Shoulder Arthrography for Sports Injury Evaluation

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Disclosure

- Off-label use for gadolinium

MR Arthrography

- MRA vs Conventional MR imaging*
  - Labrum
  - Rotator cuff
- MRA vs Conventional MR imaging and CT arthrography**
  - Labrum

**Chandnani et al., AJR 161:1229-1235, 1993

MR Arthrography

- MRA vs Conventional MR imaging
  - Rotator cuff interval
  - Intra-articular biceps tendon
  - Glenohumeral ligaments
  - Coracohumeral ligament

Rotator Cuff Interval

MR Arthrography

- Placement of contrast (dilute gadolinium solution) into the joint
MR Arthrography

- Improve visualization of intraarticular structures
- Articular distension with fluid
  - Allow fluid intravasation into recesses and tears
- Improve contrast between joint fluid, intraarticular, and osseous structures

Rotator Cuff Interval

Intraarticular Biceps Tendon

- Standard T1W Sagittal MR
- T1 Fat Sat Post MRA Sagittal

Glenohumeral Ligaments

- STD GRADIENT AXIAL MR
- T1 Fat Sat Post MRA Sagittal

MR Arthrography Indications

- Labral pathology
- Undersurface tears of the RC
- Intraarticular biceps tendon pathology
- Rotator cuff interval evaluation
- Glenohumeral ligament evaluation
- Coracohumeral ligament evaluation
- Post-surgical rotator cuff

Tailored Approach to MR Arthrography

- Clinical History
  - Anterior Symptoms
  - Posterior Symptoms
- Posterior Approach
- Anterior Approach
Tailored Approach to MR Arthrography

- Structures traversed
  - Variability patterns
  - Pathology patterns
- Complications

Anterior Approach Complications

- Anterior Contrast Extravasation

Anterior Approach Complications

- Subcoracoid bursa injection

Anterior Approach Complication

- Iatrogenic contrast in anterior structures

Extraarticular Injection
Infiltration of Subscapularis

Contrast Solution

- Standard approach
  - Small test injection with iodinated contrast to ensure intraarticular location
  - 12 - 15 cc of a gadolinium solution
    - 1 cc gadolinium in 250 cc saline
- Variation
  - 12 - 15 cc of a gadolinium solution
    - Iodinated contrast
    - Solution of 2 cc gadolinium in 250 cc saline
Standard Anterior Approach

- Patient supine
- Arm external rotation
- Weight

Posterior Approach

- Posterior approach right shoulder

Arthrography

- Post-arthrogram images
  - Internal and external rotation
  - No exercise
- Post-arthrogram patient instructions
  - Transport to MR scanner
  - Image immediately after arthrogram

Delayed Imaging
**MR Arthrogram**

- Pure gadolinium injection

**MR Imaging Technique**

- T1-weighted with fat saturation
  - Coronal oblique
  - Sagittal oblique
  - Axial
  - ABER
- T2-weighted with fat saturation
- Tailored MR imaging
  - Specialized planes
  - Additional techniques

**Image Localizers**

- Axial
- Coronal
- Sagittal

**Ganglion Cyst**

- T1 Fat Sat Post MRA Coronal
- T2 Fat Sat Post MRA Coronal

**Tailored MR Arthrography**

- Specialized imaging planes
Glenoid Labrum
- Cuff of fibrous and fibrocartilaginous tissue surrounding glenoid fossa
- Attachment site
  - Long head of biceps
  - Glenohumeral ligaments

Buford Complex
- Cordlike middle glenohumeral ligament associated with absent anterosuperior labrum

Glenoid Labrum
- Variation in morphology and signal intensity

Cordlike Middle Glenohumeral Ligament
- Cordlike middle glenohumeral ligament associated with normal or small anterosuperior labrum

Buford Complex
• Occurs between anterosuperior labrum and glenoid
• Frequency 10%
• Simulates labral pathology

Sublabral Recess

Histologic Zone

Glenohumeral Ligaments
• Thickenings of joint capsule
• Function
  – Integrity
  – Site of attachment
  – Position of arm
• Extend from anterior glenoid to proximal humerus

Glenohumeral Ligaments
• Superior GHL
  – Present 90-97%
  – Variable origin
• Middle GHL
  – Present 73-92%
• Inferior GHL
  – Present almost 100%

Glenohumeral Ligaments

Superior Glenohumeral Ligament
Middle Glenohumeral Ligament

IGHL

IGHL

ABduction External Rotation

• Through change in arm position and alteration of capsule dynamics
  – Place capsulolabral complex under tension
  – Force fluid into redundant superior capsule and RC

ABER
ABduction External Rotation
Unstable Capsulo-Labral Lesions

- Glenoid Failure (70-75%)
- Capsular Failure (15-20%)
- Humeral Failure (5-10%)
- Humeral + Glenoid Failure

Bankart

Bankart ALPSA Perthes

Tear/Laxity

HAGL BHAGL

Floating AIGHL

Anterior Inferior Labrum? Standard MR Imaging

Anterior Inference Labrum? MR Arthrography

Bankart Lesion
Anterior Inferior Labrum
Standard MR Imaging

Perthes Lesion
MR Arthrography

Perthes

Perthes Lesion

Anterior Inferior Labral Lesion
Standard MR Imaging

Anterior Inferior Labral Lesion
MR Arthrography

Chronic ALPSA:
Anterior Labral-Ligamentous Periosteal Sleeve Avulsion