Diagnostic Imaging Pathways - Chronic Shoulder Pain

Population Covered By The Guidance

This pathway provides guidance on the imaging of adult patients with subacute or chronic shoulder pain without a definite precipitating event, or patients with persistent shoulder pain following an injury despite conservative management.

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Date of next review: November 2021

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Quick User Guide

Move the mouse cursor over the PINK text boxes inside the flow chart to bring up a pop up box with salient points. Clicking on the PINK text box will bring up the full text. The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

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<tr>
<th>SYMBOL</th>
<th>RRL</th>
<th>EFFECTIVE DOSE RANGE</th>
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<td></td>
<td>Minimal</td>
<td>&lt; 1 millisieverts</td>
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<td>5-10 mSv</td>
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<tr>
<td></td>
<td>High</td>
<td>&gt;10 mSv</td>
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Pathway Diagram
**Image Gallery**

*Note: These images open in a new page*

1. **Anterior Shoulder Dislocation**
   Image 1 (Plain Radiograph): Anterior shoulder dislocation showing anterior, medially and inferiorly displaced humeral head.

2. **Supraspinatus Tendon Tear**
   Image 2 (Ultrasound): Full thickness supraspinatus tendon tear of the left shoulder (arrow).

3. **Glenoid Labral Tear**
   Image 3 (MR Arthrogram): Axial fat-saturated proton density image of shoulder showing anterior labral tear.
Teaching Points

- A number of shoulder conditions are diagnosed clinically and managed conservatively such as osteoarthritis and frozen shoulder (adhesive capsulitis). The role of imaging is to rule out other causes that are amenable to surgical treatment such as a complete thickness rotator cuff tear. Imaging may be undertaken if there is no improvement after initial conservative treatment.
- Although radiographs are generally of little use in atraumatic shoulder pain, they can be useful to screen for other potentially serious causes if the original diagnosis is in doubt. Plain radiography can be used to rule out osseous causes of pain including occult fracture, dislocation, malignancy and avascular necrosis of the femoral head, as well as calcific tendonitis.
- Further imaging studies should only be considered if they are likely to provide additional clinical information which could potentially alter treatment.
- MRI and ultrasound are useful investigations to evaluate soft tissue structures.
  - Ultrasound is preferable if the question is only to evaluate for a rotator cuff tear as it is cheaper, more acceptable, has equivalent accuracy and has no contraindications.
  - MRI is preferred for evaluating labral abnormalities and nerves.
  - MR arthography can be useful as a problem solving tool if MRI does not identify the cause of symptoms.

Plain Radiography

- Where imaging is indicated, many authors agree that plain radiographs should be the initial investigation.
- However, evidence suggests that plain radiography rarely changes management in atraumatic shoulder pain.
- The advantage of radiography is that it is a safe, fast and inexpensive imaging modality that can demonstrate or rule out a number of conditions affecting the shoulder.
- Radiographs are good for detecting several causes of shoulder pain that are not well demonstrated on ultrasound, including fractures, dislocations, calcific tendonitis, avascular necrosis, osteoarthritis, inflammatory arthropathies and bone tumours.
- In patients with suspected soft tissue pathology who do not improve after conservative treatment, radiographs can be useful to assess for missed diagnoses, although the yield is generally low.
- Different situations require different views (AP, lateral or axillary views). Shoulder trauma protocols should have 3 views, 2 of which are orthogonal.
  - Axillary, scapular Y-view and AP view in trauma.
  - Routine axillary views in non-traumatised shoulder.
  - Impingement views in clinically suspected impingement syndrome and/or rotator cuff tears to detect subacromial spur.

Ultrasonography

- MRI and ultrasound (US) are both useful investigations to assess impingement or rotator cuff tears.
- US is preferable if the question is only to evaluate for a rotator cuff tear as it is cheaper, more acceptable, has equivalent accuracy and has no contraindications.
- US has high accuracy for the detection and staging of full-thickness rotator cuff tears, but is less sensitive in partial-thickness tears.
  - Meta-analyses report a sensitivity of 87-92% for full-thickness tears with specificity of
93-96%, which is comparable to MRI \(^4,10,11\).

- MR arthrography is more sensitive and specific than both MR and US for identifying partial tears \(^2\).
- US is comparable to MRI in the hands of an experienced user. \(^10\) US may be considered for the initial imaging investigation if rotator cuff pathology is suspected \(^1,12\).
- May also be considered in the evaluation of patients >40 years of age with primary traumatic anterior shoulder dislocation as rotator cuff tear is more common in this age group \(^13,14\).
- Useful in guiding aspiration of calcium deposits or bursal injections.
- Useful in evaluating the long head of biceps tendon, though MR and US are both less accurate for biceps tendon pathology compared to rotator cuff injuries \(^2\).
- There is evidence that US is useful in guiding clinical decision making, \(^15\) although a small prospective cohort study found no difference between outcomes in patients who received usual conservative treatment and patients whose treatment was tailored based on pathology found on US. \(^16\) Additionally a group of patients recovered from their injuries before being randomised. These findings support guidelines that suggest initial conservative management before proceeding to imaging \(^16\).
- **Advantages:** no ionising radiation, non-invasive, no contrast agent, relatively inexpensive, readily available.
- **Limitations:**
  - Operator-dependent
  - Less sensitive in detecting partial thickness rotator cuff tears
  - Cannot accurately evaluate the labral-ligamentous complex and other deep shoulder structures.

**Magnetic Resonance Imaging (MRI)**

- MRI and ultrasound (US) are both useful investigations to assess impingement or rotator cuff tears \(^1,2\).
- Further imaging studies should only be considered if they are likely to provide additional clinical information which could potentially alter treatment \(^17,18\).
- MRI allows accurate assessment of soft tissue injuries and has significant clinical impact \(^4\).
- If no cause for pain is demonstrated, then additional information may be obtained by proceeding to MR arthrography \(^19\).
- Highly accurate in the assessment of full thickness rotator cuff tears, with sensitivity of 89-94% and specificity of 93% \(^4,10,11\).
- Equally sensitive as MR arthrography with comparable in clinical impact for full thickness rotator cuff tears, but less accurate in the detection of partial-thickness tears \(^10,11\).
- Comparable accuracy to US in the assessment of both full and partial thickness rotator cuff tears \(^4,10,11\).
- Indicated in the investigation of rotator cuff disease when US expertise is unavailable or when further investigation of rotator cuff pathology is needed.
- **Advantages:**
  - No ionising radiation
  - Non-invasive
  - Demonstrates other lesions such as acromioclavicular joint osteoarthritis, occult fractures and avascular necrosis
  - Comprehensive display of soft tissue anatomy
    - Demonstration of the causes for impingement
    - Useful in characterisation and staging of bone tumours
- **Limitations:**
  - Can be less useful than MR arthrography for evaluating labral tears \(^19-22\).
Cost
- May not be tolerated in claustrophobia, contraindicated with ferromagnetic prostheses

**MRI Arthrography**

- Involves an MRI following the intra-articular injection of a dilute contrast agent (gadolinium)
- When MRI is inconclusive, MR arthrography is a useful problem-solving tool to assess labral pathology \(^1,2,19,21,23\)
- Most accurate imaging modality for defining:
  1. Rotator cuff pathology
    - 94-95% sensitive and 93-99% specific for full thickness tears, and 62-86% sensitive and 47-96% specific for partial thickness tears \(^10,11\)
    - Superior depiction of partial-thickness tears compared to conventional MRI \(^10,11\)
    - MR arthrography is less sensitive for bursal-sided partial thickness tears than articular-sided partial thickness tears \(^24\)
  2. Labral/capsule abnormalities in gleno-humeral instability \(^25,26\)
- Minimally invasive but most patients find MR arthrography less painful than expected \(^27\)
- Disadvantages: invasive, limited availability and high expense. Some studies report limited clinical value in patients already destined for arthroscopy \(^28,29\)

**References**

**Date of literature search: April-August 2018**

The search methodology is available on request. Email

References are graded from Level I to V according to the Oxford Centre for Evidence-Based Medicine, Levels of Evidence. Download the document


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