

# Imaging of the Elbow

**Marco Zanetti**

**Radiology**

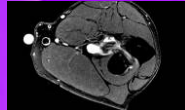
**Balgrist University Hospital**

***Zurich***



# Elbow

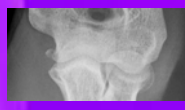
Case 1



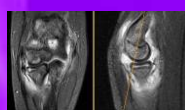
Case 2



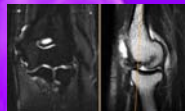
Case 3



Case 4



Case 5



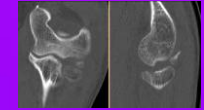
Case 6



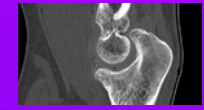
Case 7



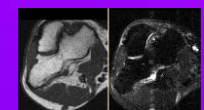
Case 8



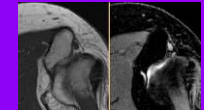
Case 9



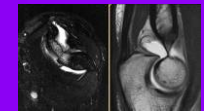
Case 10



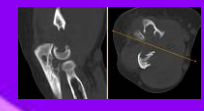
Case 11



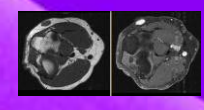
Case 12



Case 13



Case 14



# Elbow Imaging Case 3

32-year old man.

Fall on the extended elbow.

Pain. Restricted flexion/extension. Instability can not be examined due to extreme pain.

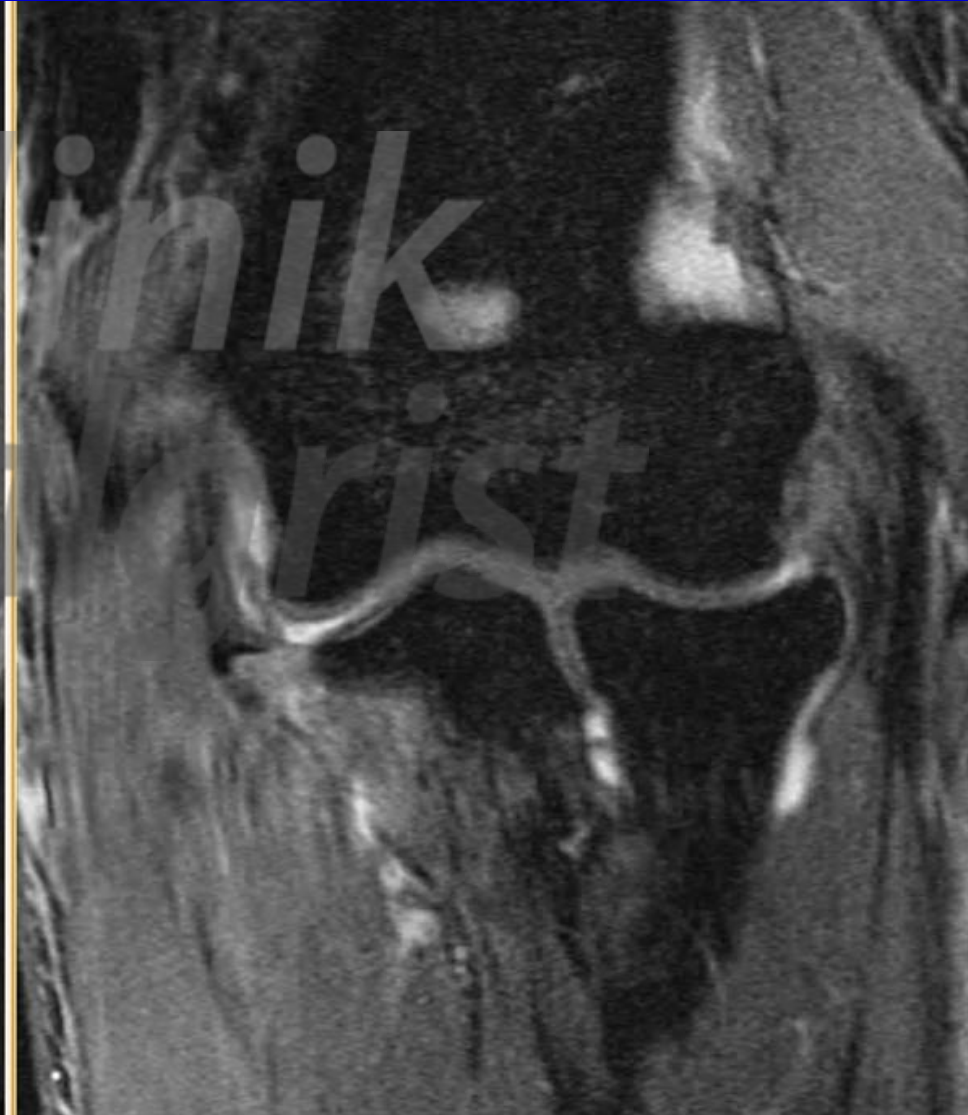
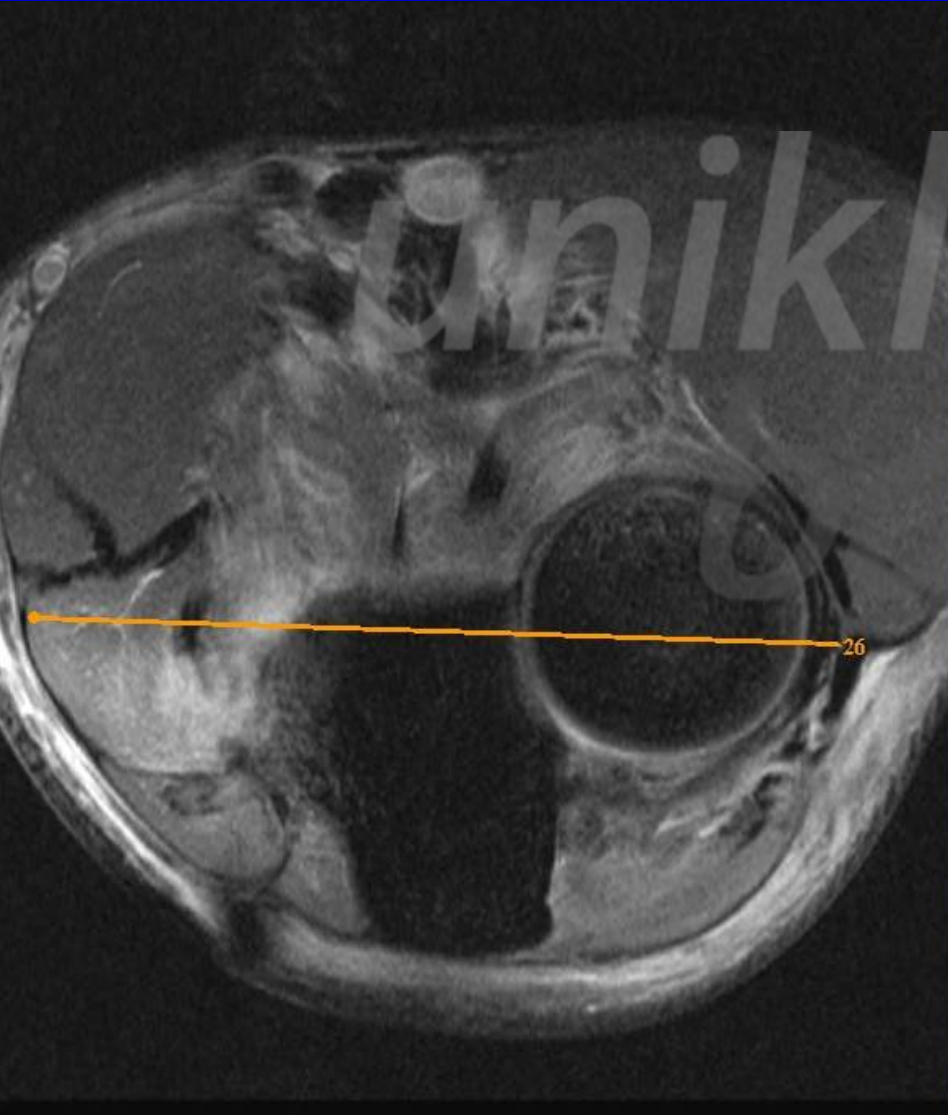
# Intraarticular or extraarticular osseous lesion?







# Osseous Avulsion of the Anterior Ulnar Collateral Ligament

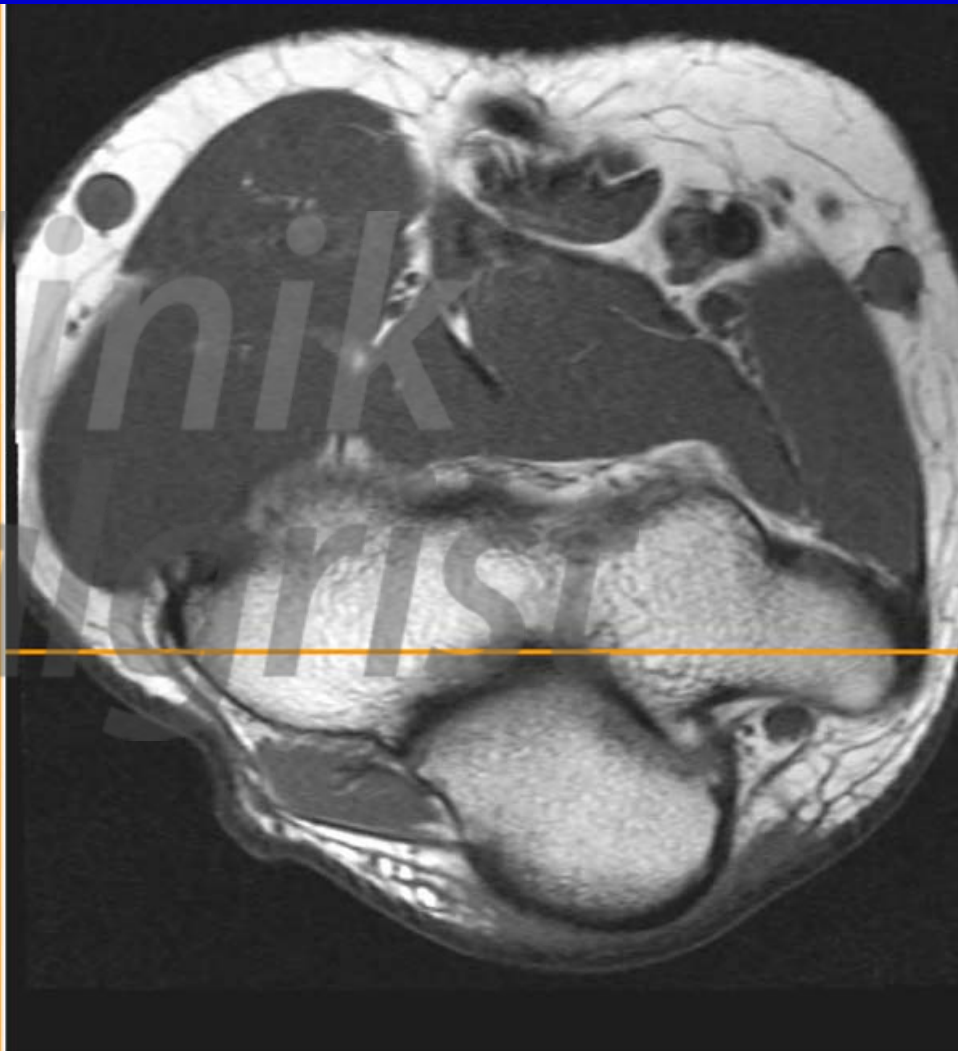


# Medial (=Ulnar) Anatomy



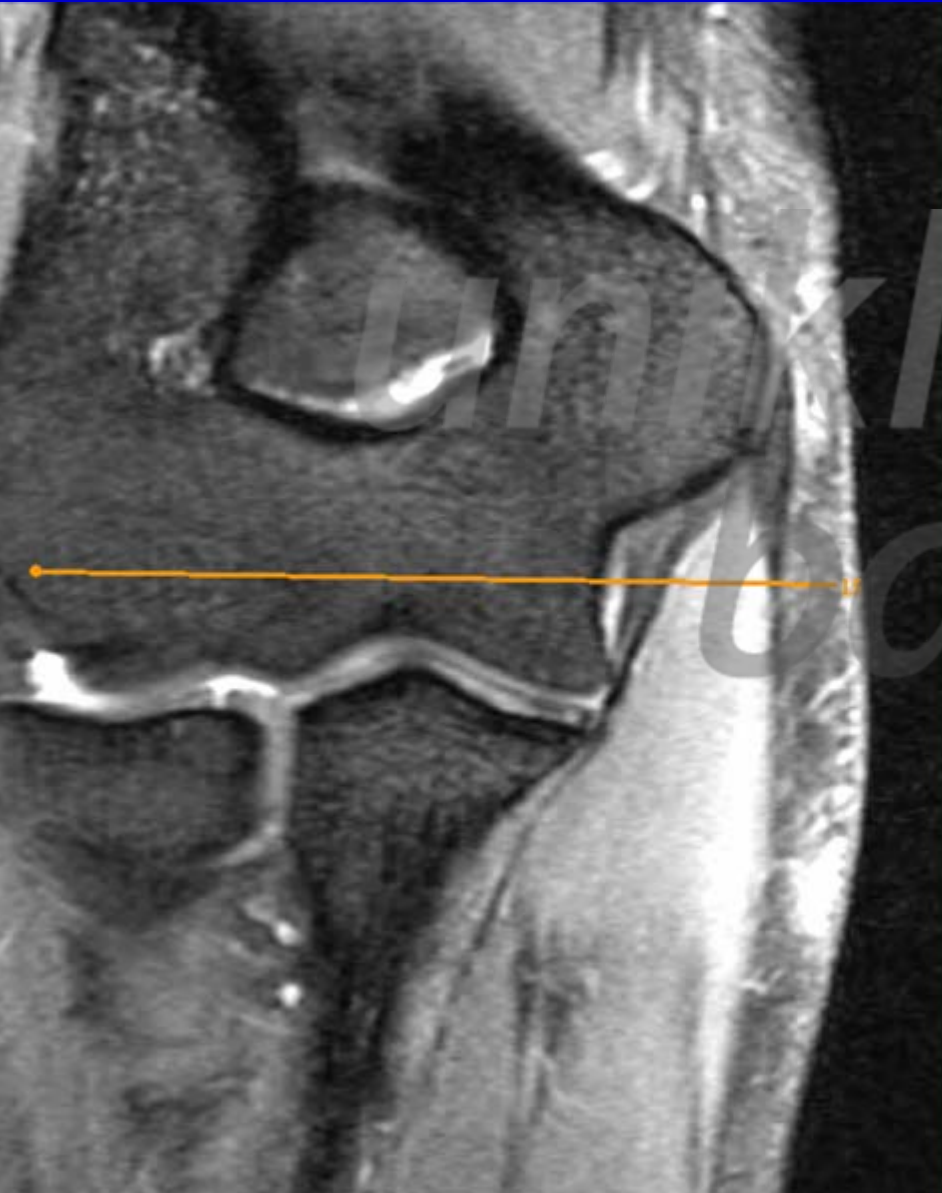


# Anterior Bundle of the Ulnar Collateral Ligament

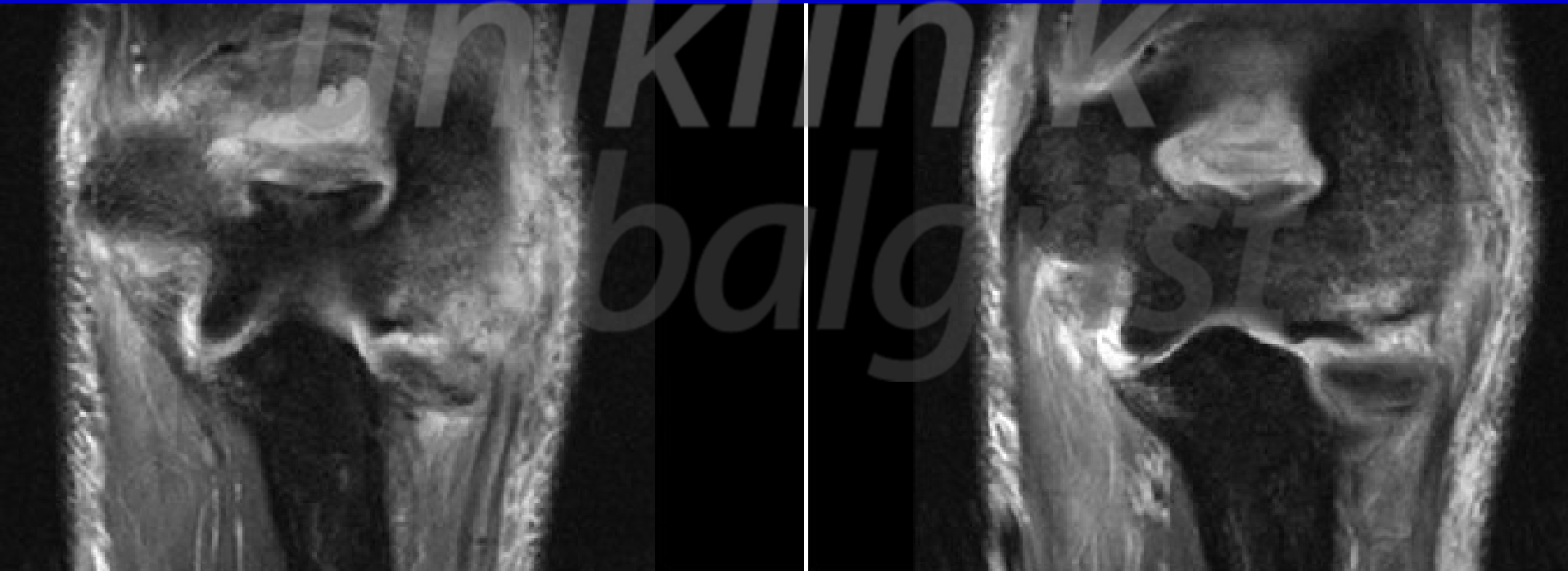




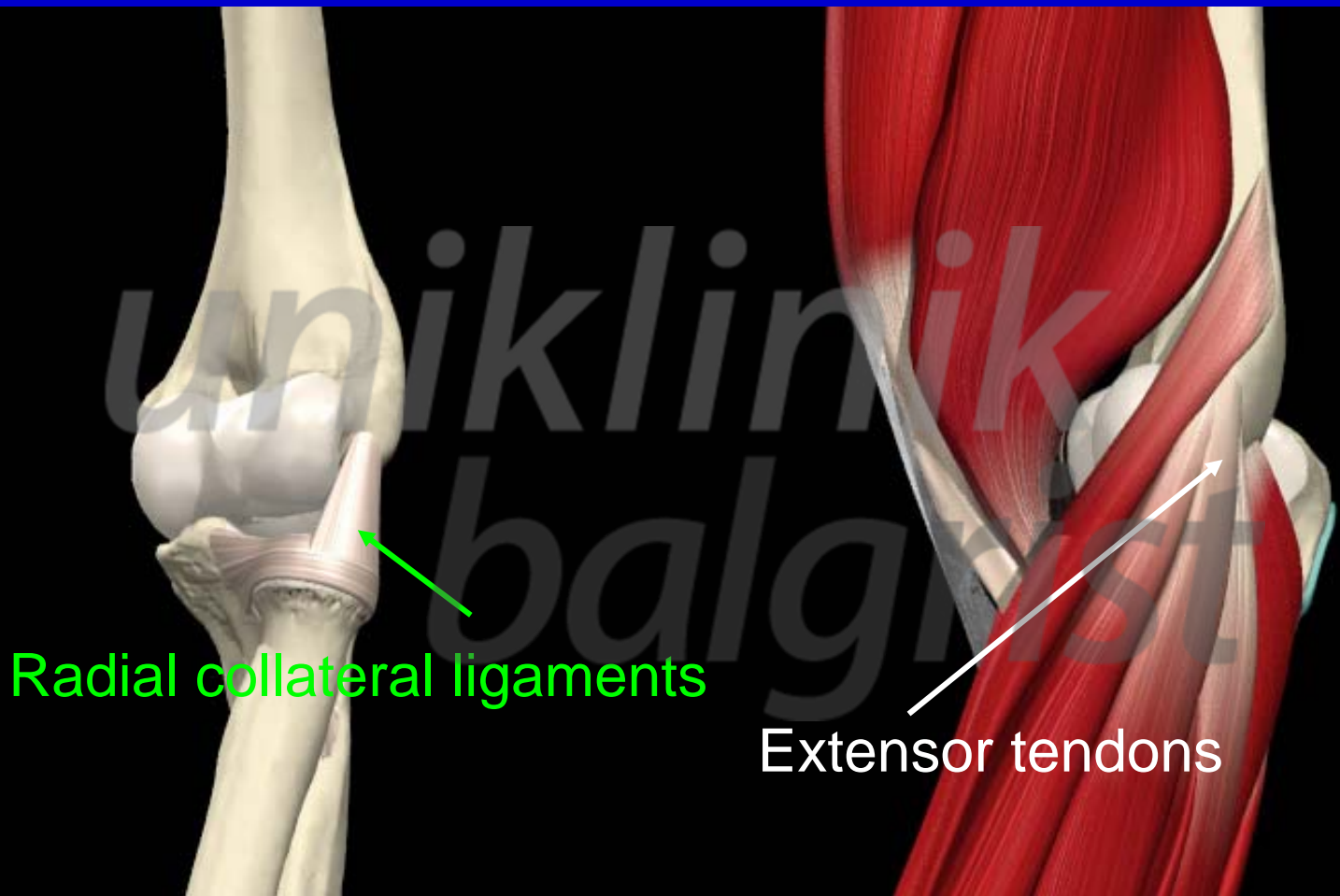
# Posterior Bundle of the Ulnar Collateral Ligament



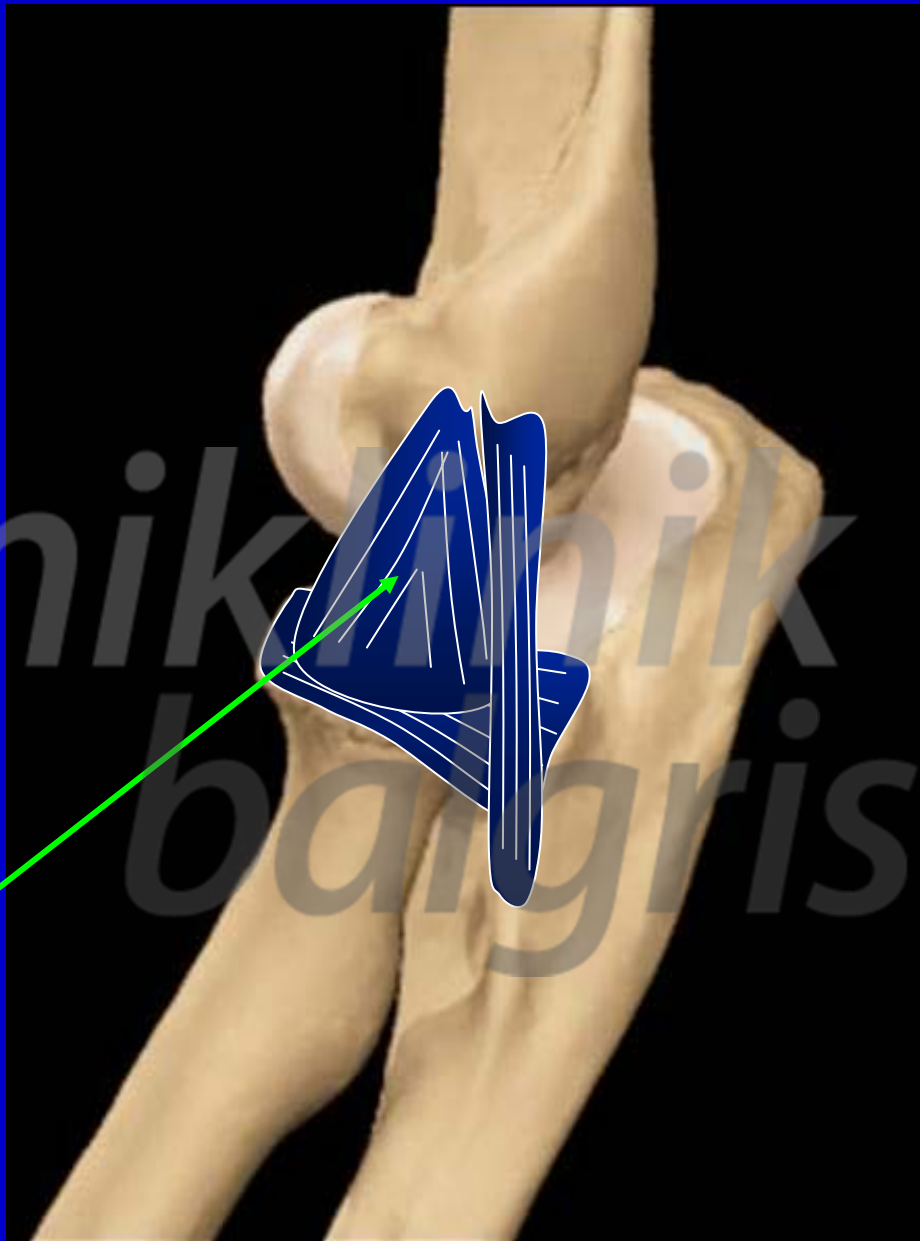
# Posterolateral Lesion (Lateral Ulnar Collateral Ligament = LUCL Lesion, Bone Bruise Capitellum)



# Lateral (= Radial) Anatomy



# Radial Ligaments



*uniklinik  
balgrist*

Proper RCL

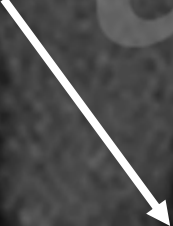
Lateral Ulnar Collateral Ligament (LUCL)

Annular ligament

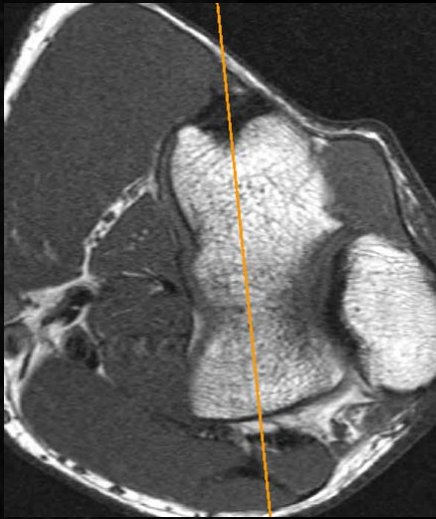
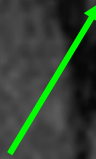


# Lateral Anatomy

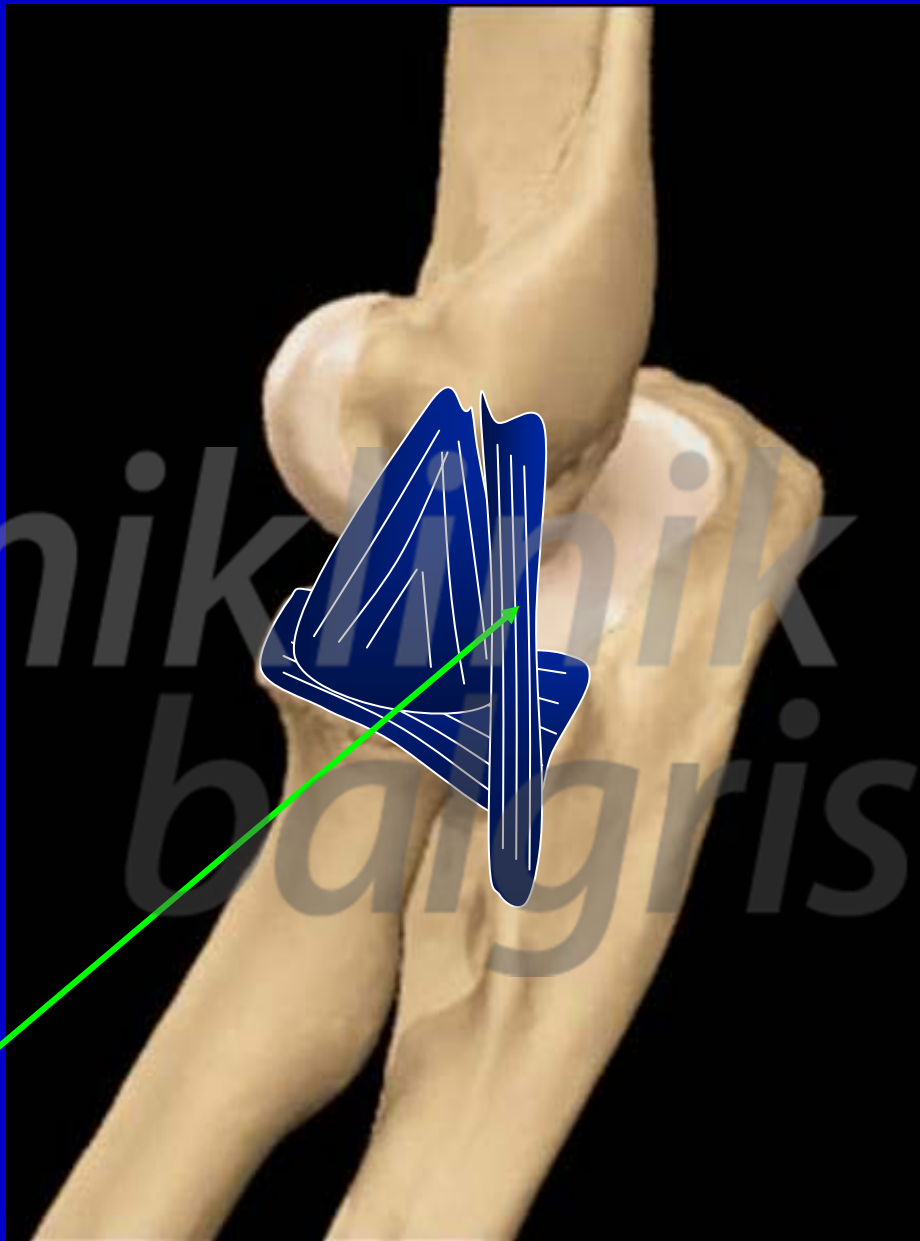
Extensor tensor tendons



(Proper) radial collateral ligament



# Radial Ligaments



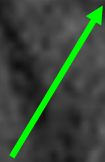
*uniklinik  
balgrist*

Proper RCL

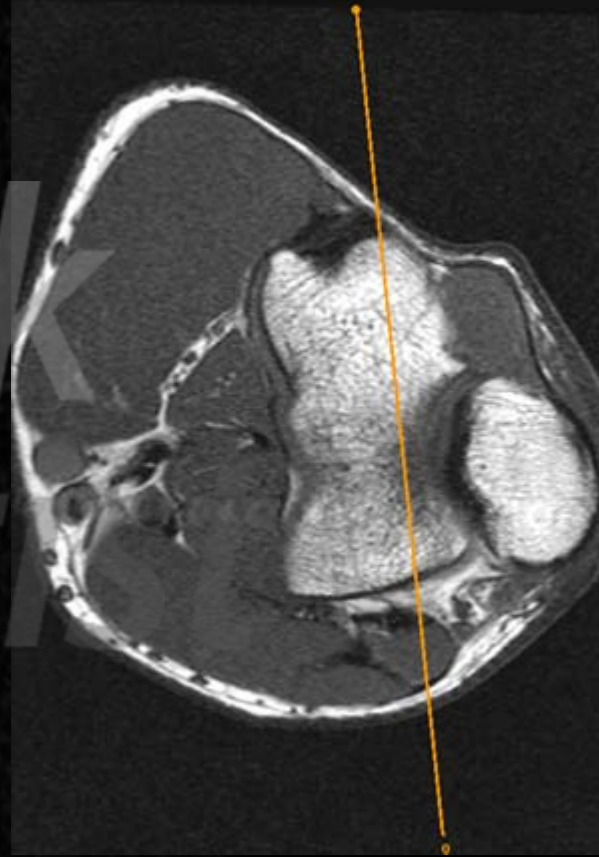
Lateral Ulnar Collateral Ligament (LUCL)

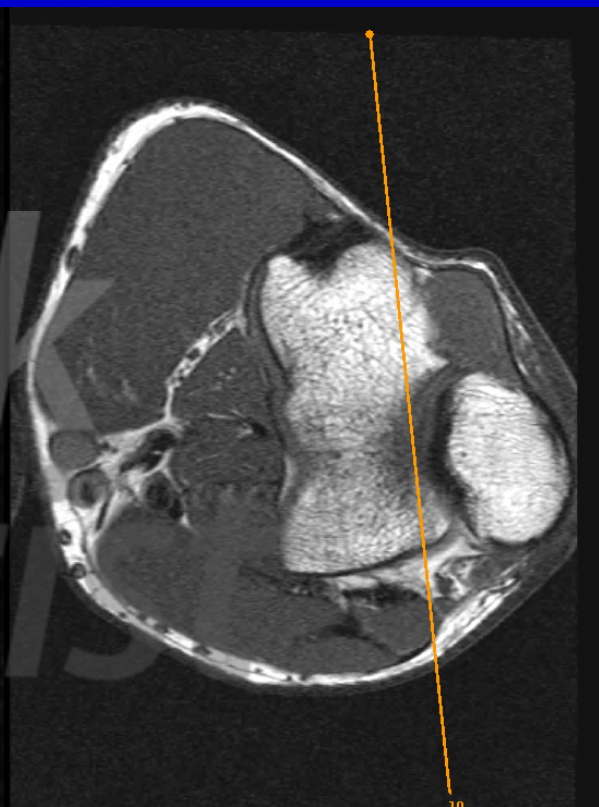
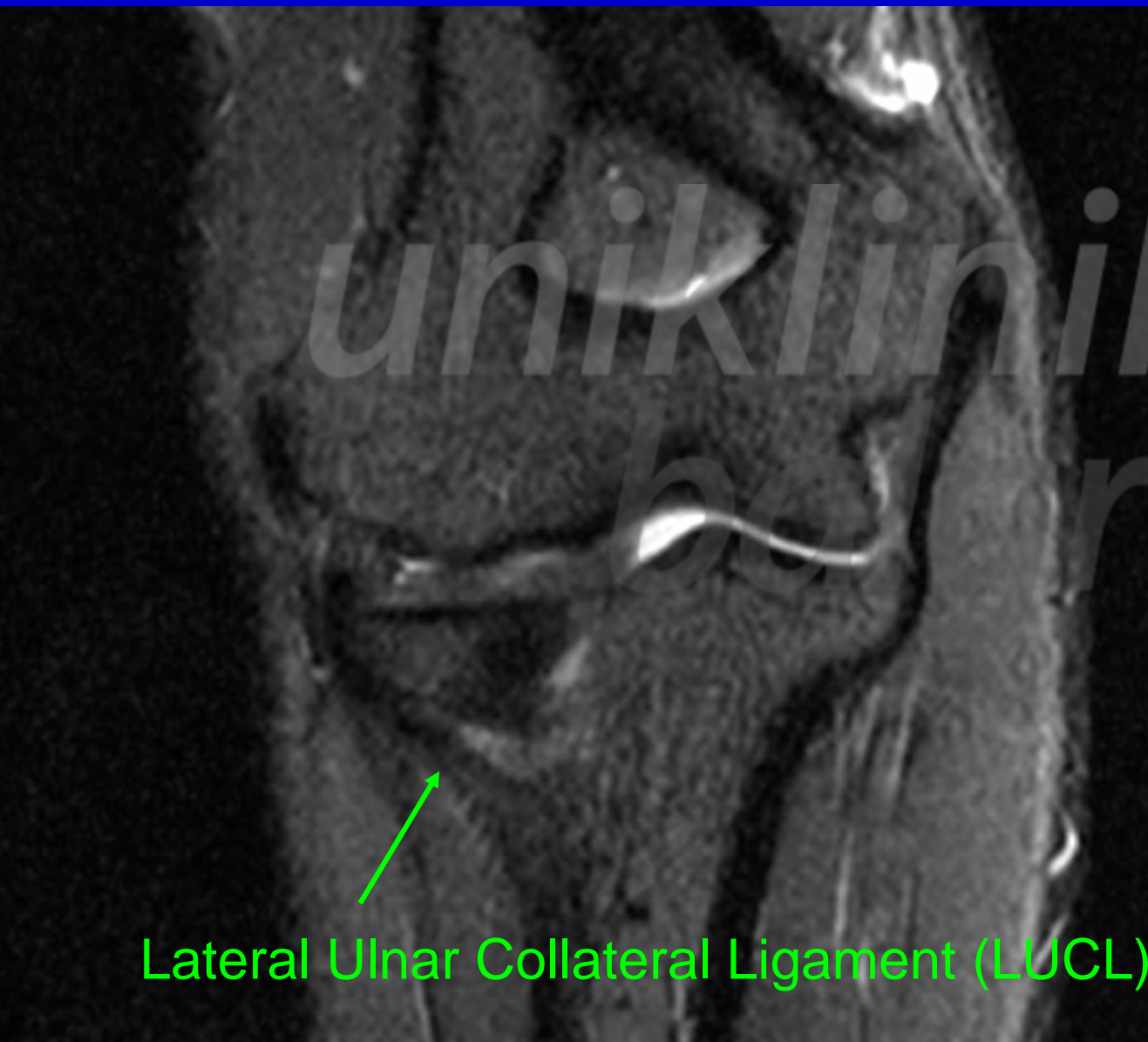
Annular ligament

*uniklinik  
koeln*



Lateral Ulnar Collateral Ligament (LUCL)





Lateral Ulnar Collateral Ligament (LUCL)



# Radial Ligaments

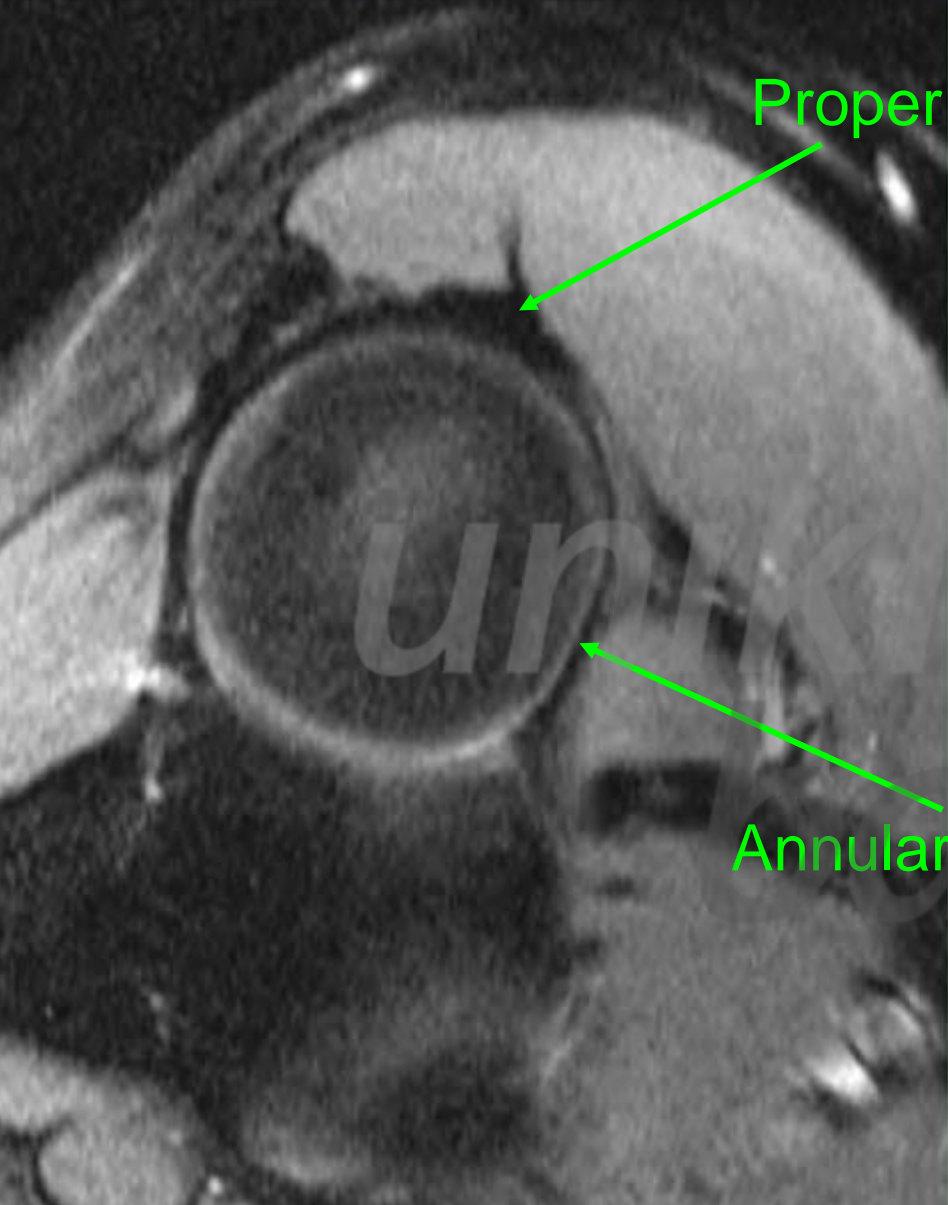


*uniklinik  
balgrist*

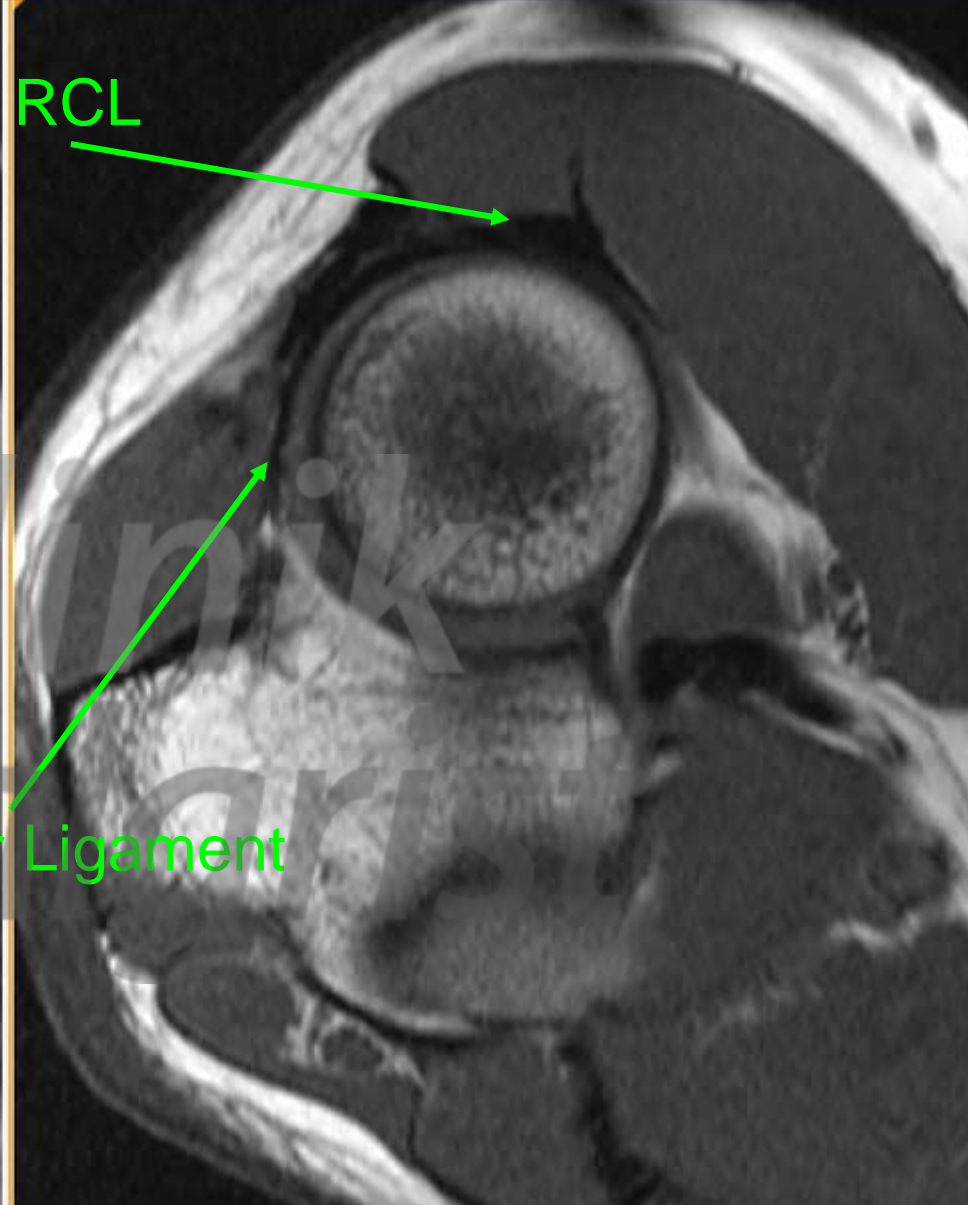
Proper RCL

Lateral Ulnar Collateral Ligament (LUCL)

Annular ligament

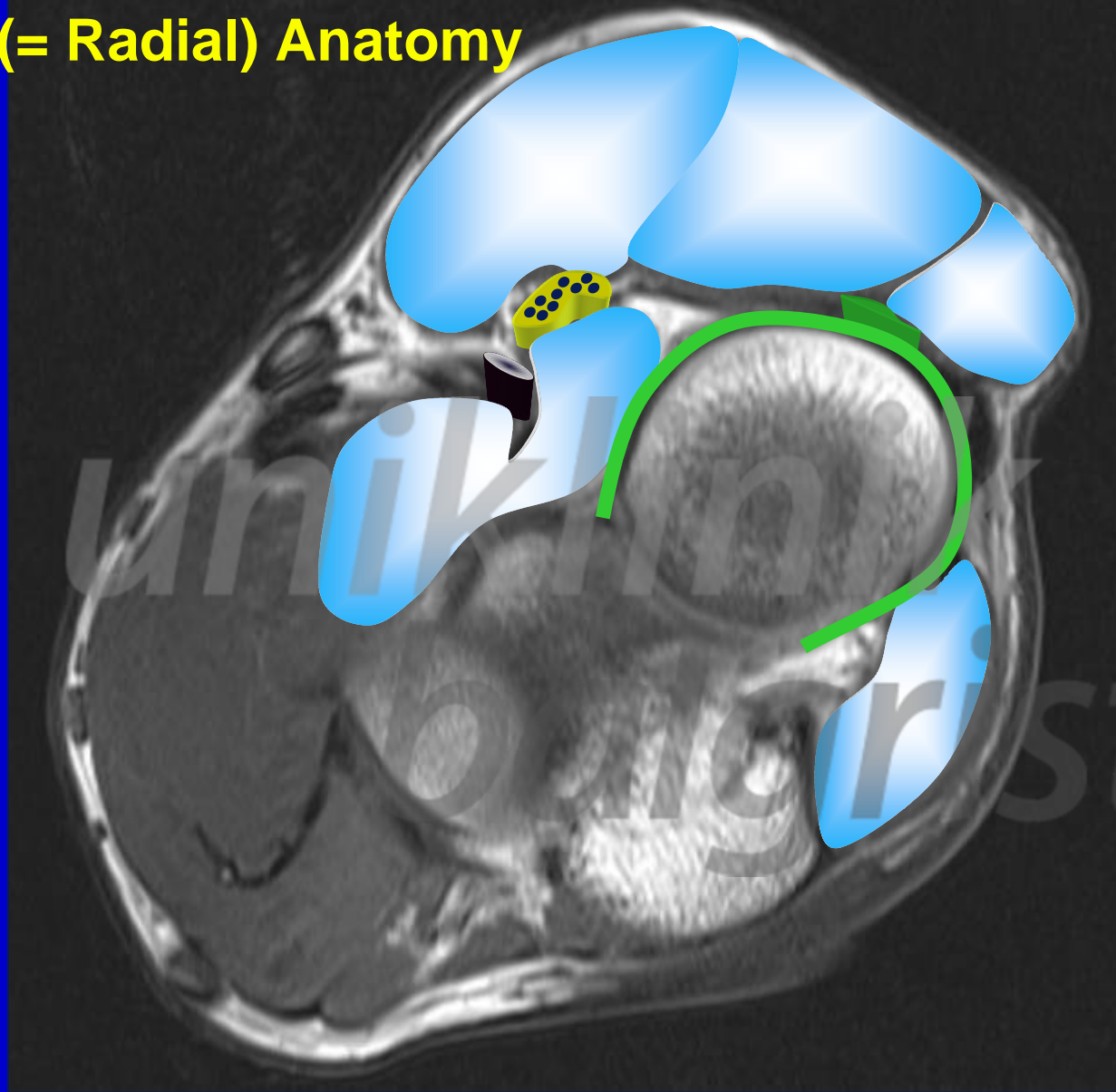


Intermediated weighted fat sat



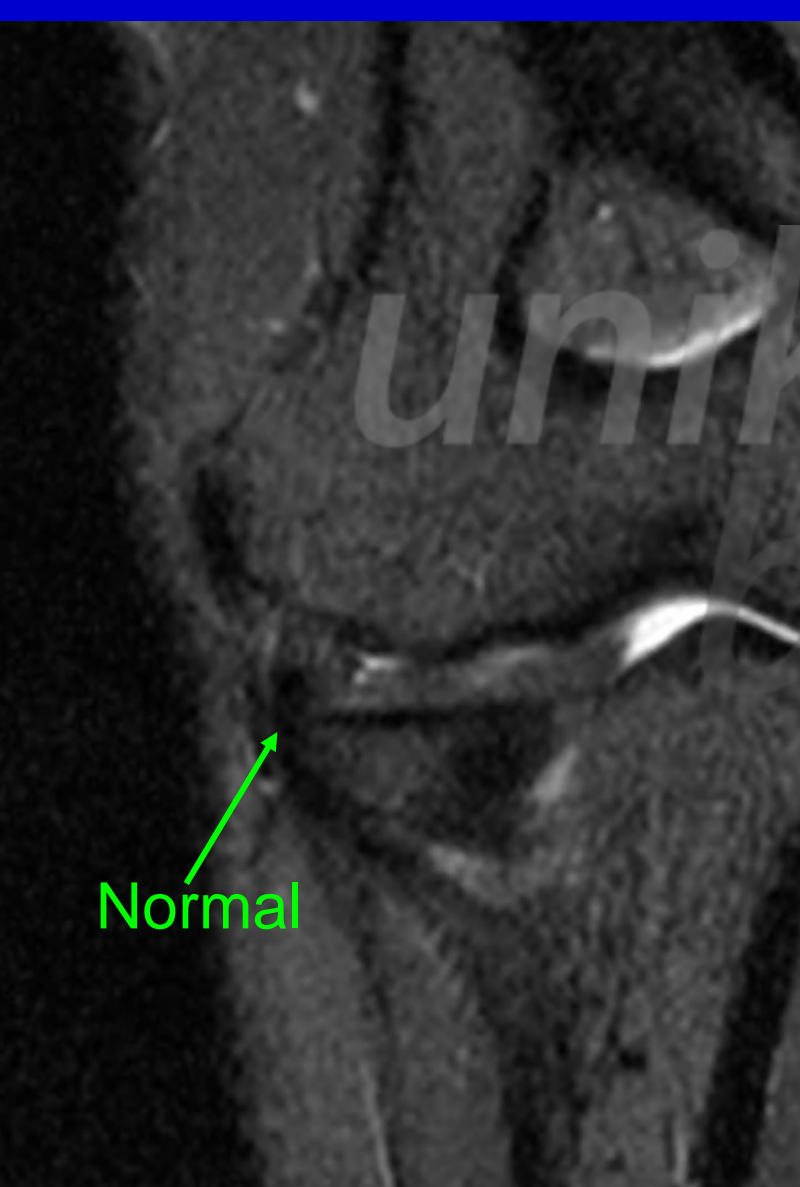
T1 weighted

# Lateral (= Radial) Anatomy



Courtesy of Eugene McNally

# Lateral Ulnar Collateral Ligament (LUCL)



Normal

Lesion

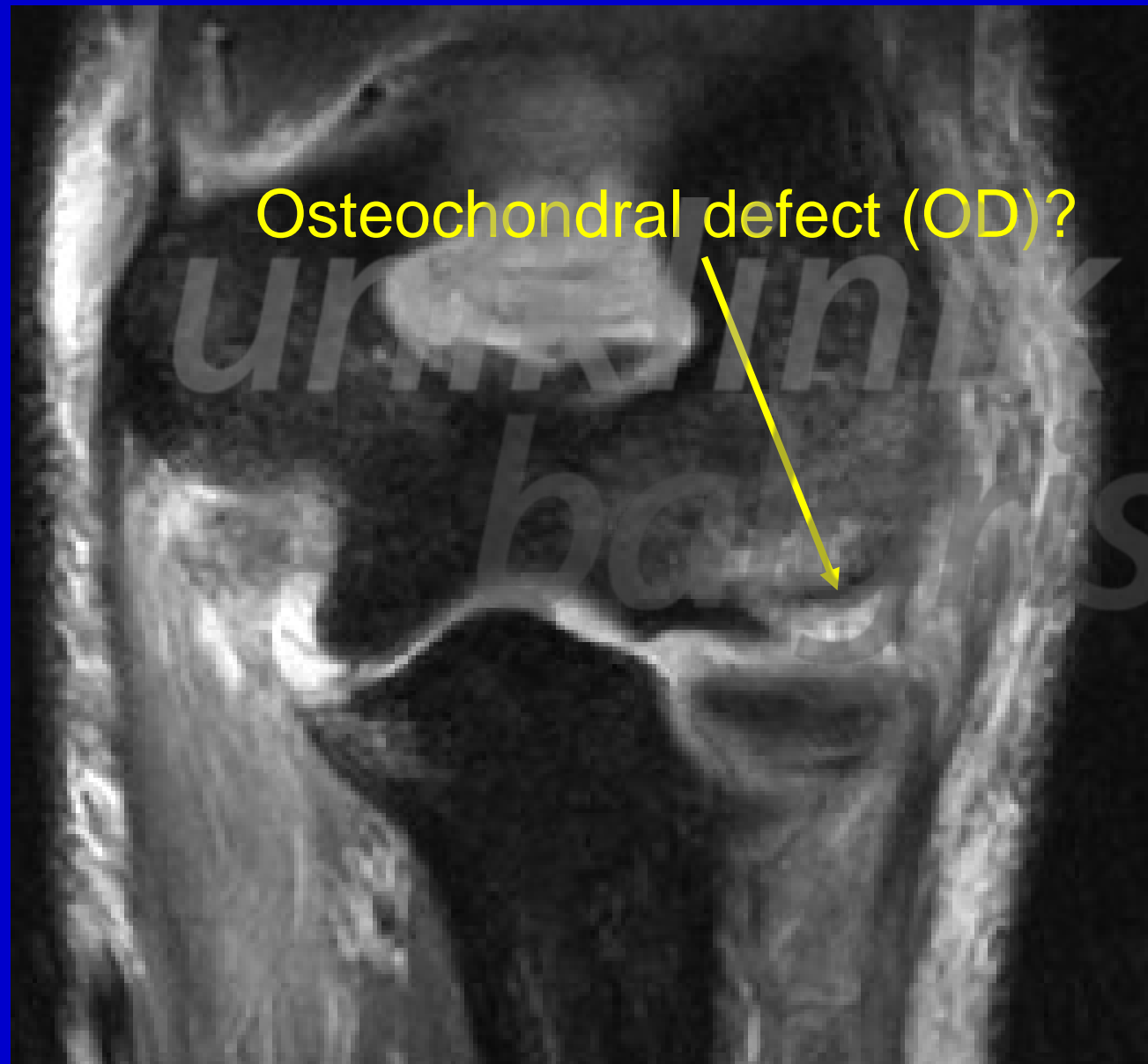
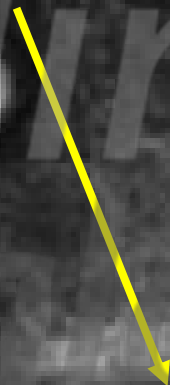
uniklinik  
berlin  
orthopedie  
hand- und  
fingerchirurgie



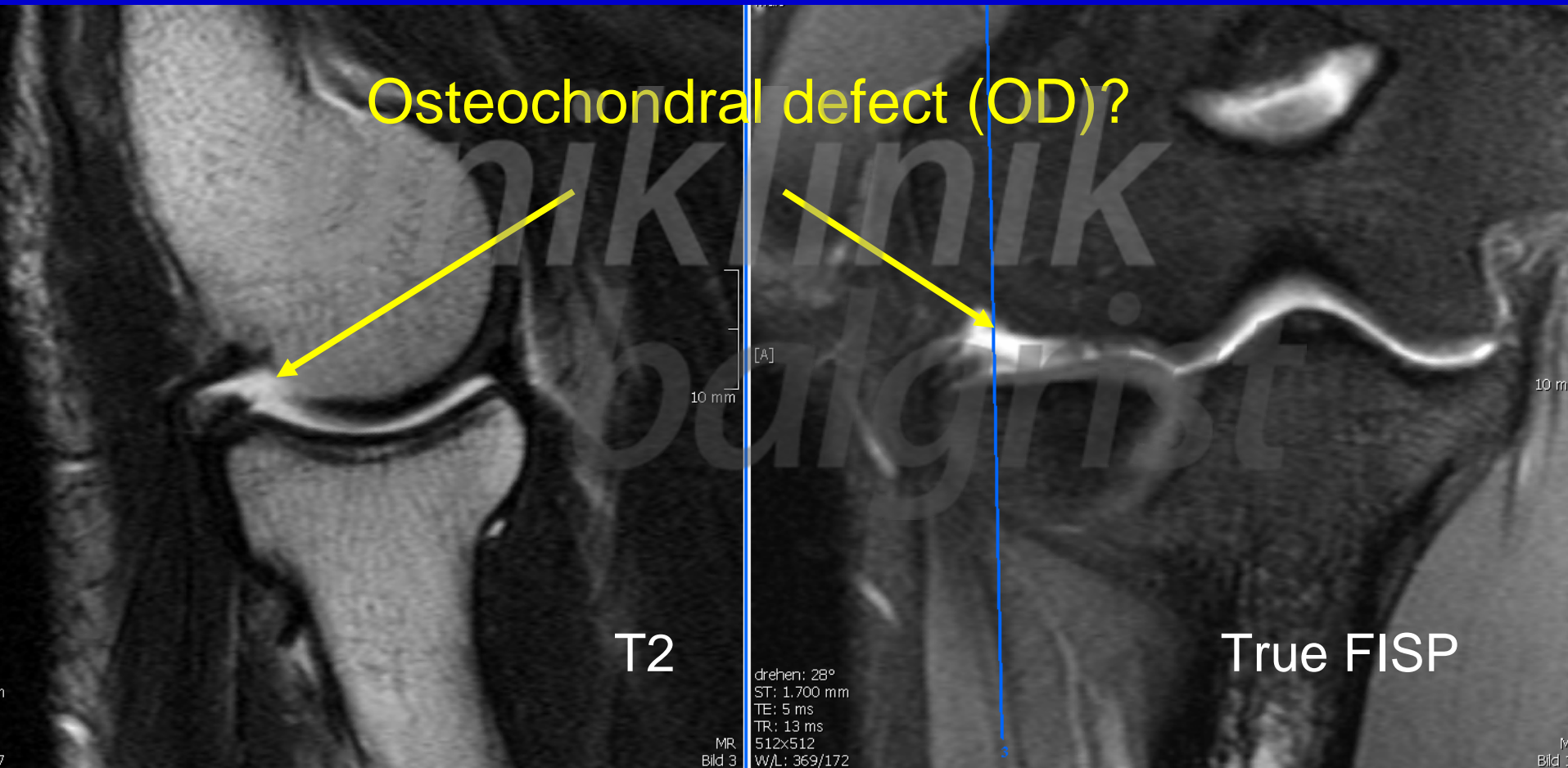
# Take Home Points Ligament Tears

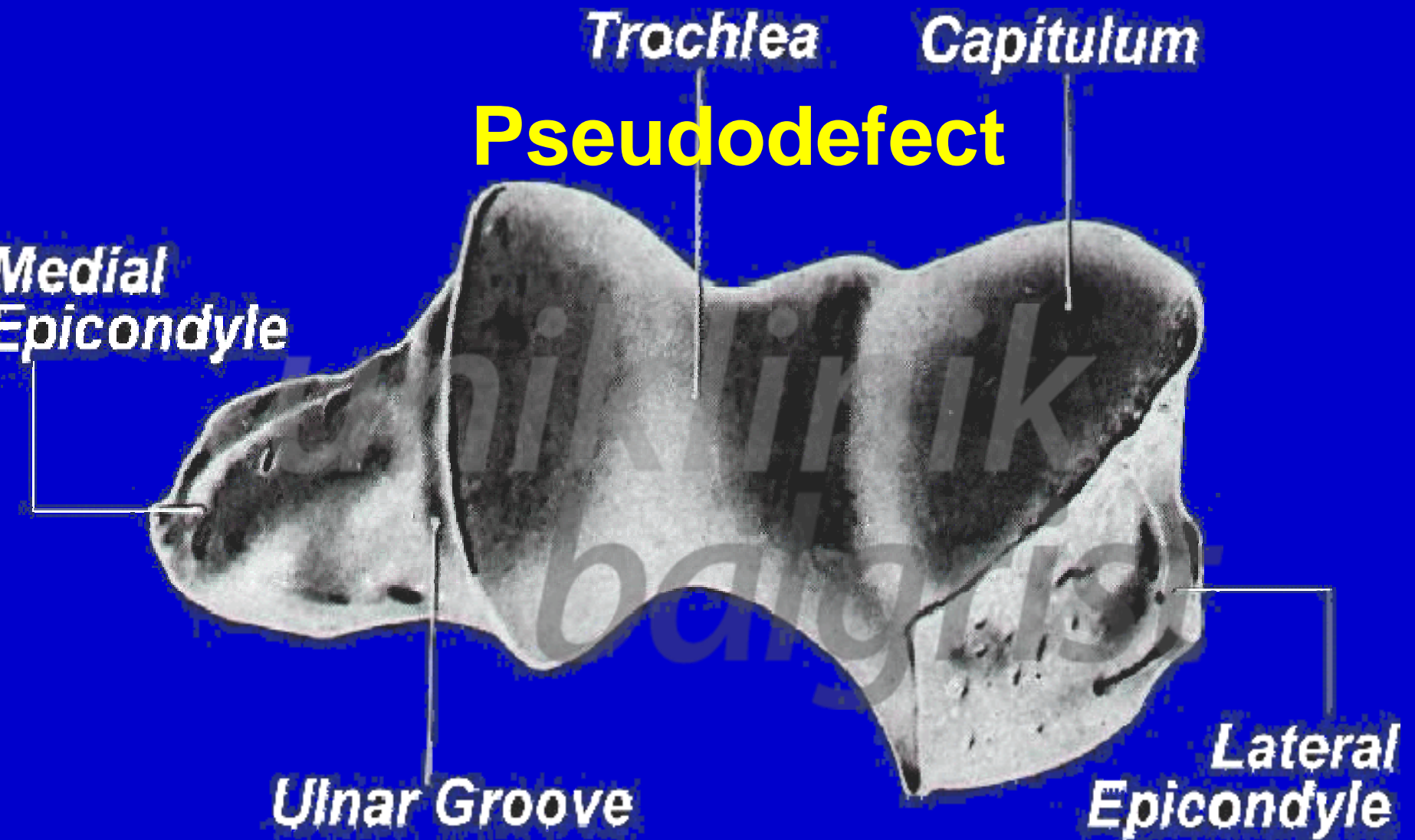
1. Standard MR is appropriate
2. Osseous lesions are hardly visible on MR images

Osteochondral defect (OD)?



# Pseudodefekt of the Capitellum

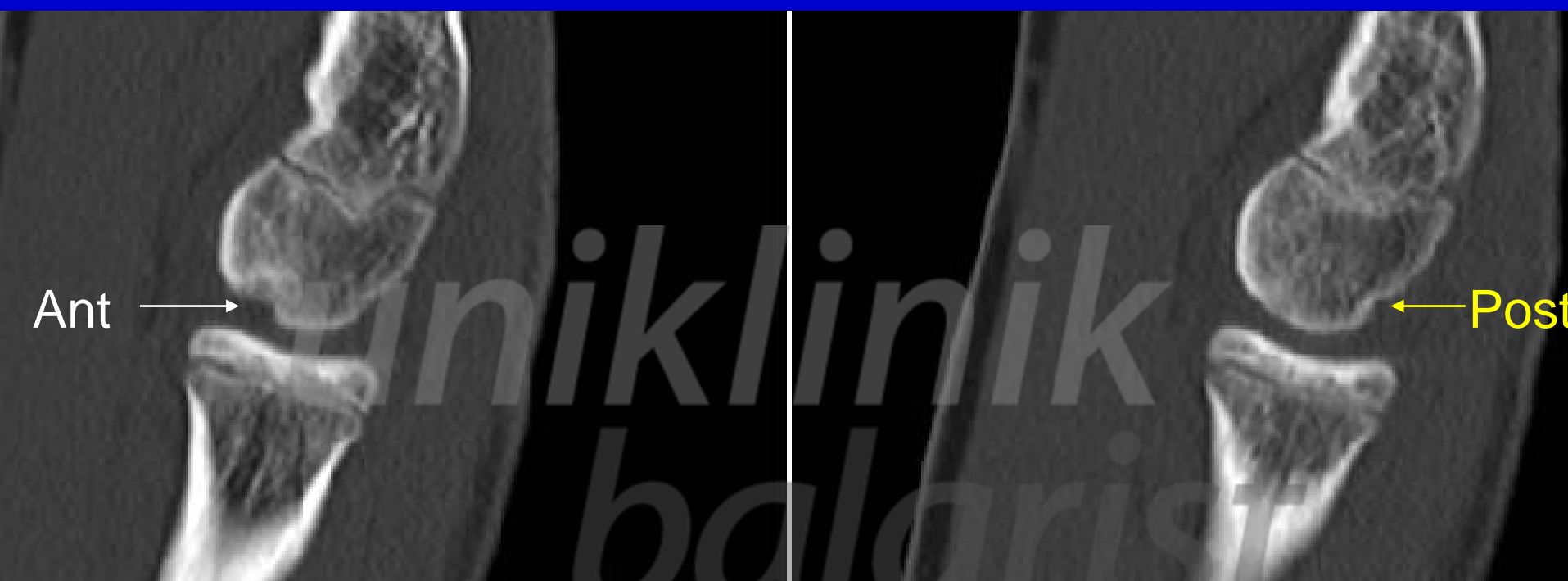




Rosenberg ZS, Beltran J, Cheung YY. Pseudodefekt of the capitellum: potential MR imaging pitfall. Radiology 1994; 191:821-823.



# Osteochondral Defect vs. Pseudodefekt



Lesion anterior

Capitellum pseudo-defect posterior

# Elbow Imaging Case 5

52-year old tennis teacher, former professional tennis player suffers from pain and extension deficit since two months.



T2 w



uniklinik

balgrist

T2 fat sat





uniklinika

balgrin

T1 w Gd fat sat

# Hypertrophied Posterolateral Plica



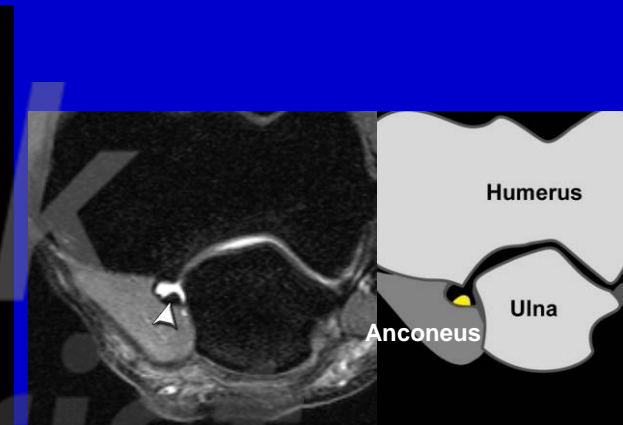
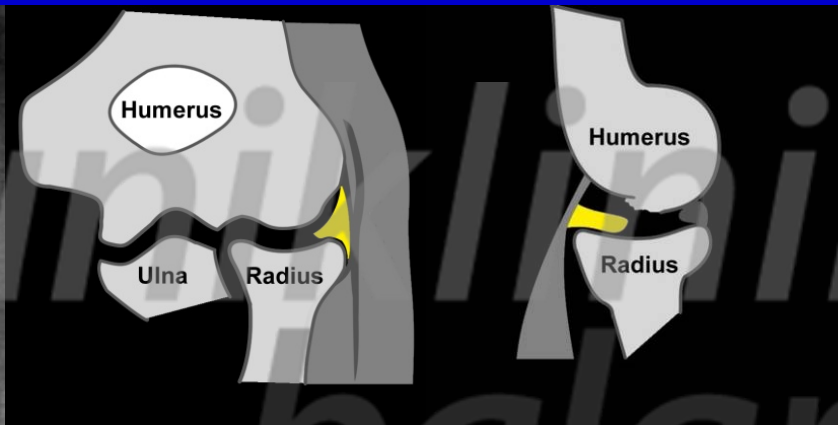
# Asymptomatic Volunteer

Plicae Syndrome?



True FISP





Posterolateral plica

Posterior plica

● Presence

➤ Yes

98%

33%

➤ No

2%

67%

Husarik DB, Saupe N, Jost B, Pfirrmann CWA, Hodler J, Zanetti M. Ligaments and plicae of the elbow: normal MR imaging variability in 60 asymptomatic volunteers. Radiology, accepted for publication

# Plicae Thickness

median

- **Posterolat. Plica**

- sag x cc x medlat

4.3 x 1.9 x 3.9 mm

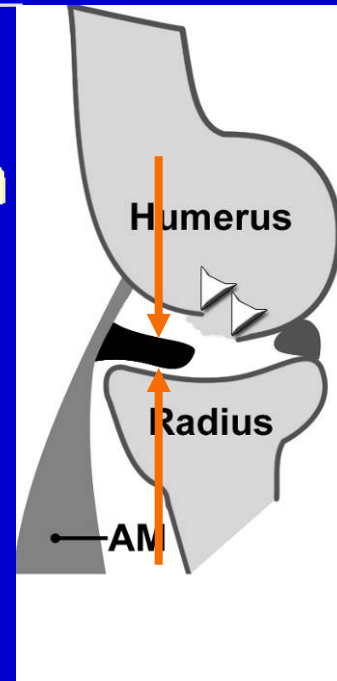
- cc max: **3.1**

- **Posterior plica**

- sag x medlat

1.8 x 1.4 mm

- medlat max: **2.6**



Thickness of elbow plicae is usually < 3 mm

Husarik DB, Saupe N, Jost B, Pfirrmann CWA, Hodler J, Zanetti M. Ligaments and plicae of the elbow: normal MR imaging variability in 60 asymptomatic volunteers. Radiology, accepted for publication



# Take Home Point Plicae

1. Generally minor clinical importance
2. More important when thicker than 2 mm
3. More important when associated with surrounding synovitis (gd. i.v)

Awaya H, Schweitzer ME, Feng SA, et al. Elbow synovial fold syndrome: MR imaging findings. *AJR Am J Roentgenol* 2001; 177:1377-1381.

Huang GS, Lee CH, Lee HS, Chen CY. A meniscus causing painful snapping of the elbow joint: MR imaging with arthroscopic and histologic correlation. *Eur Radiol* 2005; 15:2411-2414.

# Elbow Imaging Case 9

26-year old man.

Elbow contusion one month before imaging was performed.

Pain and swelling of the elbow.

Flexion/extension 130/20/0



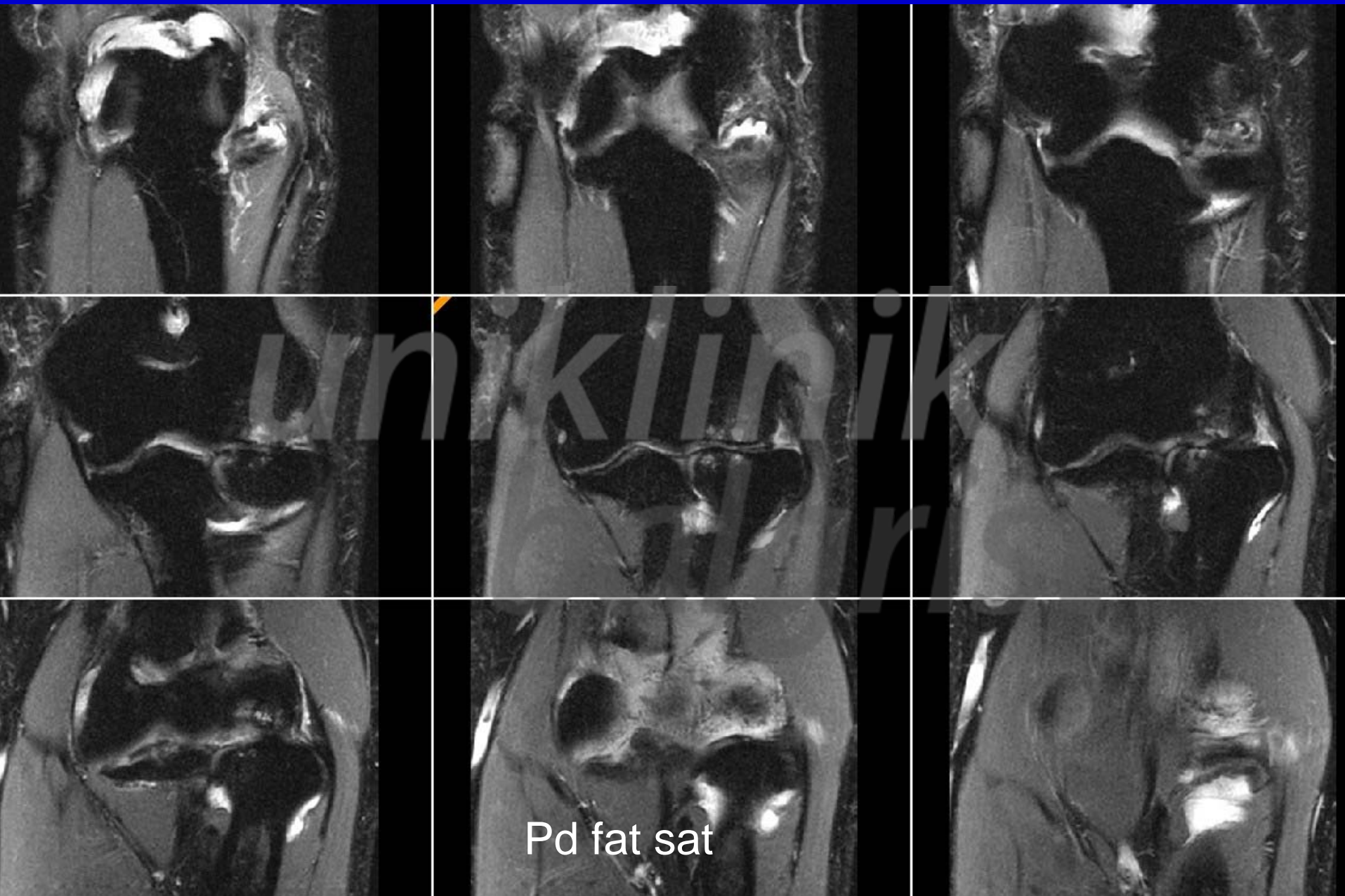


Ulnar side



Radial side





Pd fat sat

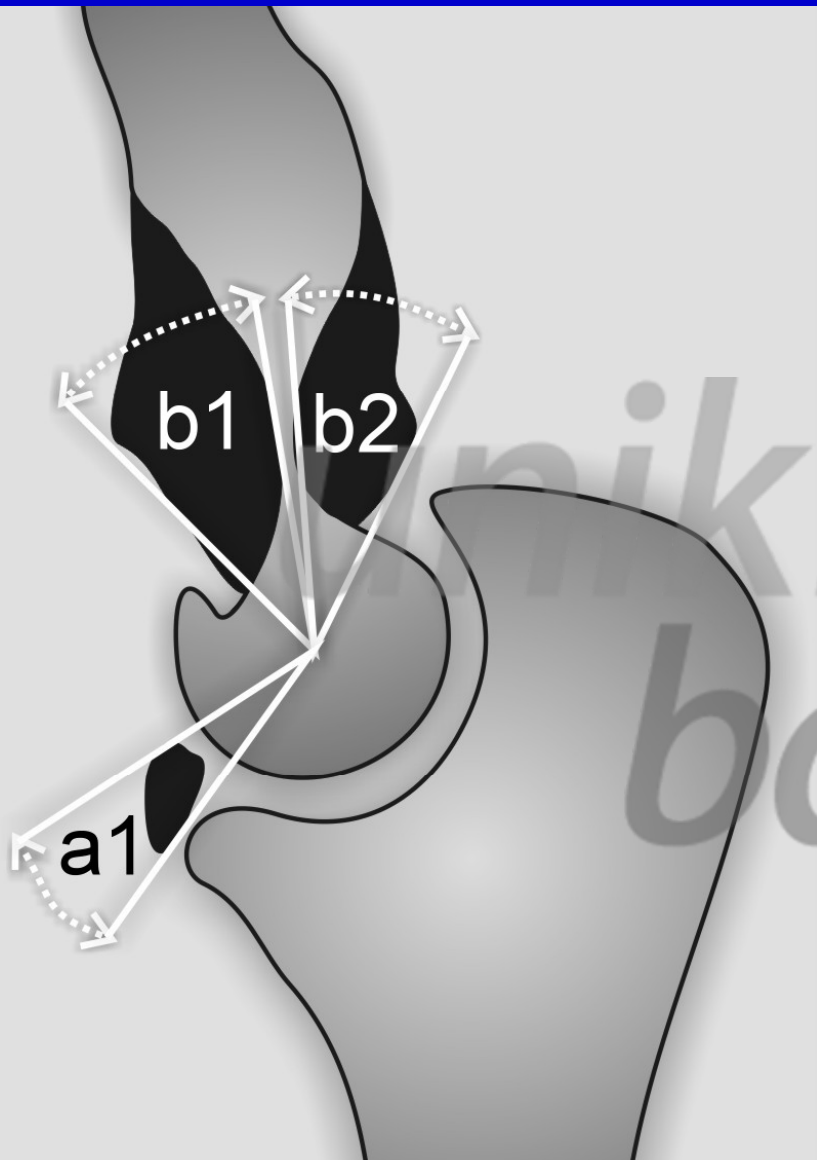


Ulnar side





Radial side



Elbow stiffness: effectiveness of conventional radiographs and CT to explain osseous causes  
Zubler V, Saupe N, Jost B, Pfirrmann CWA, Hodler J, Zanetti M. Am J Roentgenology 2010  
in press



Auto Shutter On | KVP 0.00



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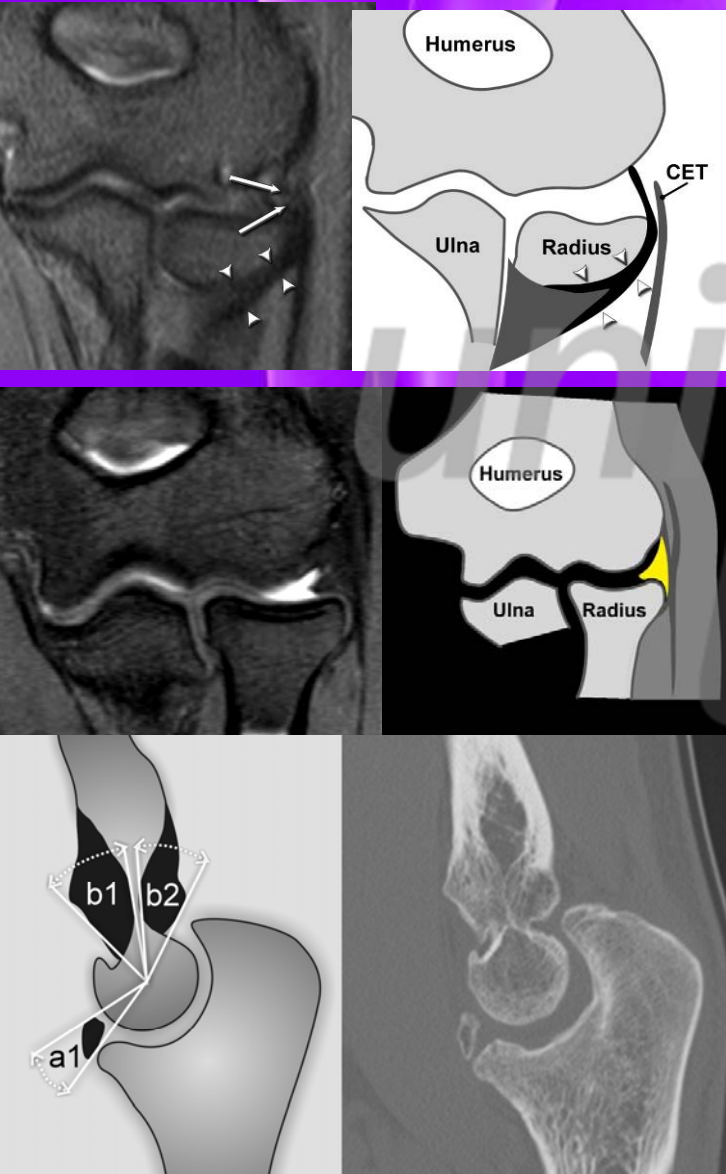
# Surgery: KASHIWAGI-OUTERBRIDGE



# Take Home Point Osteoarthritis

1. CT or CT arthrography with sagittal reconstructions provides extremely important therapeutic information for the surgeons in patients with elbow osteoarthritis.
2. CT or CT arthrography not only detect free intraarticular bodies but also *detect osteophytes* not visible on conventional radiographs.
3. *Osteophytes* and intraarticular bodies located in the fossa olecrani and fossa coronoidea are often hidden on conventional radiographs.

# Summary



- All elbow ligaments are consistently seen on standard MR images
- Posterolateral plica is always visible and thinner than 3mm
- CT with secondary (sagittal) reformations preferred for osseous causes of elbow stiffness





## BENEFITS

- Reduced registration fee at the Annual Meetings of the Society
- Special subscription rates for  
"Skeletal Radiology" (€ 170.00 instead of € 400.00 for individuals)  
"Seminars in Musculoskeletal Imaging" (€ 135.00 instead of € 216.00)



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EUROPEAN SOCIETY OF MUSCULOSKELETAL RADIOLOGY  
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