What can Imaging tell us?

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Case Study

A 94yo presents with a stiff but not painful shoulder

20 DEGREES CEPHALAD
Case Study

A 94yo presents with a stiff but not painful shoulder
Imaging offers an anatomical “snapshot”, but in isolation is meaningless
Ask yourself: Why am I imaging this patient?

1. Diagnosis – No idea what is going on
2. Facilitate Management – Pretty good idea what is going on but want confirmation before implementing Rx plan
3. Patient expectation
4. End point of consultation/manage workload
5. Risk management – “cover my ass”
Common Shoulder problems

1. Impingement
2. Rotator Cuff Tears
3. Arthritis
4. Capsulitis
5. Trauma
Impingement

MUSCLE

TENDON

BONE

Tensile Undersurface Fiber Failure (TUFF)
AC arthrosis

Hypertrophic bony change, capsular thickening, cystic change and bony oedema
Indentation of the mucotendinous union of SS

Chronic inflammation of the bursa

Bursal thickening and fluid collections
Dynamic ultrasound shows bunching

Role of imaging

Exclude rotator cuff tear
Accurate guidance of injection
Impingement

Narrow subacromial space:

Bony hypertrophy of AC joint/CA ligament
Superior migration of humeral head
Tendon thickening
Inflammation of bursa
Fraying/tearing of the tendon

Impingement is a clinical diagnosis

Lots of people “impinge” but are asymptomatic
Pain generator might be AC joint
So what do I request for impingement?

1. XR and Ultrasound?
   XR might show AC Joint arthritis. So what?
   US might demonstrate impingement. So what

2. Nothing (no change to my RX plan)

3. US - guided injection
   Pain goes away. (Hi Ho Hi Ho Off to physio we go!)
   Pain doesn’t go away (Whoops! Wrong diagnosis. Rethink)
Common Shoulder problems

1. Impingement
2. Rotator Cuff Tears – US right?!
3. Arthritis
4. Capsulitis
5. Trauma
Greater Tuberosity Facets

Superior: Supraspinatus tendon

Middle: Supraspinatus and infraspinatus tendons

Inferior: Teres minor tendon
Greater Tuberosity Facets

Superior: Supraspinatus tendon
Middle: Infraspinatus tendons
Inferior: Teres minor tendon
Mechanisms of Cuff Injury

1. Impingement
2. Ischaemia
3. Intrinsic Structure
4. Degeneration
5. Trauma
In some tendons, such as the supraspinatus tendon, normal avascular regions (critical zones) may be vulnerable to degeneration and subsequent failure.
Ischaemia
Mechanisms of Cuff Injury

1. Impingement
2. Ischaemia
3. Intrinsic Structure
4. Degeneration
5. Trauma
Supraspinatus muscle consists of 2 muscle bellies:

1. Anterior belly:
   Larger with central tendon

2. Posterior belly:
   Straplike with terminal tendon
Intrinsic Structure

Clark’s Layers

II - superficial part of tendon
III – deep part of tendon
In the presence of a joint effusion, delaminated tears that violate the articular surface may be accompanied by **sentinel cysts** at the myotendinous junction.
Delaminating Tears Rotator Cuff
What does the surgeon want to know?

- Tendon torn or not? Dimensions of tear
- Tendon edge morphology
- Preexisting tendon path
Rotator Cuff Failure

Chronic Massive Tears:

- Progressive tendon failure with retraction
- Tendon not seen with ultrasound
- Superior humeral migration
- Muscle fatty infiltration
- surgical repair
- Compensation by other muscles - teres minor
So what do I ask for a rotator cuff tear?

1. Ultrasound
   - US only shows a small part of the rotator cuff
   - US performed badly in the community and most shoulder surgeons have no confidence in the report
   - US does not provide adequate roadmap for surgery

2. Nothing (no change to my RX plan)
   - Many elderly patients in the community cope quite well with chronic RC tears

3. US-guided injection

4. Call your friendly neighborhood surgeon

5. MRI
   - Quality and interpretation improved; cost effective; best test

The Shoulder Symposium
Epworth MSK Clinical Institute
Melbourne 16 June 2017
What is the role of shoulder ultrasound?

1. Overused in general community
   - Cheap and accessible, but poorly performed
   - Qualify for rebate need radiologist supervision

2. Operator dependent
   - Difficult for referring doctor to interpret

3. Confined to specialist centres
   - Occasionally ordered by specialists
   - Integrity postoperative repair, document healing
   - C/I MRI i.e. pacemaker, claustrophobia

4. Role for Guided injections
Common Shoulder problems

1. Impingement
2. Rotator Cuff Tears
3. Arthritis - radiographs
4. Capsulitis
5. Trauma
Osteoarthritis

Clinically obvious in many cases
Radiographs confirm diagnosis +/- severity
MRI can be useful for early OA +/- intraarticular bodies
Surgeons sometimes order CT scans for surgical planning/prosthesis

Problem: OA often does not occur in isolation
Common Shoulder problems

1. Impingement
2. Rotator Cuff Tears
3. Arthritis
4. Capsulitis - MRI
5. Trauma
Capsulitis

Rotator Interval Space
Common Shoulder problems

1. Impingement
2. Rotator Cuff Tears
3. Arthritis
4. Capsulitis
5. Trauma
Trauma

Bone Trauma – radiographs +/- CT
Soft tissue Trauma – radiographs +/- MRI
Shoulder Dislocation

MRI best test for assessing labral-capsular-ligament complex
Also chondral insult, bone bruise
Soft Tissue Trauma

Case Study:
23yo professional AFL player tackled by pulling his arm across his body
Infraspinatus rupture

Case Study:
27yo rugby player with tackling injury
Subscapularis rupture
Common Shoulder problems

What about Ultrasound???
Calcific Tendonitis

Ax unknown
Crystals migrate into bursa
Secondary bursitis
Often self-limiting
US most sensitive
Common Shoulder problems

Ultrasound is fantastic for injections, aspirations and biopsies

Ancillary information/dynamic scanning

Shoulder specialists prefer MRI
Imaging Shoulder problems

1. Impingement - diagnostic imaging unnecessary, US-guided injection
2. Rotator Cuff Tears - MRI
3. Arthritis - Radiographs +/− MRI
4. Capsulitis - MRI (US in specialist centres)
5. Trauma - Radiographs +/− CT +/− MRI
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