Acetabular Labrum

• Composed of type I collagen fibers
• Vascularity
  ✓ Small peripheral capsular vessels
  – Supplies peripheral 3rd of labrum
  – Repair vs debridement
• Network of nerve endings
  ✓ Tears are painful

Labrum

• Fibrocartilage (variable)
  ✓ Thinner anteroinferior
  ✓ Thickest superior
• MR Signal
  ✓ Homogenously low SI
  ✓ Increased signal T2 with ↑ age
• Shape
  ✓ Variable

Labrum

• Triangular shape: 96% 10-19 y/o; 62% > 50 y/o

Labral tear detection

- Naraghi A. AJR 2015
- 10 conventional MR
  - Sens/spec ranged from 0-100%
    - 3 studies had sens > 90%
    - 4 studies had spec > 80%
- 19 MR arthrography
  - Sens: 29-100%
  - Spec: 0-100%; most <80%
- MR arthrography current standard technique

Tear Location

- Anterior to anterior/superior (92%): FAI Fitzgerald
- Posterior much less common
  - Younger pt population
  - In athletes due to axial loading in flexed position
  - Following posterior hip dislocation

Secondary sign: Paralabral cyst

- Typically extra-articular
- Associated with labral tears

Pitfall: Iliopsoas Bursa

- Contrast within bursa on MR arthrography does not indicate capsular disruption
- Communicates with hip joint ~15%

Pitfall: chondrolabral junction

- Normal transition zone 1-3 mm
Pitfall: Junction of transverse ligament & labrum

- Superior capsule attachment
  - 2-3 mm superior to labral attachment
- Ant/post attachment more directly to labrum
- Can be confused for labral tear or paralabral cyst

Pitfall: Perilabral recess

Petersilge CA Skel Radiol 2001

Pitfalls: Sublabral Sulcus/Recess?

- Anterior superior sulcus is controversial
  - ? Healing tear (Fitzgerald Clin Orthop 1995;311:60-68)
- No sulci (Petersilge CA, Rad 1996; 202:231-235)
  - 24 hips
    - Currently believes yes ant-sup cleft (MRI Cnr 2006)
- No sulci (Czerny C. AJR 1999; 173:345-349)
  - 40 pts, 6 cadavers
    - Tears; 5 ant 11 sup 19 ant-sup 0 posterior
- Small “labrocartilaginous cleft” can be seen in ant-sup labrum (Vanhoenacker FM. JBR 2009; 92:31-59)
  - Review of MR arthrography of hip
  - No references

Pitfalls: Sublabral Sulcus/Recess?

- Posteroinferior sulcus common
  - 58 scope pts with MRI/MR arthrography
  - 13/58 normal post-inf “sublabral groove”
  - No ant-sup sublabral sulcus (based on notes and photos)
  - 51/58 ant or ant-sup tears
  - 3/58 ant and post tears
  - 0/58 isolated posterior tears

Pitfalls: Sublabral Sulcus/Recess?

  - 27 of their 121 patients had sulci
    - 44% anterosuperior
    - 48% posteroinferior
    - 4% anteroinferior
    - 4% posterosuperior
  - Tears:
    - 69 ant/a-s
    - 3 a-s & p-s
    - 3 p-s
    - 4 a-i

Anterior Sublabral Recess vs. Tear

- 10/57 pts had a recess
- Recesses not:
  - Into labral substance
  - Full thickness
  - Abnormal labral signal
  - Cartilage defects
  - Ossous abnormalities
  - Paralabral cysts
- Selection bias (sx)

• 41 pts
  - Presence or absence of cleft, location, depth, abn SI in labrum, shape
  - Reader 1 & 2: 41% (17/41), 29% (12/41)
  - No (0%) clefts met the criteria for a sulcus
  - Selection bias: all had hip pain
  - Only 12/41 underwent arthroscopy

Sublabral Sulcus

Anteroinferior & Posteroinferior Sulci

• Found in 2-3% asymptomatic individuals

Pitfall: Os acetabuli

Pitfall: Obturator externus bursa

• Normal anatomic variant
• Communicates with hip joint 5% arthrograms
• May mimic a paralabral cyst


Os acetabuli

Obturator externus bursa
Cartilage

Chondral lesion detection

- 6 conventional MR
  - Sensitivity: 0-93%
  - Specificity: 50-100%
  - 3T study sens/spec acet: 94/67% & 100% femur
- 12 MR arthrography
  - Sens: 22-92%
  - Spec: 25-100%
- 2 studies comparing MR arthro vs. conv MR
  - Pooled sens/spec: 59% & 94% conv MR, 62% & 86% for MR arthro

Cartilage Pathology

- Anterosuperior location most frequent
- Posteroinferior location (contrecoup) less frequent
- Osteochondritis dissecans
  - Acetabulum > femur
  - Rare (surgeon preference)
- Joint bodies
- Normal variants
  - Supraacetabular fossa
  - Stellate crease

Chondral Lesions

T1  PD  SPGR

Normal Variant: Supraacetabular Fossa

- Variant/defect of the osseous acetabular roof at ~12:00 (sag & cor)
- Not connected to acetabular fossa/cotyloid notch
- Dietrich TJ. Radiology 2012; 263:484-491
- 1002 MR arthros
  - Type 1 (filled with contrast): 16
  - Type 2 (filled with cartilage): 89
  - ~5 mm across
  - No edema, sclerosis, LBs
  - Surgery (17/105): no cartilage damage

Normal Variant: Supraacetabular Fossa

T1 cor  T2 cor  T1 sag
Normal Variant: Supraacetabular Fossa
- Usually visible on radiographs
- May be bilateral
- T2:00
- Smooth
- No edema
- No cartilage lesion

Normal Variant: Stellate Crease
- Stellate defect in cartilage: adjacent to acetabular notch

Ligamentum Teres (LT)
- LT originates from the transverse ligament and surrounding structures
- Inserts on the fovea capitis
- May provide stability, proprioception info
- When partially or completely torn, causes deep anterior groin pain, usually mechanical symptoms

Normal MR appearance of LT
- 2 or 3 bundles
- Striated

Ligamentum Teres
- LT tears are common
  - 51% of 558 scopes in one study
- LT tears respond well to debridement and shrinkage
- No clinical test
- Preoperative diagnosis rare
- Imaging hasn't helped

Ligamentum Teres: Imaging

• Cerezal L. RG 2010; 30:1637-1651
  ✓ Injured LT → increased signal T2
  ✓ MR arthro better: abnl signal and morphology, focal loss of continuity.
  ✓ But no references!

• Armfield DR. Clin SM 2006; 25:211-239 [Review]
  ✓ Tears: discontinuity, fraying, signal changes
  ✓ Abnormal T2 signal and morphology; or hypertrophy with either

• Armfield DR. SSR 2006
  ✓ 66 scopes → 50 partial LT tears
  ✓ MR arthro 93% sens, 80% spec

• Sampatchalit S. JCAT 2009; 33:927-933
  ✓ Cadaver study on 11 hips
  ✓ Degeneration of LT → increased signal, sometimes T2 signal

• Blankenbaker DG. AJR 2012; 199:1-6.
  ✓ 116 hip scopes
  ✓ 12 LT partial tears (PT)
  ✓ Reader 1: 42% sens
  ✓ Reader 2: 67% sens
  ✓ 26 and 18 false positives
  ✓ Overlap intact & partial tears

• Datir A. AJR 2014;203:418-423
  ✓ Sens/spec: 41% & 75% conv MR vs 83% & 93% MR arthro for partial tears
  ✓ MRI & MR arthro equal in diagnosing complete tears

• Cerezal L. Skel Radiol 2015;44:1585
  ✓ MR arthro: Leg traction
  ✓ Partial tears (low/high grade)
    – Sens/spec: 87%/95%
  ✓ Complete tears
    – Sens/spec: 92% & 98%

Pearl: Use all imaging planes

43♀ hurt while stretching
LT tear confirmed at surgery

Pearl: Use all imaging planes

57♂ with labral tear
LT partial tear confirmed at surgery
**Ligamentum Teres: Complete Tear**

- No discrete fibers

**Hip Plicae**

- Reflections of synovial membrane
- 2 morphological variants
  - Flat (leaf like)
  - Villous
- Main functions
  - Synovial fluid production
  - Transmission of neurovascular structures
  - Joint stabilization

**Plica Classification**

- Anatomic*
  - Ligamental plica
  - Neck plica
  - Labral plica


**Hip Plica**

- Plica commonly seen at MR arthrography
- *5/63 with plica had no other abnormalities
- Pain may be due to plica

*Bencardino Skeletal Radiol 2011:10:415

**Ligamental Hip Plica**

- *Seen in 78% MR artho’s
- Pitfall
  - Ligamentum teres tear

*Bencardino Skeletal Radiol 2011:10:415
Normal Pectinofoveal Fold
a.k.a. neck plica
- Seen in 95-97%
- Mean thickness: 2-3 mm

Labral Plica
- *Seen in 76% (48/53) MR artho’s
  - Mean thickness: 1.5 mm

Hip Plica
Treatment: surgical excision

Take-Home Points
- Sublabral recesses and sulci
  - Posteroinferior clefts are normal variants
  - Ant-superior recesses uncertain, but tears are very common there
- Normal cartilage var
  - Don’t call cartilage defects/OCD at 12 o’clock or right next to acetabular fossa
    - Unless there is edema, other defects

Take-Home Points
- Ligamentum teres
  - May be important, generates pain
  - Look for fiber disruption: be sure
- Plicae
  - May be cause for pain; isolated
  - Ligamental plica; separate structure from ligamentum teres