Ultrasound Evaluation of the Athletic Hip
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Objectives
- Groin pain
- Inguinal region hernias
- “Sports hernia”
- Iliopsoas

Groin Pain
- Hip joint: labral tear
- Pubic symphysis
- Fracture
- Tendon tear
- Inguinal hernia
- Algorithm: radiographs, US, MRI

US protocol
- Hip joint: effusion, labrum
- Tendons:
  – Rectus abdominis, adductors
  – Rectus femoris, sartorius, iliopsoas
- Inguinal region hernias
  – Include Valsalva

Outline
- Hip joint: effusion, labrum
- Adductor longus, rectus abdominis
- Rectus femoris
- Snapping iliopsoas
- Inguinal-region hernias
  – Indirect and direct inguinal
  – Femoral
Hip: anterior recess

- Anterior and posterior layers
  - Fibrous tissue + minute layer of synovium
  - Hyperechoic
  - Each 2 - 4 mm thick

Radiology 1999; 210:499

Pitfall: capsule thickening

- Internal rotation of hip:
  - Anterior hip capsule
  - Thicker, convex anterior

External Rotation  Internal Rotation

Hip Effusion

- Separation of anterior and posterior layers
  - Capsule distention at femoral neck > 7 mm or difference of 1 mm from opposite side
  - Extension & abduction improves visualization
  - Do not internally rotate hip: capsule thickens

1Radiology 1999; 210:449
2Scand J Rheumatology 1989; 18:113
3Acta Radiologica 1997; 38:867

Hip Joint: septic effusion

- It is incorrect to assume that joint fluid may not be seen anterior due to gravity
- Native hip: joint fluid distributes around femoral neck
- In no cases was fluid only seen posterior
- Exception: after hip surgery

Moss et al. Radiology 1998; 208:43
Hip Joint: aseptic effusion

Hip Effusion:
- Cannot predict infection by ultrasound
- Negative power color Doppler does not exclude infection*
- Guided aspiration

* AJR 1998; 206:731

Joint injection
- Anterior recess
- In plane
- Transducer:
  - Parallel to femoral neck
  - Consider curvilinear
- Needle: distal to proximal
- 97% accuracy


Joint Injection
- Femoral neck target
- Preferred over aiming for femoral head
- Allows higher injection volumes
- Less extra-articular contrast


Pigmented Villonodular Synovitis

Hip Labrum
- Normal:
  - Hyperechoic, triangular
- Degeneration: hypoechoic
- Tear: anterior
  - Anechoic cleft
  - Sensitivity 82%, specificity 60%, accuracy 80%*

**Labral Tear and Paralabral Cyst**
- Associated with labral tear
  - Full-thickness or detachment
- Anechoic to hypoechoic
- Multilocular

**Paralabral Cyst**
- Ultrasound-guided aspiration
- 18 – 20 gauge spinal needle
- Steroid injection

**Femoroacetabular Impingement**
- Pincer-type: deep acetabulum
- Cam-type
  - Broad irregular femoral neck
  - Possible cortical irregularity at US
- Associated with anterior labrum tear
- Consider dynamic evaluation

**FAI: Ultrasound**
- Ultrasound can demonstrate a bony protuberance and non-spherical head associated with CAM FAI
- Alpha angle measurements
  - Buck et al.: unreliable
  - Lerch et al.: strong correlation with MRI

*Note: labral tear (yellow arrow) and osseous bump (white arrow)*
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Sports Hernia?

- A non-anatomic, non-diagnostic term attributed to many causes of groin pain
  - Tears or attenuation of inguinal structures
  - Bulge posterior wall of inguinal canal
  - Obturator nerve entrapment
  - Common aponeurosis abnormality:
    - Rectus abdominis and adductors tendons
    - Associated: pubic symphyseal instability, FAI

Omar IM et al. Radiographics 2008; 28:1415
Garvey JFW et al. Hernia 2010; 14:17
Hopkins JN et al. JBU Reviews 2017; 6:1

Rectus Abdominis / Adductor Tendinosis: “Sports Hernia”

Note: common aponeurosis

From: Radiographics 2008; 28:1415

Rectus Abdominis / Adductor Injury: “Sports Hernia”
Sports Hernia: aponeurosis injury

Complete Tear: adductor longus

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Calcific Tendinosis: rectus femoris

Calcific Tendinosis
- Ultrasound-guided lavage and aspiration
- 20 gauge spinal needle
Outline

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Snapping Hip Syndrome: iliopsoas

- Image long axis to inguinal ligament superior to femoral head
- Extension of flexed abducted and externally rotated hip
- Abrupt movement of iliopsoas as iliacus muscle interposed between tendon and bone moves

Deslandes et al. AJR 2008; 190:576

Iliopsoas Tendon

- Oblique-axial plane:
  - Superior to femoral head
  - Lateral to medial
  - Inject between tendon and ilium
- If bursa seen: inject
- Pain relief = successful iliopsoas surgical release

Blankenbaker DG. Skeletal Radiol 2006; 35: 565

Iliopsoas Bursa

- Needle placed between iliopsoas tendon and ilium
- Fills iliopsoas bursa
- There is no peritendinos spaced deep to iliopsoas tendon

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Inguinal Region Hernia:

- Start transverse: rectus abdominis
- Find inf. epigastric artery
- Follow to origin at external iliac artery
- Move superior to find deep ring
- Angle toward pubis
- Scan Hesselbach’s triangle

Inguinal Region Hernia: Posterior View

- Rectus Abdominis
- Inferior Epigastric Artery
- Inguinal Ligament

Imaging Inguinal Hernias:

- In diagnosis of occult inguinal hernias:
  - Ultrasound: 86% sensitivity and 77% specificity
  - CT: 80% sensitivity and 65% specificity
  - Herniography: 91% sensitivity and 83% specificity

Robinson A. Surg Endosc 2013; 27:11
Indirect Inguinal Hernia:
- Extends through deep inguinal ring
- Lateral to inferior epigastric
- Courses medial within inguinal canal
- Parallel to skin surface
- May contain fat or less commonly bowel
- Confirm in two planes

How do you Valsalva?
- Tighten belly
- Hold breath
- Blow on back of hand
- Stand up
- Clue: femoral vein should distend
Indirect Inguinal Hernia: containing bowel

**Indirect Hernias: Pitfalls**
- Relying on transducer position in plane or long axis to inguinal canal
  - Must scan short axis to inguinal canal
- Lipoma of inguinal canal
  - True hernias enter through deep ring
- Round ligament varicosities: pregnancy
  - Do not call hemangiomas

**Indirect: Pitfall**
- You must also scan area in the sagittal plane short axis to inguinal canal
- Inguinal canal may move out of plane relative to transducer

**Importance of obtaining two views……**

**Indirect Hernia: Pitfall**

**Pitfall: Pseudo Indirect Hernia**
Indirect: Pitfall
- Lipoma of spermatic cord
- May simulate indirect hernia
- True hernia will enter through internal inguinal ring

Spermatic Cord Lipoma

Indirect: Pitfall
- Round ligament varicosities
- Early 3rd trimester of pregnancy
- Resolves after childbirth
- Do not misinterpret as vascular malformation

Kahrman G. J Clin Ultrasound 2010; 38:512

Indirect Inguinal Hernia: deeping

Round Ligament Varicosities

Indirect: Pitfall
- Canal of Nuck cyst
- Patent processus vaginalis
Indirect: Pitfall
- Undescended testicle
- In males

Direct Inguinal Hernia:
- Extends through Hesselbach’s triangle
- Medial to inferior epigastric
- Protrudes anterior toward skin surface
- May contain fat or less commonly bowel
- Confirm in two planes
**Direct Hernia: Pitfall**

- If only scanning long axis to inguinal canal in Hesselbach’s triangle
- Intra-abdominal contents may move inferior
- Simulate direct hernia
- True hernia shows focal movement in two planes

**Femoral Hernia:**

- Extends through femoral ring
- Usually medial to femoral vein
- Protrudes inferior to inguinal ligament
- May contain fat or less commonly bowel
- Confirm in two planes
- Femoral vein should distend with adequate Valsalva!
Femoral Hernia

Medial Lateral

Axial Sagittal

Medial Lateral Superior Inferior

Artery

Paralabral Cyst into Femoral Canal

Take Home Points

- Groin pain is multifactorial
- Include common aponeurosis
- Assess for inguinal hernias
- Valsalva is essential
- Iliopsoas injection

See www.jacobsonmatus.com for syllabus and other educational material
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