UNIVERSITÄT BERN

Bern Hip Symposium 2020: Vorkurs 26.2.2020

‚Miss the forest for the trees‘:

MRI und intraoperative Korrelation

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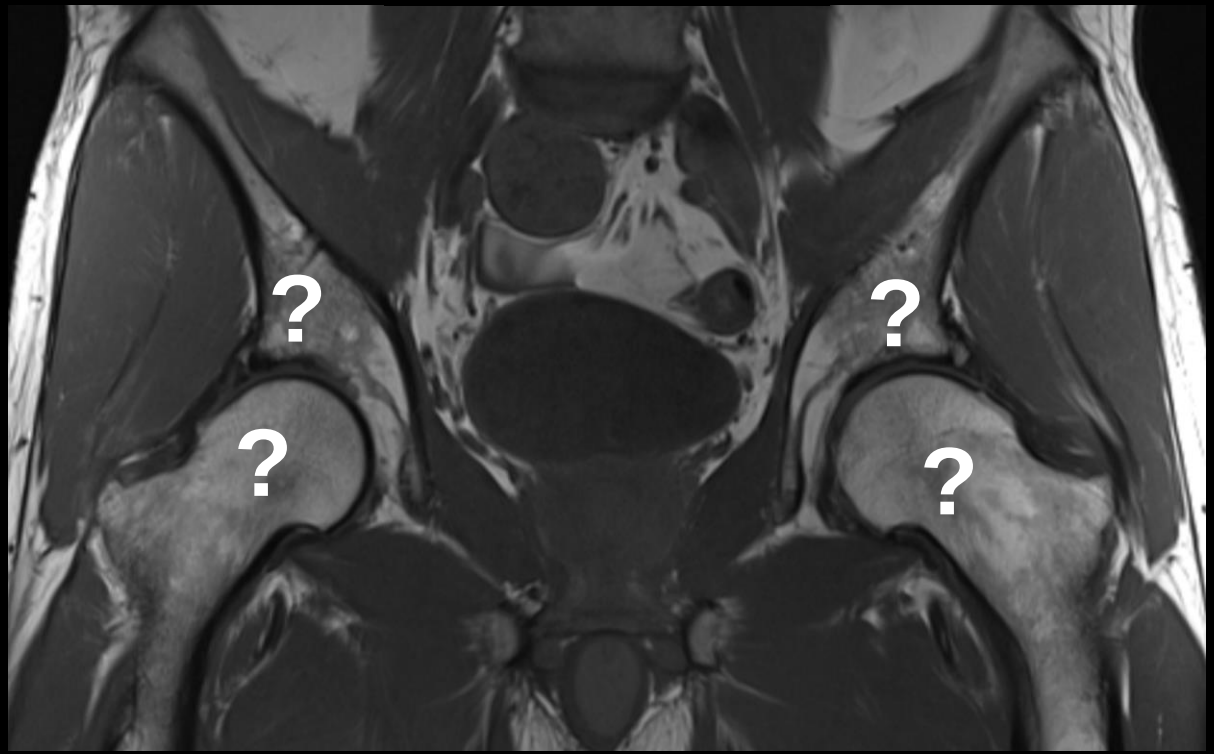
Junger Patient mit Hüftschmerz →Welche Untersuchung ?

- MR Becken ? (niedrig aufgelöst = grosses FOV)

MR Becken?

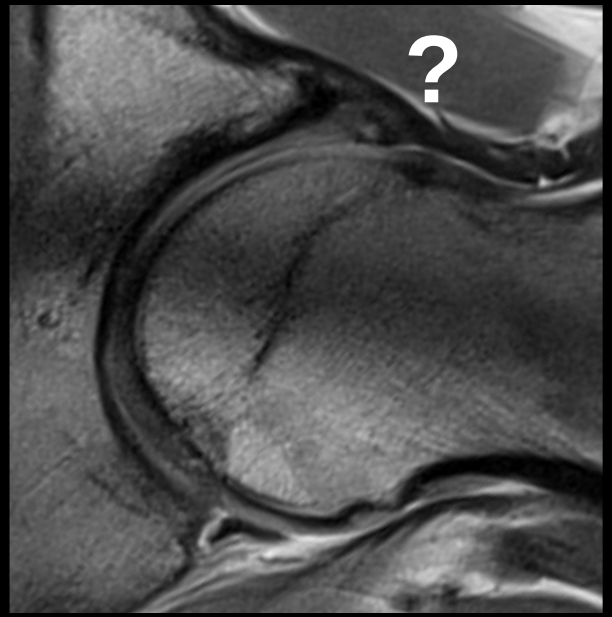


Welche Untersuchung anfordern ?

- ~~MR Becken ? (niedrig aufgelöst = grosses FOV)~~
- MRI Hüfte (hochaufgelöst = kleines FOV) ohne Kontrast (nativ) ?
- MR Arthrographie Hüfte (hochaufgelöst = kleines FOV) ?

Natives MRI vs direkte MR Arthrographie ?

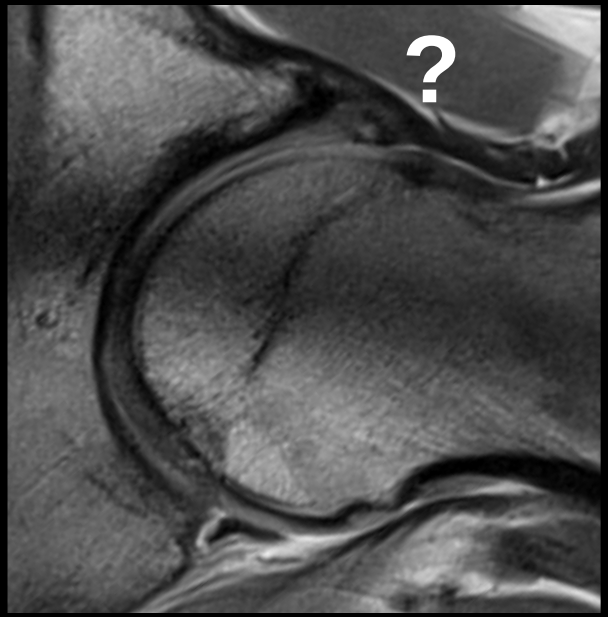
Labrum



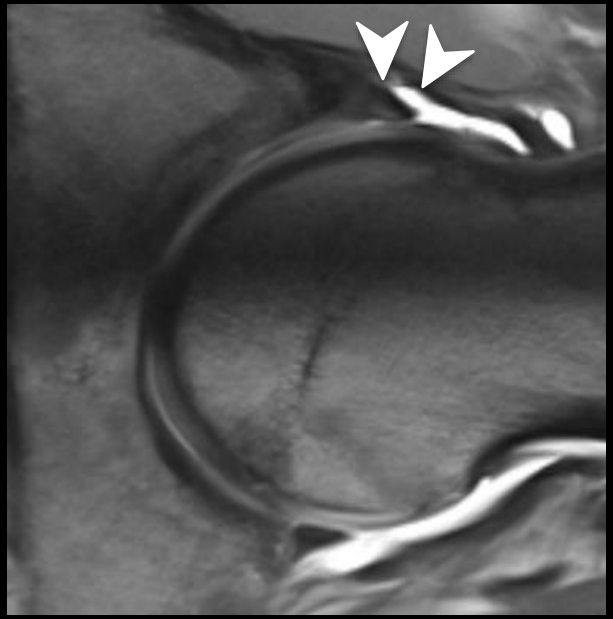
Nativ

Natives MRI vs direkte MR Arthrographie ?

Labrum



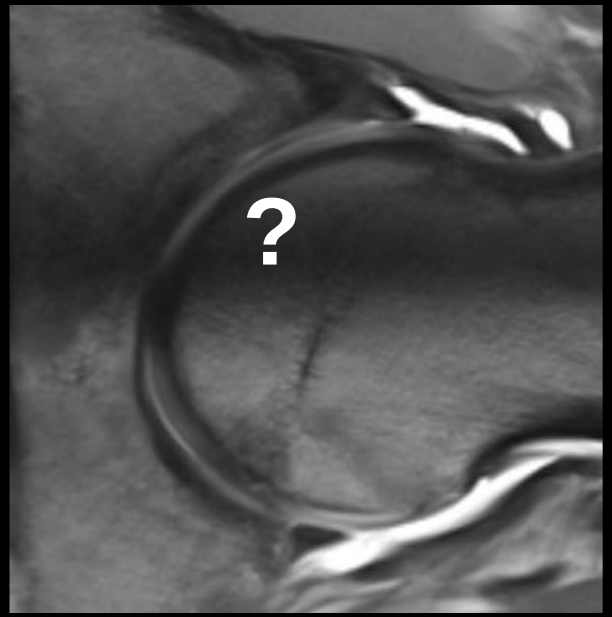
Nativ



Arthro

‚Normale‘ MR Arthrographie unter axialem Zug

Knorpel



Arthro

‚Normale‘ MR Arthrographie unter axialem Zug

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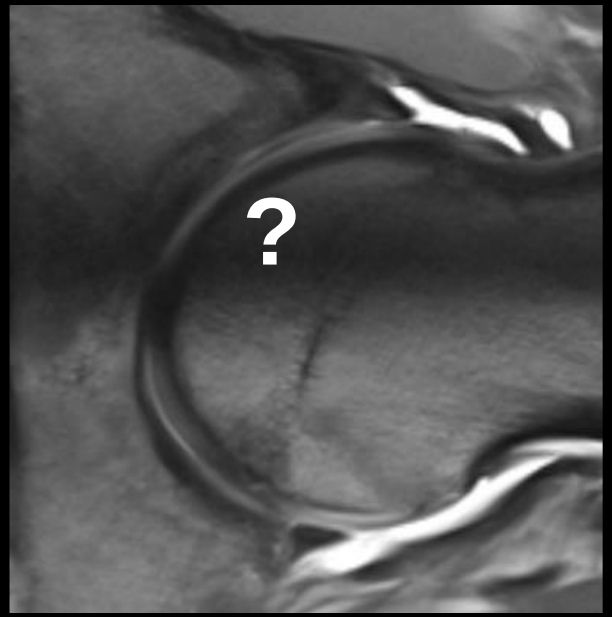
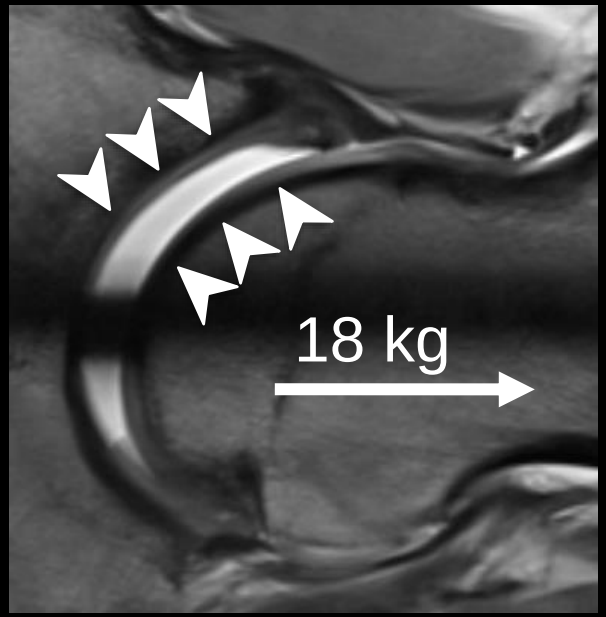


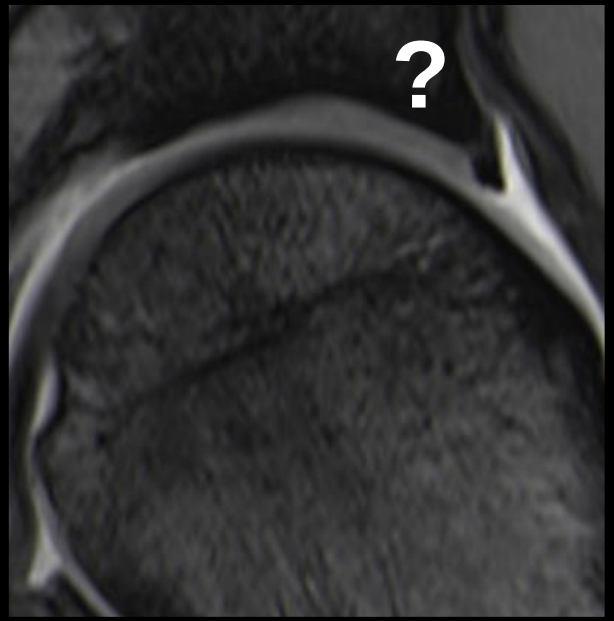
Arthro

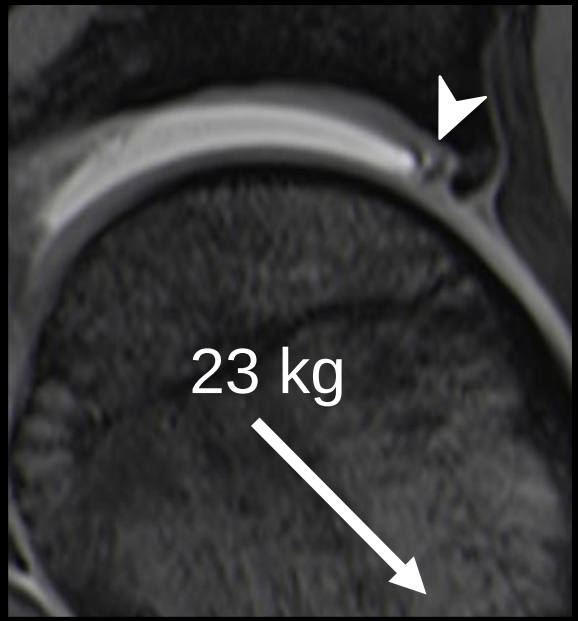


Traktions-Arthro

‚Normale‘ MR Arthrographie unter axialem Zug

23y Patient mit Knorpeldelamination

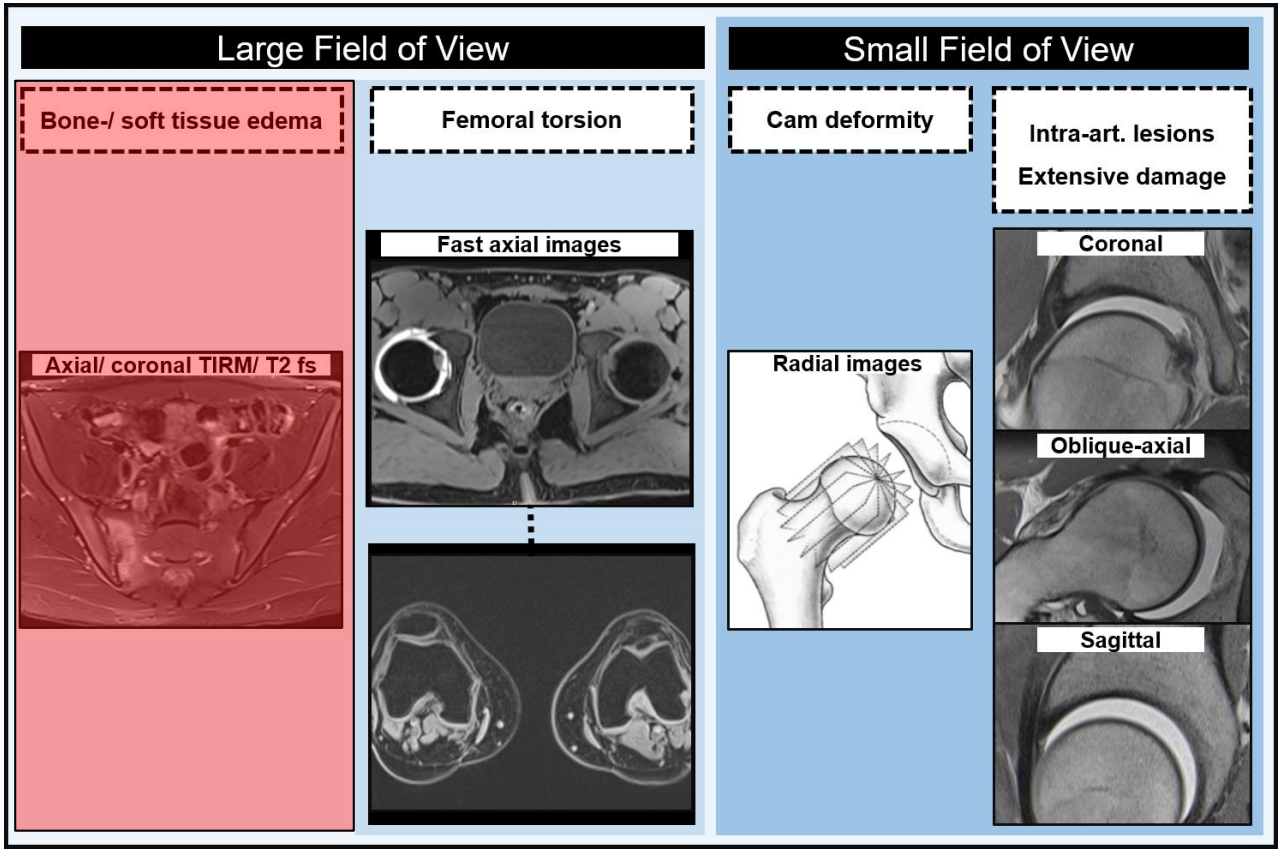




Arthroskopische FAI Korrekur

23y Patient mit Knorpeldelamination

MR-Protokoll Arthrographie/ Hüfte nativ



Schmaranzer F et al. AJR 2020 *in press*

Ausschluss von Differentialdiagnosen

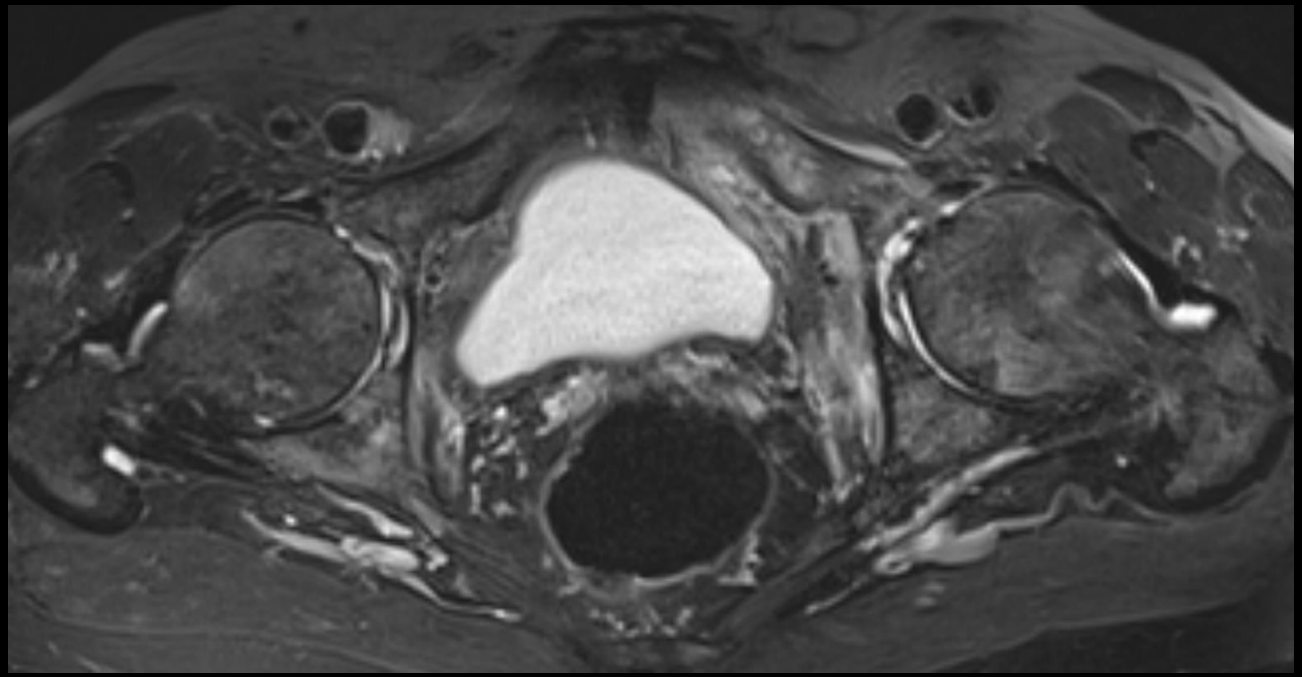
> Flüssigkeitssensitive (TIRM/ STIR) Sequenz Ausschluss periartikulären Pathologien

Faustregel:

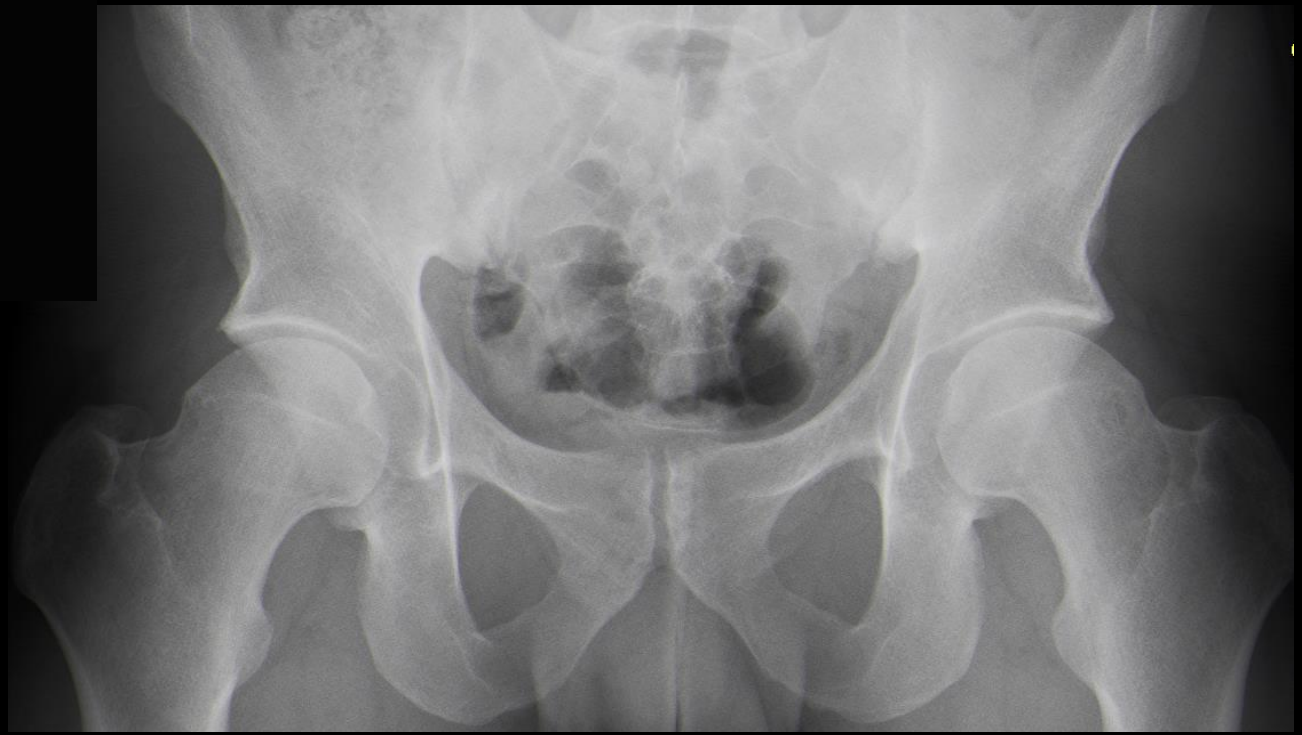
‘Alles was auf einem schwarzen MR Bild leuchtet ist pathologisch oder Kontrastmittel von der Arthrographie’

25 y Patient: beg. Stressfraktur

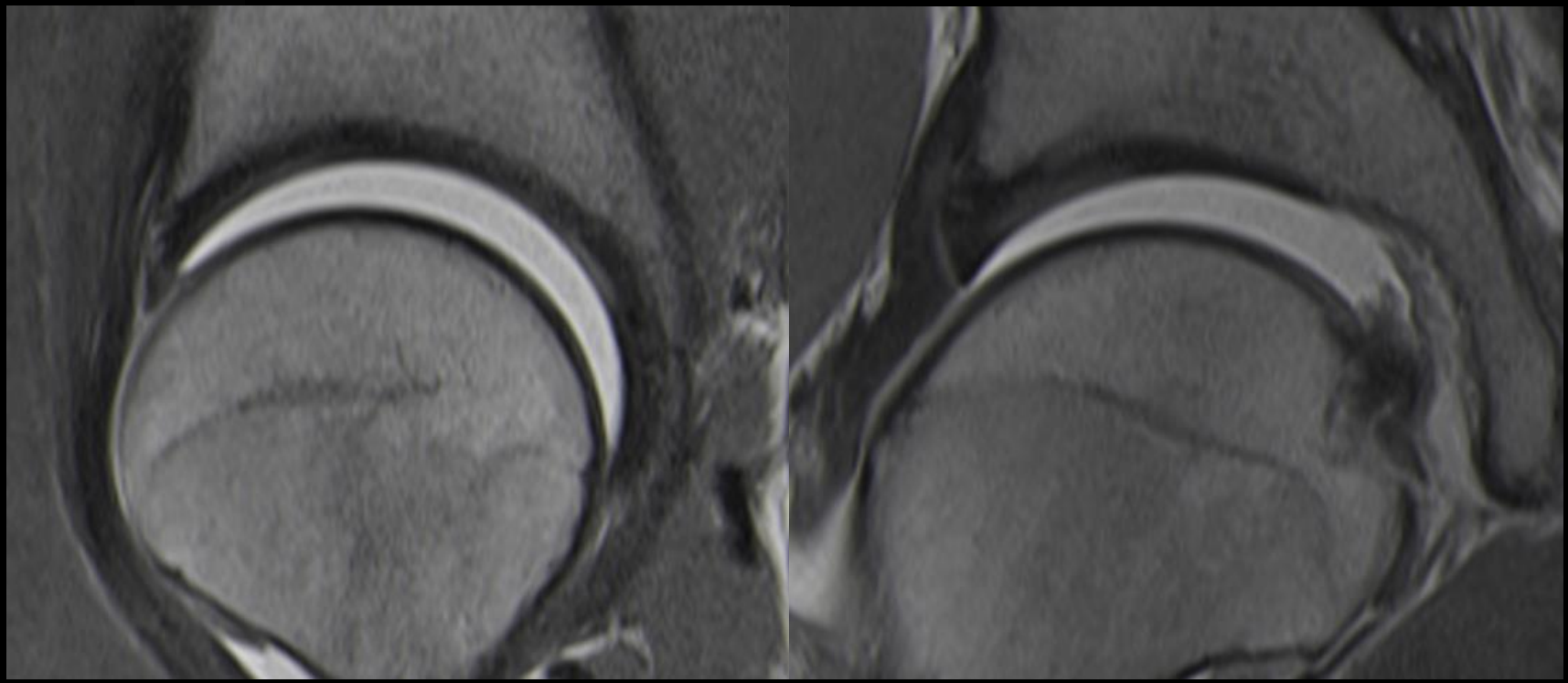
46 y Patientin: Knochenmetastasen bei Mamma-Ca



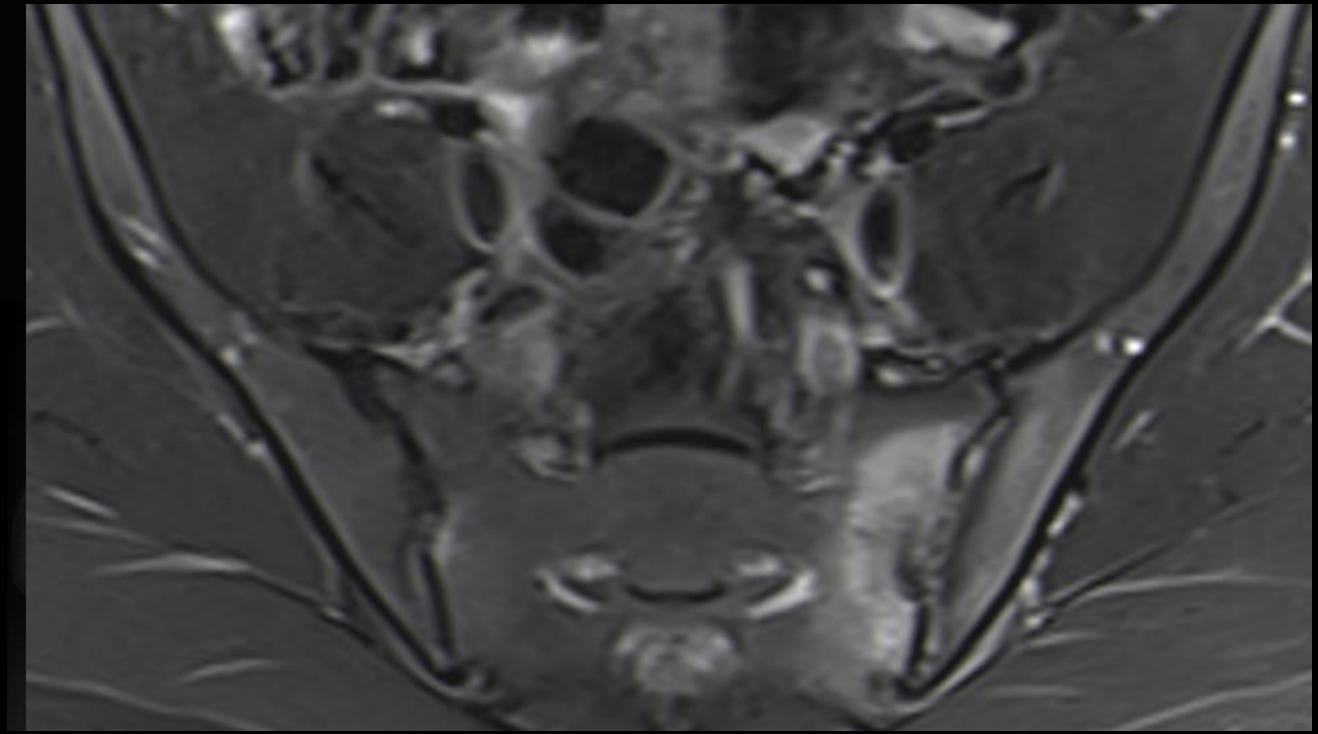
24 y Patient: Schmerzen Leiste, ISG



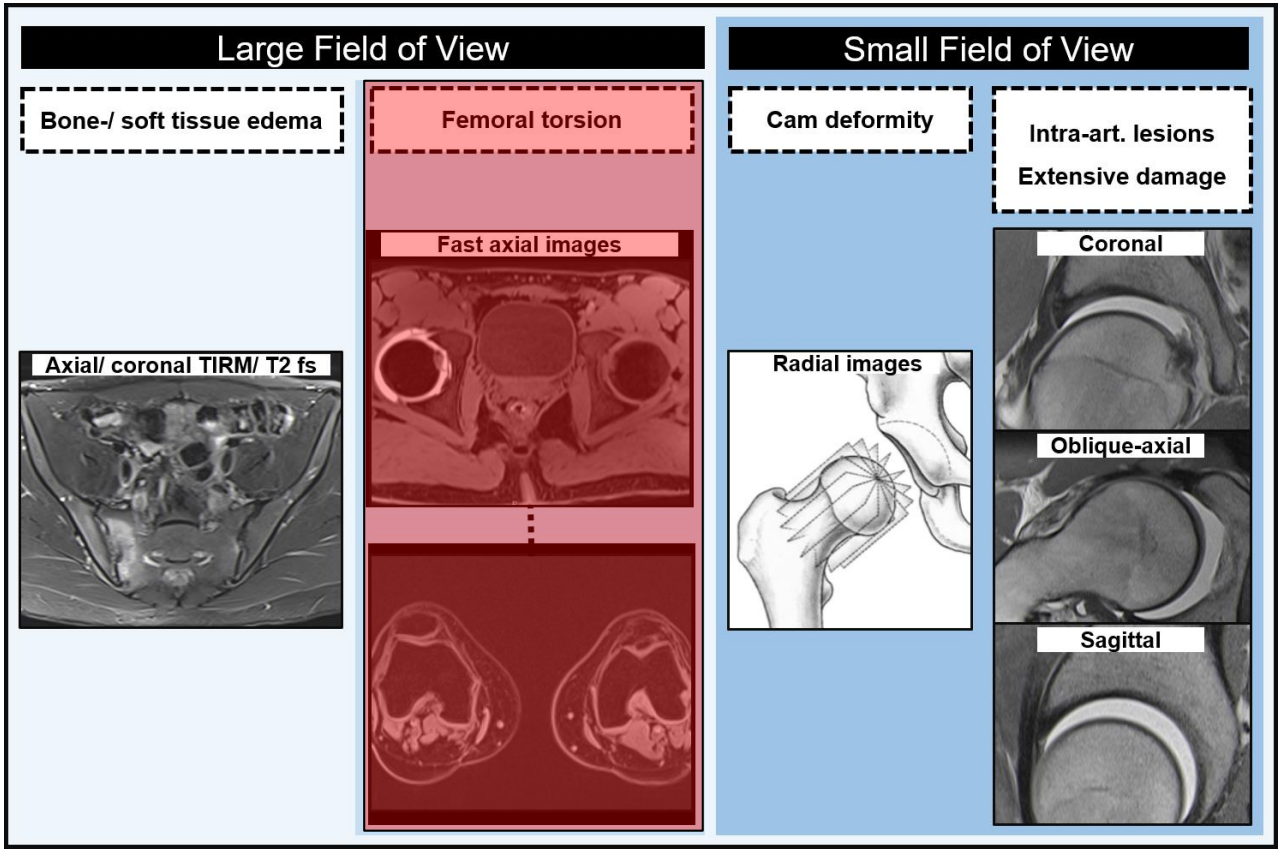
24 y Patient: normales Labrum/ Knorpel



24 y Patient: Spondyloarthritis



MR-Protokoll Arthrographie/ Hüfte nativ



Schmaranzer F et al. AJR 2020 *in press*

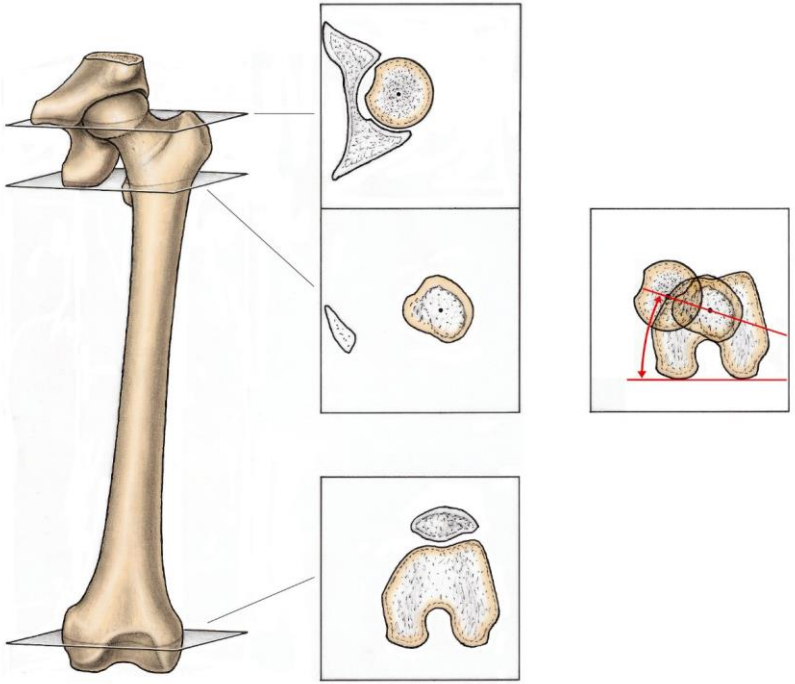
Femurtorsion im Kontext des FAI

- Tiefe Torsion: vorderes FAI
- Hohe Torsion: hinteres FAI
- **1/6 Hüften pathologisch tiefe/erhöhte Torsion**
- 3. Säule neben Cam, Pincer
- **Korrektur über proximale Femurosteotomien**

Lerch T et al. AJSM. 2017

Femurtorsion: Messung nach Murphy

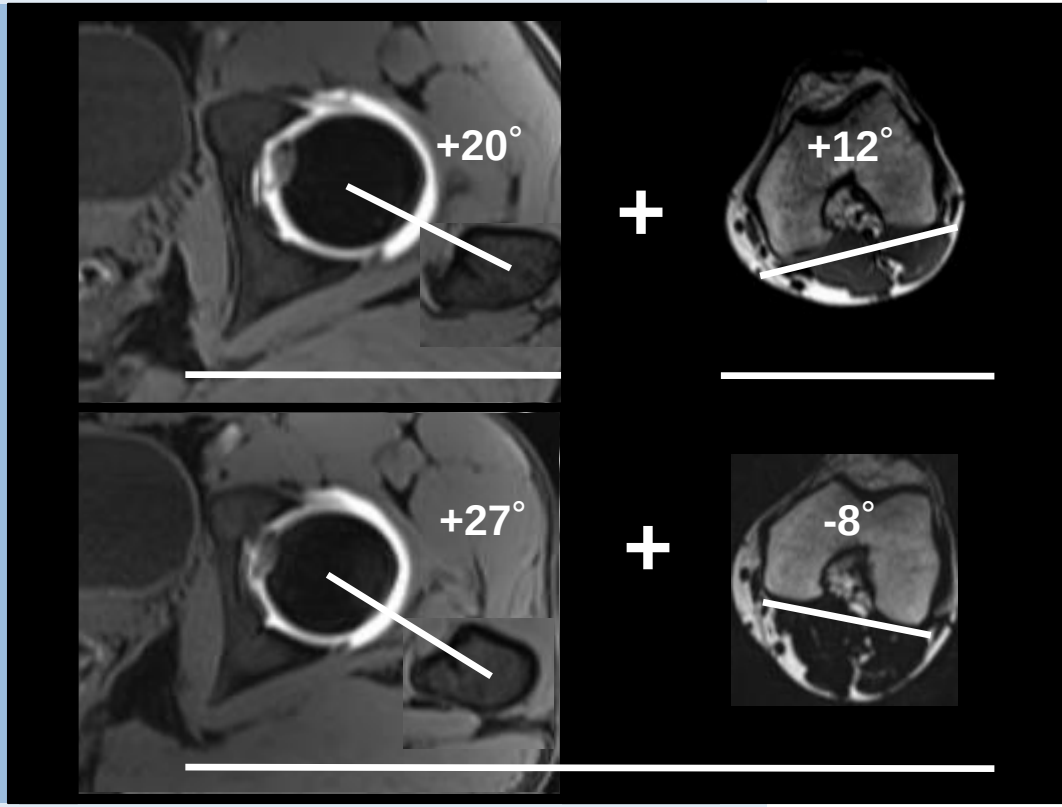
- Anatomische Femurtorsion
- Grenzwerte:
  - Normal: 10 – 25˚
  - **Deformität: <0˚ ; >35˚**



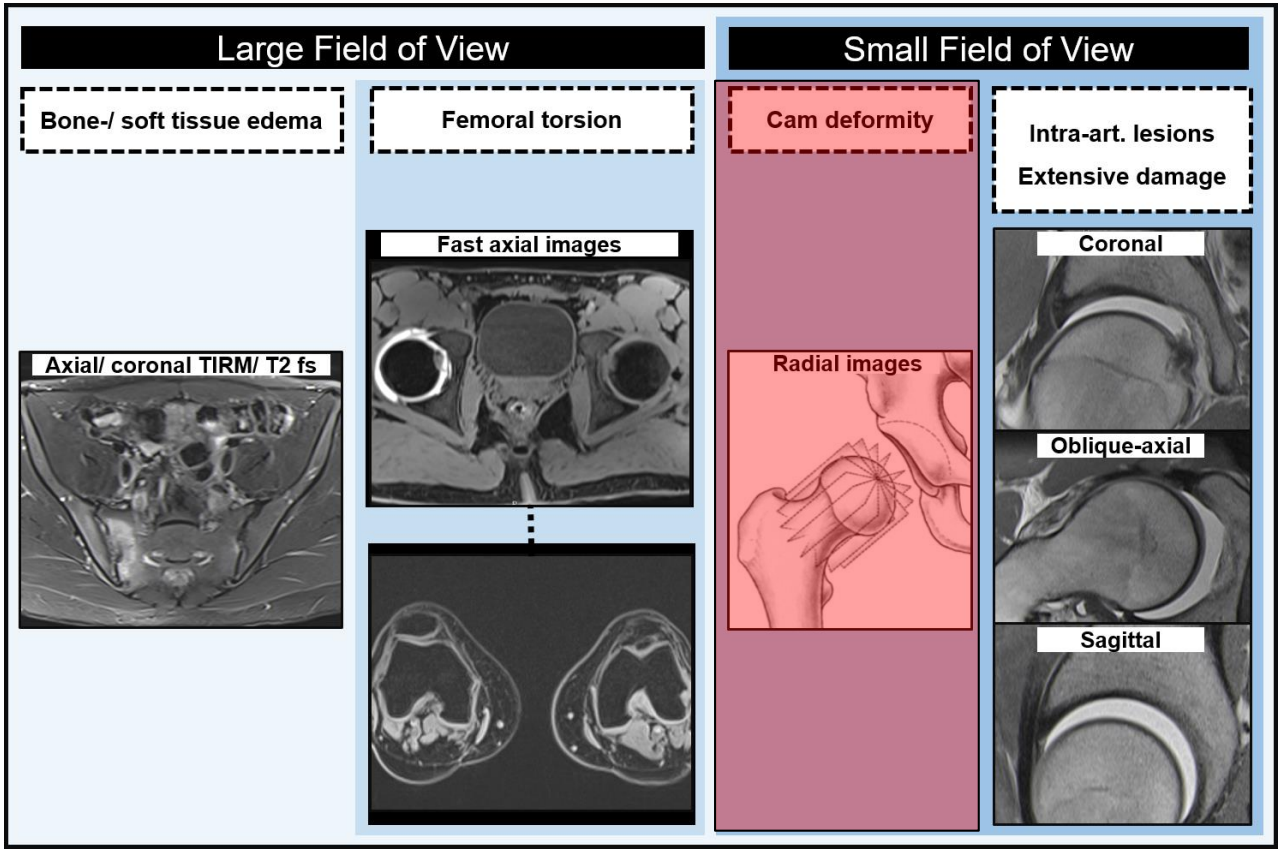
Murphy S et al. JBJS Am 1987
Lerch T et al. AJSM. 2017
Schmaranzer F et al. CORR.2019

Messung der Femurtorsion: Addition der prox./ dist. Achse

- Lagerung, schnelle Sequenzen
- Femurkondylen innenrotiert:
  — positives **(+)** Vorzeichen
- Femurkondylen aussenrotiert:
  — negatives **(-)** Vorzeichen



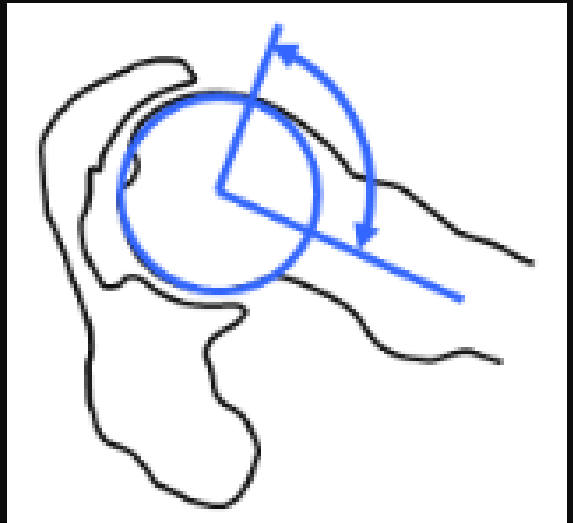
MR-Protokoll Arthrographie/ Hüfte nativ



Schmaranzer F et al. AJR 2020 *in press*

Analyse der Schenkelhalstaillierung

- Alpha Winkel gängigste Methode zur Diagnosestellung
- Cam Deformität (α > 55°)
- Anterosuperior lokalisiert



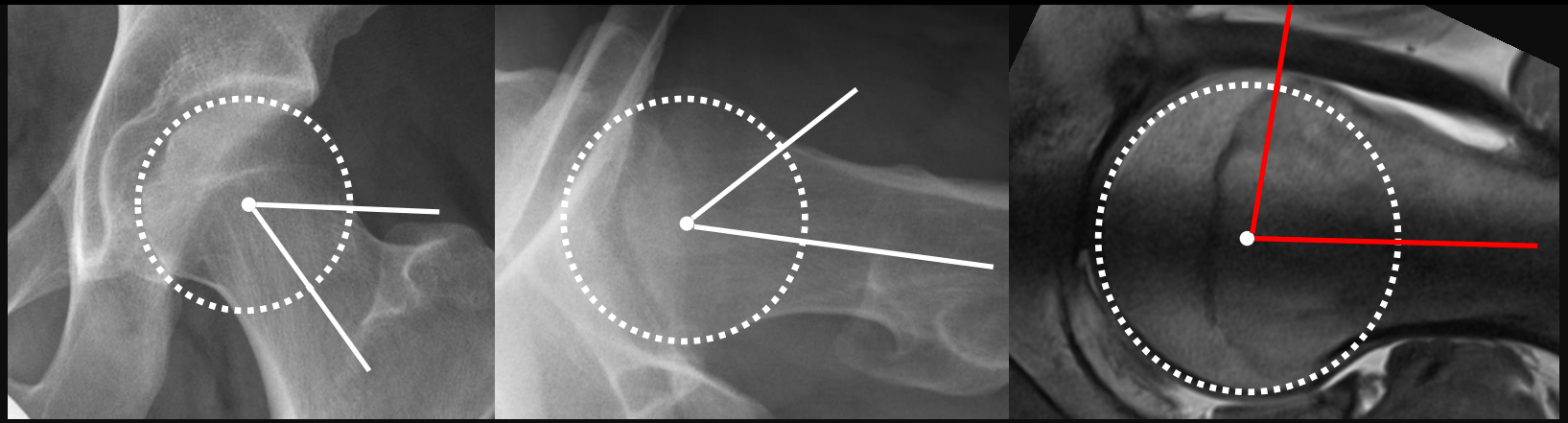
Nötzli H et al. JBJS. 2003

Röntgenprojektionen vs radiäres MRI

- Becken AP → superolateral = ‚Pistol Grip Deformität‘

- axial Röntgen: anterosuperiore Cam Deformität

- 2D/3D radiäre Schichten: Goldstandard !!

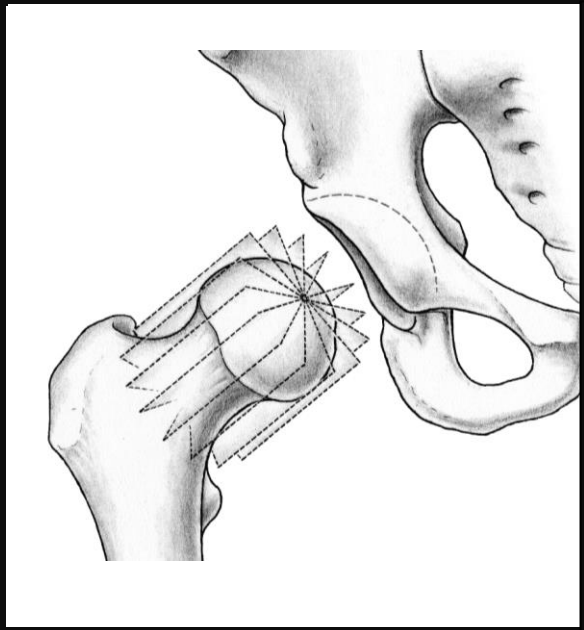


-CAVE: Rx kein Ausschluss Cam Deformität

Radiäre Schichten MRI

- rotieren um die Schenkelhalasachse

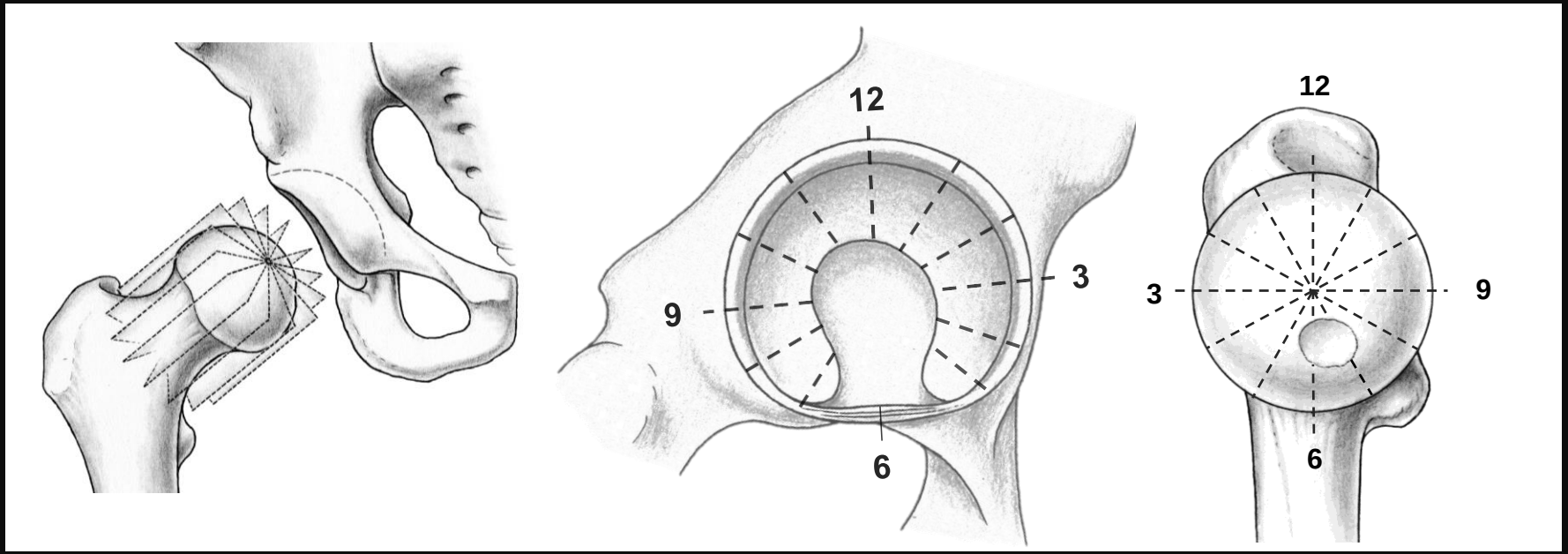
- zirkumferentielle, orthogonale Darstellung der Cam Deformität



Radiäre Schichten MRI

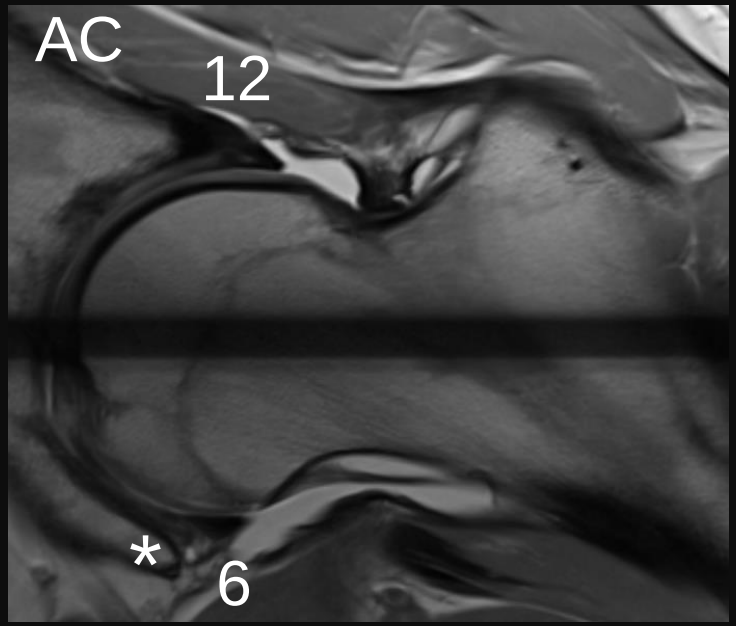
- rotieren um die Schenkelhalasachse

- exaktes ‚Mapping der Läsionen‘ anhand anatomischer Landmarks



Radiäre Schichten MRI: ‚Mapping‘ von Läsionen

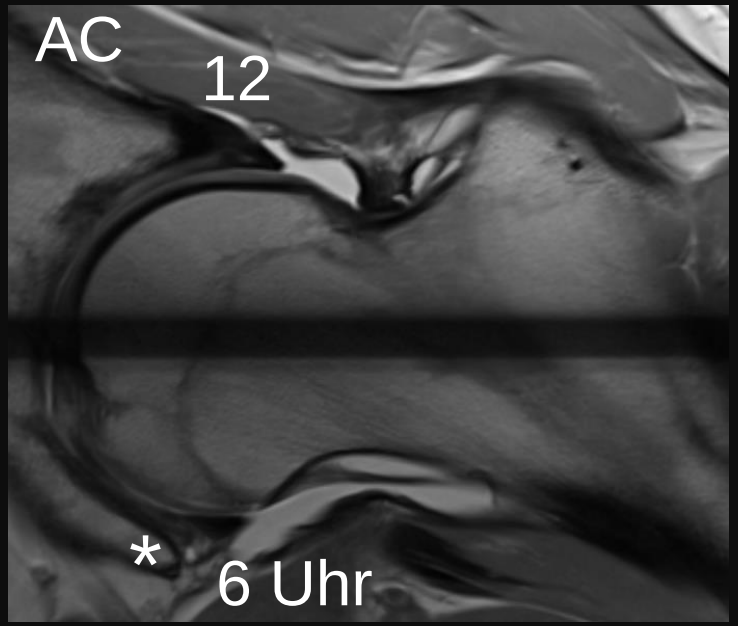
- Acetabuläre Landmark: Tränenfigur (6 Uhr)

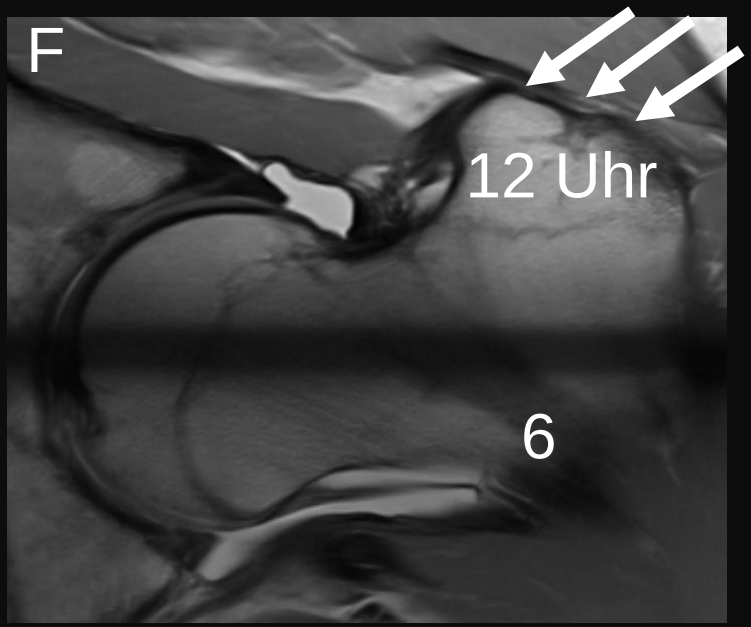


Radiäre Schichten MRI: ‚Mapping‘ von Läsionen

- **Acetabuläre Landmark: Tränenfigur (6 Uhr)**

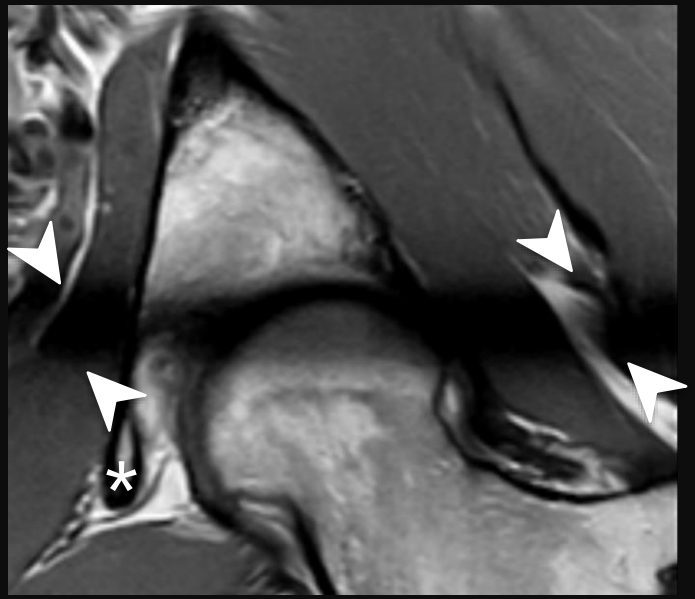
- **Femorale Landmark: prominenteste Darstellung des Trochanter major (12 Uhr)**

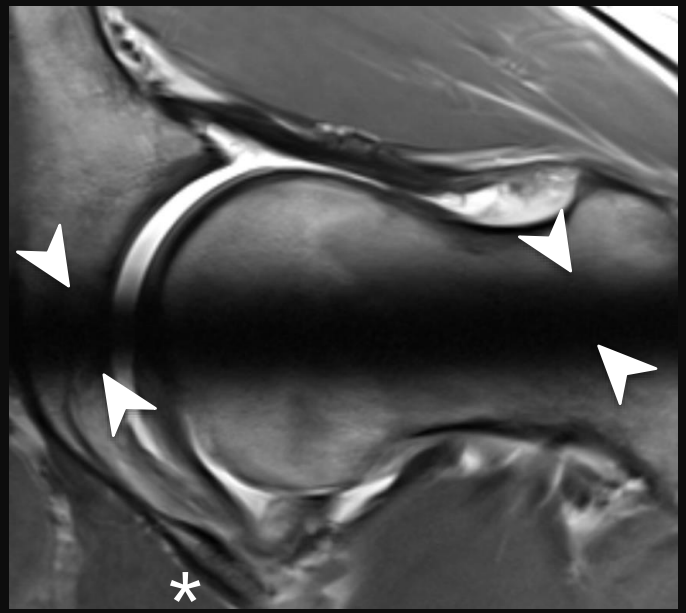




Radiäre Schichten MRI:

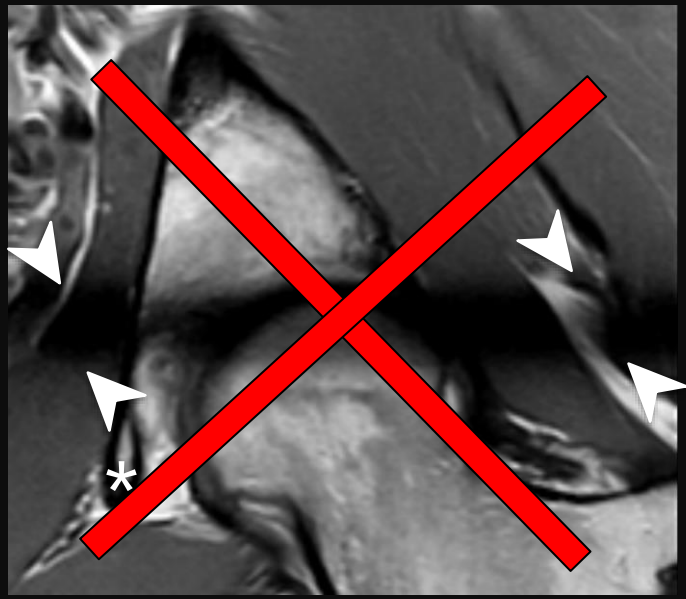
- CAVE Orientierung der Rotationsachse

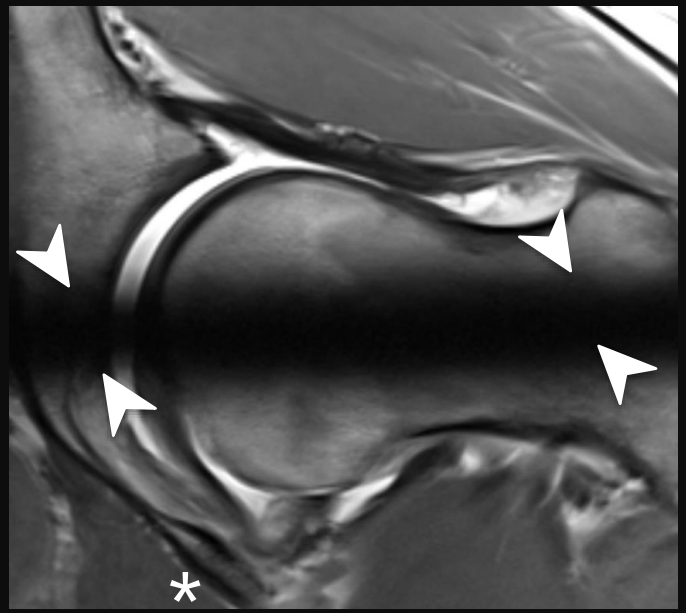




Radiäre Schichten MRI:

- CAVE Orientierung der Rotationsachse

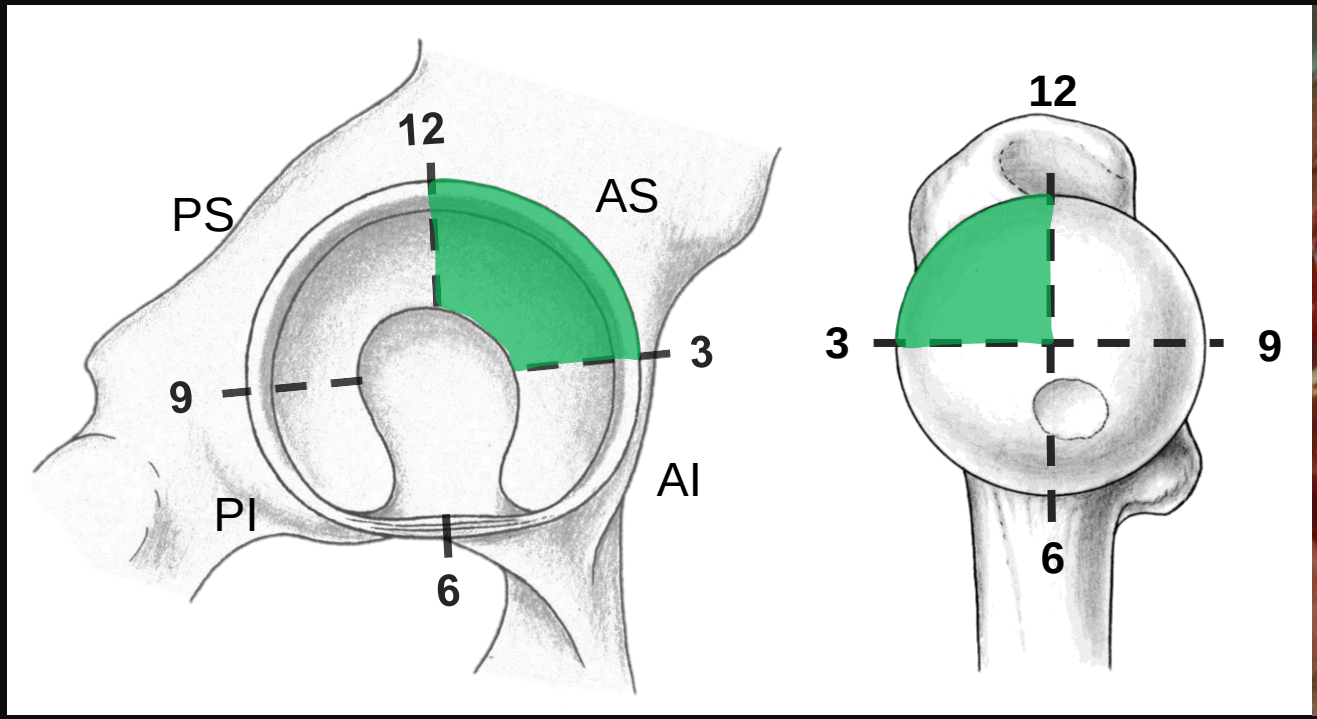




Achse falsch → Keine valide Messung möglich

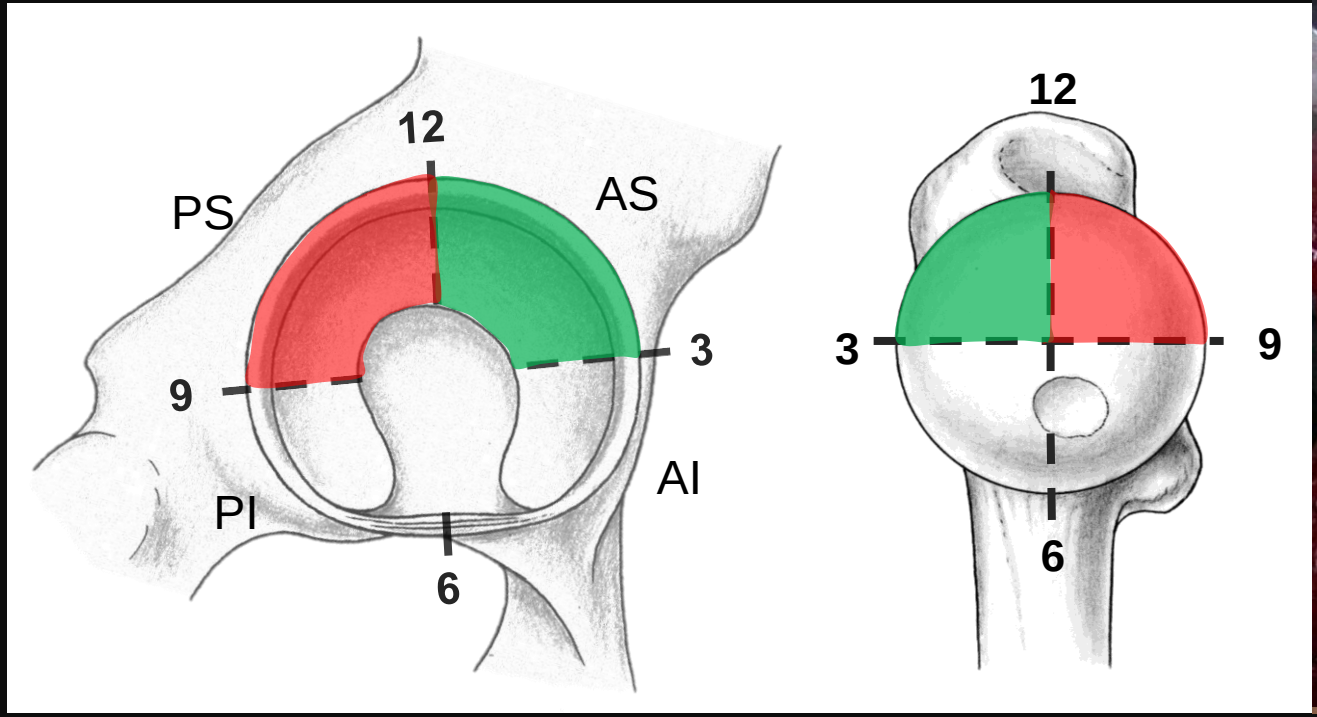
Radiäre Schichten: Wo ist die Deformität/Schaden ?

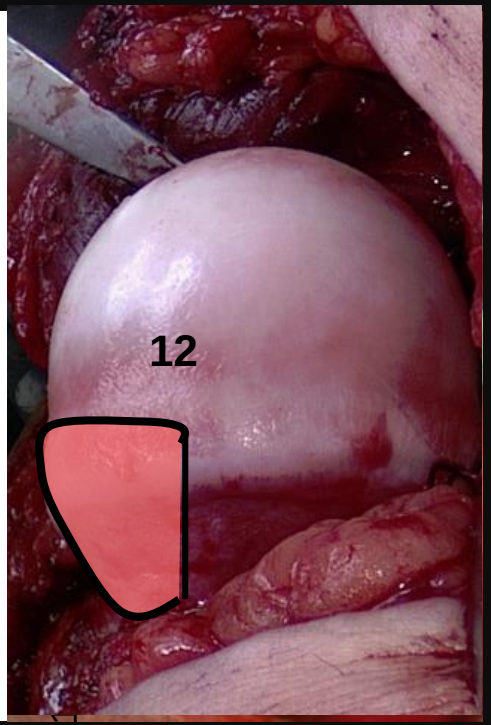
- Anterior: arthroskopisch (HASK) sehr gut adressierbar



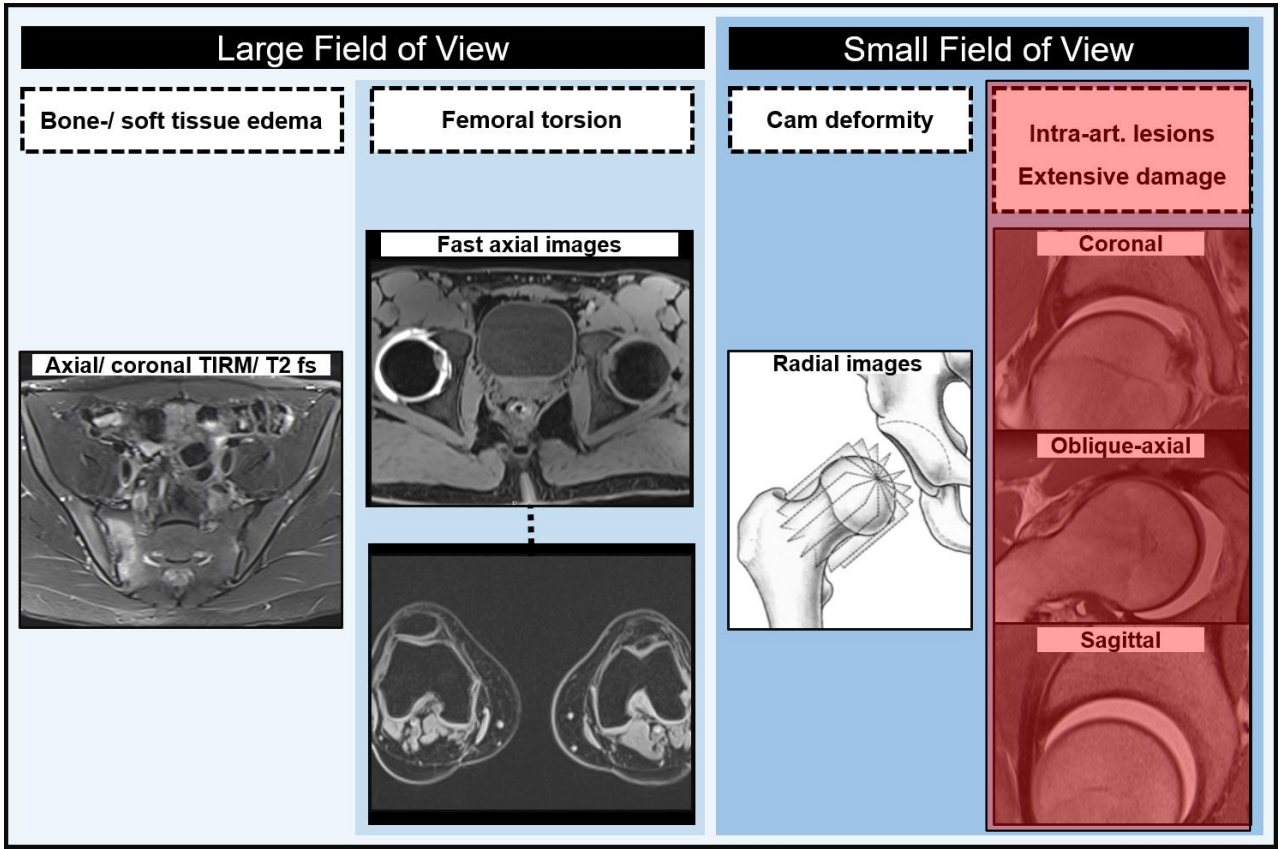
Radiäre Schichten: Wo ist die Deformität/Schaden ?

- CAVE: Je dorsaler → schwieriger HASK → offene FAI Chirurgie



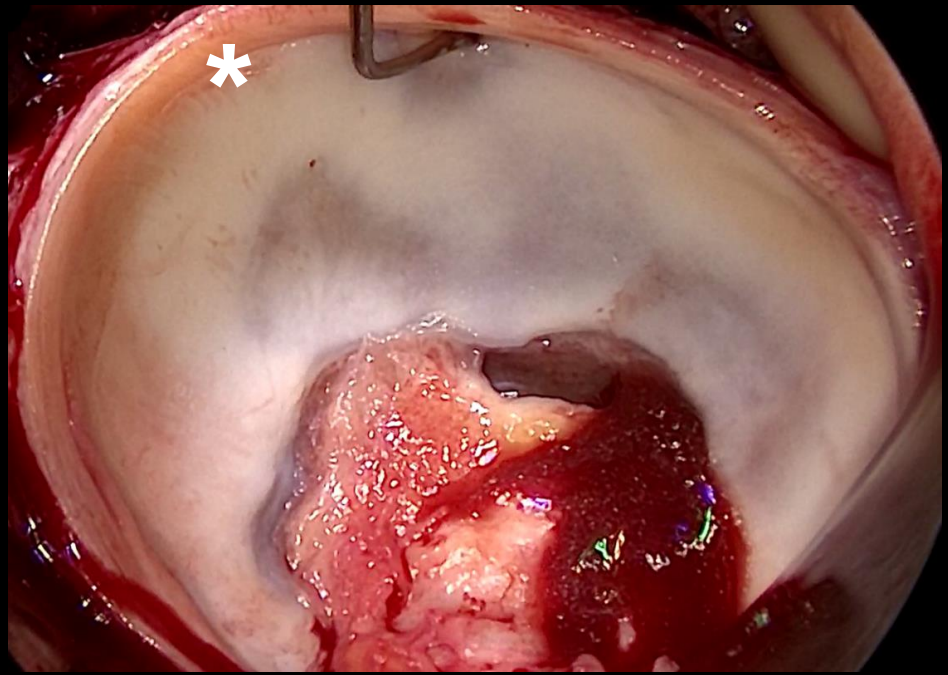


MR-Protokoll Arthrographie/ Hüfte nativ

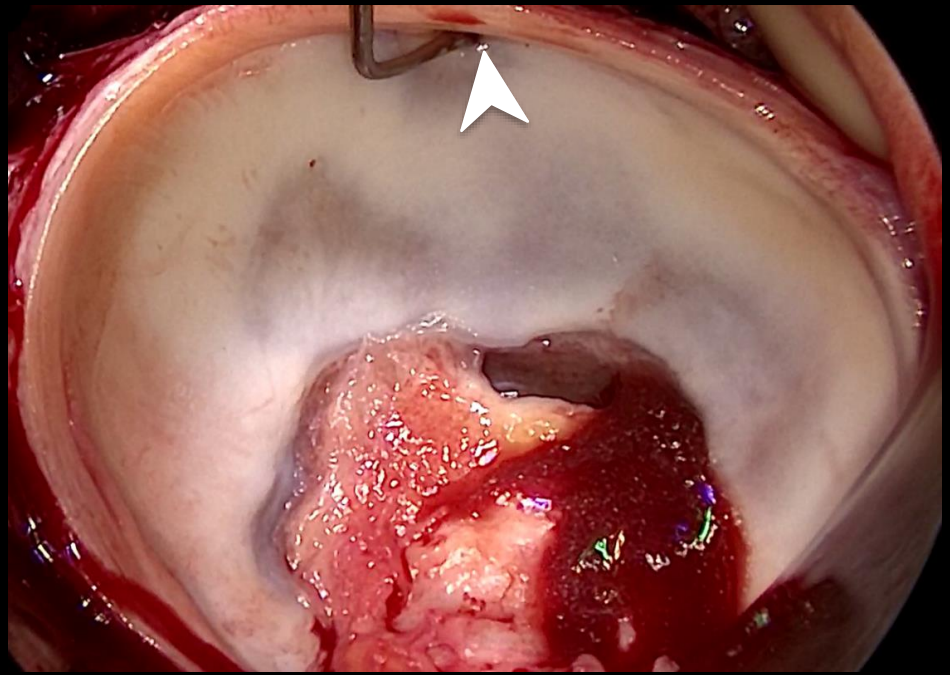


Schmaranzer F et al. AJR 2020 *in press*

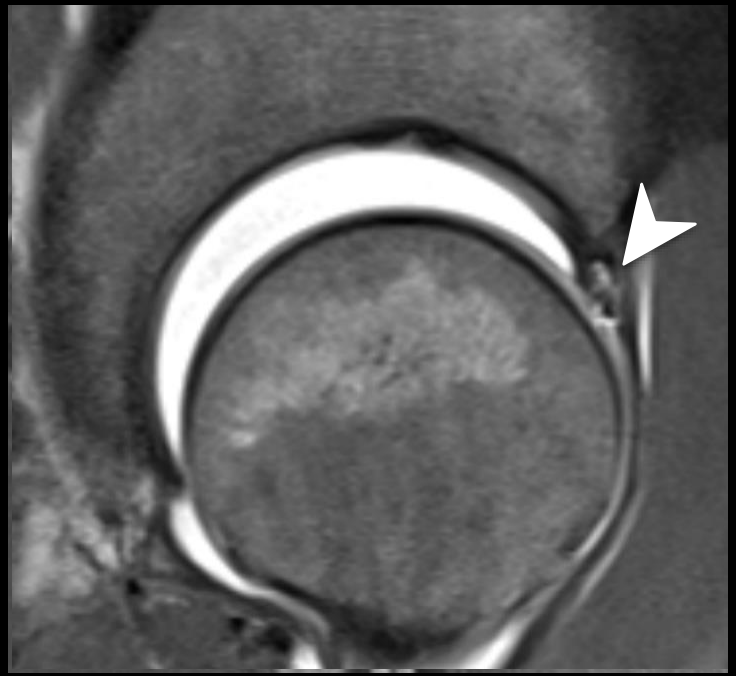
20 y: normale chondrolabrale Übergangszone

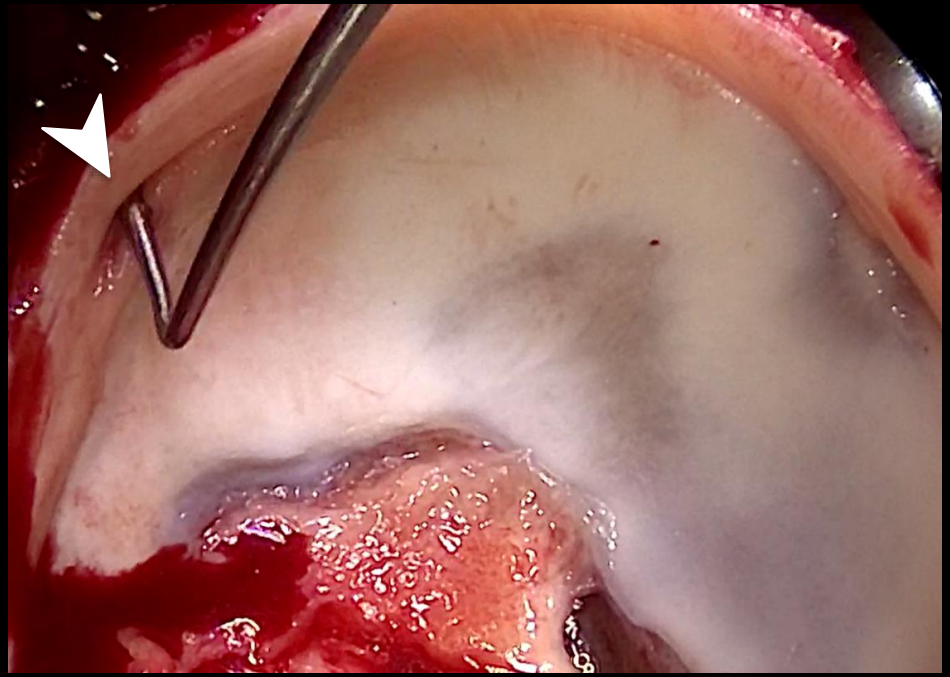


20 y: superiorer sublabraler Sulcus

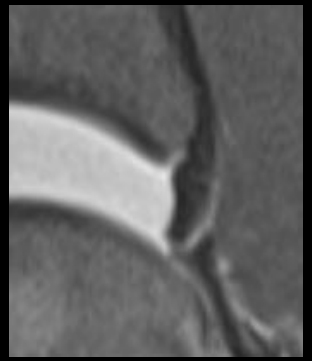


20 y: anteriorer Labrumriss, Knorpeldelamination





Sublabraler Sulcus



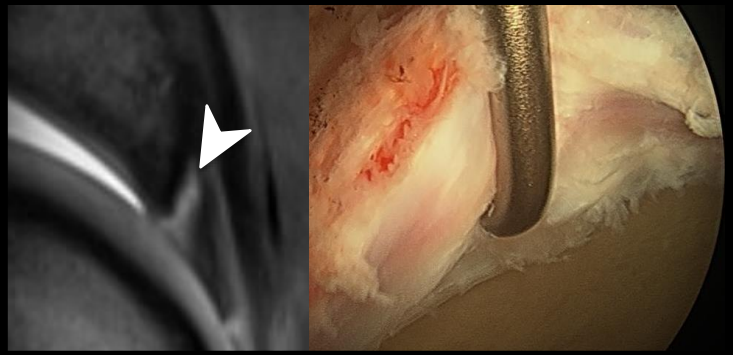
- 5-10% Normalbefund
- Im gesamten Gelenk
- Oberflächlich
- Labrum schwarz

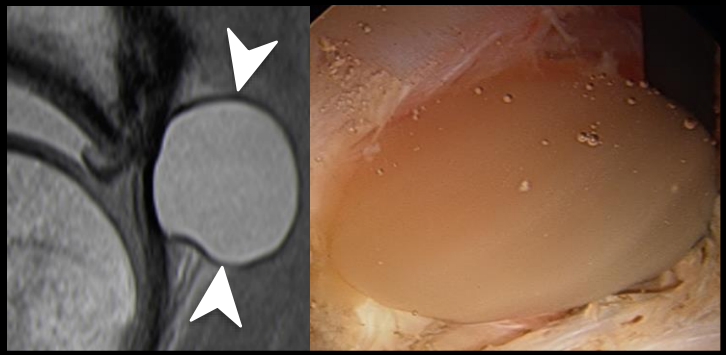
DD

Labrumriss

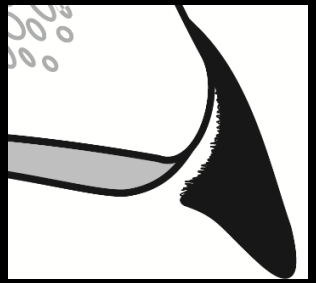
- >90 % FAI Patienten
- -v.a. Antero-/posterosuperior
- Im Labrum; an der Basis
- Labrum signalverändert

Labrumläsionen: Klassifikation

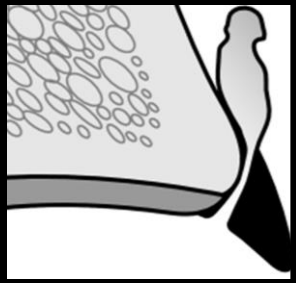




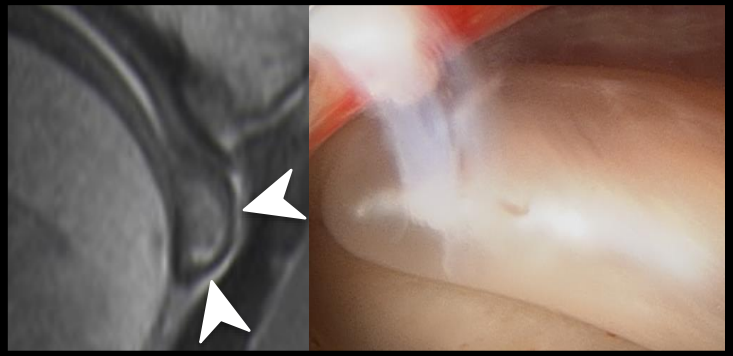
- Ablösung
- Labrumbasis
- Cam FAI

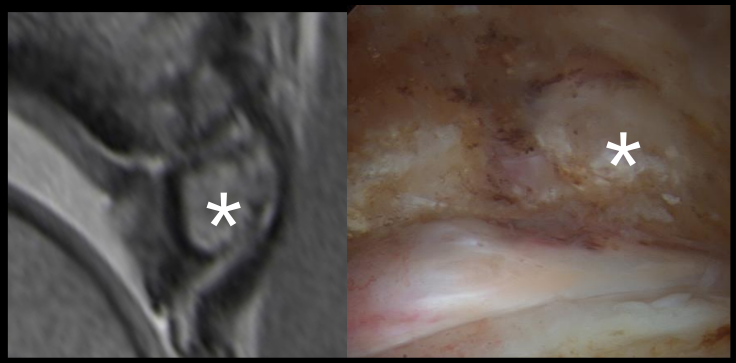


- Ganglion
- Basis/ im Labrum
- Dysplasie/ Cam

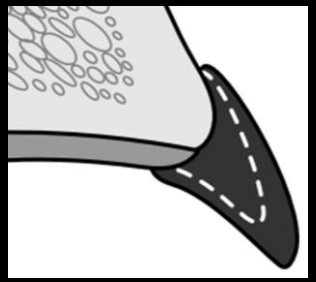


Labrumläsionen: Klassifikation

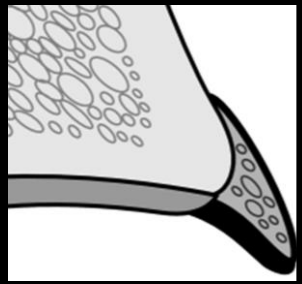




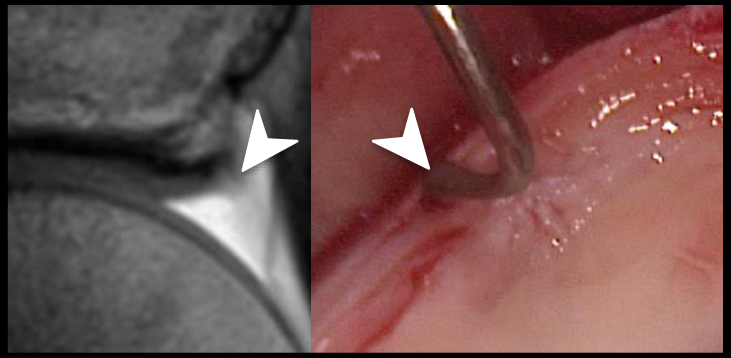
- Dysplasielabrum
- aufgeqollen
- signalverändert

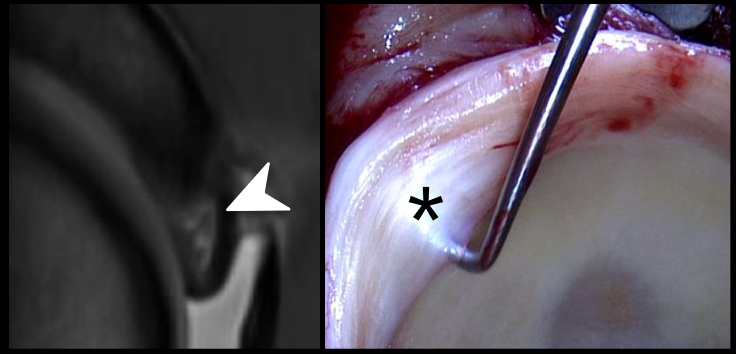


- Verknöcherung
- peri-/ intralabral
- Pincer FAI

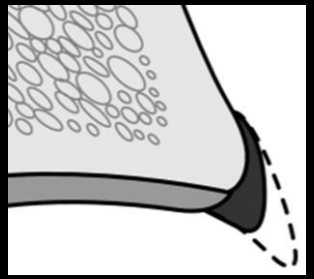


Labrumläsionen: Klassifikation

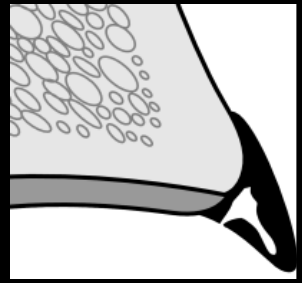




- Hypotrophie
- Retrotorsion



- Intrasubstanzriss
- im Labrum
- großes Labrum
- hohe Torsion



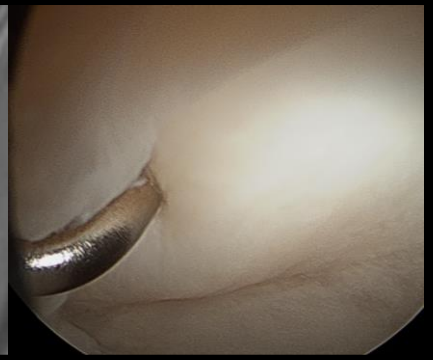
Normalbefunde DD Knorpelschaden

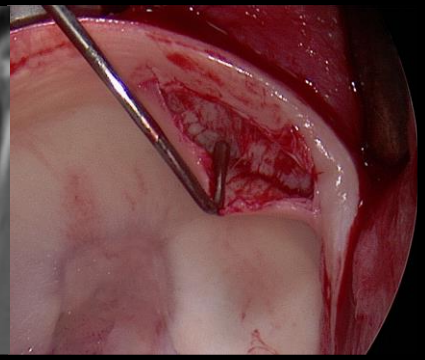
CAVE !

- Tubular tracking (5%)

- Fossa supraacetabularis (10%)

Knorpelschäden: Klassifikation

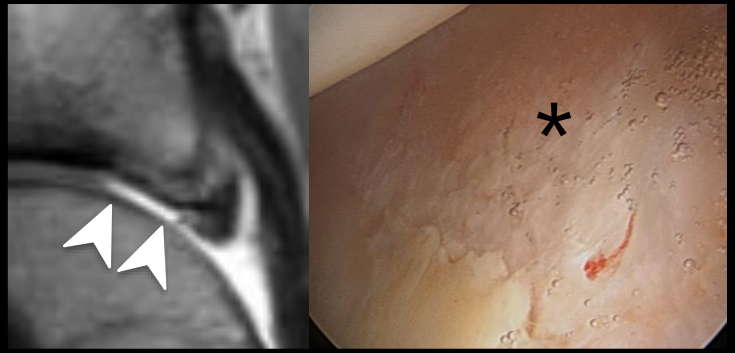


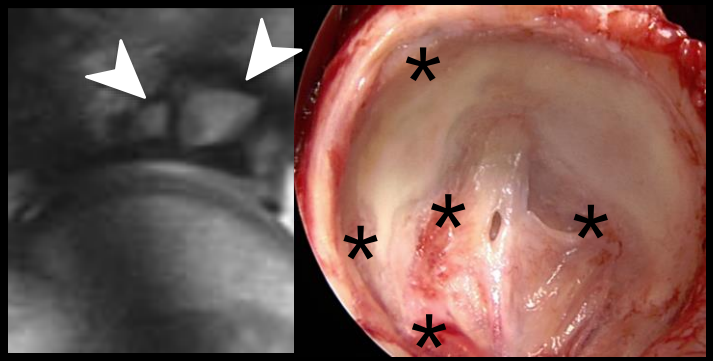


- Bubble
- In-toto Ablösung
- Oberfläche intakt
- Cam FAI

- Flap
- In-toto Ablösung
- Einriss
- Cam FAI

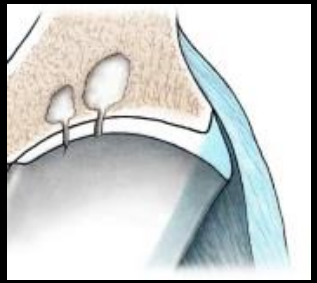
Knorpelschäden: Klassifikation



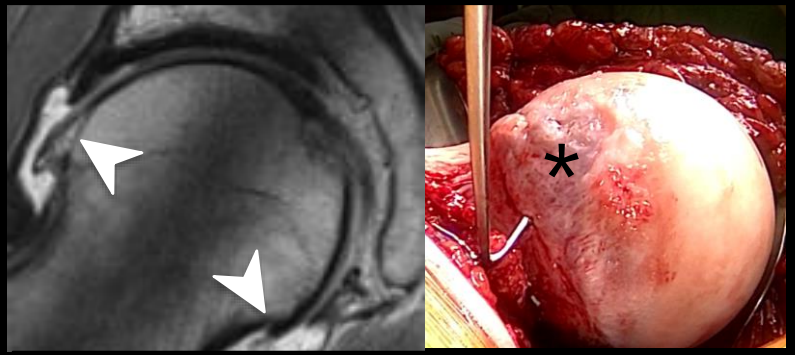


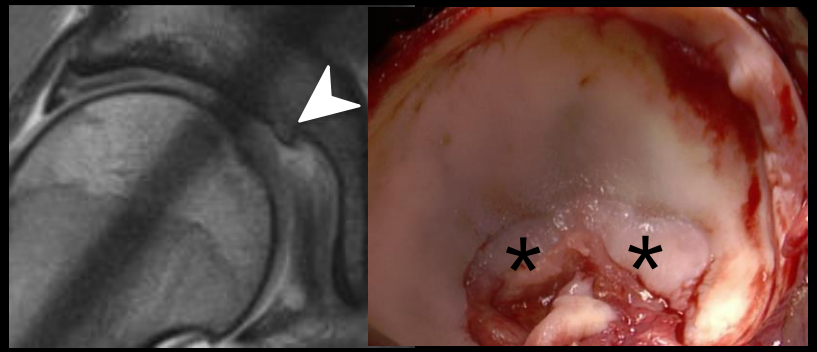
- Defekt
- beg. Coxarthrose
- alle Pathologien

- Zyste
- beg. Coxarthrose
- alle Pathologien

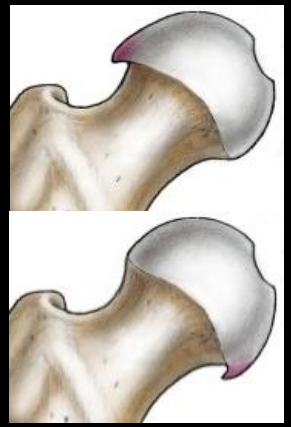


Osteophyten im MRI





- per. Osteophyten
- beg. Coxarthrose
- alle Pathologien

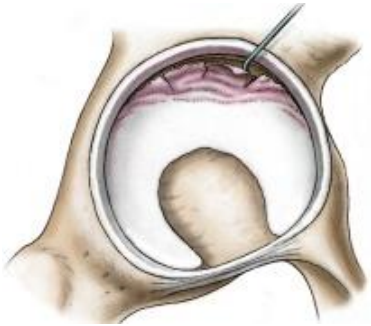


- cen. Osteopyhten
- beg. Coxarthrose
- alle Pathologien

FAI Chirurgie bei beg. Coxarthrose: CAVE !

UNIVERSITÄT BERN

Red Flags



+

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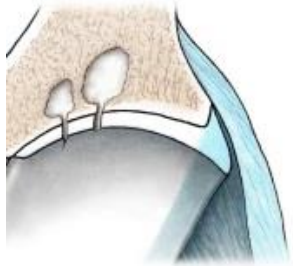
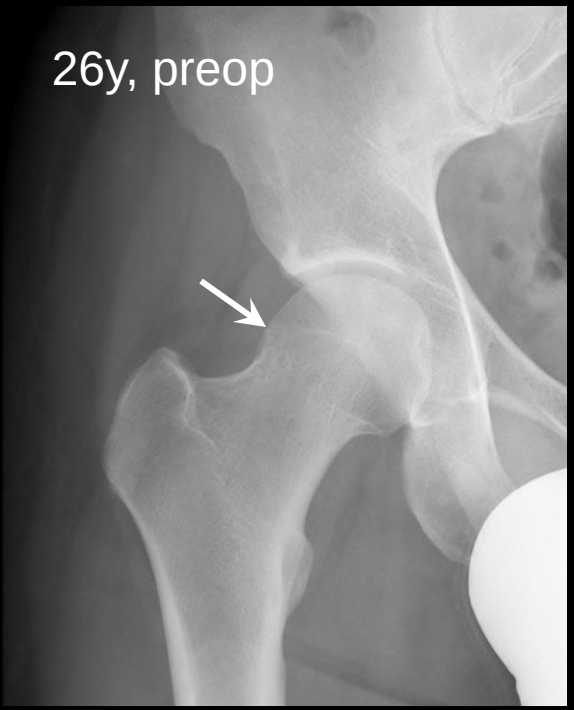
Red Flags

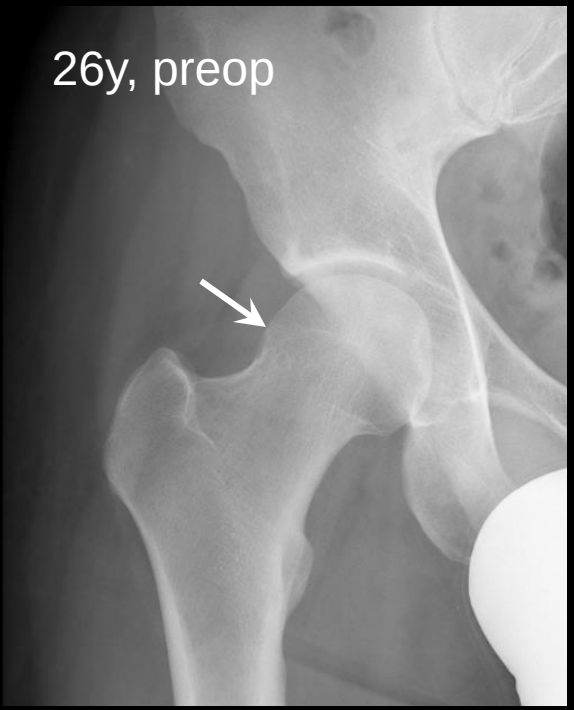


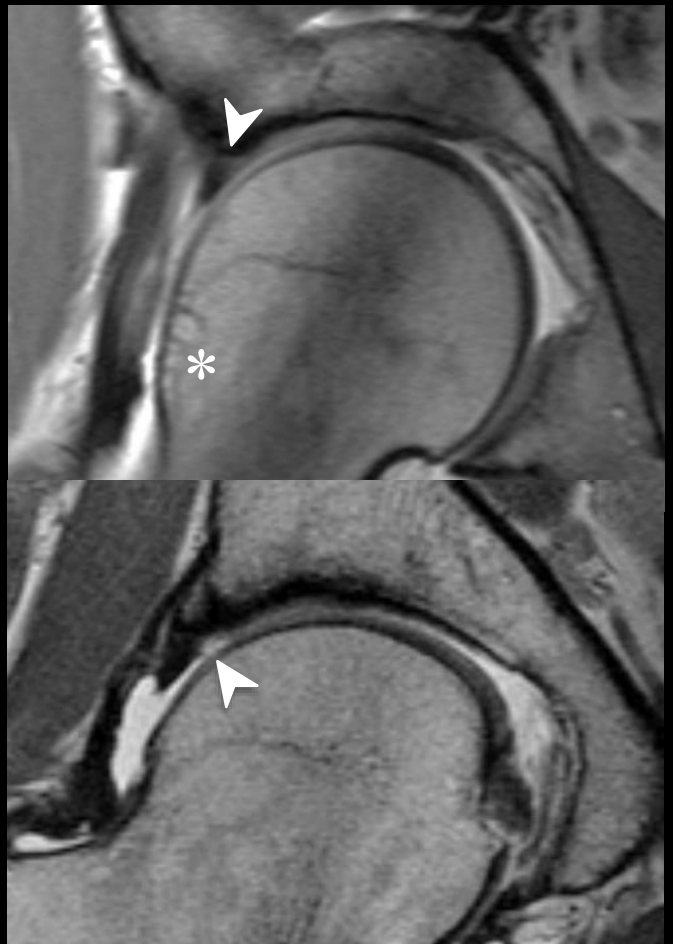
Hanke MS et al. CORR 2017

Wenig Schaden MRI: gutes Langzeitergebnis

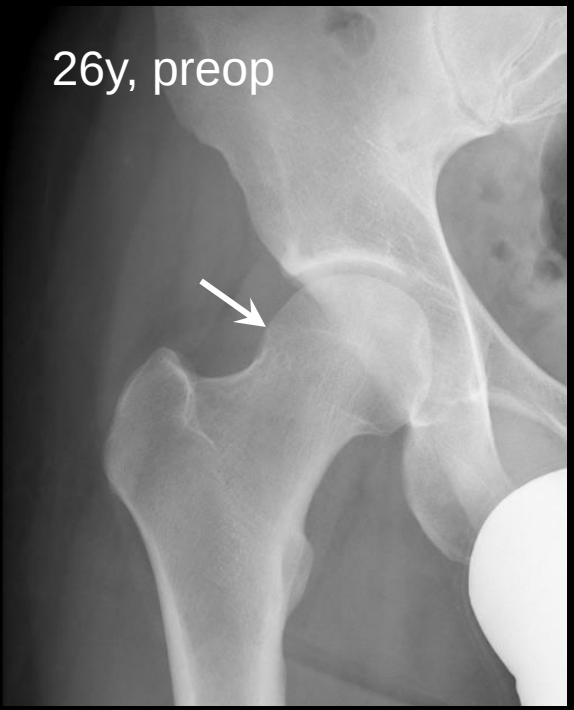


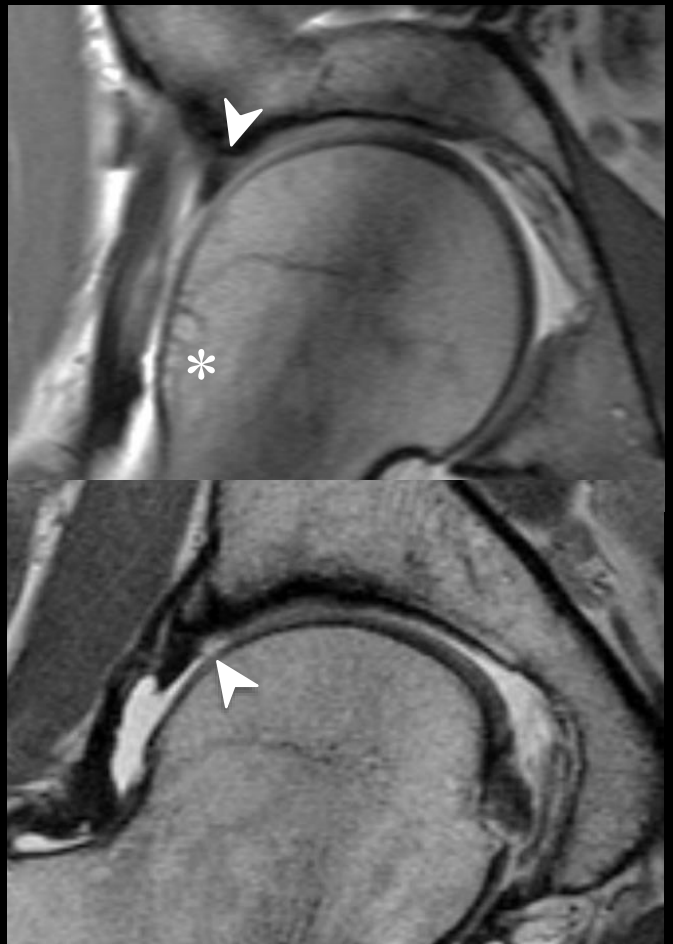
Wenig Schaden MRI: gutes Langzeitergebnis





Wenig Schaden MRI: gutes Langzeitergebnis

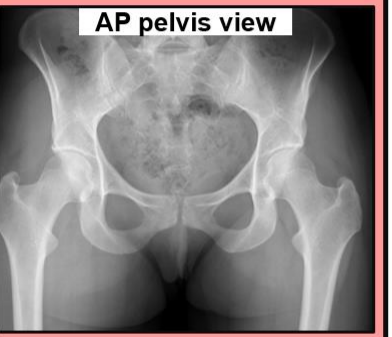


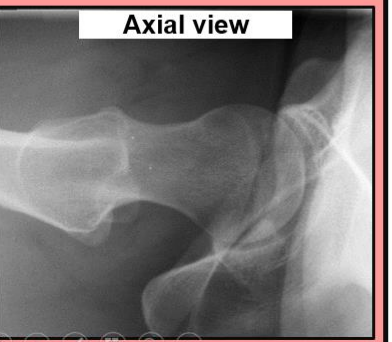


Diagnostischer Algorhytmus bei Hüftschmerz

Radiographs

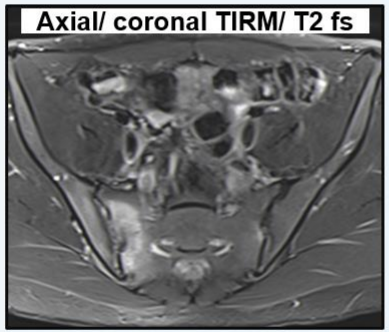
AC coverage/ version
Osteoarthritis
Screen cam deformity



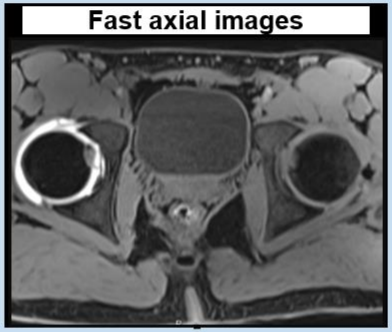


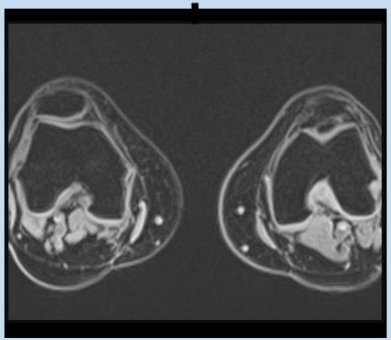
Large Field of View

Bone-/ soft tissue edema



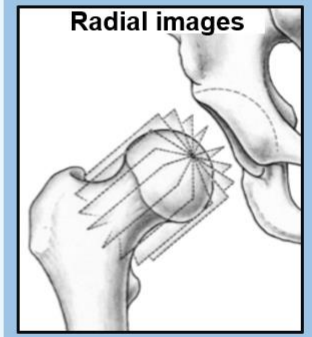
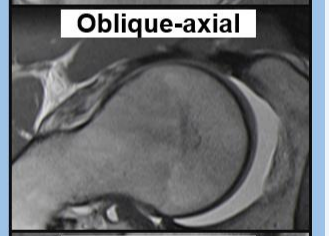
Femoral torsion





Small Field of View

Cam deformity



Intra-art. lesions
Extensive damage