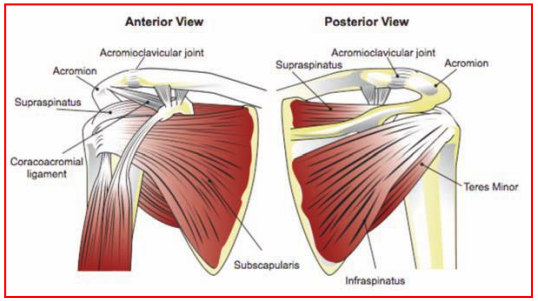
Shoulder Pain:
Not Always What it Seems

Dr Craig M Ball

Goodfellow Webinar
January 21, 2019

Auckland Bone and Joint Surgery

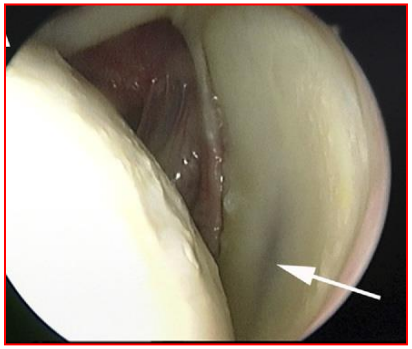


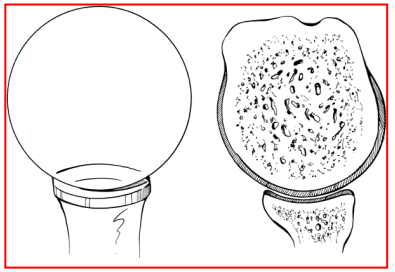
The Shoulder

- Common source of pain and functional disability
  - third most common musculoskeletal complaint

- Diagnosis and management often very challenging
  - presentation often delayed
  - number of conditions can present with similar symptoms
  - pathologies often co-exist
  - recovery can be prolonged

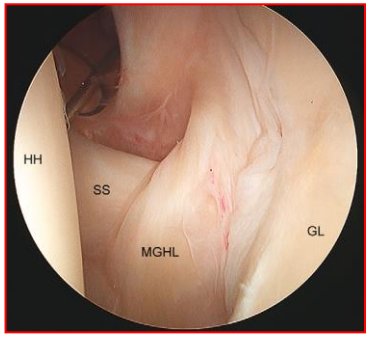
Glenohumeral Joint

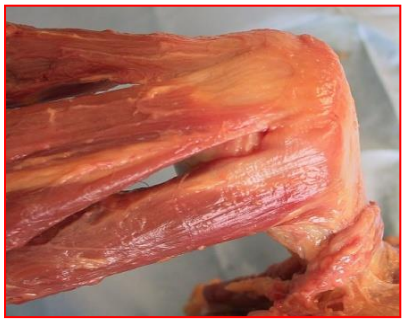




- Provides foundation for stability while allowing wide ROM
- Inherently unstable by design
  - stability determined by soft tissues, not bone

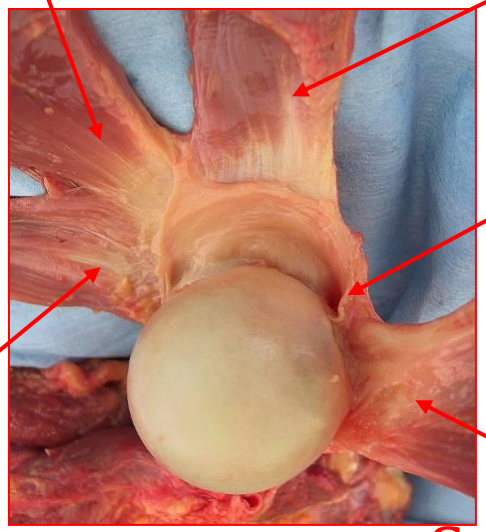
- Ligaments main source of stability for the shoulder
  - complex thickenings of the capsule that become tight at end ROM
- Motion loss can occur when capsule becomes thickened and contracted (frozen shoulder)





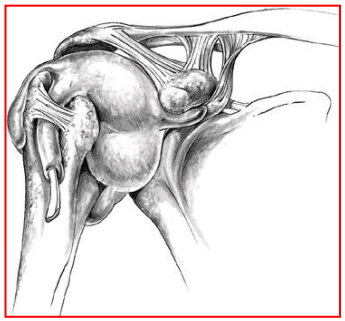
Rotator Cuff

- Four separate muscles organized as one tendinous sleeve around the humeral head
- Divided into 2 functional parts by the biceps tendon

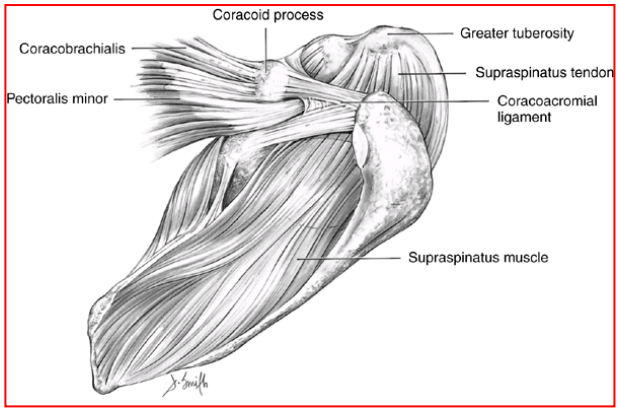


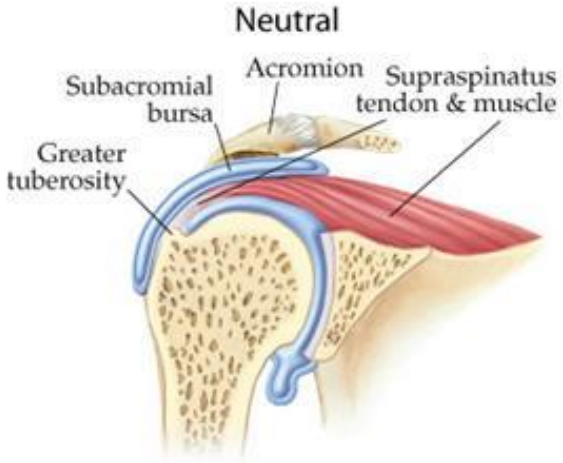
- Functions primarily in coordinating shoulder motion and keeping humeral head centered within the joint
- Also provides strength in own right

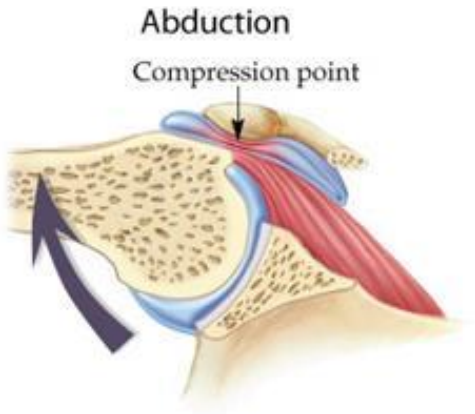
Subacromial Space



- Contains the subacromial/subdeltoid bursa which provides a lubricated cushion between the RC and the coracoacromial arch
- Exact function of arch unknown (?protection)
- Common area of painful pathology

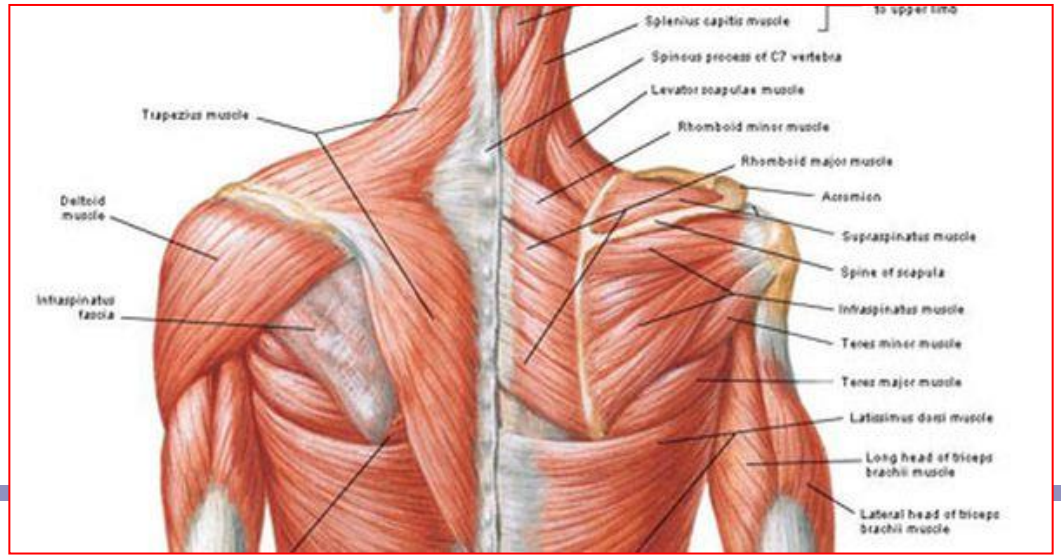






Overlying Muscles

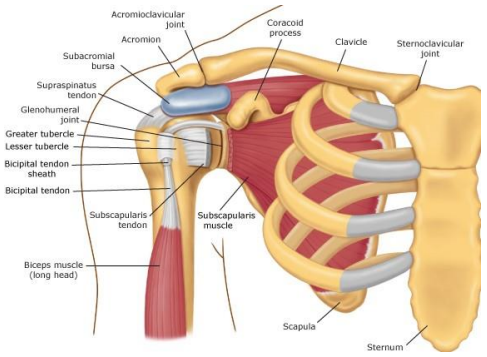
- Work together with RC to provide mobility and strength of the entire shoulder girdle
- Important to understand that 2/3 all shoulder movement is glenohumeral, 1/3 is scapulothoracic
- Complex functional relationship with underlying RC



Take Home Points

- Helpful to think of the shoulder in layers
- Pathology can occur in one or more of these layers
- Findings from history and examination will depend on what layers are ultimately involved:

Glenohumeral joint	- loose (instability), tight (frozen shoulder or OA)
RC	- RC tears, calcification
SA space	- impingement, AC joint
Overlying muscle	- muscle tears, scapula problems



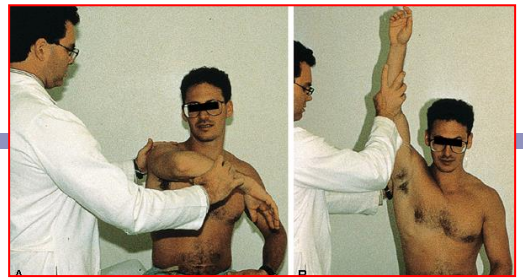
Assessment of Shoulder Pain

- Aim with any shoulder problem is to establish an accurate and definitive diagnosis
  - directed history and examination
  - appropriate use of imaging studies
- Remember that different shoulder conditions can present with similar shoulder symptoms (typically impingement)

- Site of pain often does not correlate with where pain is coming from

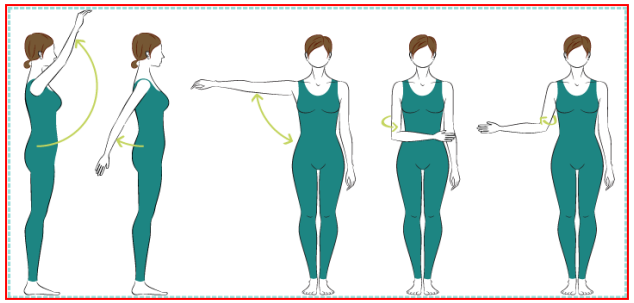
History and Examination

- Important to take a good history
  - main complaint will usually be pain
  - ask about associated symptoms (stiffness, weakness, instability)
- Common things occur commonly but in the shoulder presentation and pain patterns are not specific
- No single clinical examination test valid and reliable (or diagnostic) for any one specific pathology
  - sensitive but not specific; often limited by pain
- Probably most important is active versus passive ROM and what provocation test causes the pain



Take Home Points

- A good history and examination will make the diagnosis in many cases
  - RC pain more activity related, frozen shoulder pain just as bad at rest
- Always look for ROM loss
  - Patients will often not be aware of this



- Age of patient important when considering diagnosis
  < 40 consider instability / labral / biceps pathology and problems related to the AC joint (osteolysis)
  > 40 consider RC problems, frozen shoulder, and glenohumeral arthritis

Case Example

- 52 year old female with 3 month history of L) shoulder pain; thinks may have started after overstraining lifting a weight in the gym. Pain now worsening and no longer helped by NSAID's; starting to wake her at night

- Many diagnoses are possible, but history would not suggest a traumatic RC tear and progressive nature more in keeping with subacromial pathology or a frozen shoulder

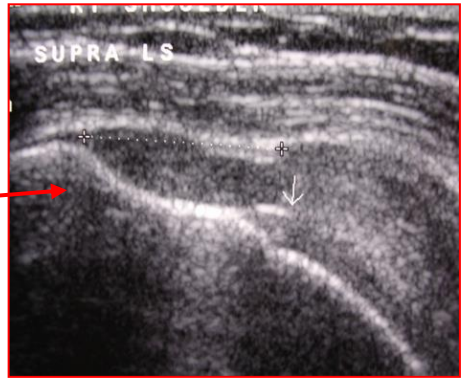
- Careful examination of ROM will often identify cause

Imaging – Plain Xray

- Should *always* be performed
- No validated clinical decision rules, but important to rule out other causes of shoulder pain
- Subacromial sclerosis/spurring and greater tuberosity cysts can suggest ‘impingement’ and underlying RC pathology but can also be a normal age-related finding and is not relevant to treatment

- Similarly AC joint arthrosis very common and increases with age

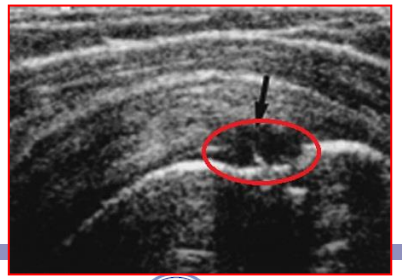
Imaging - USS



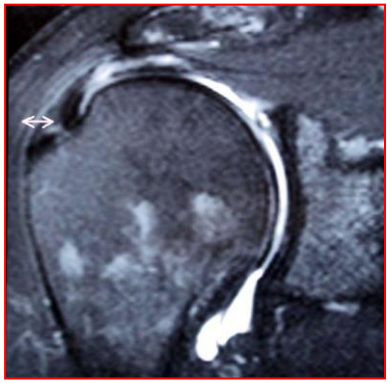
- Valid tool for ‘excluding’ full thickness RC tear but not much else
  - cannot assess muscle quality
  - cannot assess intra-articular structures
- Unreliable in stiff shoulders even in experienced hands

<u>Remember</u>

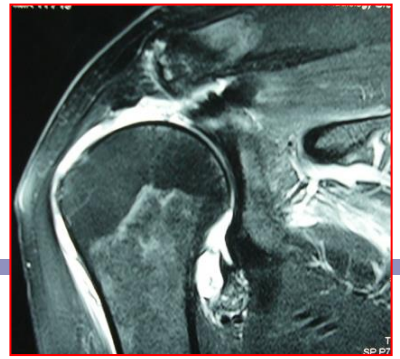
- Bursal thickening and ‘bursitis’ in patients with shoulder pain highly variable and may not be the cause of symptoms
- Partial thickness RC tears also not uncommon in patients > 40 years
  - may not be the source of patient symptoms



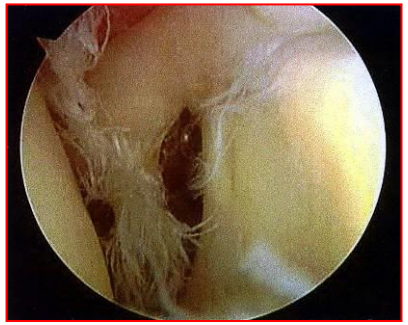
Imaging - MRI



- MRA much more accurate and sensitive in differentiating between tendinopathy and partial thickness RC tears
- Also much more accurate and sensitive when evaluating the glenohumeral joint
- MRI necessary when need to determine RC tear size, tear retraction, and extent of muscle belly changes - important in determining reparability



Take Home Points



- Treatment decisions should not be based on imaging studies alone
- Even MRI is still just a guide
  - will miss pathology some cases
  - pathology seen may be normal for age

- Many a shoulder has been misdiagnosed because of reliance on the radiology report
  - may not be the cause of the patients symptoms
  - should always be placed in context with history and examination findings

Case Example

- 52 year old female with 3 month history of L) shoulder pain; thinks may have started after overstraining lifting a weight in the gym. Examination noted painful loss of both active and passive ROM

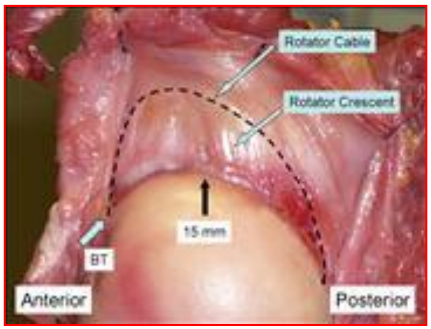
- Plain radiographs unremarkable but USS reports evidence of subacromial bursitis with dynamic impingement but no evidence of a RC tear

- Likely to be a frozen shoulder and a subacromial injection unlikely to be of benefit

Painful Shoulder Conditions

- Disorders of the Rotator Cuff
  - RC impingement
  - RC tear
  - Calcification of the RC
- Adhesive Capsulitis (Frozen Shoulder)
- Painful ‘unstable’ shoulder
- Shoulder arthritis
- Painful acromioclavicular joint

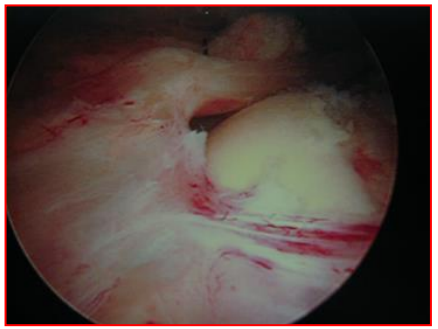
RC Disorders



- Amongst the most common of upper extremity disorders

Rare before the age of 40 years

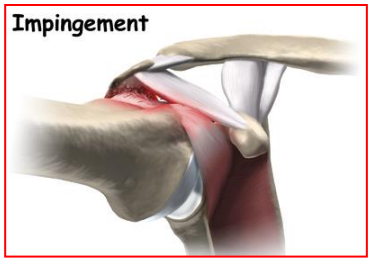
- Throughout life RC is subject to various adverse factors
- RC tendon fibres become weaker with age - intrinsic and age related degeneration
- Incidence of full thickness tears increases with age ➡ > 30% by age 65



- Patient may be completely unaware of a RC tear until something triggers shoulder to become symptomatic

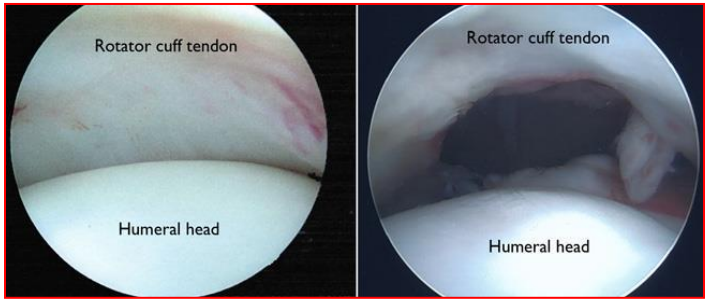
Subacromial Impingement

- A term used to describe a characteristic patient presentation with a similar constellation of history, pain patterns, and findings on clinical examination



- Not a diagnosis in and of itself and can be caused by many different pathologies (bursitis, tendinosis, RC tears, AC joint pathology)

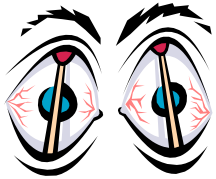
- The primary role of imaging in patients with impingement is to exclude a full thickness RC tear



Subacromial Bursitis

History and Examination

- History
  - anterolateral pain worse with overhead activity (painful arc) and reaching behind back
  - often painful at night (? vascular)

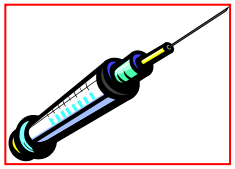


- Examination
  - painful arc in mid ROM
  - provocative tests usually positive
  - active ROM often painful but will have **full passive ROM** (cf. frozen shoulder)

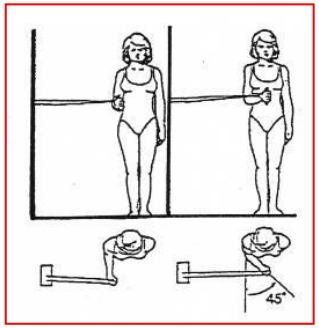
Treatment

- Initial treatment *always* non-operative

1) Aim to reduce inflammation (and hence pain) in the subacromial bursa by use of anti-inflammatories and/or <u>subacromial</u> cortisone injection



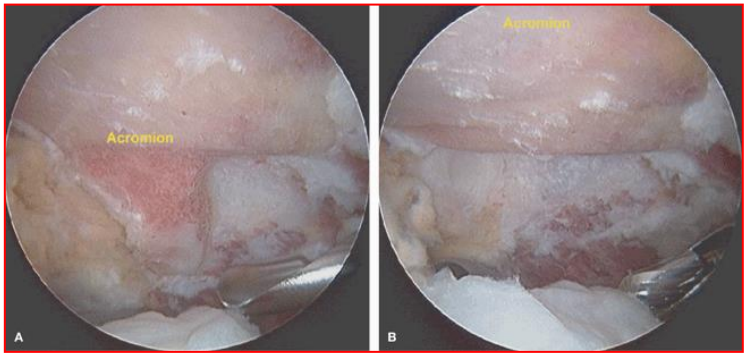
2) Aim to improve RC mechanics (and hence reduce impingement) by directed RC and scapula stabiliser strengthening exercises



Should not do 1) without doing 2)
- most important part of treatment

Treatment

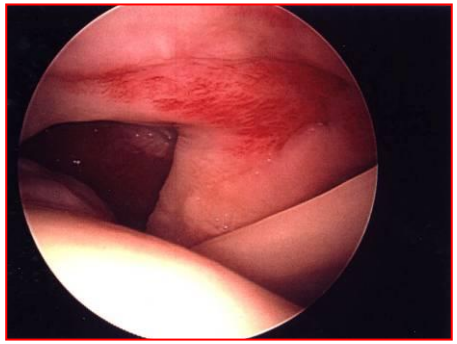
- Majority (85 – 90%) will respond to this conservative treatment but it can take time (mechanical imbalance issue)
- Surgery considered only for recalcitrant cases
  ➡ arthroscopic acromioplasty



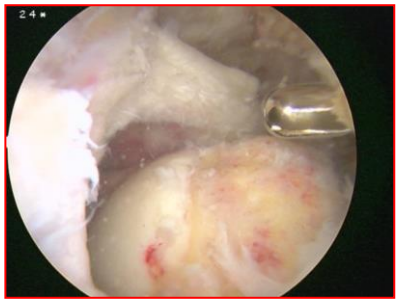
<u>However</u>

- Not a quick fix and recent sham surgery evidence suggests outcomes no better than non-op treatment

RC Tears



- Not all patients disabled with a RC tear
  - high incidence asymptomatic tears in general population
  - increases with increasing age

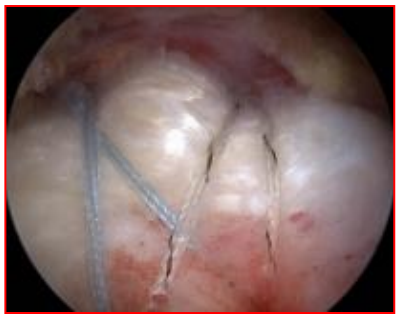


Hence

- Not all RC tears require surgery

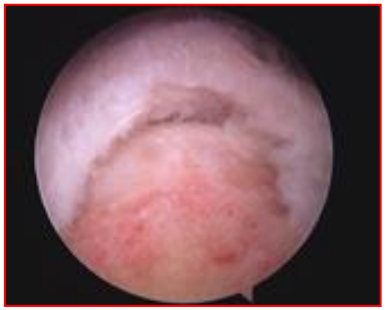
However

- RC tears never heal without surgery



Therefore

- Aim to treat patient and their symptoms, not what a scan shows



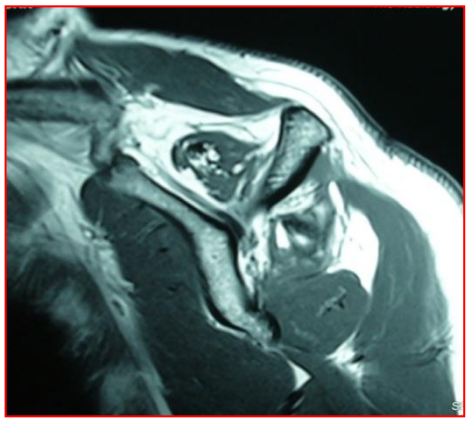
RC Tear

History and Examination

- Significant injury event usually required to tear the RC (not gardening or lifting the washing basket)
- Expect sudden onset of pain and functional limitations
- Examination similar to other causes of impingement
- May have weakness, especially in external rotation and/or of subscapularis




Natural History



- Increase in tear size
- Tendon morphological changes
- Retraction of tendon with adhesions
- Muscle atrophy and fatty degeneration
- Abnormal glenohumeral kinematics
- Articular degeneration
  (RC tear arthropathy)

- Why some patients develop symptoms and others do not remains unanswered

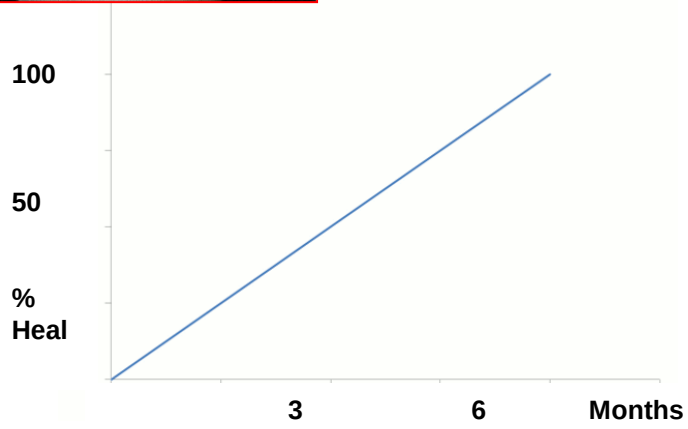
Indications for Surgery

- Pain and/or functional limitations that interfere with quality of life and have not responded to non-operative measures

<u>Considerations</u>

- age of patient
- small versus large tear size
- acute versus chronic

- Remember long post-op rehab (biology of healing)



My Approach

- Initial treatment *usually* non-operative
- Need good reason to consider repair
  - ‘younger’ patients with symptomatic tear > 1 cm
  - large symptomatic ‘acute’ tear any age
  - symptomatic chronic or acute-on-chronic tears if deemed repairable on MRI
  - certain symptomatic partial thickness RC tears

- ACC can be a challenge
- Outcomes in general are very good

Partial Thickness RC Tears

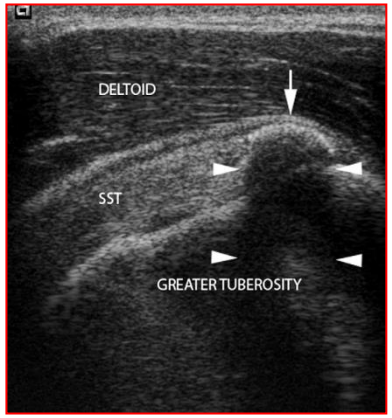
- Can be traumatic (especially articular surface) but not uncommon > 40 years and not necessarily the cause of symptoms (normal ageing process, especially interstitial)

- Treatment as for RC impingement (ie. non-operative) unless tear is significant or patient has failed to respond to extensive trial of non-op treatment
- Tear considered significant if:
  - AP dimension > 1cm
  - depth of tear > 50 % tendon thickness

Calcification within the RC

- Occurs incidentally in up to 15 - 20%
- Small deposits when seen on plain Xrays or USS are usually incidental findings and not responsible for patient symptoms

- Treat as for RC impingement (ie. non-operative)



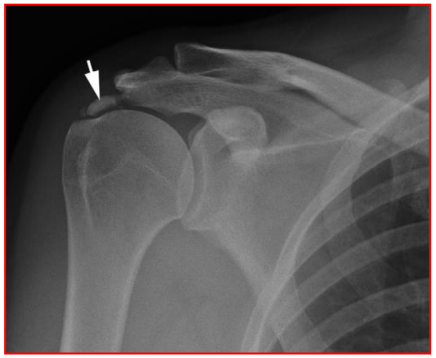
- 2 specific situations when symptoms can be more severe:

Calcification within the RC

1) Acute calcific tendonitis

- body actively reabsorbing deposit
- uncommon but dramatic presentation (severe pain and ROM loss)
- treatment supportive (rest, analgesia, injection)

2) Large (> 1cm) deposits

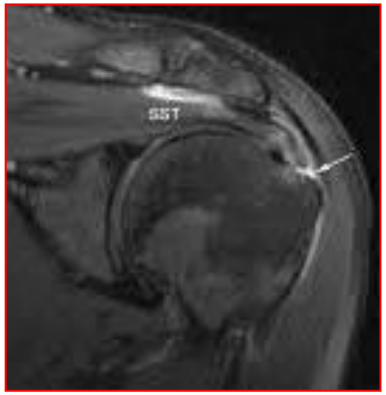


- cause symptoms due to large size
- initial treatment non-operative (barbotage)
- if do not improve may consider surgical 'debulking' of deposit

Take Home Points

- Full thickness RC tears consider early referral

- Majority of partial thickness RC tears **do not** require surgical treatment
- Intra-tendinous tears in particular almost always degenerative



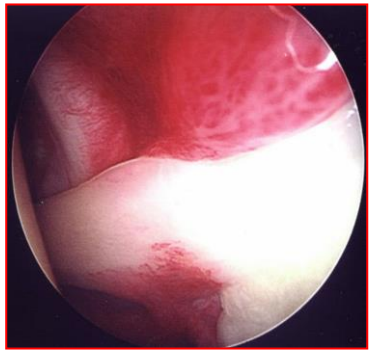
- Majority of calcification in the RC an incidental finding and does not represent ‘calcific tendonitis’
  - treatment as for impingement unless deposit very large when can consider barbotage

Case Example

- 63 year old builder with 2 month history of R) shoulder pain which started lifting gib board overhead. Now pain with use and at night. Examination reveals painful impingement signs and slight weakness but good ROM
- Plain radiographs report AC joint OA and a small subacromial spur. USS reports multi-tendon tendinopathy with high grade supraspinatous partial tear with interstitial tearing of subscapularis and subluxation of LH biceps

- Likely acute on chronic type situation where initial trial of non-operative treatment worthwhile

Adhesive Capsulitis



- Common but poorly understood condition
- Painful loss of **both active and passive** ROM that occurs in an otherwise normal shoulder (cf. glenohumeral arthritis)
- Spontaneous onset, but often a history of ‘trauma’
- More common in women between 40 and 60
- More common in diabetics
- Bilateral involvement in 15 – 20%
- Pathophysiology uncertain but see significant intra-articular synovitis followed by capsular and ligamentous fibroplasia

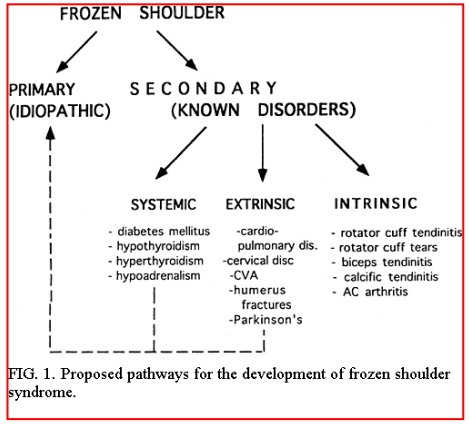
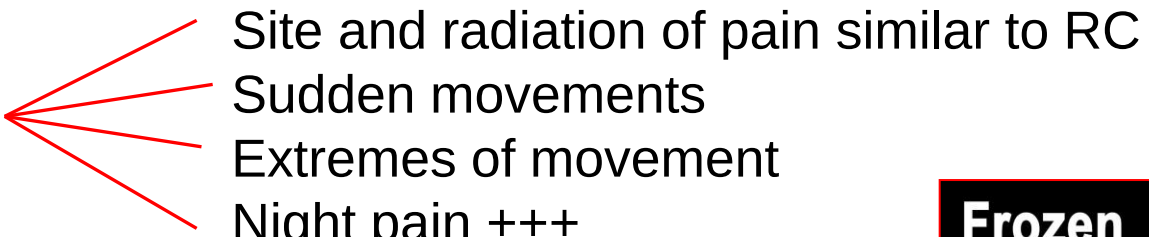


FIG. 1. Proposed pathways for the development of frozen shoulder syndrome.

Adhesive Capsulitis

History and Examination

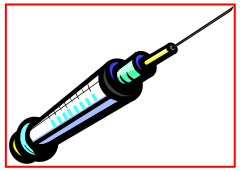
- Key finding is painful stiffness of the shoulder (both active and passive ROM)
- Diagnosis can be difficult in initial stage when ROM loss can be subtle (diagnosis of exclusion)



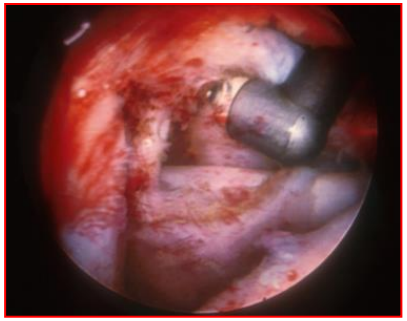
- Often significant functional limitations and pain can be quite disabling

Treatment

- Often poorly diagnosed and hence managed
- Patient education very important
- **Intra-articular** cortisone injection very effective at stopping inflammatory process
  - provides excellent pain relief
  - allows quicker recovery of motion



- Rarely is there a need for capsular release



- Few patients remain significantly disabled

Take Home Points

- Frozen shoulder is a clinical diagnosis
- Most important is adequate assessment of ROM
- Don’t be fooled by USS that reports bursal thickening and impingement +/- partial thickness RC tearing
  - if painful loss of both active and passive movement then diagnosis is frozen shoulder

- Physiotherapy often makes it worse
- Subacromial injections do not help (must be intra-articular)

Shoulder Instability

History and Examination

- usually characteristic in presence of classic subluxation or dislocation event

However

- Patients may not always perceive an instability event
- May present only with pain and deep seated mechanical symptoms from joint
- Only finding on examination may be pain in provocative positions
- Secondary ‘impingement’ not uncommon

Imaging

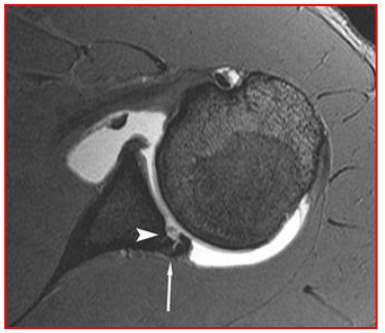
- Always obtain plain radiographs

- Ultrasound only of use in patients > 40 years
  - high incidence of RC tear following dislocation in older age groups (neurologic injury also not uncommon)

- If patient does not improve with usual non-operative measures then MR arthrography best modality to assess presence and extent of any structural damage within joint

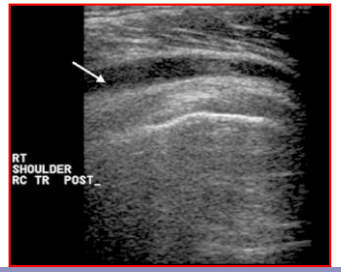
Take Home Points

- If mechanism of injury significant and patient not improving with usual non-operative measures consider possibility of structural pathology within glenohumeral joint (labrum)



- Primary RC pathology and ‘impingement’ under the age of 40 very uncommon

- USS report suggesting thickening of the bursa and bursitis < 40 years likely **not** the primary cause of symptoms



Case Example

- 31 year old male with 7 month history of R) shoulder pain. Wrenched shoulder backwards when lost control of weight doing bench press. Can't do normal gym routine and will catch in certain positions during day. No night symptoms

- May have 'impingement signs' on examination but also likely to have pain with provocative tests for labrum

- USS misleading as will invariably show 'bursal thickening and bursitis'. Likely to have labral injury as primary pathology and referral for MR arthrogram appropriate

Glenohumeral Arthritis

- Not a typical cause of shoulder pain (soft tissue causes more common)
- Many different types of arthritis
- Predominant symptoms are pain and loss of motion (same as for frozen shoulder)

- Accurate diagnosis relies on imaging studies to confirm the pathology and determine its extent - another reason why plain radiographs should always be obtained

Acromioclavicular Joint

- Superficial location and relationship to shoulder predispose it to traumatic injury
- Biomechanics of shoulder girdle also require AC joint to transmit large loads across a very small surface area

- Symptoms and signs usually localise to AC joint but patient may have associated ‘impingement’ symptoms

- Diagnostic uncertainty resolved by direct LA +/- cortisone injection into the AC joint, usually done under USS guidance

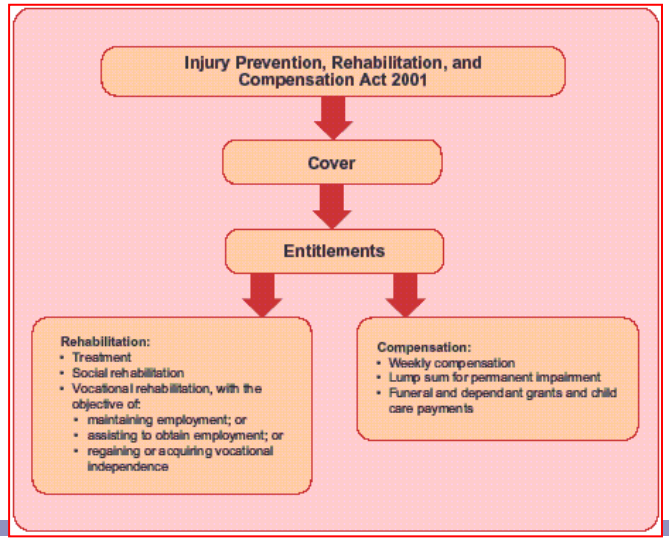
Osteolysis versus Arthrosis

- Osteolysis seen only in younger patients (< 30 years)
  - related to repetitive microtrauma with fatigue failure initiating resorption

- AC joint OA common radiographic finding in patients > 50 years
  - poor correlation with clinical symptoms
  - when symptomatic often associated with concurrent RC pathology

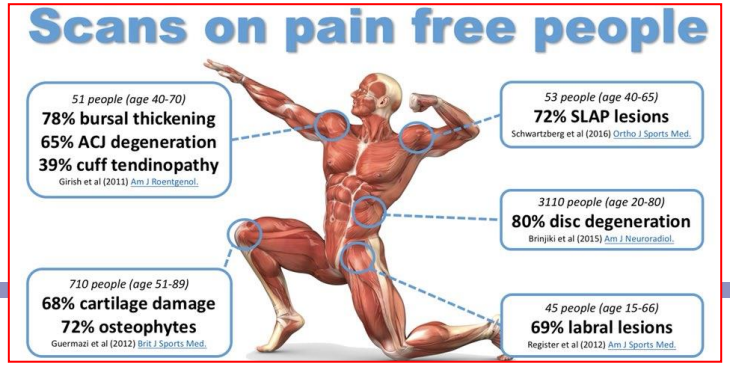
Shoulder Pain and ACC

- If an injury is covered by ACC, then a person is entitled to medical treatment, compensation for loss of wages or salary, rehabilitation to help regain independence at work and outside work, and various other assistance
- The ACC scheme calls these “entitlements”
- Causation is key when determining entitlement
- In NZ the legal burden to prove causation remains with the claimant (patient)



Elective Surgery and ACC

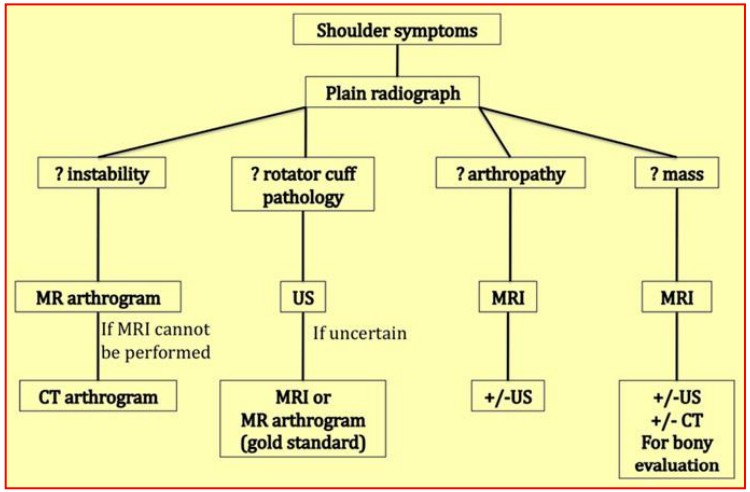
- For surgical entitlement to be granted, the patient must have an ACC covered injury, and on balance there must be sufficient medical evidence to support a causal link between the covered injury and the treatment proposed
- A causal link cannot be established when the injury is wholly or substantially caused by an underlying health condition, or the result of normal wear and tear or the ageing process (intrinsic and age related degeneration)



Summary

- Successful treatment of any shoulder pathology relies on ability to make an accurate diagnosis
- Diagnosis of the painful shoulder can be challenging
  - site of pain often not related to site of pathology
  - different conditions can present with similar findings

- Careful history and examination most important part of shoulder assessment
- Imaging studies confirmatory

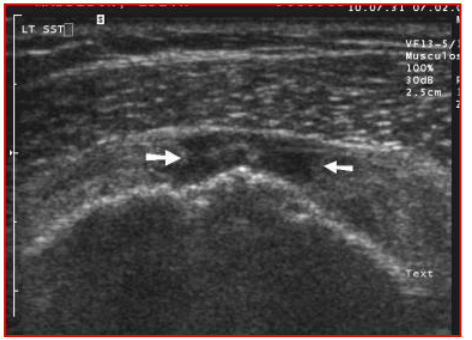


Summary

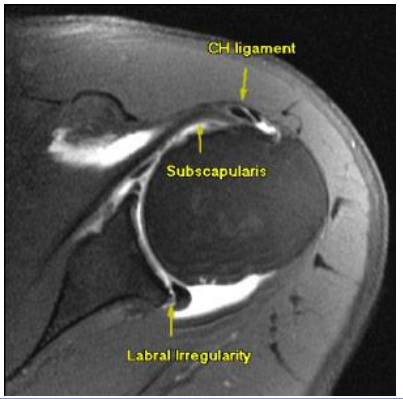
- Must understand common causes of shoulder pain and have index of suspicion when considering diagnosis
- Think of the shoulder in layers
- <u>Age of patient</u> important in diagnosis
  < 40 consider instability / labral / biceps pathology and AC joint problems
  > 40 consider RC problems, frozen shoulder, and glenohumeral arthritis

Summary

- Plain radiographs should *always* be performed
- USS only looks at the superficial layers and is really only useful when strong suspicion of full thickness RC tear
  (rarely indicated < 40 years)
- Always consider results of imaging studies in the context of clinical findings



- If concerned about possibility of intra-articular pathology then referral for MRI appropriate

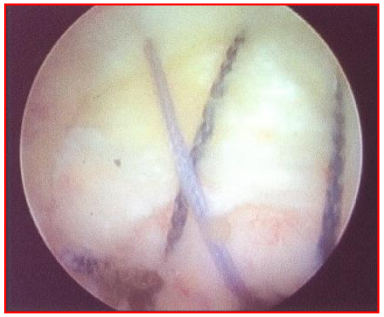


Summary

- Surgery rarely first line of treatment for:
  1) RC impingement
  2) Low grade partial thickness RC tears
  3) Adhesive capsulitis (frozen shoulder)
  4) Calcification of the RC
  5) AC joint problems

- Treatment includes adequate analgesia, activity modification, cortisone injections (AC vs SA vs IA) and an appropriate exercise program (ROM and strength program for RC and scapula stabilisers)

Summary



- Early referral appropriate for:
  1) High grade partial thickness RC tears
  2) Full thickness RC tears
  3) Shoulder instability
  4) Suspicion of occult labral pathology
  5) Glenohumeral arthritis

- Surgery may not be immediately indicated but at least a discussion can be had with the patient of the various surgical options

Thank You