55 yo female presenting with 1 year of shoulder pain without prior trauma

Nicholas Bertha, MS4
Drexel University College of Medicine

Brandon Schooley, MD
Allegheny Health Network

Matthew Hartman
Radiology Clerkship Director
Allegheny Health Network
Patient Presentation

• HPI: 55yo female presents with 1 year of pain in the posterior aspect of her right shoulder and goes down to her posterior arm. She has been very active in the past, but denies trauma

• PMH: None

• PSH: None
Patient physical exam

• Pertinent physical exam: Positive Hawkins test

What imaging should we order?
### Variant 1: Atraumatic shoulder pain. Initial imaging.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Appropriateness Category</th>
<th>Relative Radiation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiography shoulder</td>
<td>Usually Appropriate</td>
<td>☀</td>
</tr>
<tr>
<td>CT arthrography shoulder</td>
<td>Usually Not Appropriate</td>
<td>★★★★</td>
</tr>
<tr>
<td>CT shoulder with IV contrast</td>
<td>Usually Not Appropriate</td>
<td>★★★</td>
</tr>
<tr>
<td>CT shoulder without and with IV contrast</td>
<td>Usually Not Appropriate</td>
<td>★★</td>
</tr>
<tr>
<td>CT shoulder without IV contrast</td>
<td>Usually Not Appropriate</td>
<td>★</td>
</tr>
<tr>
<td>MR arthrography shoulder</td>
<td>Usually Not Appropriate</td>
<td>O</td>
</tr>
<tr>
<td>MRI shoulder without and with IV contrast</td>
<td>Usually Not Appropriate</td>
<td>O</td>
</tr>
<tr>
<td>MRI shoulder without IV contrast</td>
<td>Usually Not Appropriate</td>
<td>O</td>
</tr>
<tr>
<td>US shoulder</td>
<td>Usually Not Appropriate</td>
<td>O</td>
</tr>
<tr>
<td>X-ray arthrography shoulder</td>
<td>Usually Not Appropriate</td>
<td>★</td>
</tr>
</tbody>
</table>
Shoulder x-ray (Unmarked)
Shoulder x-ray Findings

• Normal shoulder x-ray

Further imaging?
• Most orthopedic surgeons are more comfortable with MRI
• MR arthrography can be considered in younger patients (<40) whom you suspect labral pathology and would potentially undergo operative repair
Shoulder MRI Findings

• Articular sided partial tear of the central rotator cuff tendons (◯)
  – Indicated by fluid equivalent signal filling the site of the tear

• Subcortical cysts in the humeral head (➡️), secondary to chronic rotator cuff tendinopathy.

• Tendinosis of the supraspinatus tendon (◯)
Shoulder MRI (Marked)
Final diagnosis

• Intermediate grade articular sided partial thickness tear of the central rotator cuff tendon with fluid tracking along the anterior surface of the infraspinatus muscle.
Rotator Cuff Tears

• Mechanisms of tear
  – Chronic degeneration (Most common)
  – Chronic impingement
  – Acute avulsions (Often involve subscapularis)

• Risk factors
  – Age
  – Smoking
  – Hypercholesterolemia

• High prevalence in older population
  – >60 yo: 28% with full thickness tear
  – >70yo: 65% with full thickness tear
Rotator Cuff Tears

• Anatomy
  – Cuff has 5 histologic areas
    • Thinner, less vascularized areas are on the articular side, see more articular sided tears

• Function
  – Provides dynamic stability for the shoulder by balancing opposing forces
    • SIT balance deltoid
    • Subscapularis balances SIT
Describing a tear on imaging

- Tendon
- Size
- Location
  - Articular side
  - Interstitial
  - Bursal side
- Thickness
  - Partial thickness
    - Low grade \( \Rightarrow <50\% \)
    - High grade \( \Rightarrow >50\% \)
    - Intermediate grade \( \Rightarrow \) Term not always used, but indicates \( \sim 50\% \)
  - Full thickness
- Retraction distance (If a full thickness tear)
Goutallier Classification

• **Purpose**
  - Acts as a prognostic tool to anticipate benefits on various interventions
    • More predictive than tear size or number of recurrences

• **Classification method**
  - 0 ➞ Normal/No fat
  - 1 ➞ Fatty streaks
  - 2 ➞ <50% fat
  - 3 ➞ About 50% fat
  - 4 ➞ >50% fat

• **Interpretation**
  - Higher grade correlates with less likelihood of successful operation
Resources


• Yoav Morag, MD, Jon A. Jacobson, MD, Bruce Miller, MD, Michel De Maeseneer, MD, PhD, Gandikota Girish, MD, David Jamadar, MD. MR Imaging of Rotator Cuff Injury: What the Clinician Needs to Know. RadioGraphics 2006; 26:1045–1065

• ACR Appropriateness Criteria: Shoulder Pain – Atraumatic. https://acsearch.acr.org/list
