MSK ultrasound in children

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Disclosures

• None

Where is MSK Ultrasound strong

• Growth plate injuries→ throwers shoulder
  – Can image side to side with ease, avoiding unnecessary radiation
  – Subtle fractures noted higher sensitivity than plain imaging
• Tendon injuries
  – Rare in children but faster acquisition than MRI
  – Greater resolution with ultrasound vs MRI
• Ligament injuries
  – Can do dynamic scanning and can avoid unnecessary trauma with IA arthrogram
• Apophyseal imaging and cartilage imaging improved over all techniques
  – Side to side comparison
Benefits of Ultrasound

- Improved Diagnosis
  - What hurts → countless times find growth plate?
  - On field assessment
- Direct patient and family education
- Reduced cost
- No radiation
- Faster
- No worries about claustrophobia
- Procedure visualization real time
  - Improved over fluoroscopy

Downside

- Education required is tremendous
- Time consuming in clinic
- Not able to visualize through bone
  - May miss OCD, although often get a hint with effusion
  - Often may be able to move the joint to visualize area
- Harder to store and label full imaging
  - 10-15 min scanning reduced to 5 images?
- Deeper structures loose some resolution
  - Obese children?
Controversy

• Radiologists vs Sports medicine clinicians
  – Imaging equipment
  – Bedside
  – Time

Ultrasound of Shoulder

*Transverse Biceps tendon scan plane*  
*Transverse Long Head Biceps*
**Longitudinal Biceps tendon scan plane**

**BT LS normal**

![Image of longitudinal biceps tendon scan]

**SSC scan plane**

**Normal subscapularis**

![Image of subscapularis scan]
Patient begins with arm by their side and abducts sideways to 90. Look for bunching of bursa or tendon against the acromion or coraco-acromial ligament.

SSP scan plane 2: Patient's hand behind their back.

Normal supraspinatus TS
**ACJ scan plane**

**AC joint normal**

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**Infraspinatus scan plane:** Patient's hand towards unaffected shoulder.

**Infraspinatus**
Greater Tuberosity Fracture Comparison of right left greater tuberosity.
Despite overwhelming evidence that accuracy in injections is quite low and ultrasound significantly improves this accuracy, many DO NOT BELIEVE

Many Physicians will feel that they are “excellent” at injections and “never” miss
Ultrasound – Accurate / Versatile

- 30% of injections miss subacromial bursa – Experts
  - Eustace (1197)
  - Yamakado (2002)
  - Henkus (2006)
  - Sethi (2006)

- Naredo et al. (2004)
  - Randomized cohort (41 patients to blind vs. U/S guided subacromial cortisone injections
  - VAS (p=0.001) & SFA (p=0.012) sig better in U/S guided group

Subacromial Injection – Arm Neutral
Common extensor tendon insertion to the lateral humeral epicondyle.

Biceps insertion onto radial tubercle- Longitudinal
Rheumatoid arthritis of the MCP joint in a 21 year old female with synovial thickening and bony erosions. Increased vascularity volar aspect

Elbow

Coronoid fossa
Lateral epicondyle
Capitulum
Trochlea
Radial head
Coronoid process
Radial tuberosity
Synovium
Medial epicondyle
Annular ligament
Ulnar tuberosity
Normal ulna collateral ligament

UCL injury in high school pitcher
Normal longitudinal triceps insertion

Benefits and limitations of ultrasound of the hip
Transient synovitis?
Hip ultrasound guided injection

Quadiceps – Poor Technique

- Leg position: Extension
- Problem: Concave tendon & false positive for tendon tear
- Solutions: Angle transducer perpendicular to tendon
  Bend knee to 30°

NO!!! - ANISOTROPY
SLJ Inferior pole of the patella?

Patellar Tendinosis

Normal

Swollen
Partial Patellar Tendon Tear

Femoral Condyles - Anterior

- Leg position: Full Flexion
- Tip: Superior to patella
- MRI equivalent: Sagittal plane
MCL

- Leg position: 30° Flexion; Hip externally rotated
- Tip: Find medial epicondyle and follow to joint
- MRI equivalent: Frontal plane

MCL Tear

Varus Stress  Valgus Stress
Medial Meniscus Tear

MPFL Strain
IT Band

- Leg position: Extension; Hip internally rotated
- Tip: Find Gerdy's tubercle and follow proximally
- MRI equivalent: Frontal plane

Posterior Medial Meniscus Tear
8-year-old girl suffered from pain at the anterior part of the right knee after falling down on a pedestrian walk. X-ray of the patella revealed no pathology.
Tibiatalar Joint

Normal Planter Plate
Dancers Foot injuries

Degenerative Plantar Plate

Joint effusion elevating plantar plate

A date-palm thorn in the foot
Thank You

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