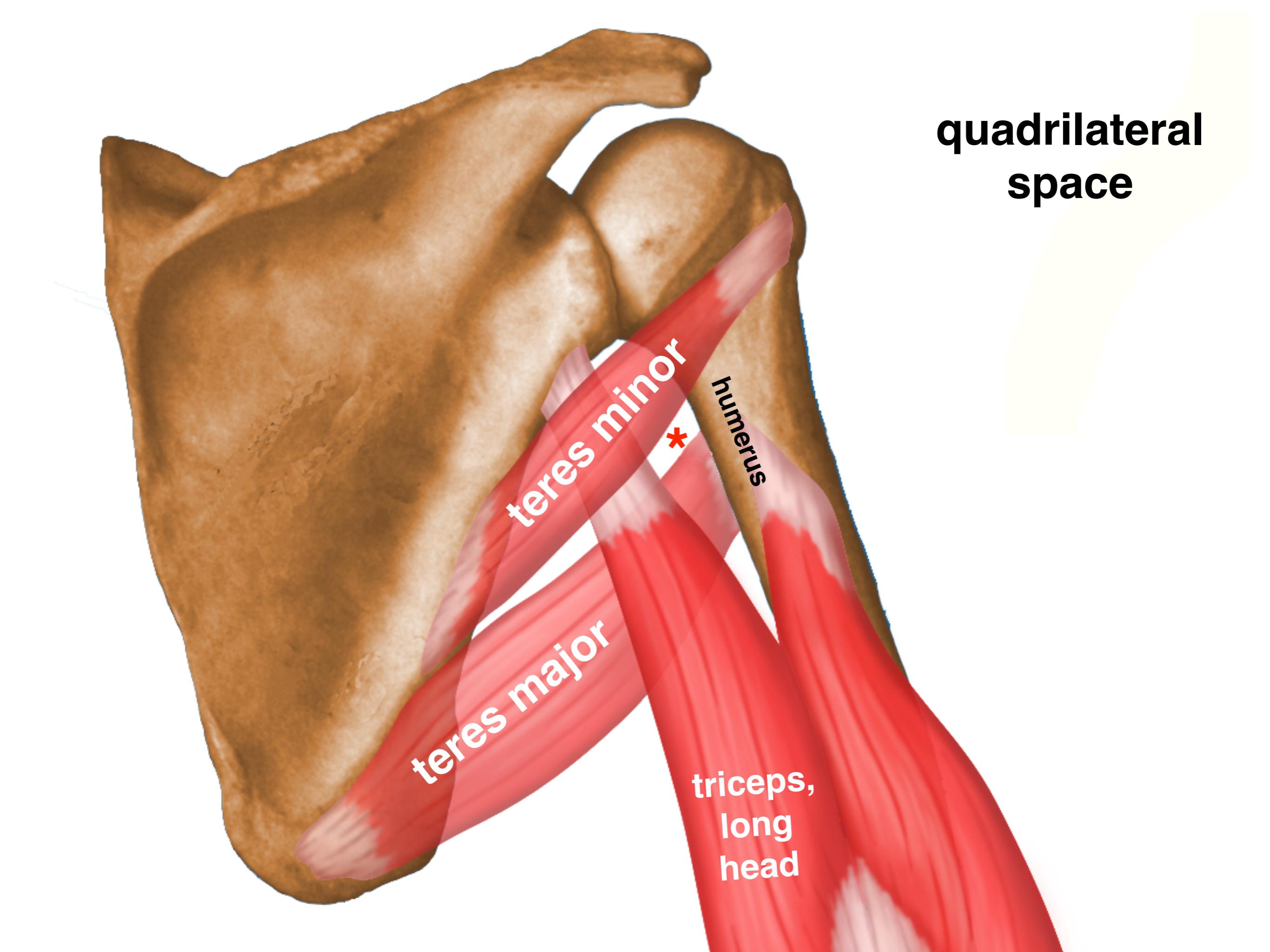
A 3D anatomical model of the right shoulder joint. The humerus bone is shown in light brown. Three muscles are highlighted in red: the teres major, the teres minor, and the triceps, long head. The triceps muscle is the largest and most posterior, while the teres minor is a smaller triangular muscle located between the teres major and the triceps. The quadrilateral space is a diamond-shaped area bounded by the lateral border of the teres major, the medial border of the teres minor, the long head of the triceps, and the medial border of the humerus. A white line traces the boundary of this space.

**quadrilateral  
space**

teres minor \*

teres major

triceps,  
long  
head



A 3D anatomical model of the right shoulder joint. The humerus bone is shown in light brown, and the trapezius muscle is in a darker shade of brown. Three red muscles are highlighted: teres major, teres minor, and triceps long head. The teres major and teres minor are located posterior to the humerus, while the triceps long head is located anterior to it. The quadrilateral space is a diamond-shaped area bounded by the lateral border of the teres major, the medial border of the teres minor, the medial border of the triceps long head, and the lateral lip of the surgical neck of the humerus. A red asterisk marks the lateral lip of the surgical neck.

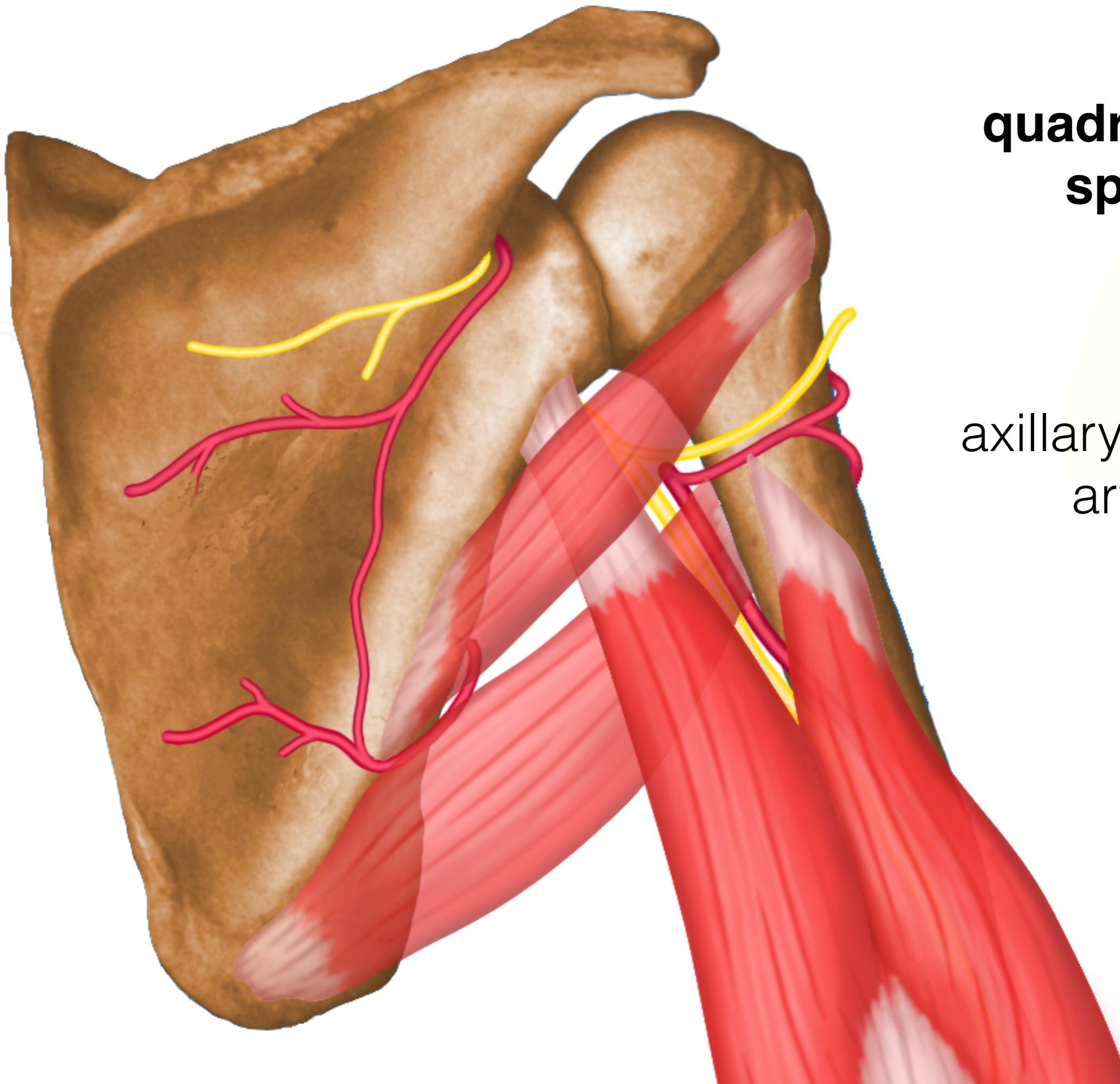
**quadrilateral  
space**

teres minor \*

humerus

teres major

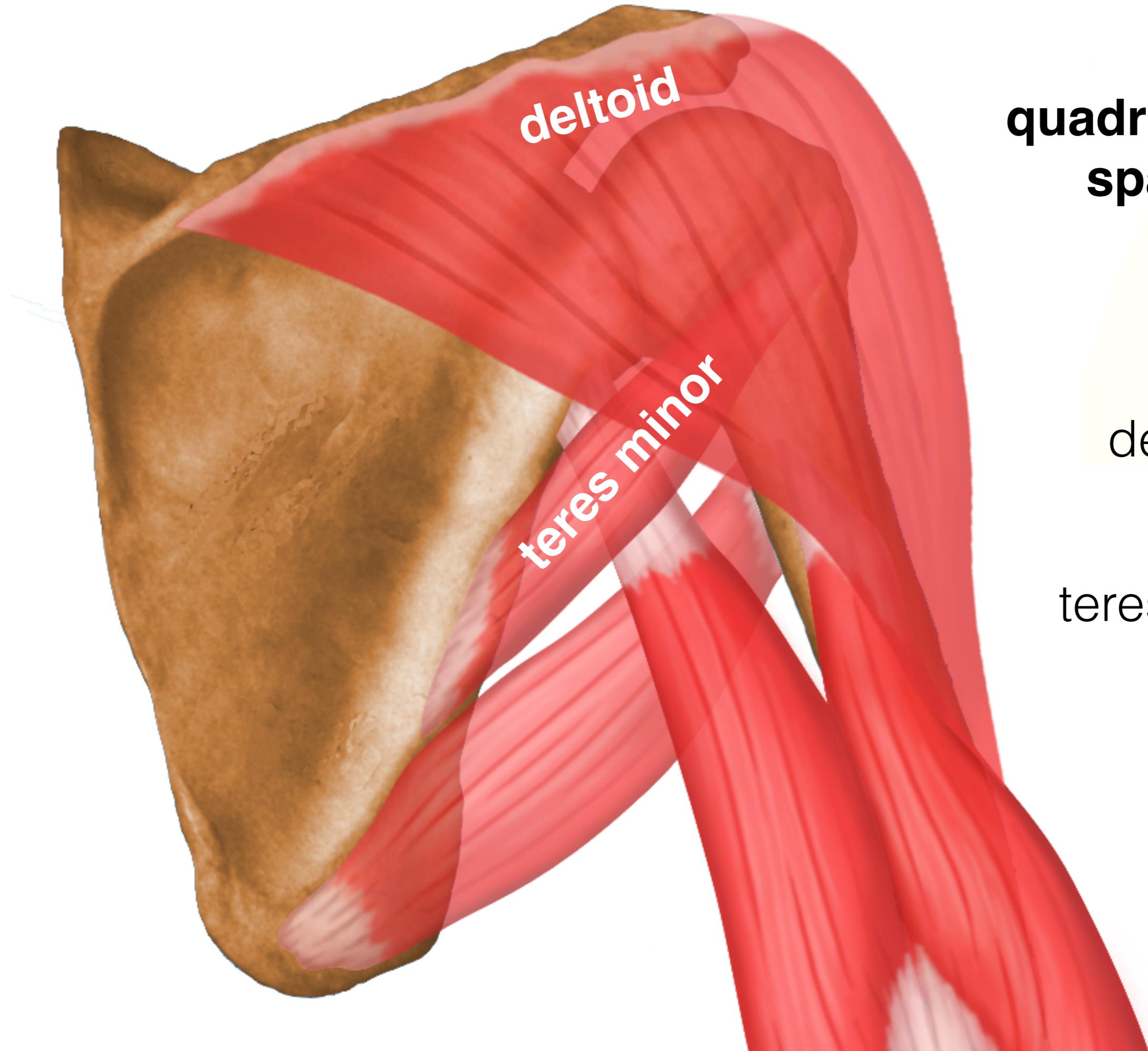
triceps,  
long  
head



A detailed anatomical illustration of the posterior aspect of a human arm. The trapezius muscle is shown in brown, with its fibers originating from the spine of the scapula and the sacrum. The latissimus dorsi muscle is visible at the bottom, appearing as a large red mass. The axillary nerve and artery are depicted as yellow and red structures respectively, passing through the quadrilateral space. This space is bounded by the teres major muscle laterally, the long head of the triceps brachii medially, the latissimus dorsi superiorly, and the infraspinatus inferiorly. The nerve and artery run deep to the triceps brachii, anterior to the teres major.

**quadrilateral  
space**

axillary nerve &  
artery

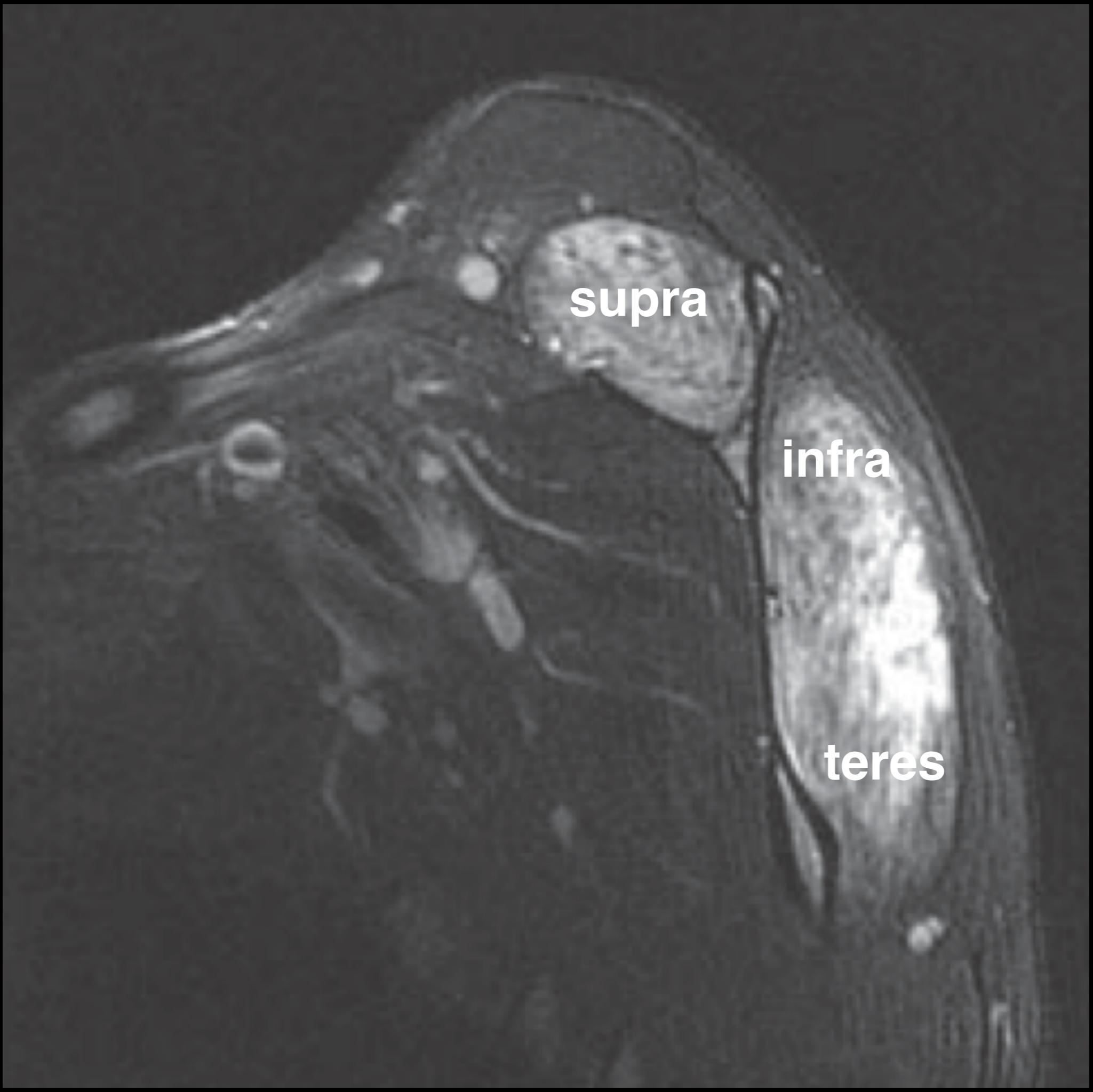


**quadrilateral  
space**

deltoid

teres minor

pattern 4.



Parsonage-  
Turner  
syndrome

supra

infra

teres

no logical  
pattern

# Case 8

37 F

2 months of  
swelling in  
right lateral  
lower leg

T1W

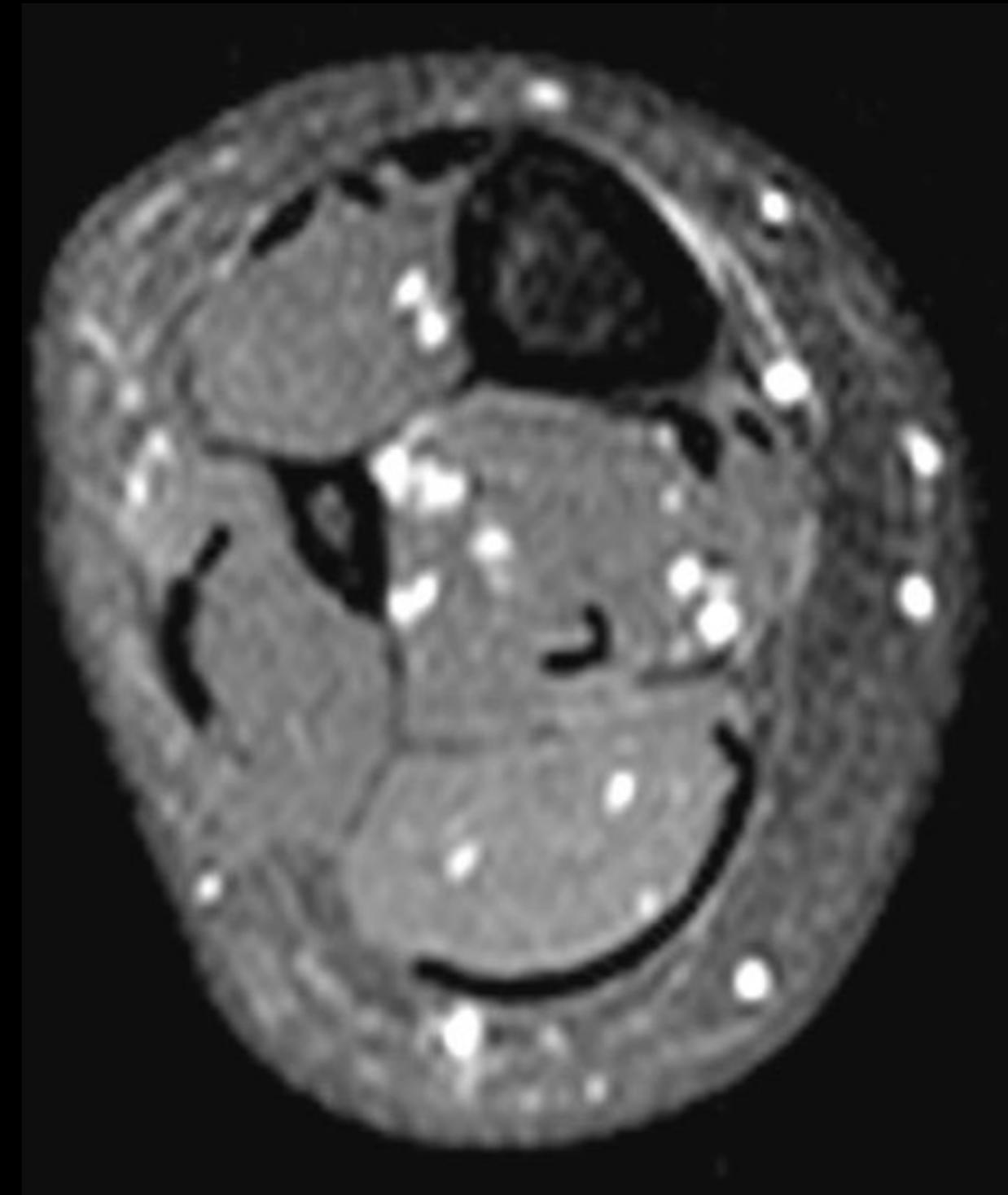


STIR





T1 fat sat



T2 fat sat

37 F

2 months of  
swelling in  
right lateral  
lower leg

?

T1W



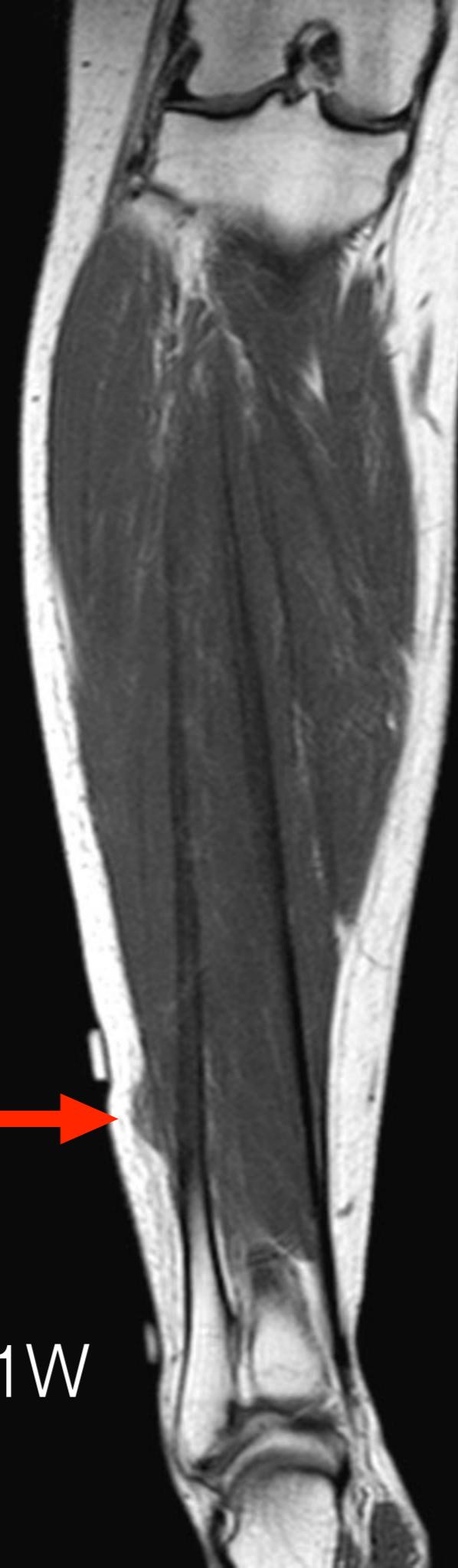
STIR



37 F

2 months of  
swelling in  
right lateral  
lower leg

?



a hint

T1W

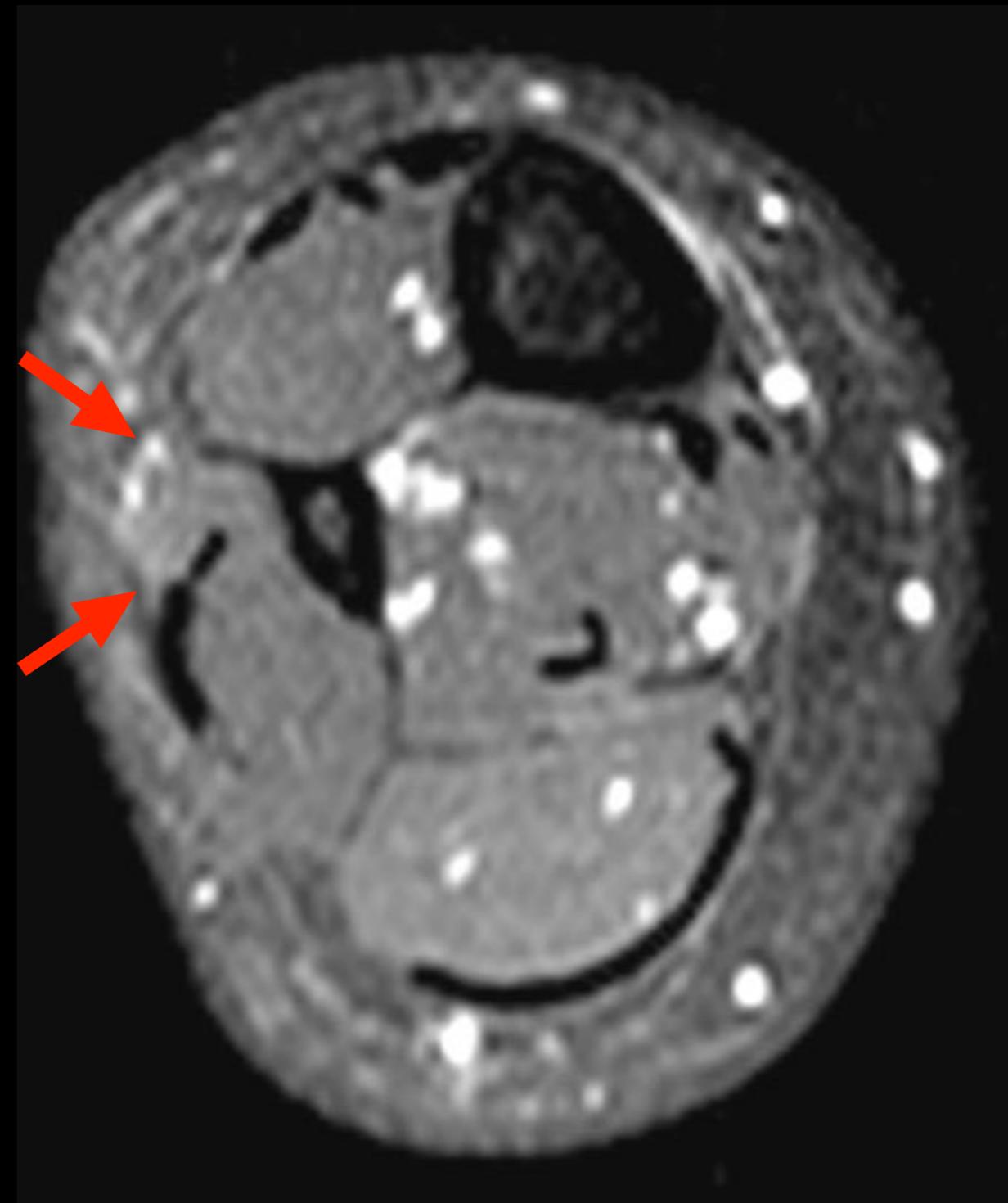


STIR

another hint



T1 fat sat



T2 fat sat

Mellado et al.  
Skeletal  
Radiol.  
1999 Aug;  
28(8):465

muscle  
herniation in  
peroneus  
longus

T1W



STIR



usually seen  
in athletes &  
soldiers in  
lower  
extremity



T1W

STIR

usually seen  
in athletes &  
soldiers in  
lower  
extremity

## tibialis ant

t. dig. longus

troneus brevis  
& longus

gastroc

T1W



STIR



usually seen  
in athletes &  
soldiers in  
lower  
extremity

## tibialis ant

ext. dig. longus

peroneus brevis  
& longus

gastroc

T1W



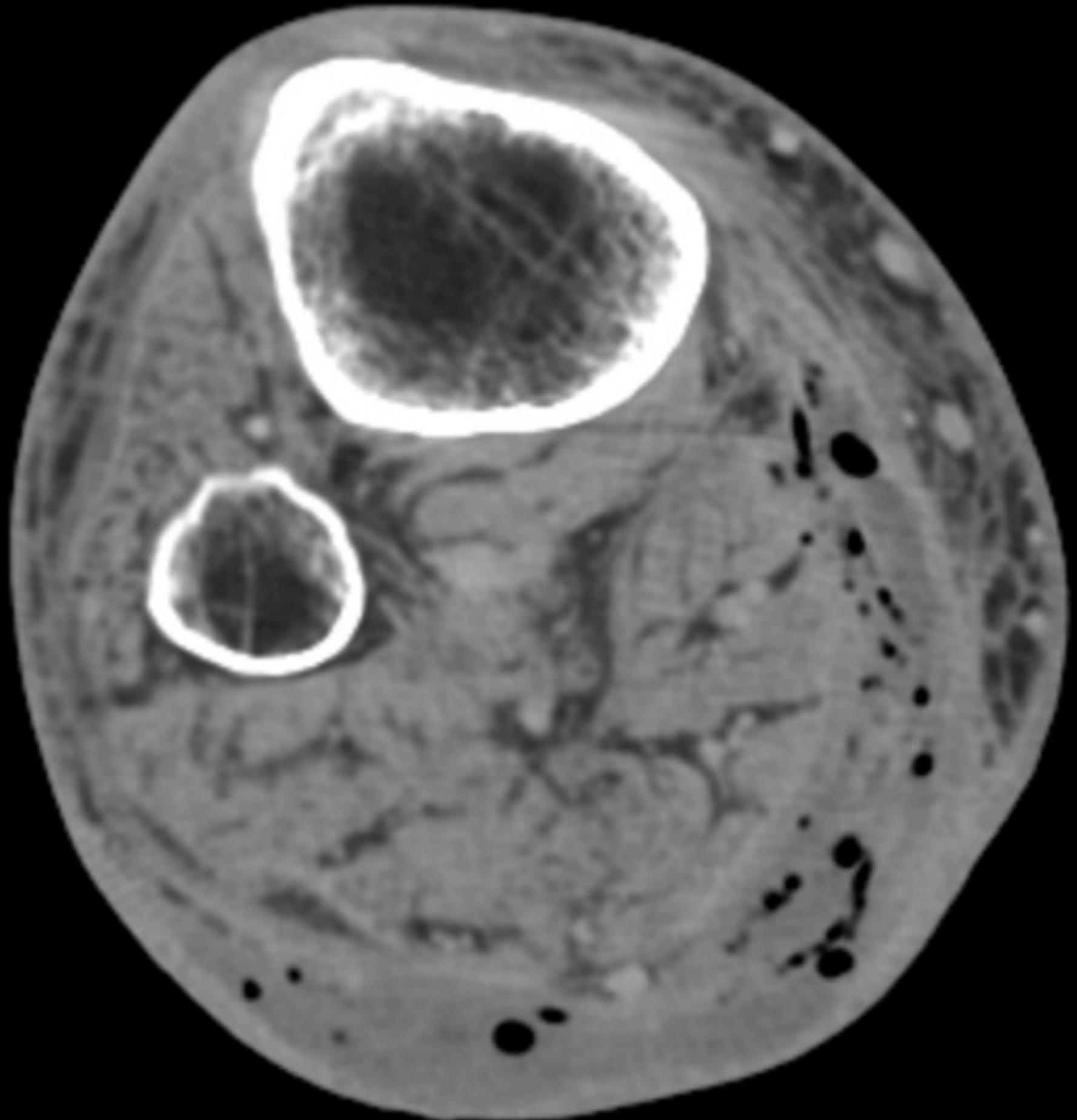
STIR



# Case 9

49 M

pain after  
dog bite





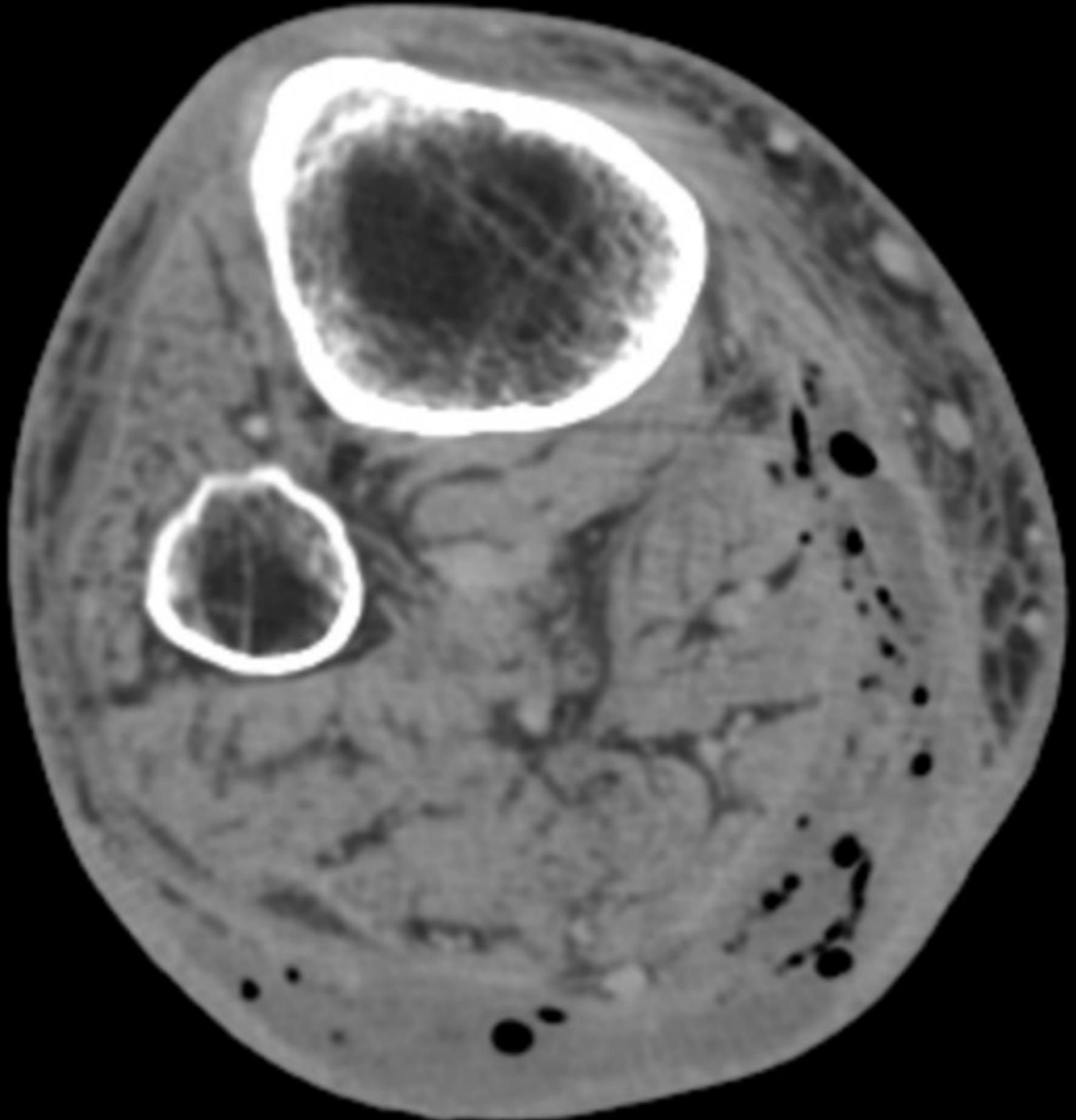
sagittal

coronal

49 M

pain after  
dog bite

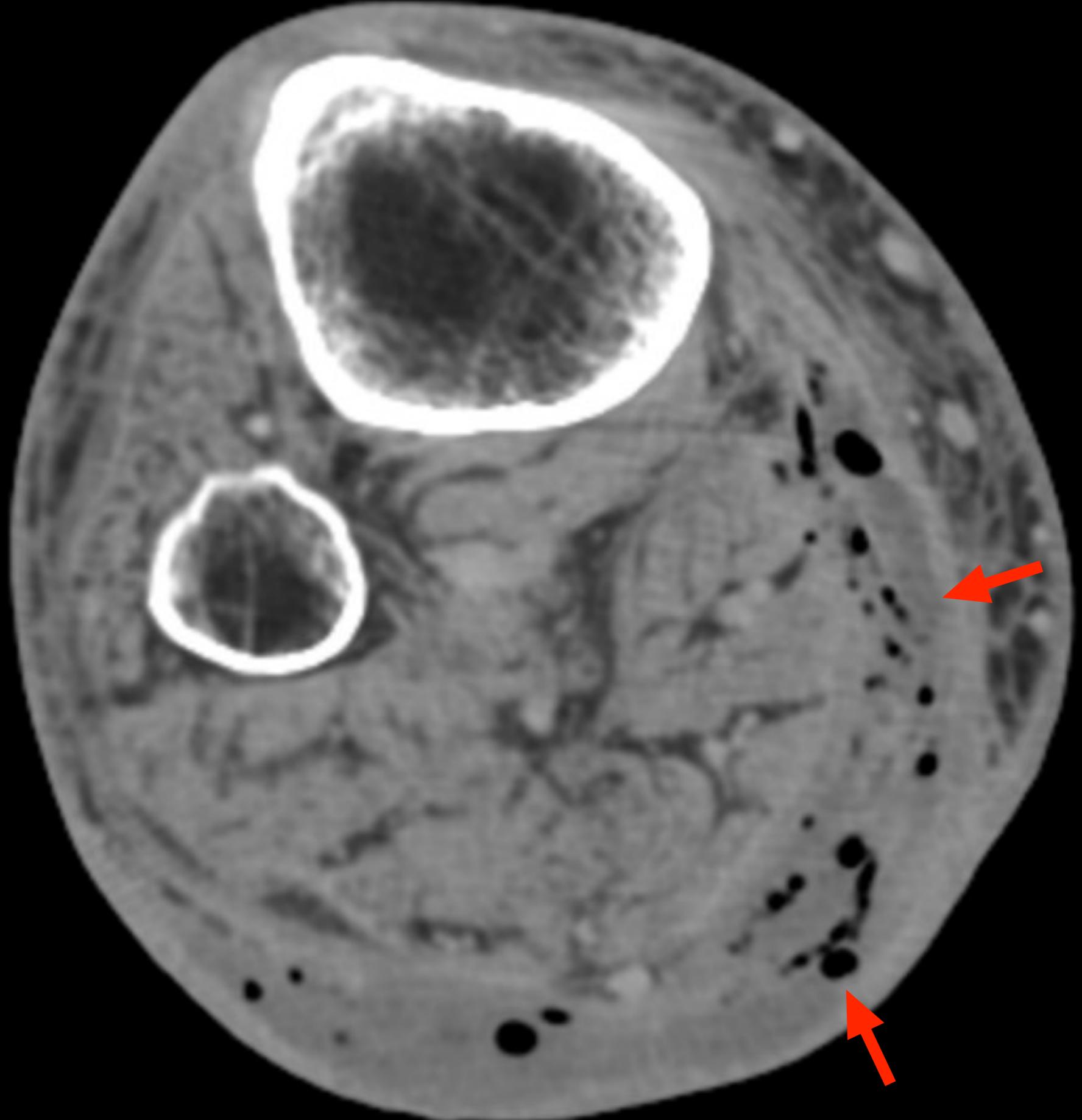
?



49 M

pain after  
dog bite

necrotizing  
fasciitis

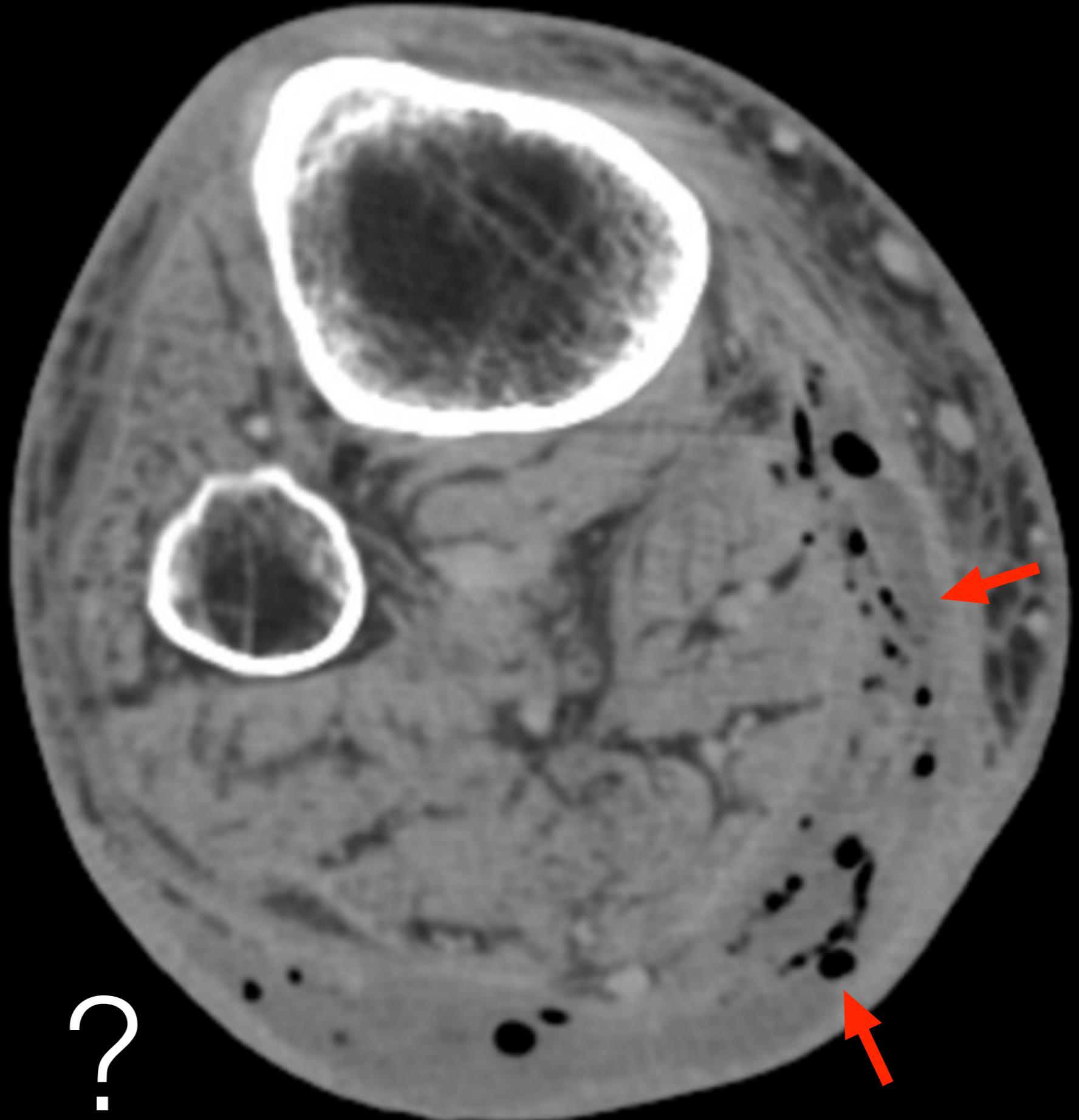


49 M

pain after  
dog bite

necrotizing  
fasciitis

predisposing      ?  
causes??

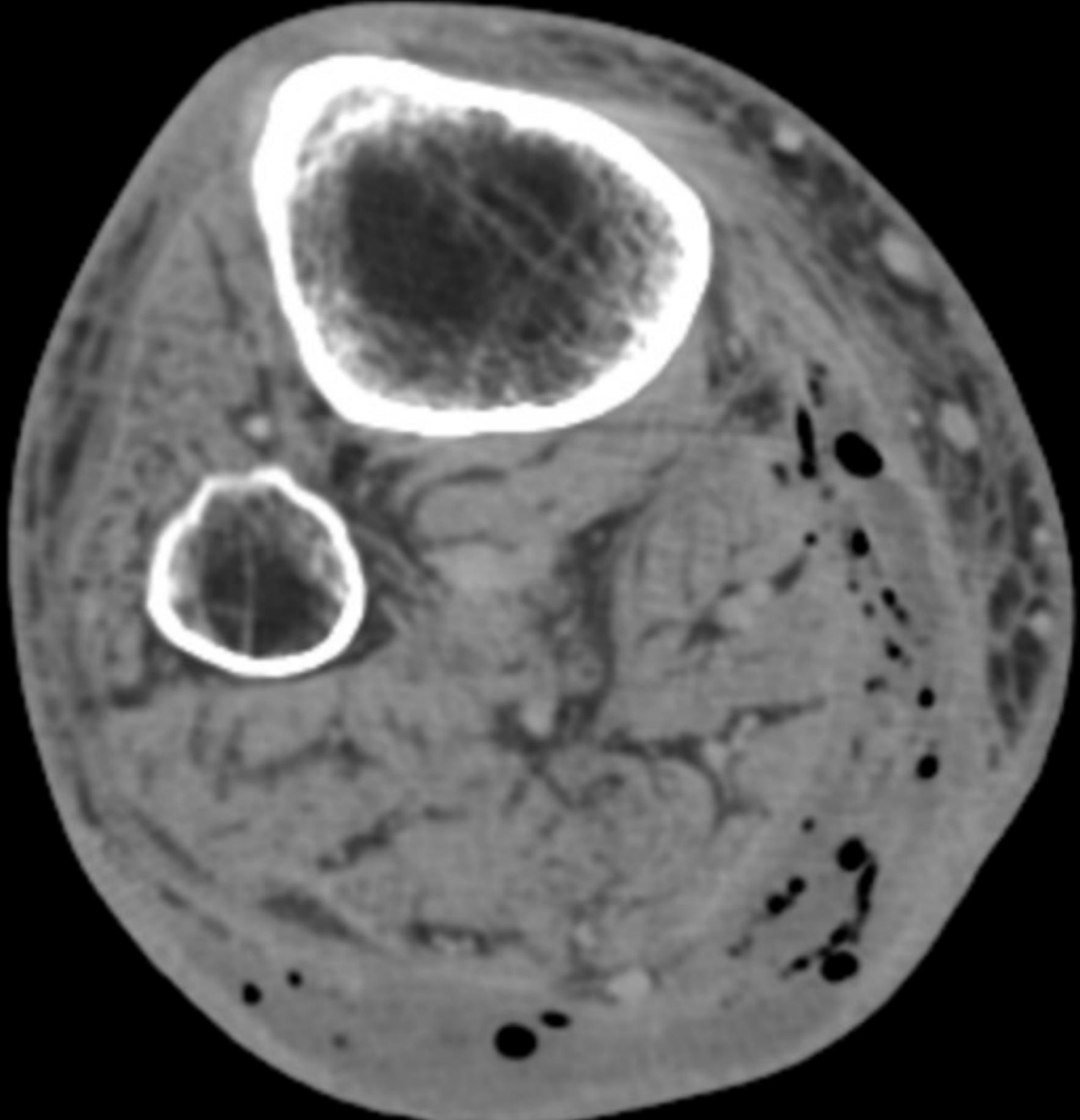


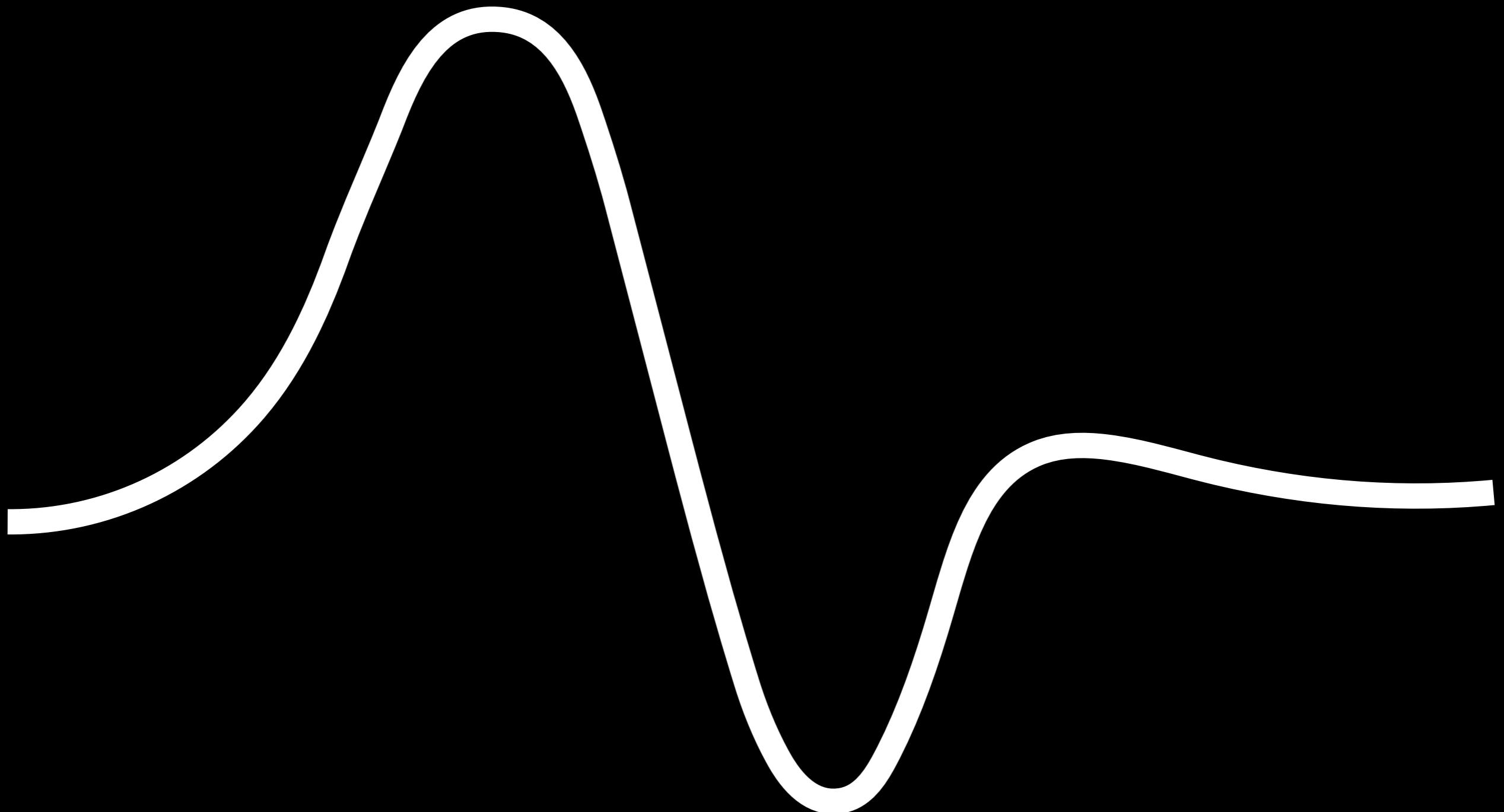
most appropriate workup to

**“R/O nec fasc”**

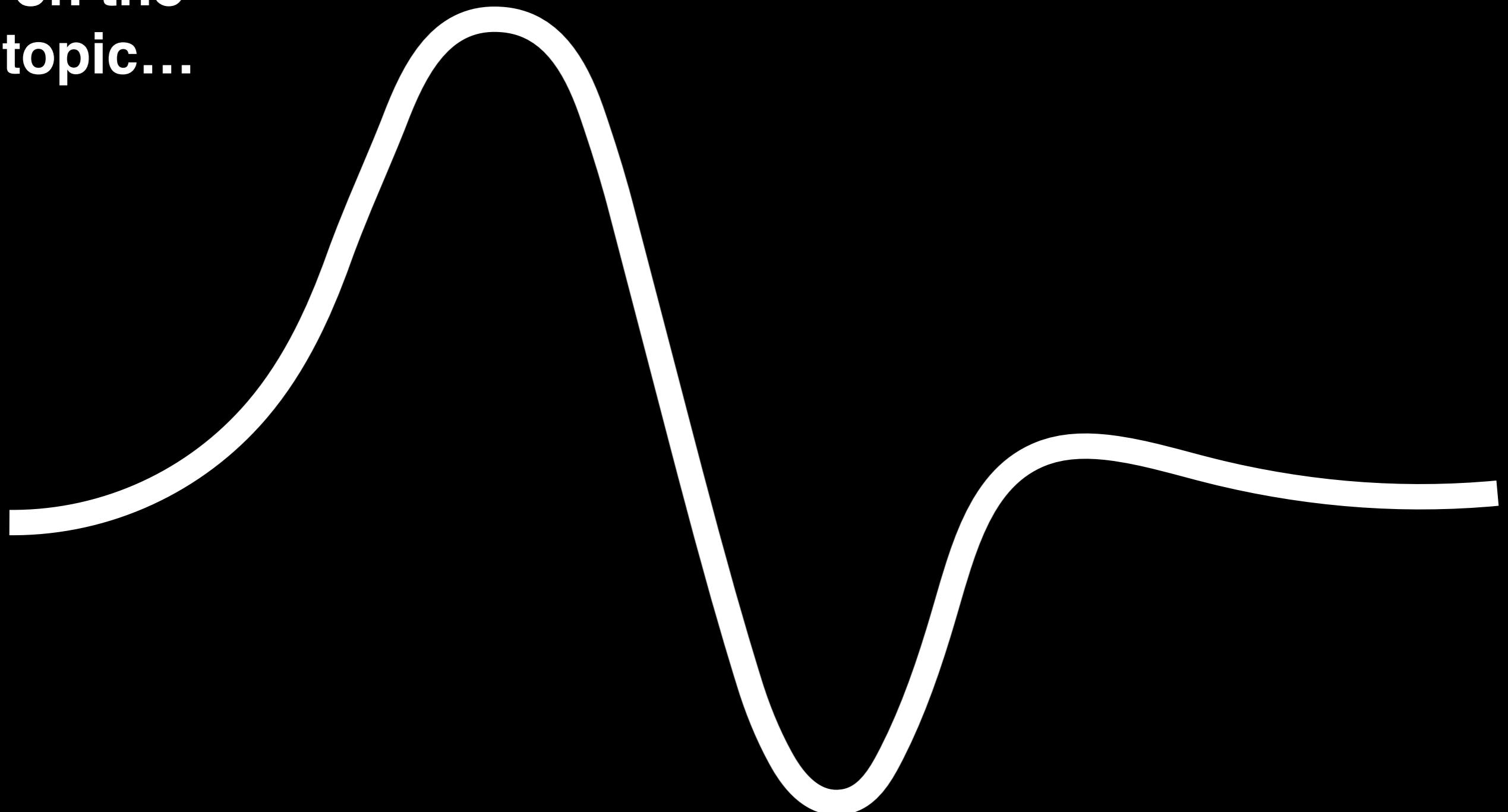
?

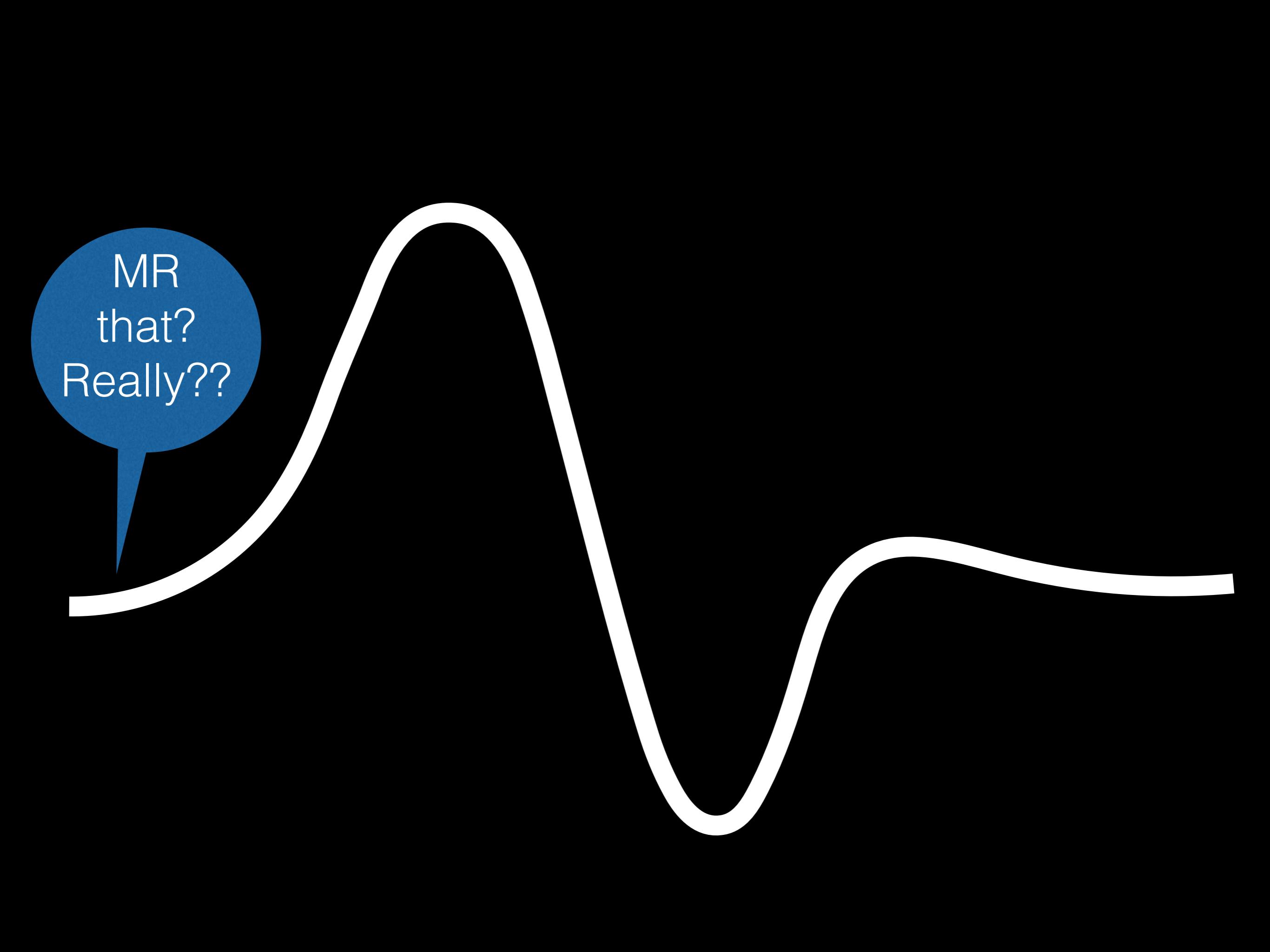
necrotizing fasciitis



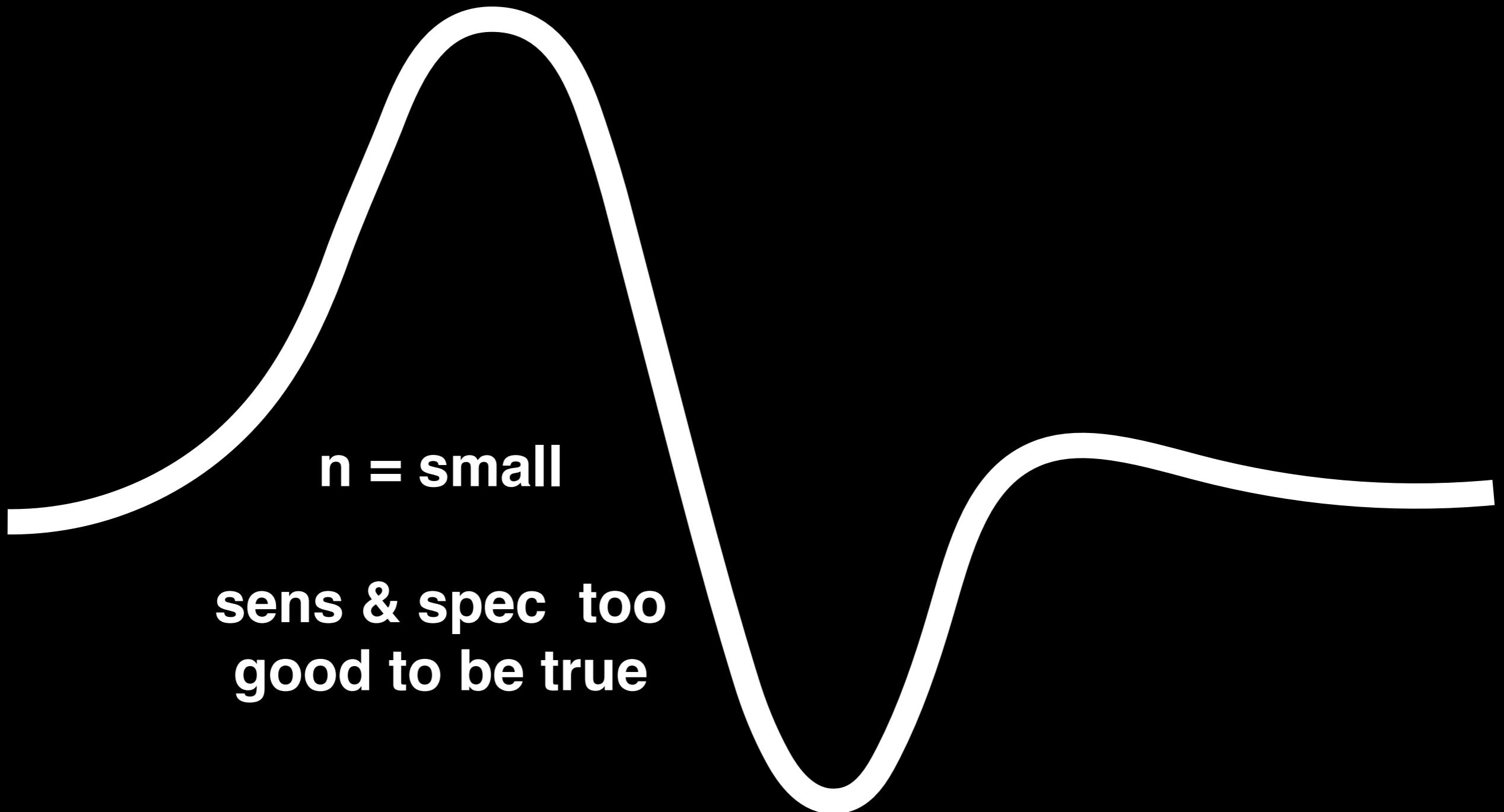


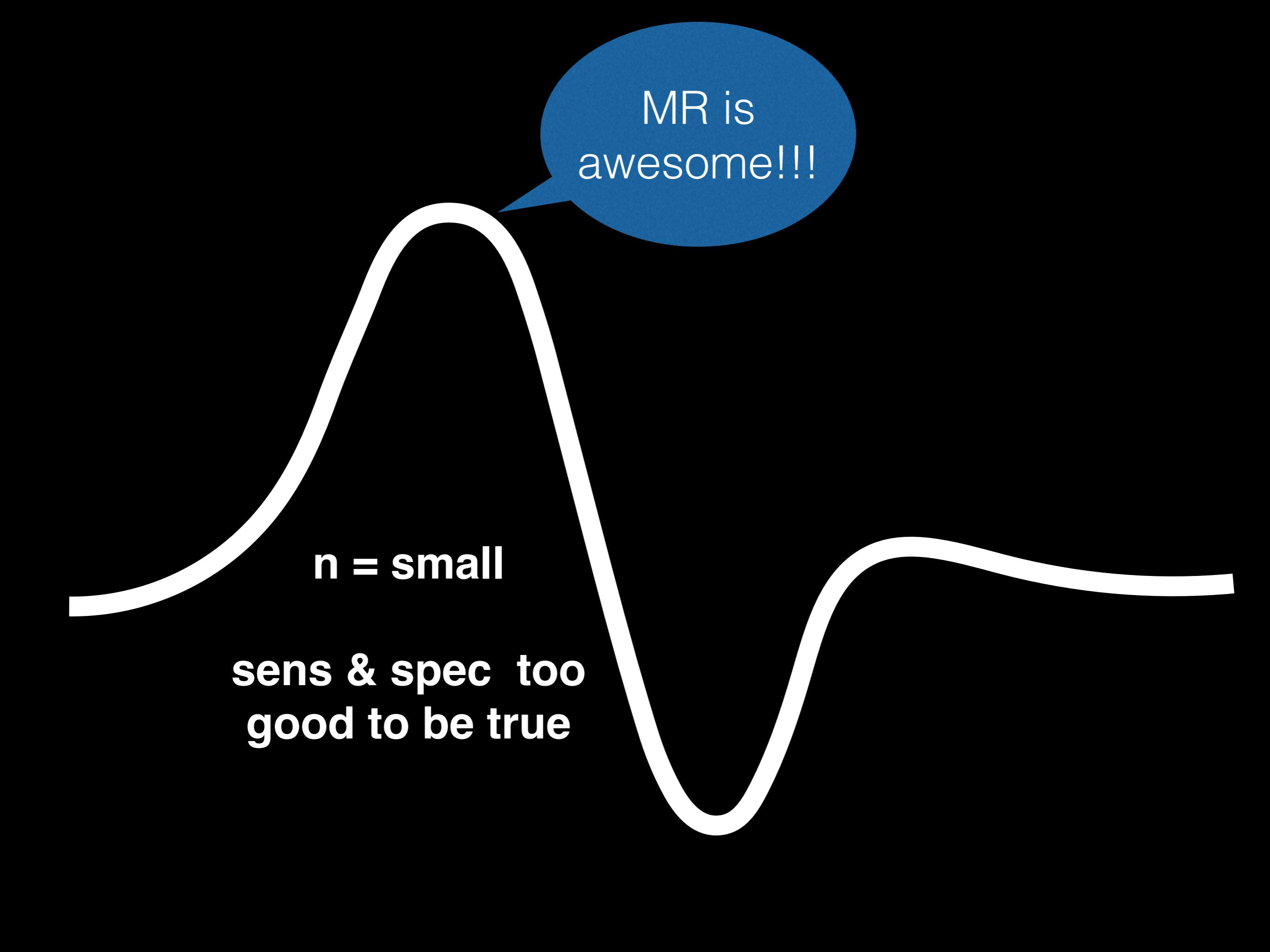
**no  
literature  
on the  
topic...**





MR  
that?  
Really??

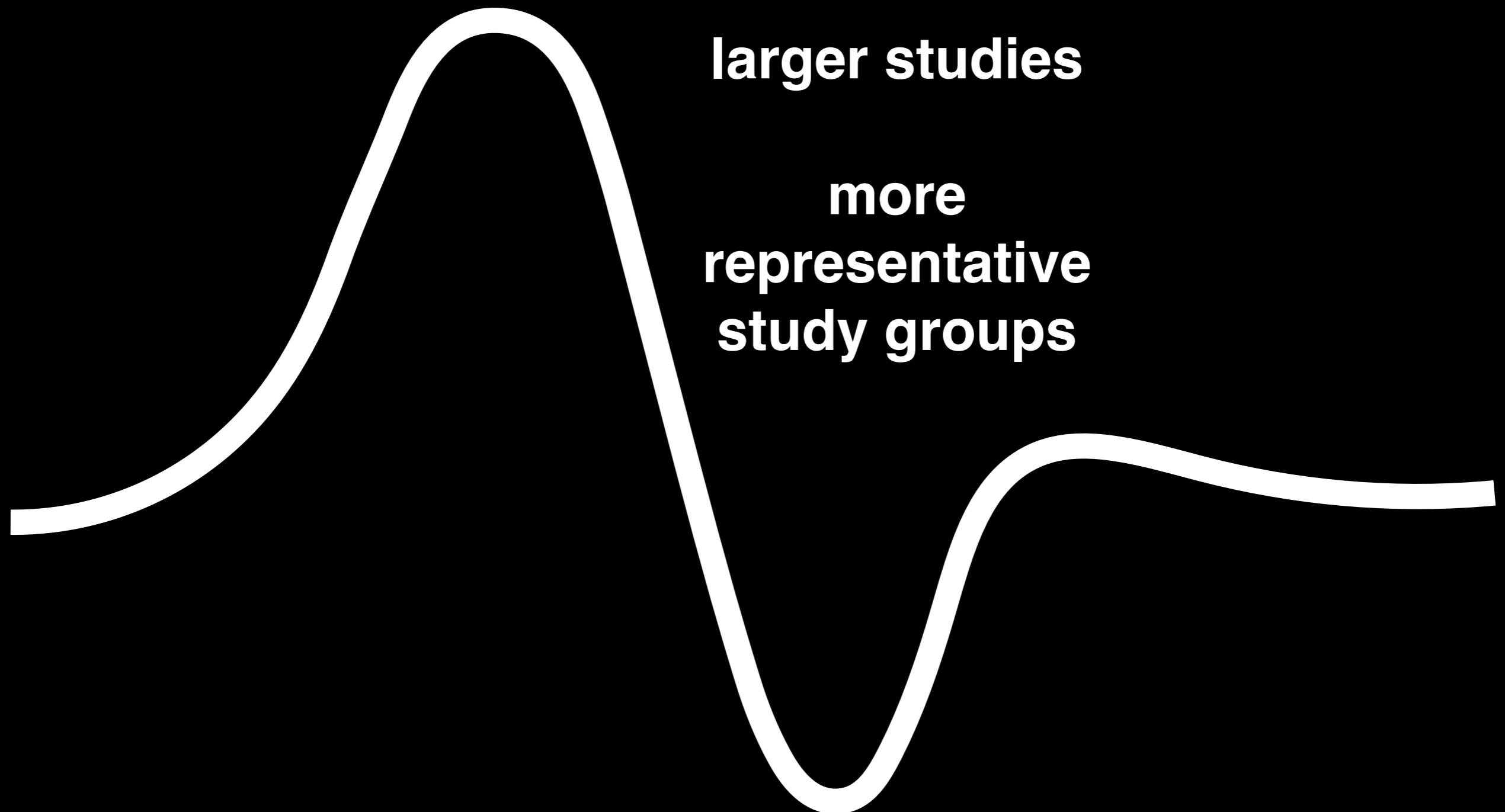


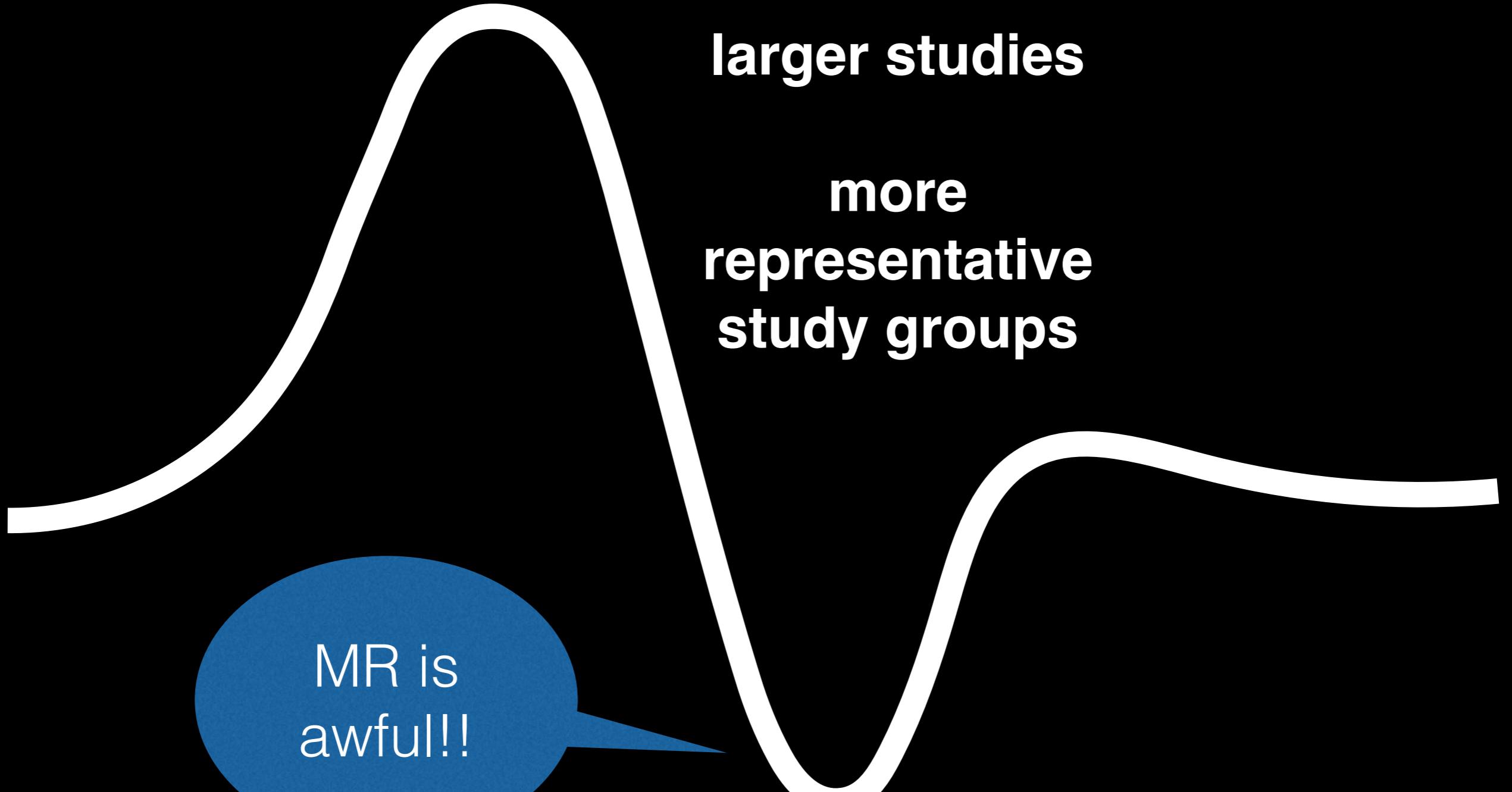


MR is  
awesome!!!

**n = small**

**sens & spec too  
good to be true**



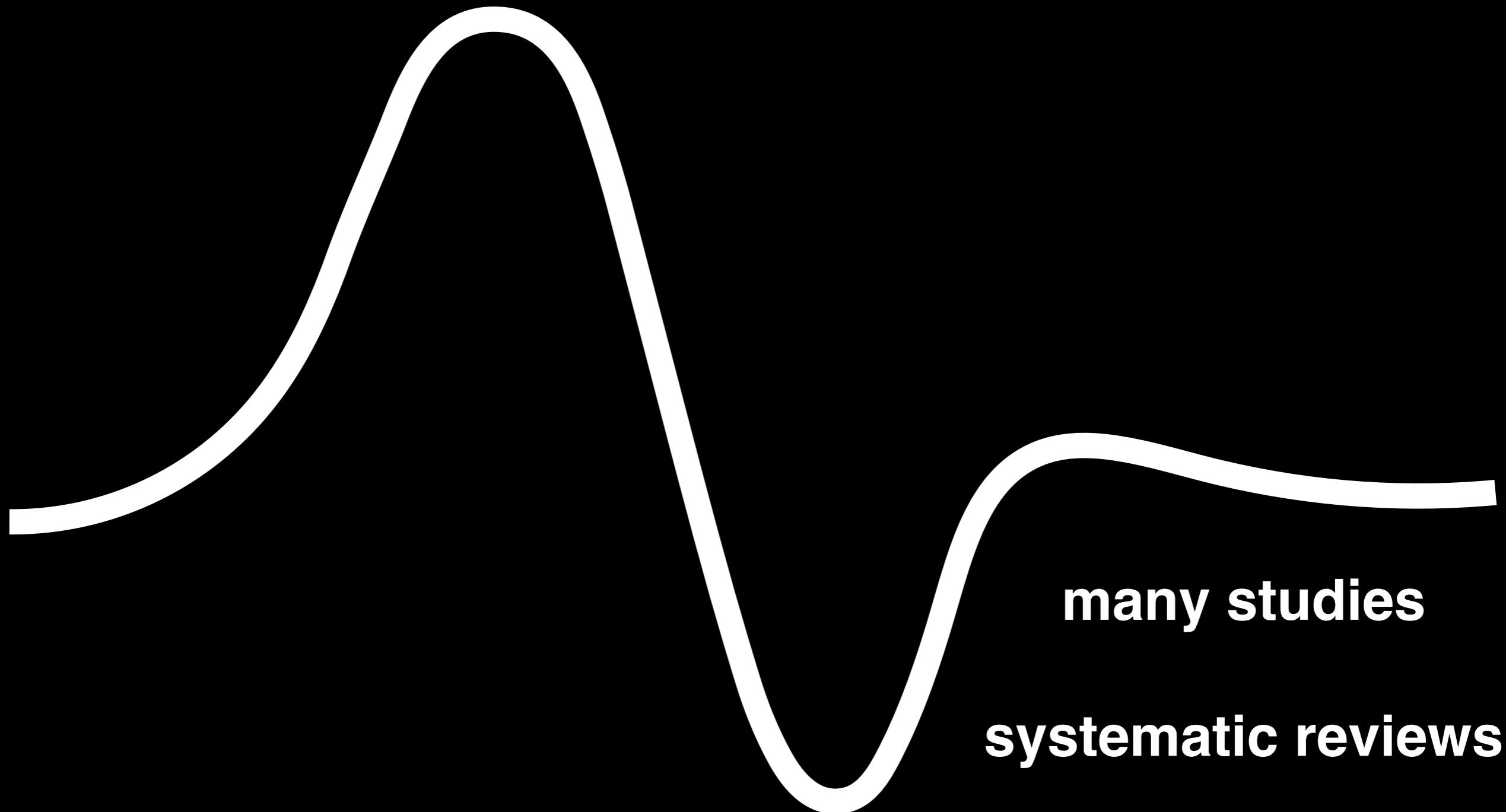


**larger studies**

**more  
representative  
study groups**



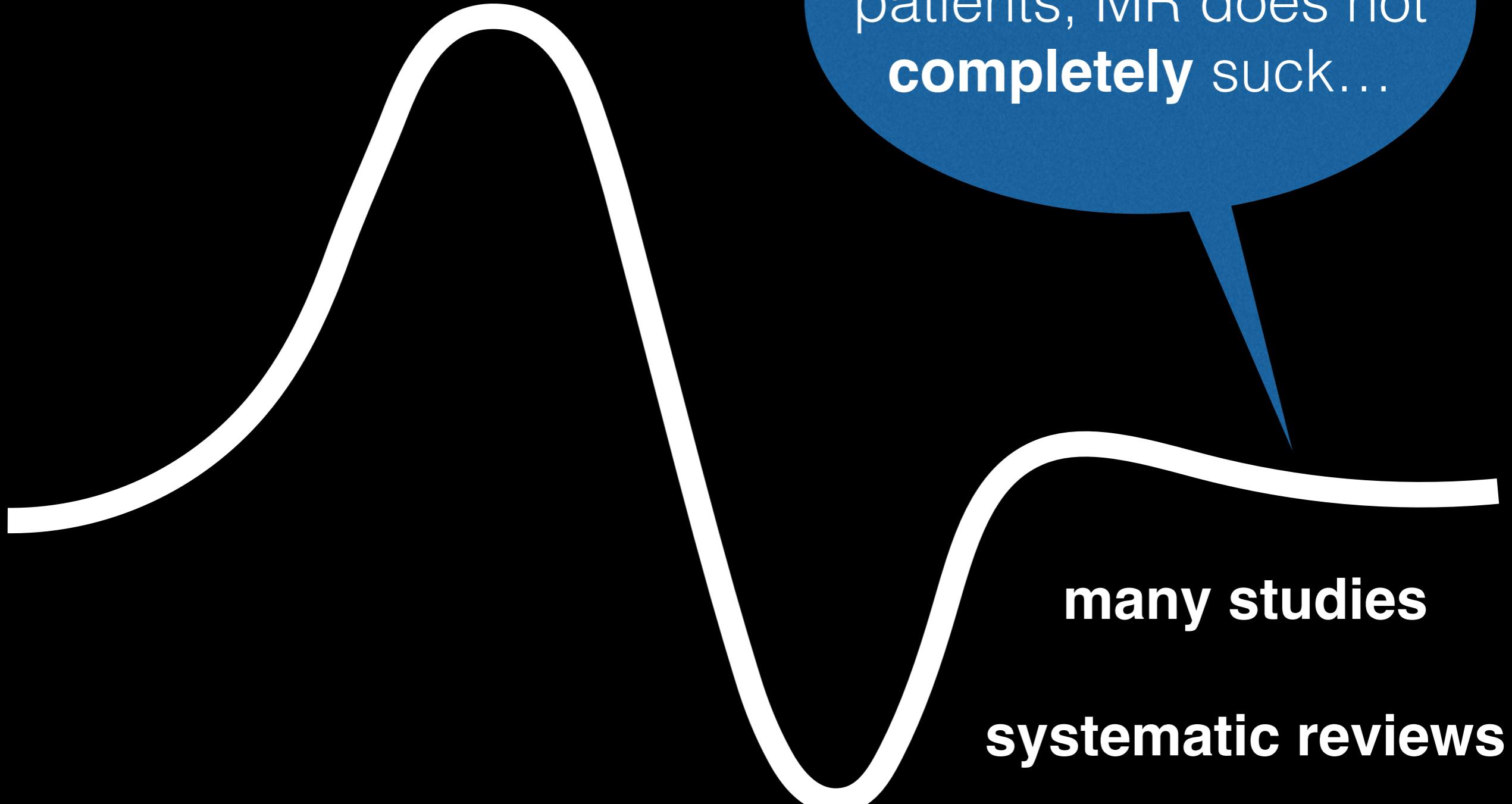
**MR is  
awful!!**



**many studies**

**systematic reviews**

**meta-analyses**

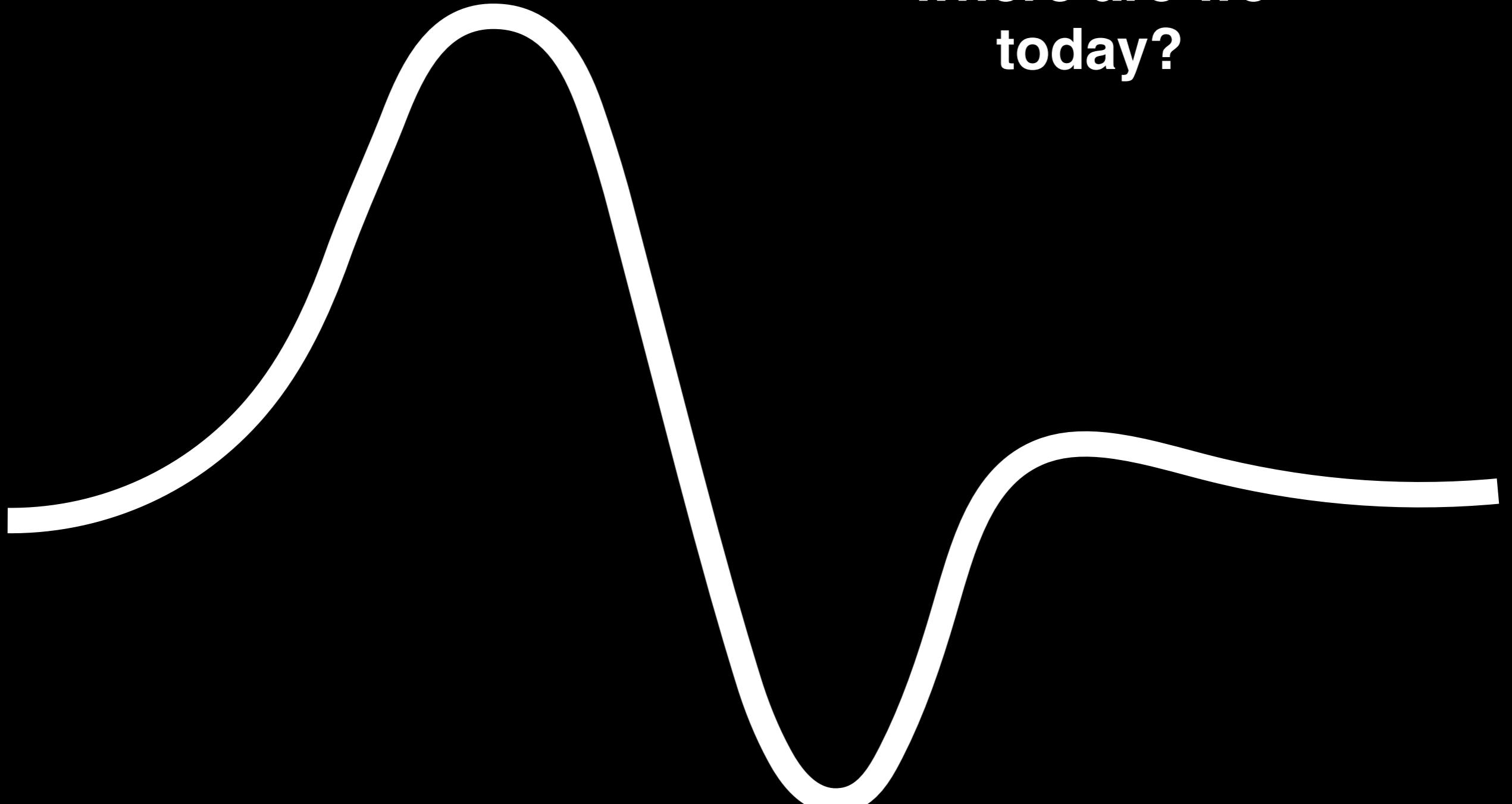


In the right group of patients, MR does not **completely suck...**

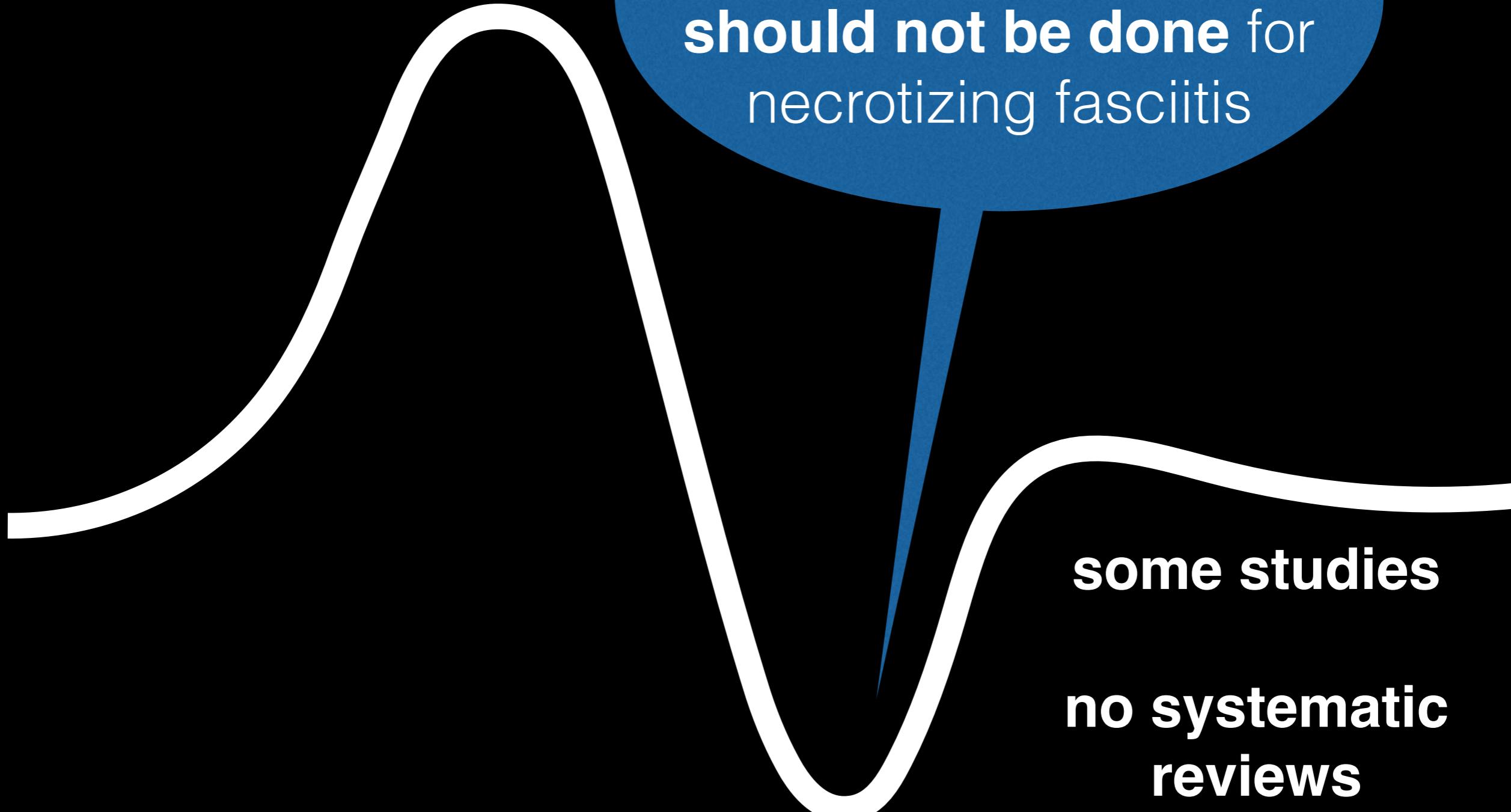
**many studies**

**systematic reviews**

**meta-analyses**



**where are we  
today?**

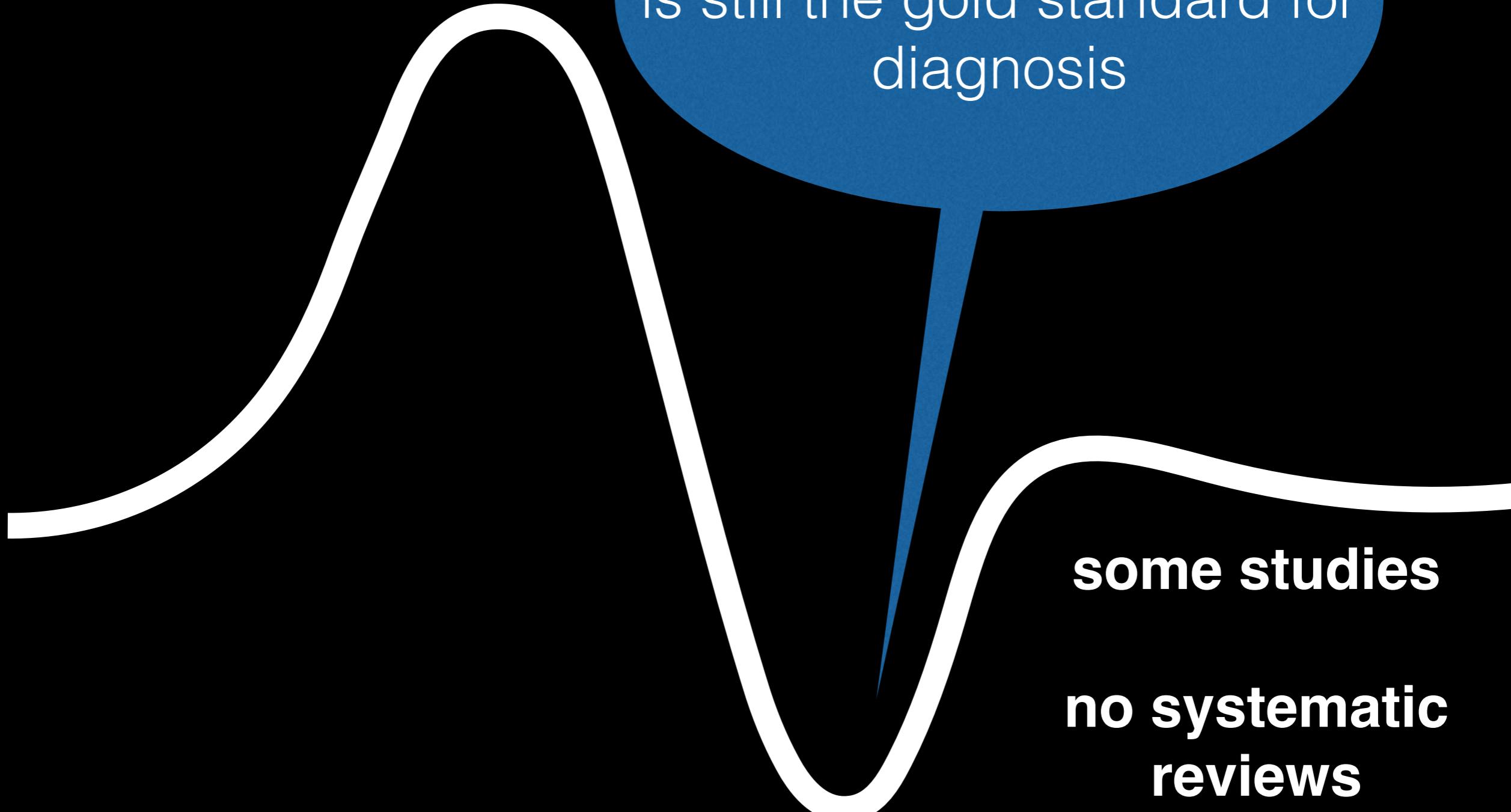


Imaging will only  
delay the diagnosis &  
**should not be done** for  
necrotizing fasciitis

**some studies**

**no systematic  
reviews**

**no meta-analyses**



**surgical debridement**  
is still the gold standard for  
diagnosis

**some studies**

**no systematic  
reviews**

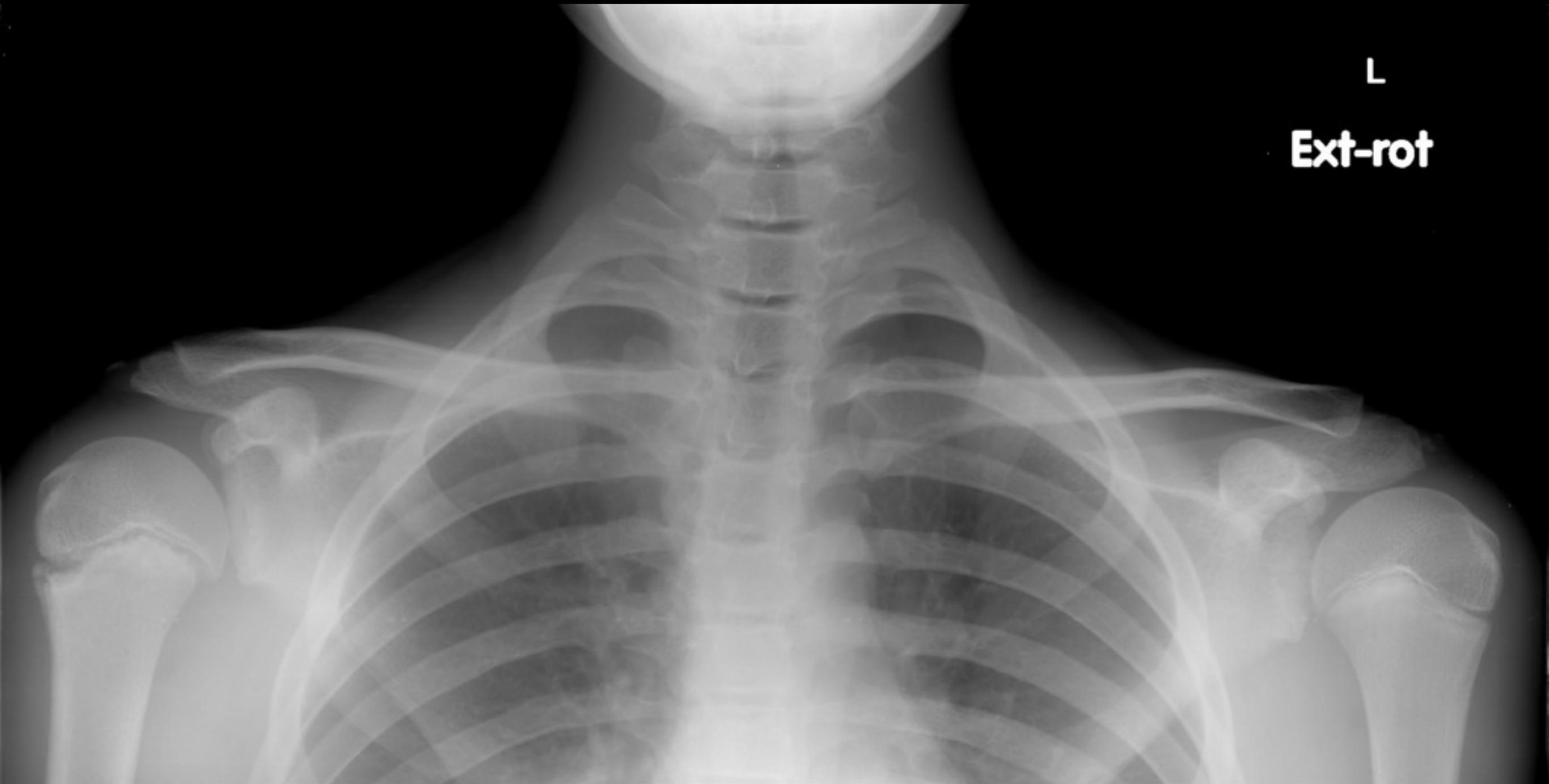
**no meta-analyses**

# Case 10

13 M

right  
shoulder  
pain

?



L

**Ext-rot**

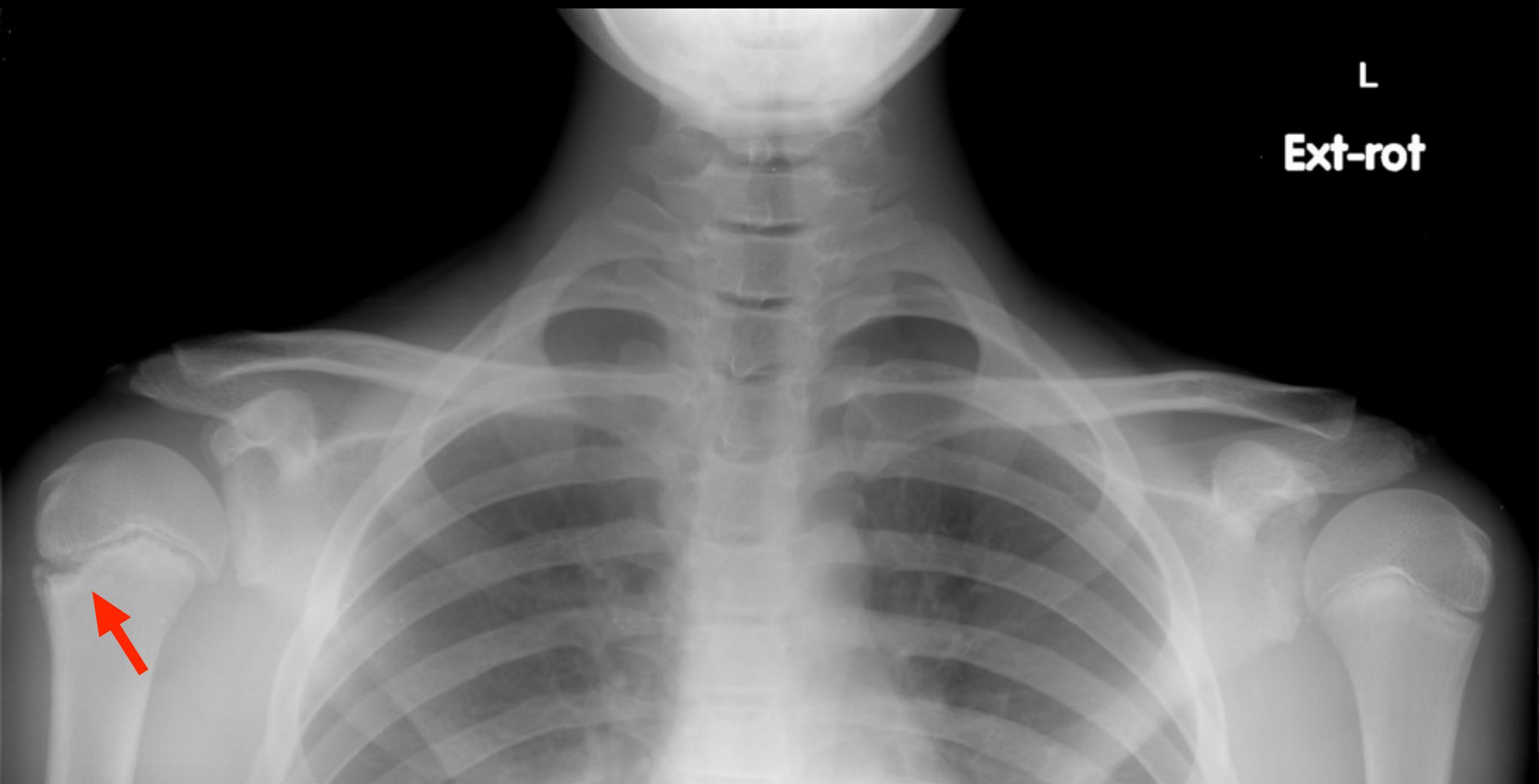
13 M

right  
shoulder  
pain

?

L

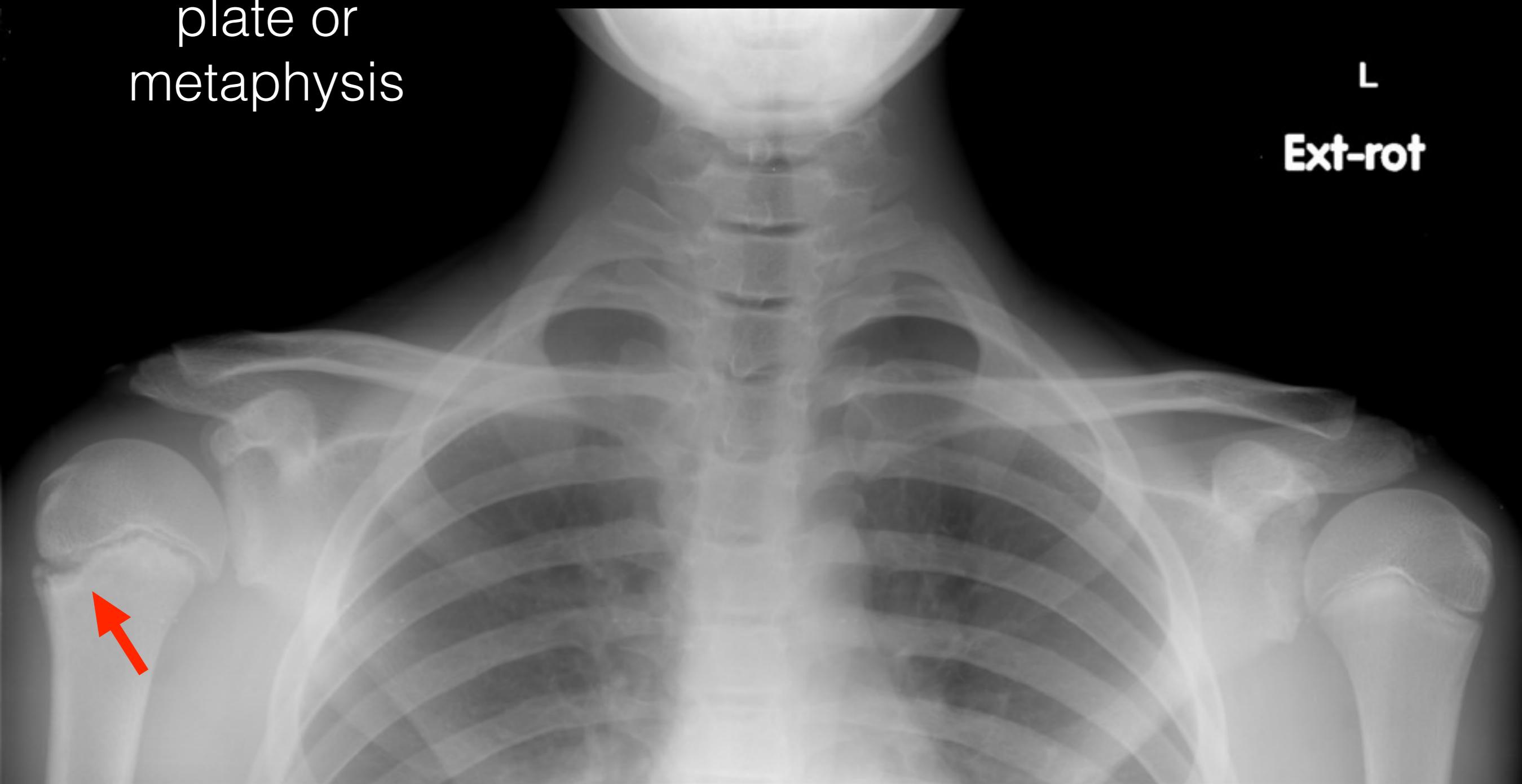
**Ext-rot**



# “Little League shoulder”

overuse or stress  
injury of growth  
plate or  
metaphysis

Anton et al.  
Pediatr Radiol.  
2010 Oct  
23;40(S1):54.



- physeal widening
- fragmentation
- sclerosis



- usually in 13-16 year-old boys



125

**littleleague.org**

100

maximum pitches / day

75

50

25

0

85

95

105

7-8

9-10

11-12

13-16

17-18

Age

- rest
- PT
- limit activity



handout at:

[uwmск.org/  
msktrauma2015.pdf](http://uwmск.org/msktrauma2015.pdf)