

Diagnostic Imaging Pathways - Shoulder (Pain or Instability)

Population Covered By The Guidance

This pathway provides guidance on the imaging of adult patients with new onset traumatic and non-traumatic shoulder pain or instability.

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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.

SYMBOL	RRL	EFFECTIVE DOSE RANGE
	None	0
	Minimal	< 1 millisieverts
	Low	1-5 mSv
	Medium	5-10 mSv
	High	>10 mSv

Pathway Diagram

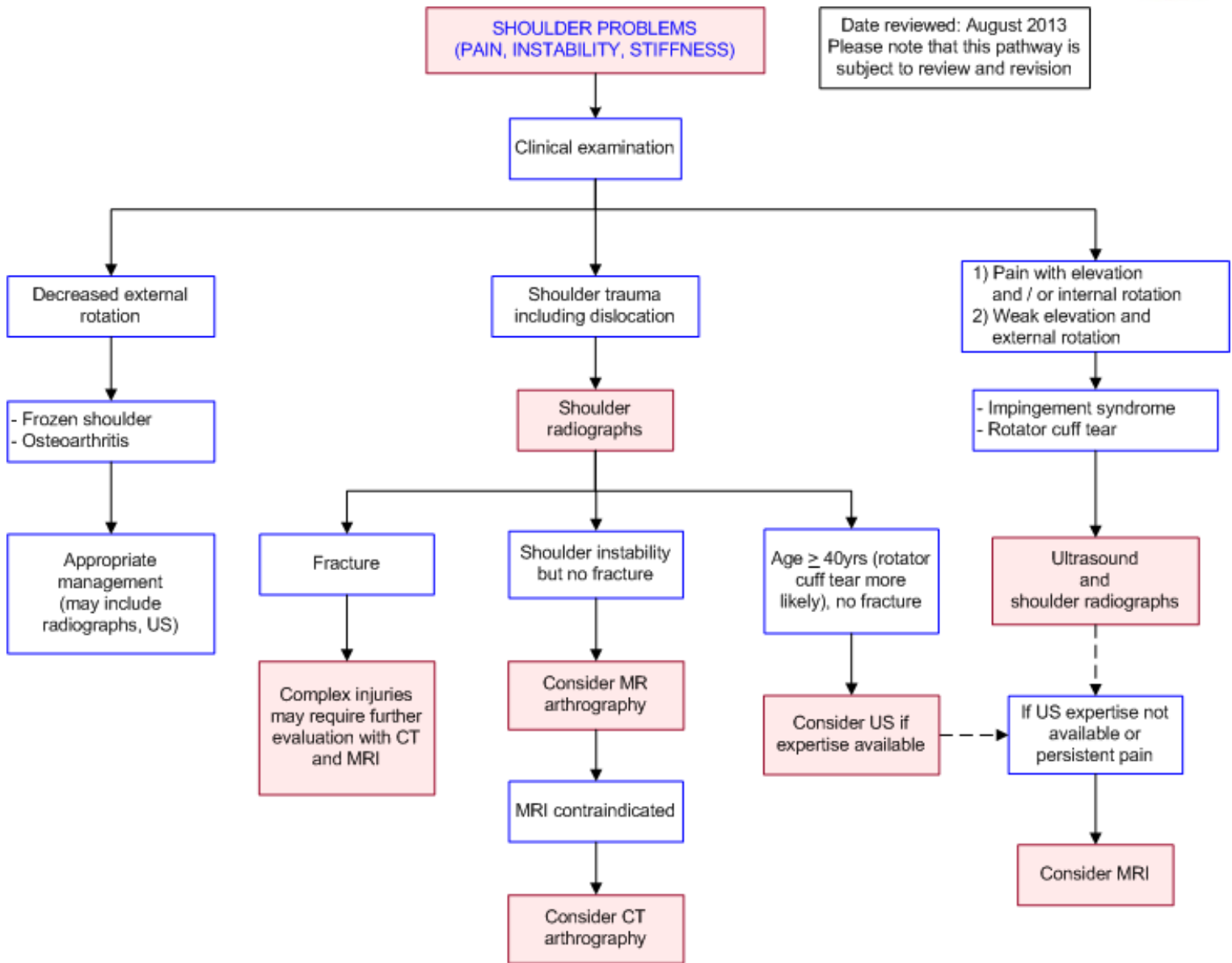


Image Gallery

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

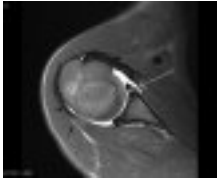


Image 3 (MR Arthrogram): Axial fat-saturated proton density image of shoulder showing anterior labral tear.

Teaching Points

- Plain radiography is the initial diagnostic modality for the evaluation of traumatic shoulder pain
- If impingement syndrome is suspected due to rotator cuff insufficiency, ultrasound is recommended in addition to plain radiography
- CT of the shoulder may be useful in complex fracture-dislocation injuries of the shoulder, as a pre-surgical tool
- MRI is useful as an alternative in suspected rotator cuff insufficiency, when ultrasound is not available or in complex cases

Plain Radiography

- Initial investigation of choice for all shoulder problems [1](#)
- Can detect most fractures, dislocations, calcific tendonitis and other skeletal causes of pain such as arthritis and bone tumour [2](#)
- Different situations require different types of plain films (AP/lateral/axillary views). Shoulder trauma protocols should have 3 views, 2 of which are orthogonal [1](#)
 - Axillary, scapular Y-view and AP view in trauma [3,4](#)
 - Routine axillary views in non-traumatized shoulder [5](#)
 - Impingement views in clinically suspected impingement syndrome and/or rotator cuff tears to detect subacromial spur [6](#)

Ultrasonography

- High accuracy in the detection and staging of full-thickness rotator cuff tears, but less sensitive in partial-thickness tears [7,8](#)
- A recent metaanalysis reported a pooled 96% sensitivity and 93% specificity for full thickness rotator cuff tears and 84% sensitivity and 89% specificity for partial thickness rotator cuff tears compared to arthroscopic or open surgical findings as the reference standard [7](#)
- US is comparable to MRI in the hands of an experienced user. [8](#) In many institutions, US has replaced MR imaging in the initial evaluation of rotator cuff
- Equally sensitive but less specific than MR arthrography in the detection of full thickness tears, and less accurate than MR arthrography in the detection of partial thickness tears [8](#)
- May 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 [9](#)
- Useful in guiding aspiration of calcium deposits or bursal injections
- Useful in evaluating the long head of biceps tendon [10](#)
- Advantages: no ionising radiation, non-invasive, no contrast agent, relatively inexpensive, readily available
- Limitations
 - User-dependent

- Less sensitive in detecting partial thickness rotator cuff tears [7](#), [8](#)
- Cannot accurately evaluate the labral-ligamentous complex and other deep shoulder structures

Magnetic Resonance Imaging (MRI)

- Allows accurate assessment of soft tissue injuries and has significant clinical impact [11](#)
- Highly accurate in the assessment of full thickness rotator cuff tears. A recent metaanalysis reported a pooled 91% sensitivity and 97% specificity for full thickness rotator cuff tears and 80% sensitivity and 95% specificity for partial thickness rotator cuff tears, compared to surgical procedures as the reference standard [12](#)
- Equally sensitive to MR arthrography and comparable in clinical impact for full thickness rotator cuff tears, but less accurate in the detection of partial-thickness tears [8,11-13](#)
- Comparable accuracy to US in the assessment of both full and partial thickness rotator cuff tears [8](#)
- 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
 - Less specific than MR arthrography for rotator cuff tears, and less sensitive for detection of partial tears [8](#)

MR Arthrography

- Involves an MRI following the intra-articular injection of a dilute contrast agent (gadolinium)
- Most accurate imaging modality for defining
 1. Rotator cuff pathology [8,11,14](#)
 - 96% sensitive, 99% specific and 98% accurate for full thickness tears, and 80% sensitive, 97% specific and 95% accurate for partial thickness tears compared to arthroscopy [14](#)
 - Superior depiction of partial-thickness tears compared to conventional MRI [11](#)
 - MR arthrography is less sensitive for bursal-sided partial thickness tears than articular-sided partial thickness tears [15](#)
 2. Labral/capsule abnormalities in gleno-humeral instability [16,17](#)
- Disadvantages: invasive, limited availability and high expense. Some studies report limited clinical value in patients already destined for arthroscopy [18,19](#)

Computed Tomography (CT)

- Superior to plain radiographs in evaluation of complex fractures and fracture-dislocations involving the head of the humerus [3,20](#)

- Allows planning of treatment of complex proximal humeral fractures [3,20](#)

CT Arthrography

- Role has been largely taken over by MR arthrography
- Alternative for assessment of gleno-humeral instability (usually following dislocation) when MRI is unavailable [21-23](#)
- Allows accurate evaluation of labral abnormalities [21](#)
- Poor accuracy in the detection of partial thickness rotator cuff tears [21,23](#)

References

Date of literature search: May 2013

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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