Shoulder pain across the Ages - Diagnosis and Management

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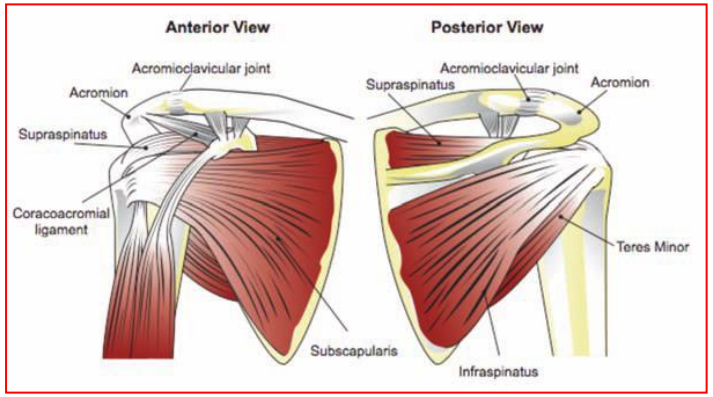
Auckland Bone and Joint Surgery

The Shoulder



- Common source of pain and functional disability:
  - third most common musculoskeletal complaint in general population
  - approximately 5% of musculoskeletal consultations to GP's
  - considerable cost to public of NZ

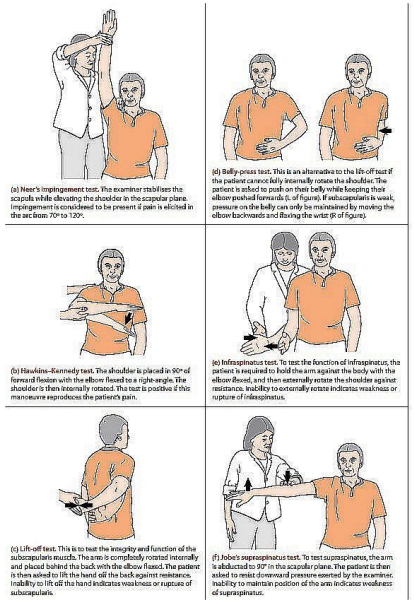
- Diagnosis and management of shoulder disorders challenging
  - presentation often delayed
  - different conditions can present with similar symptoms
  - pathologies often co-exist
  - recovery can be prolonged

The Shoulder

- Age of patient important when considering diagnosis

- Common things occur commonly in the shoulder, with different pathology more common in certain age groups

- A good history and examination will make the diagnosis in the majority of patients
- Important not rely on the results from imaging studies
  - despite what the USS report may suggest not everyone has ‘’bursitis and impingement’’



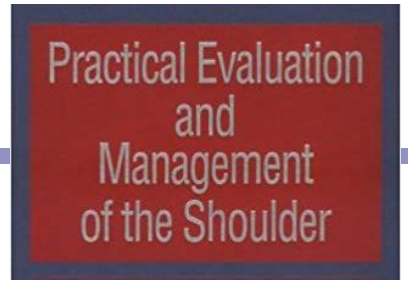
Outline

- How to assess the shoulder joint
  - history
  - examination
  - imaging studies

- Common causes of shoulder pain and the influence of age (age < 20, 20 to 40, 40 to 60, > 60 years)

- Practical evaluation and management of shoulder disorders

Take Home Points



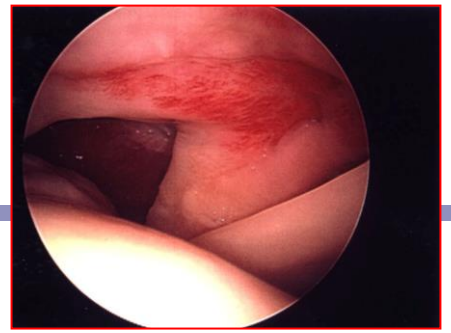
Shoulder Assessment

Shoulder Assessment

- Aim with any shoulder problem is to establish an accurate and definitive diagnosis
  - directed history and examination
  - appropriate use of imaging studies

- This is essential to allow timely initiation of appropriate treatment

- Also essential to determine need and urgency for referral (ACC Shoulder Guidelines)

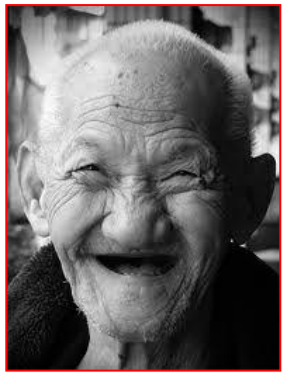


Note

- Different shoulder conditions can present with similar shoulder symptoms - many conditions present with ‘subacromial impingement syndrome’
- Site of pain often does not correlate with where pain is coming from
- Presentation can vary even between patients with the same condition (need high index of suspicion)

<u>However</u>

- Important to remember that certain conditions are more common in different age groups



History

- Probably most critical part of patient assessment
  - patient age, occupation, hand dominance
  - main complaint (usually this will be pain)
  - when and how symptoms began
  - associated symptoms (stiffness, weakness, instability)
  - previous treatment and response

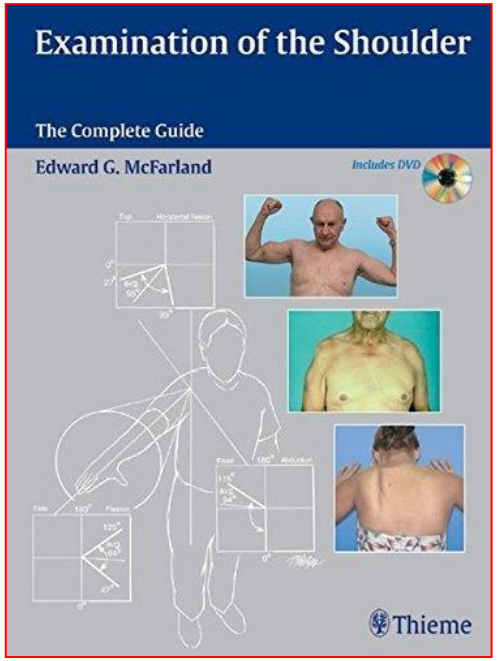
- Remember in the shoulder patient presentation and pain patterns are not specific for any one particular disorder
- Unrelated diagnoses can present with shoulder symptoms (consider extrinsic causes)

History

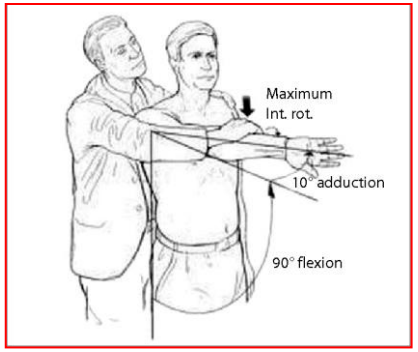
- Shoulder Pain
  - spontaneous or was there some sort of injury
  - was the injury of sufficient force and severity to potentially cause structural damage
  - did the pain start immediately or did it come on in a delayed fashion
  - was there any functional disability associated with the pain
  - when is the pain at its worst (activity related versus at rest versus at night)
  - what activity makes the pain worse (load versus movement versus stretch)
  - has there been any loss of movement or strength

- Remember where patients feel pain often does not always correlate with where pain comes from

Examination



- No single clinical examination test valid and reliable
- No test absolutely diagnostic for any one particular pathology (sensitive but not specific)
- Many examination tests described but few are routinely used
- Probably most important is active versus passive ROM and what provocative test actually causes the patient pain



Examination

- My shoulder examination

Imaging - Xray

- No validated clinical decision rules, but important to rule out other causes of shoulder pain
- Best practice is that these should **always** be performed

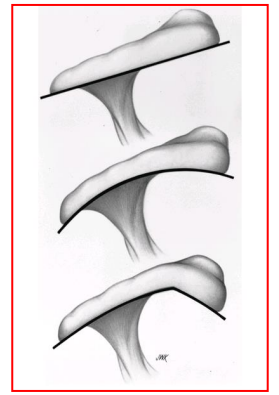
Joint space AP

Lateral

Axillary view

Imaging - Xray

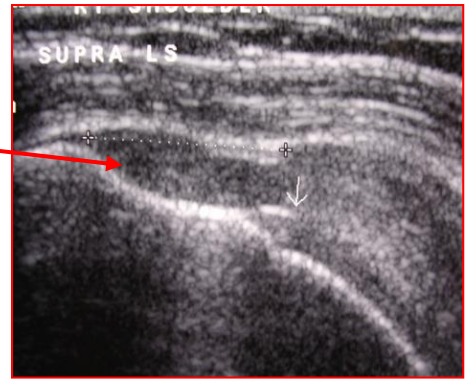
- Cannot be used to indicate the presence of a RC tear, except when there is significant proximal humeral migration



- An association between acromial shape and RC disease has been shown but a causal relationship has not been established
- Subacromial sclerosis / spurring and the presence of greater tuberosity cysts suggest ‘impingement’ but can be asymptomatic and an incidental finding (clinical correlation imperative)

- AC joint arthrosis common and increases with age (normal > 40 years and no correlation with RC tears)

Imaging - USS



- Valid diagnostoic tool for excluding ‘full thickness’ RC tear
  - not a valid tool for assessing tendinopathy
  - cannot assess muscle quality
  - cannot assess intra-articular structures

<u>Remember</u>

- Effectiveness varies depending on equipment and operator experience
- If patient has pain and limited ROM then USS can be unreliable
- Of limited usefulness in patients < 40 years

Imaging - USS

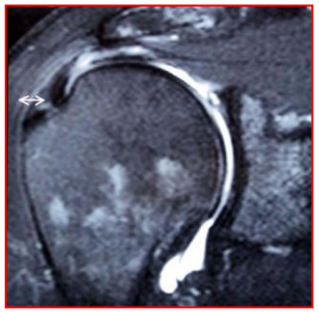
- Not a valid diagnostic tool for assessing RC ‘tendinosis’
  - controversy as to what areas of abnormal echogenicity represent

- Nothing to indicate significance of bursal thickening and bursitis
  - common finding even in asymptomatic shoulders
  - often used as justification for a SA cortisone injection

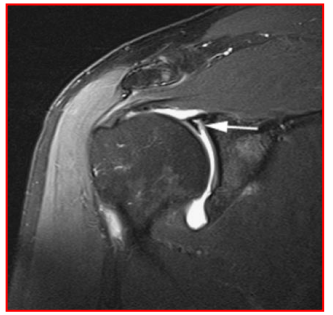
- Partial thickness RC tears common in patients > 40 years
  - may not be the source of patient symptoms

Imaging - MRI

- More accurate and sensitive in differentiating between tendinopathy and partial thickness RC tears
  (must be placed in context with history and examination



- MRI/A essential to establish extent of intra-articular pathology
  - many variations in normal anatomy may also be seen (SLAP)

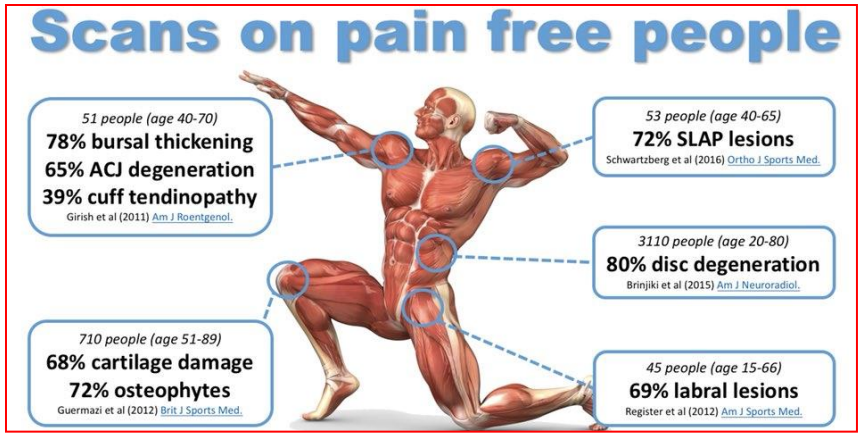


- MRI necessary to determine chronicity and reparability of a RC tear
  (tear size, retraction, muscle belly changes)

Take Home Points

- Important that treatment decisions are not be based on imaging studies alone
- Imaging studies are only a guide
  - will miss pathology in a number of cases (even MRI)
  - pathology seen may be normal for age
  - pathology seen may not be the cause of the patients symptoms

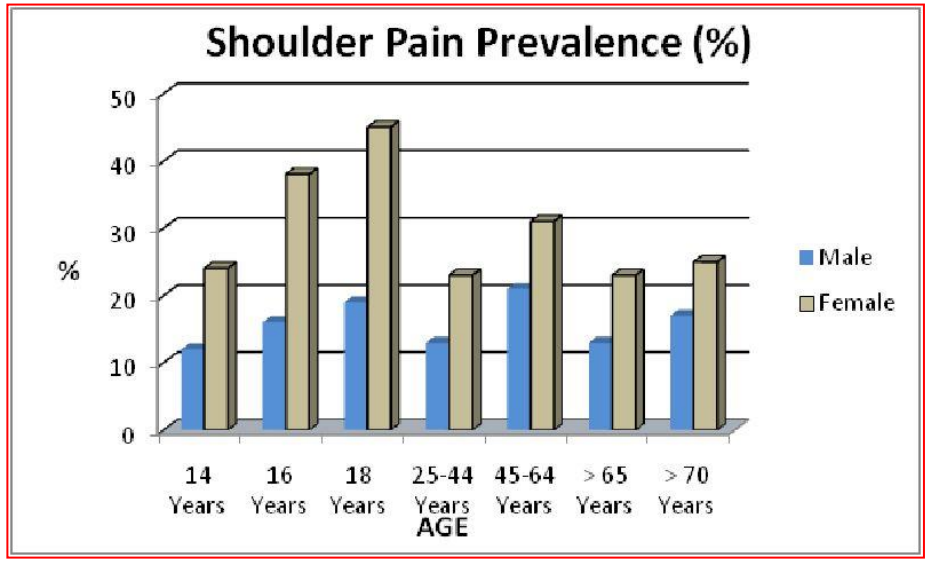
- Imaging findings should always be placed in context with history and examination findings in order to determine treatment



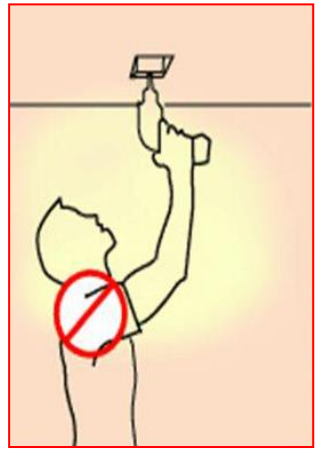
The Influence of Age

Shoulder Pain Prevalence

- Many causes of shoulder pain and dysfunction occur in specific age groups
- Onset of shoulder pain has a strong correlation with adult age (middle age), likely due to the fact that aging is associated with intrinsic and degenerative changes in the shoulder and RC tendons
- However also common in teenage years
- Gender also plays a prominent role, with the presence of shoulder symptoms more prevalent in females (especially teenage girls)

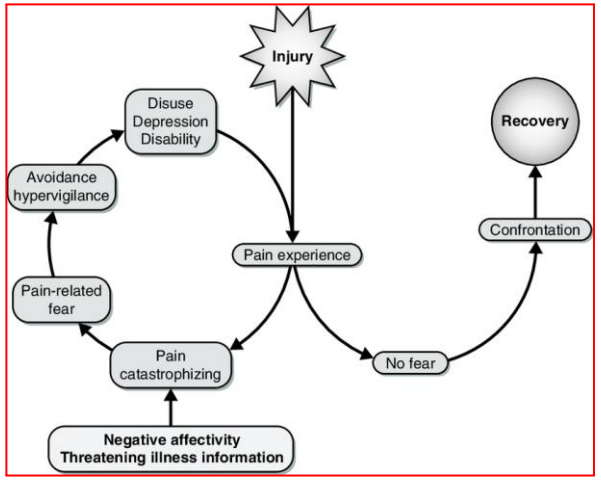


In Addition



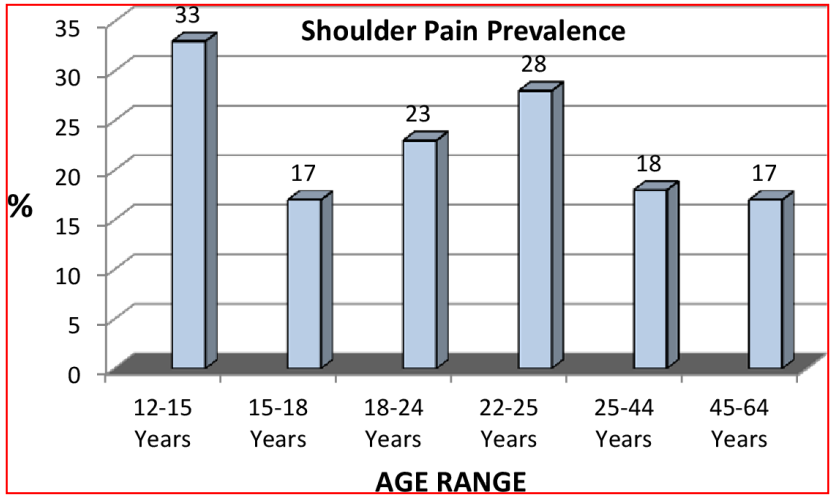
- Poor posture, obesity and mental stress, as well as physically strenuous work and working with the hands above shoulder height increases the risk of shoulder pain

- Patients with acute shoulder symptoms show the most favorable recovery course over a 6-month period, with more pain reduction and improvement of functional disability
- Patients with chronic shoulder symptoms show the poorest results, with predictors of a better outcome being lower scores on pain catastrophizing scale at baseline (high pain intensity)



Age < 20 years

- Shoulder pain is common in the younger age group
  - adolescents aged 12 to18 years, especially in girls
- Explanatory variables include sociodemographic factors, leisure time activities, self-assessed physical condition, psychosomatic stress symptoms, and symptoms of fatigue and sleep difficulties
  - strong association with psychosomatic symptoms

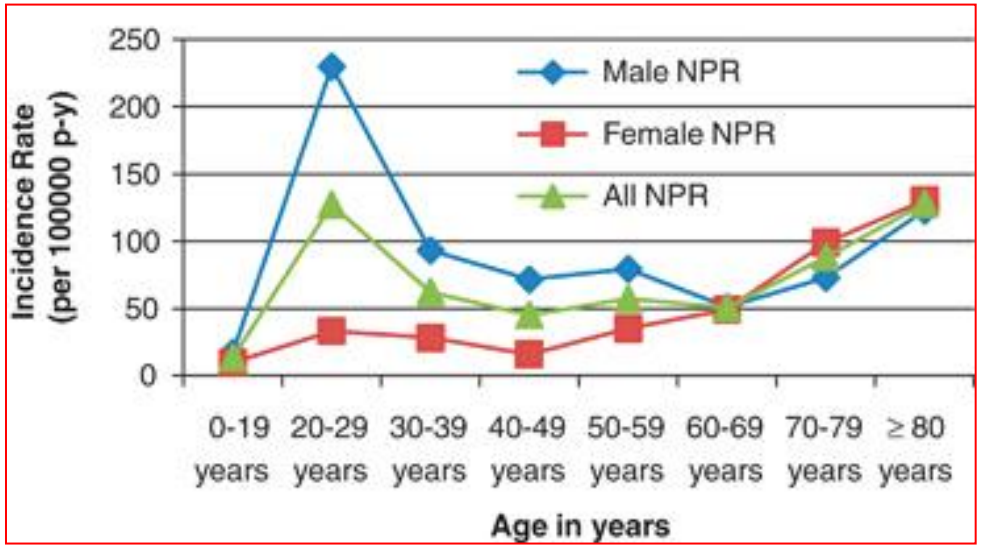


Age 20 to 40 Years

- Shoulder instability most common in this age group
- History usually characteristic in presence of classic instability event

<u>However</u>

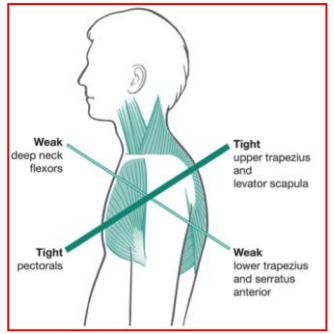
- Labral pathology can occur in the absence of an instability event
  - pain and mechanical symptoms from joint
  - secondary ‘impingement’ not uncommon



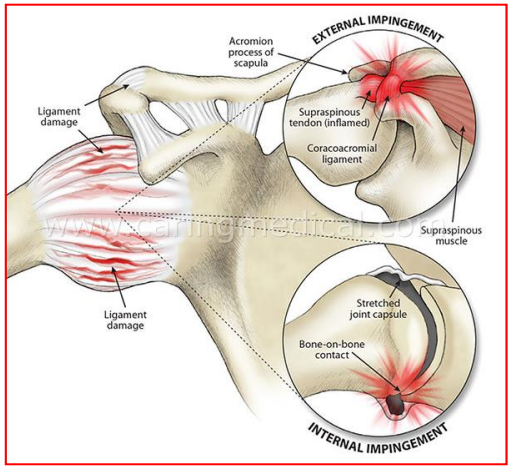
- Osteolysis of the distal clavicle also seen in this age group
  - related to repetitive microtrauma with fatigue failure initiating resorption

Remember

- The prevalence of shoulder pain in sport is quite high, especially sports that require repetitive overhead use of the shoulder (swimming, tennis etc)
  - stress, fatigue, microtrauma and laxity of static stabilisers
  - muscular imbalances of dynamic stabilisers
  - altered mechanical functioning of the shoulder

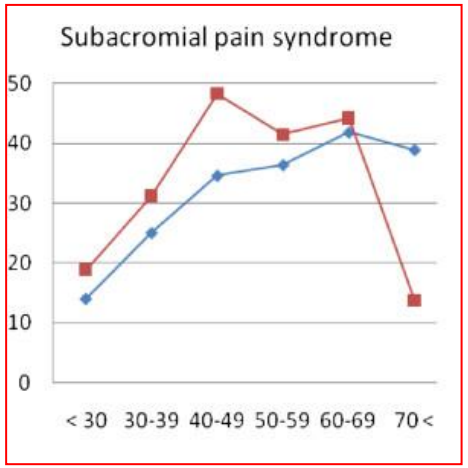


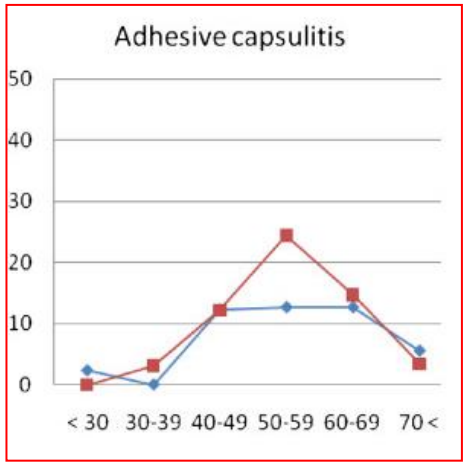
- When considering sources of shoulder pain in athletes, most are derived from local structures within the shoulder joint itself (capsule, labrum, biceps, RC)
- Common clinical diagnosis involves dysfunction of the RC with signs of SA impingement syndrome
- Important to remember that this is not the primary problem

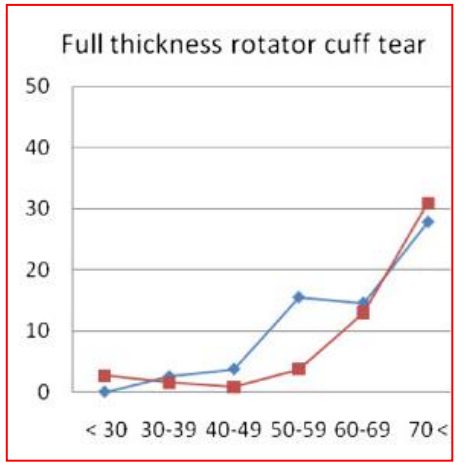


Age 40 to 60 years

- Typical age group for the common soft tissue shoulder pathologies





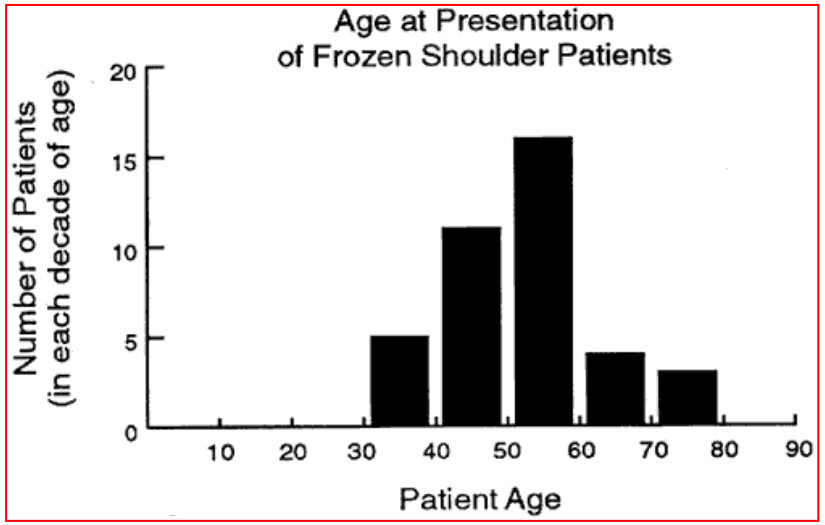


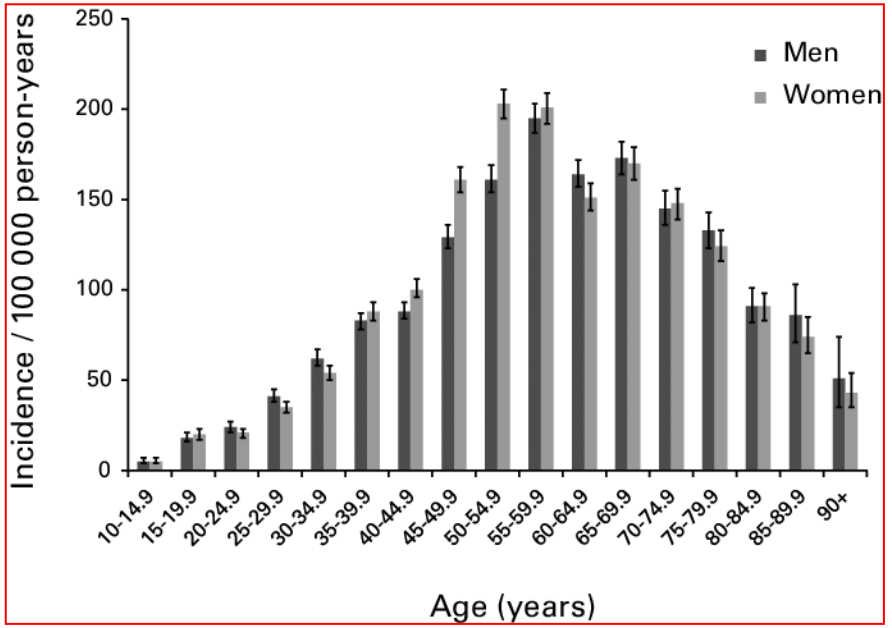
- Also the typical age group where shoulder pain can be the most troublesome, with the greatest impact on daily and working life

- Also a strong gender association, with presence of shoulder pain in this age group again more prevalent in women

Remember

- The two most common conditions in this age group are either frozen shoulder or subacromial impingement syndrome related to RC disorders - tendinosis, calcification, partial, or full thickness RC tears

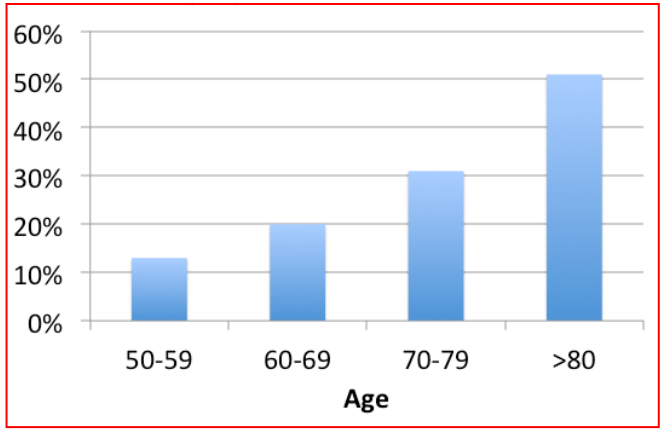




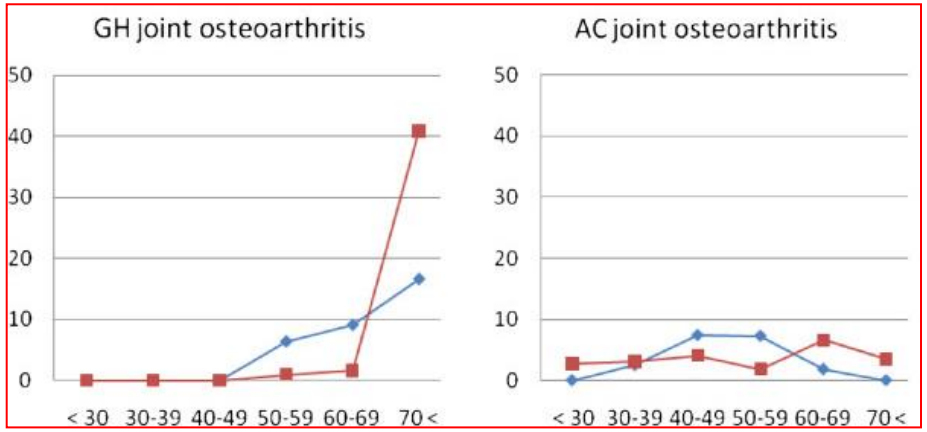
Incidence of RC pathology by age group

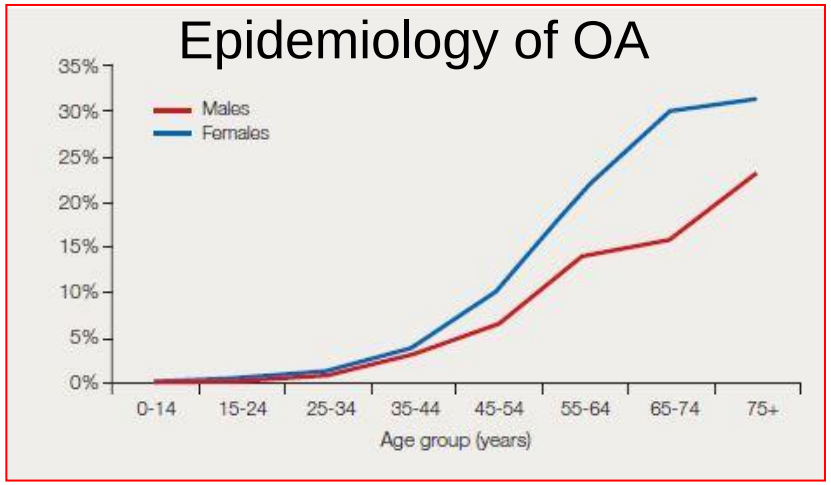
Age > 60 years

- Prevalence of RC pathology continues to rise (but remember this may be asymptomatic)



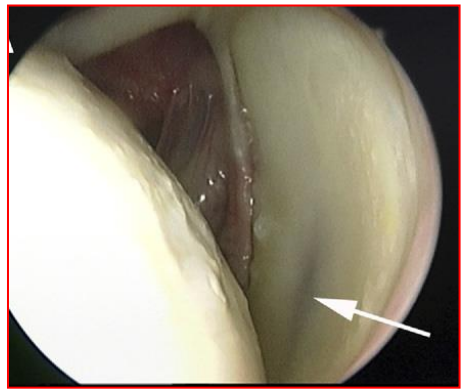
- Symptomatic degenerative conditions of the glenohumeral and acromioclavicular (AC) joint may be seen



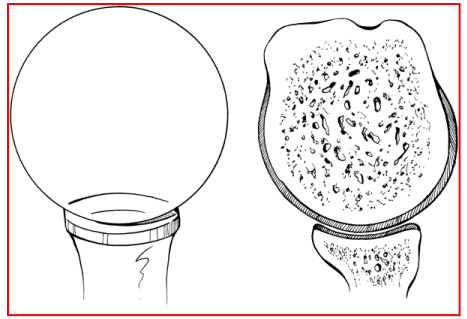


Evaluation and Management of Common Shoulder Disorders

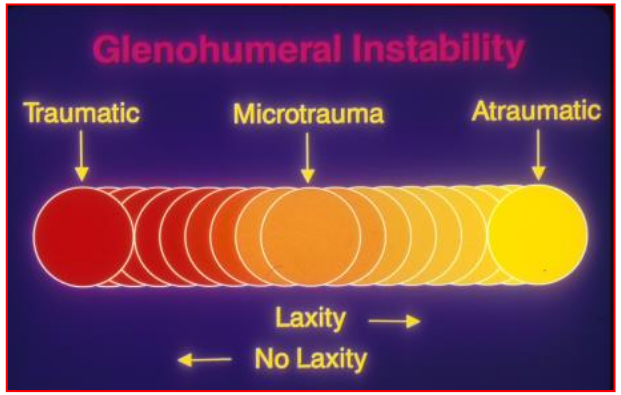
Shoulder Instability



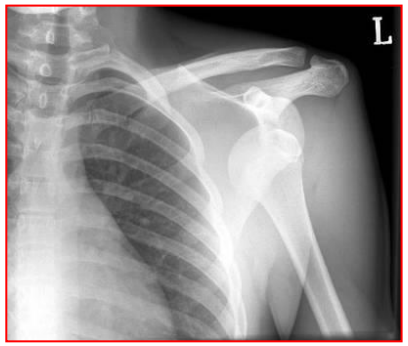
- Numerous factors important for normal shoulder stability
  - muscle forces (RC) essential for stability in mid ROM
  - static restraints (labrum, capsule, ligaments) essential for stability in end ROM



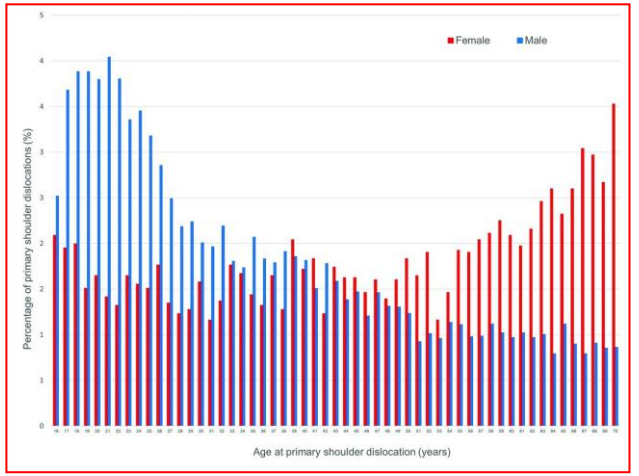
- Instability itself represents a spectrum of disease



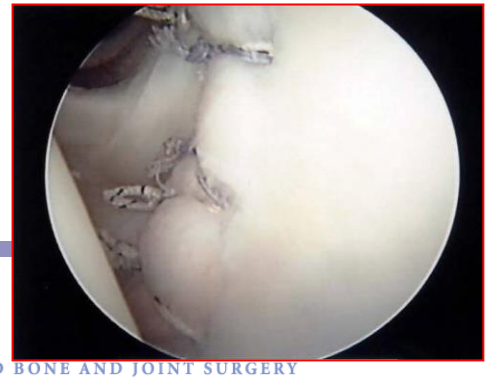
Shoulder Instability



- Common injury in athletes who participate in contact sport
  - over half of all traumatic shoulder dislocations occur in contact athletes



- Incidence of primary shoulder instability bimodal
- Patient age most significant risk factor for recurrence (< 20 years)
- When recurrent non-operative treatment has limited success and surgical treatment frequently required

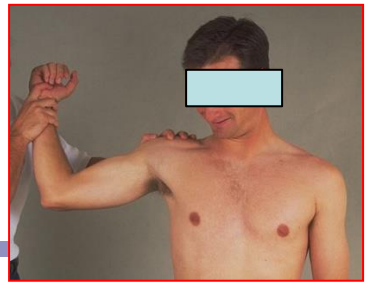


Remember

- Not all patients report an instability event
- Subsequent symptoms and signs often non-specific (‘internal derangement’)

Deep seated pain and catching
Loss of confidence in shoulder
Repeat injuries common

- If patient (usually < 40 years) not improving with usual non-operative measures and mechanism of injury significant, consider possibility of structural pathology within glenohumeral joint (capsule, ligament, labrum, LH biceps)
- May report impingement symptoms but only finding may be pain +/- apprehension in provocative position



Imaging

- Ultrasound typically of use only in patients > 40 years

- Incidence of RC tear following dislocation in older age groups in excess of 50% (neurologic injury also not uncommon)

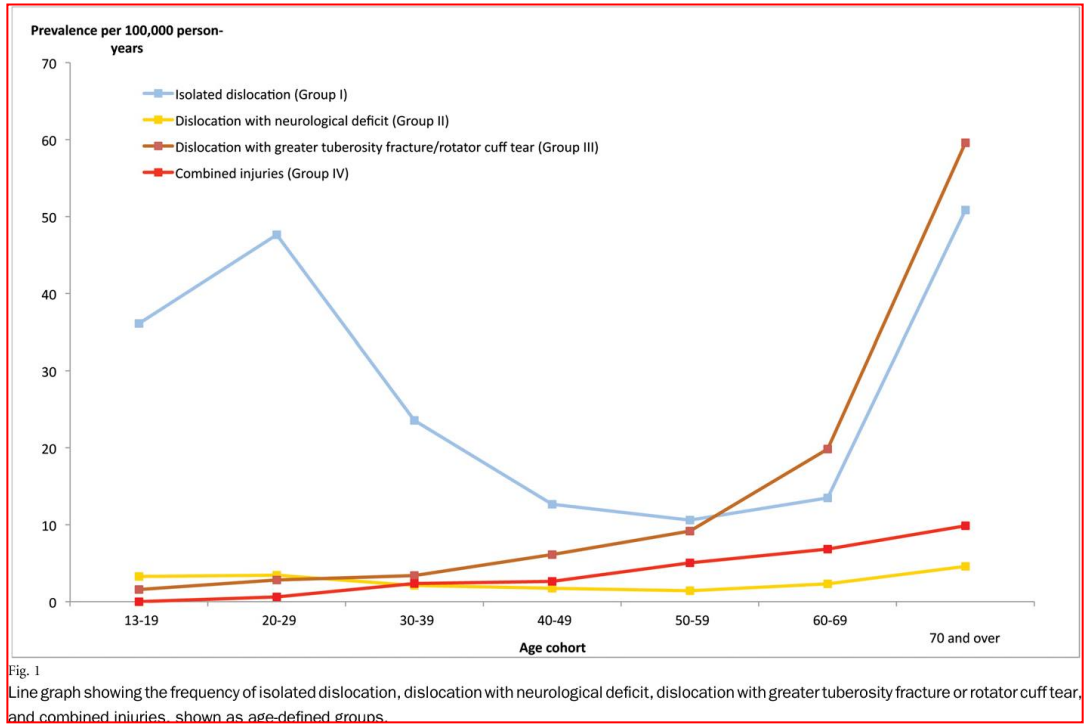
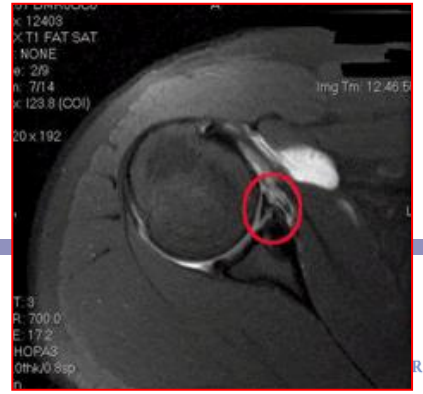
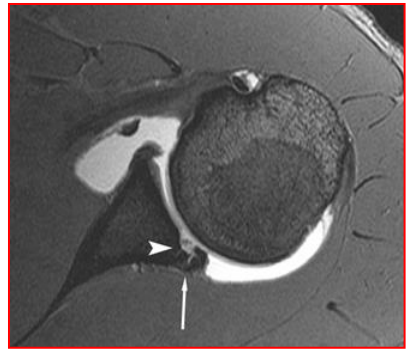


Fig. 1
Line graph showing the frequency of isolated dislocation, dislocation with neurological deficit, dislocation with greater tuberosity fracture or rotator cuff tear, and combined injuries, shown as age-defined groups.

- MR arthrography best modality to assess presence and extent of any structural damage within joint

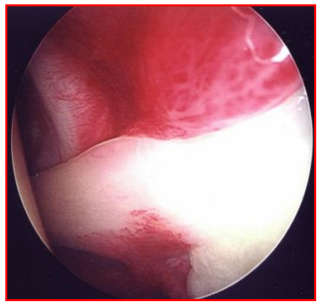


Take Home Points



- Primary RC pathology < 40 years very uncommon
- Patients in this age group who present with SA impingement syndrome consider (micro)instability or possibility of structural pathology within joint (labral, LH biceps) as a cause for symptoms
- USS that reports thickening of the bursa and bursitis in patients < 40 years likely not of significance and treating the bursa (with a SA cortisone injection) in isolation is almost always doomed to fail

Frozen Shoulder



- 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 may be history of “trauma”
- More common in women between 40 and 60
- More common in diabetics
- Bilateral involvement in 15 to 20%
- Pathophysiology uncertain (idiopathic) but see significant intra-articular synovitis followed by capsular and ligamentous fibroplasia

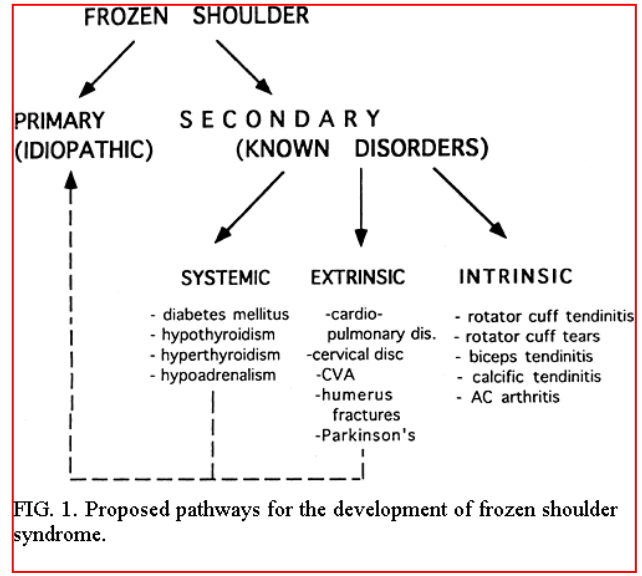


FIG. 1. Proposed pathways for the development of frozen shoulder syndrome.

Frozen Shoulder

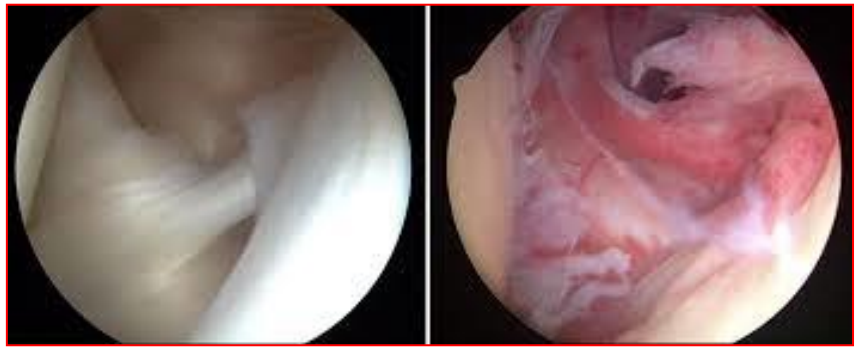
- Key finding is painful stiffness of the shoulder (both active and passive)
- Diagnosis can be difficult in initial stage when ROM loss can be subtle

Site and radiation of pain similar to RC
Sudden movements
Extremes of movement
Night pain +++

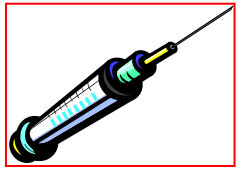
- Often significant functional limitations and pain can be quite disabling
- Don’t be fooled by USS reporting bursal thickening and impingement

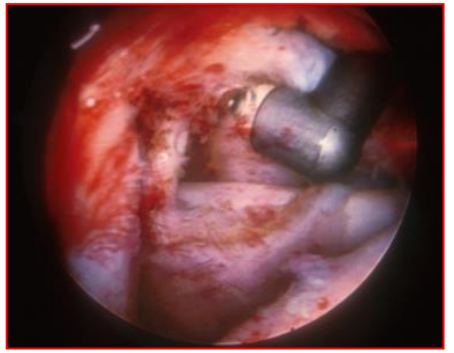
→ If painful loss of both active and passive movement then diagnosis is frozen shoulder until proven otherwise

Treatment



- Poorly diagnosed and hence managed
- Patient education very important (natural history)
- Intra-articular cortisone injection very effective at stopping inflammatory process
  - provides excellent pain relief
  - allows quicker recovery of motion



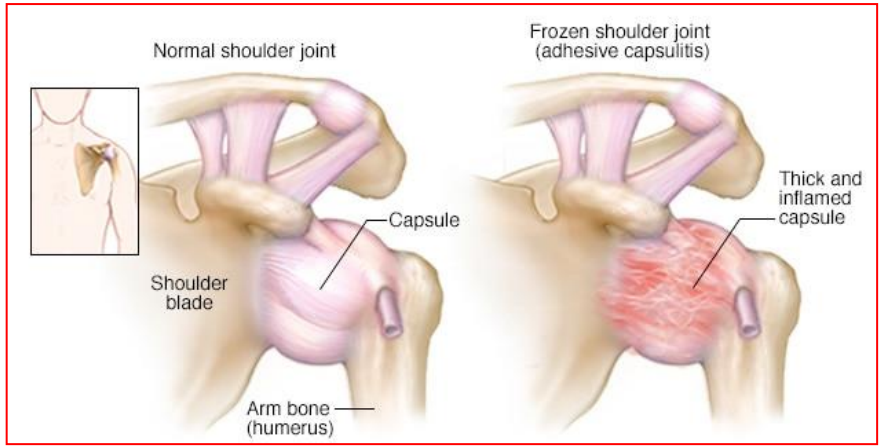


- Rarely is there a need for MUA and capsular release

- Few patients remain significantly disabled

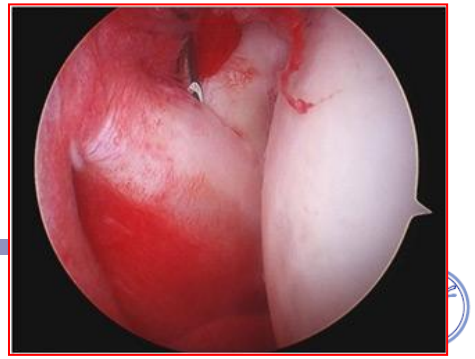
Take Home Points

- Frozen shoulder is a clinical diagnosis (careful history and examination)
- Most important is adequate assessment of ROM

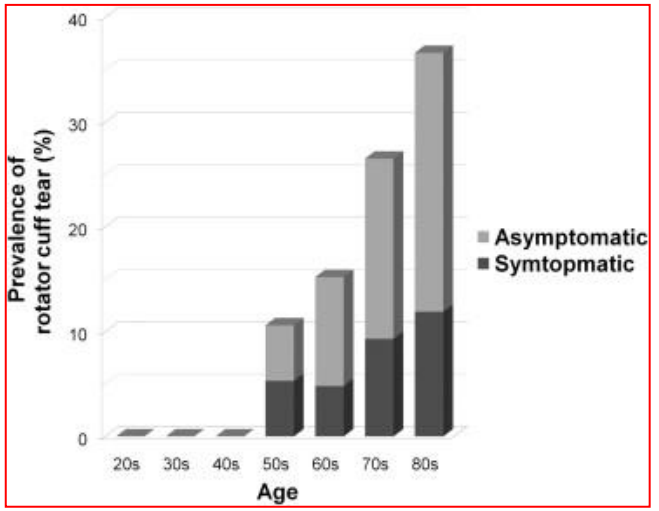


- Take Xrays to exclude glenohumeral OA
- USS only of use to exclude a full thickness RC tear

- Physiotherapy often makes it worse
- Subacromial injections do not help (must be intra-articular) - the problem is not in the bursa



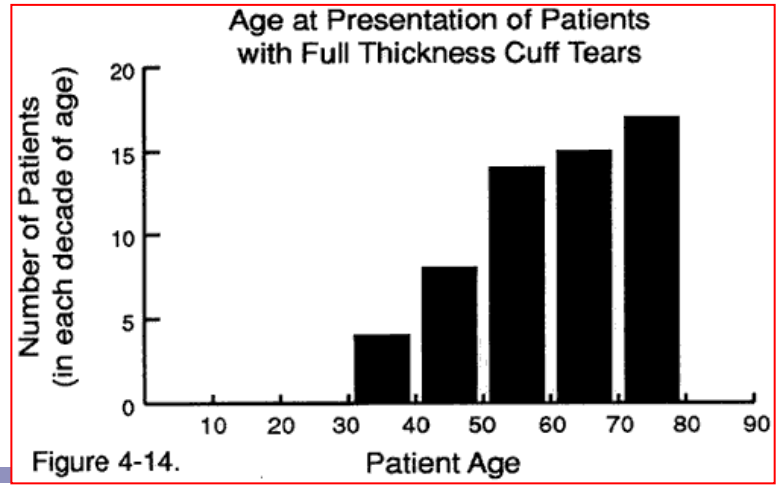
RC Disorders



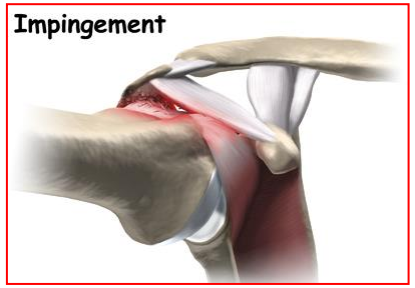
- Amongst the most common of upper extremity disorders, but rare < 40 years

- Throughout life our RC is subject to various adverse factors
- > 40 years RC experiences intrinsic and age related degenerative changes

- Incidence of full thickness tears increases with age
- Patient may be completely unaware they have a RC tear until something triggers shoulder to become symptomatic



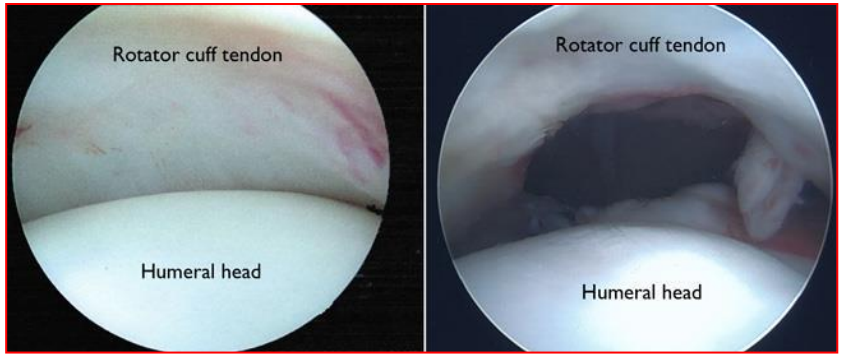
RC Impingement



- ‘Subacromial impingement syndrome’ is 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)

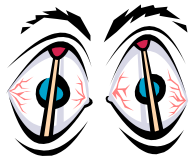
- Primary role of imaging in patients with impingement is to exclude a full thickness RC tear



RC Impingement

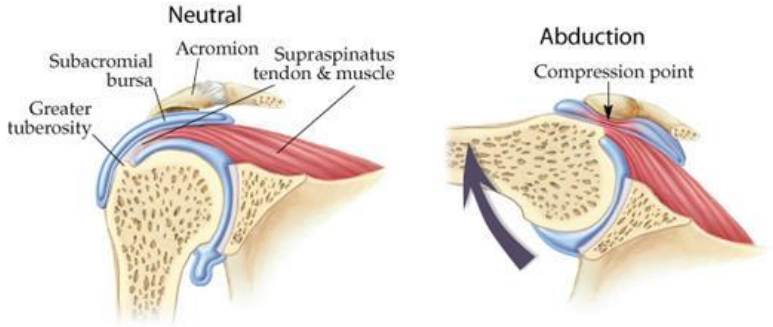
<u>History and Examination</u>

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



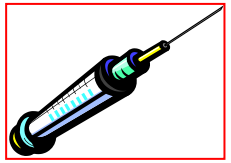
- Examination
  - painful arc in mid ROM
  - provocative tests usually positive
  - active ROM may be painful but passive ROM full (cf. frozen shoulder)

Treatment

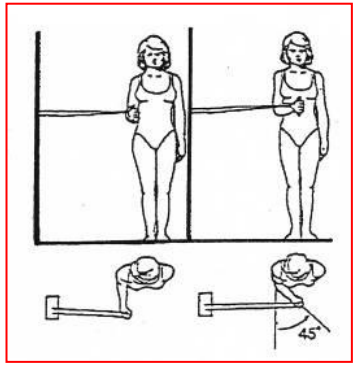


- Initial treatment **always** non-operative

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



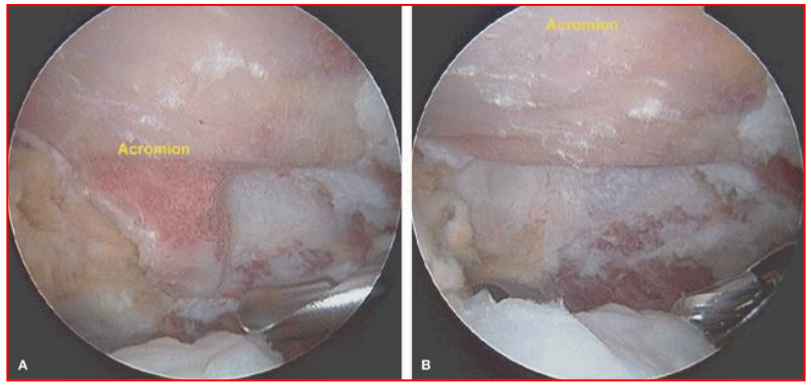
<u>Remember</u>

- Do not do 1) without doing 2) – this is most important part of treatment

Treatment

- Majority (> 90%) will respond to conservative treatment but it can take time

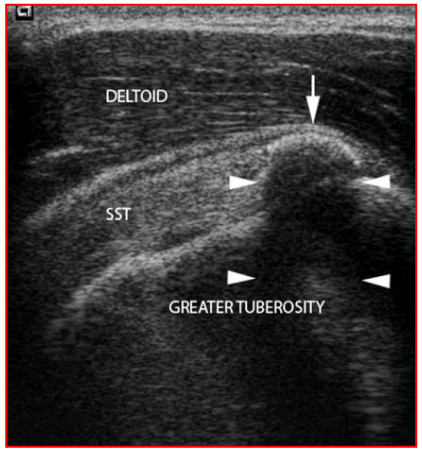
- Surgery considered only for recalcitrant cases
  ➡ arthroscopic acromioplasty



<u>However</u>

- Never a quick fix and recent sham surgery studies and randomized controlled trials suggests outcomes of surgery no better than non-op treatment for isolated SA impingement syndrome

Calcification within the RC



- Can occur in up to 15 - 20% individuals
- Small deposits when seen on plain Xrays or USS are usually incidental findings (rarely the cause of symptoms)

- Always treat as for SA impingement syndrome (ie. non-operative)
- Most cases do not represent “calcific tendinosis”

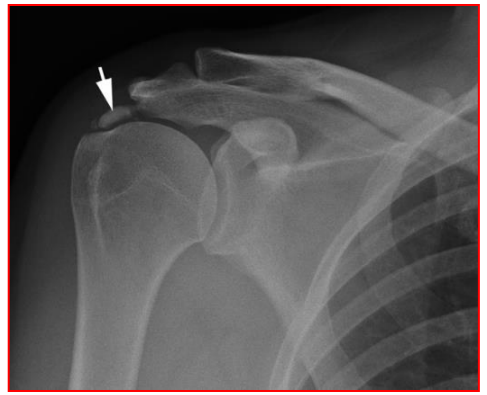
<u>However</u>

- 2 specific situations when calcification itself can be more significant:

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)

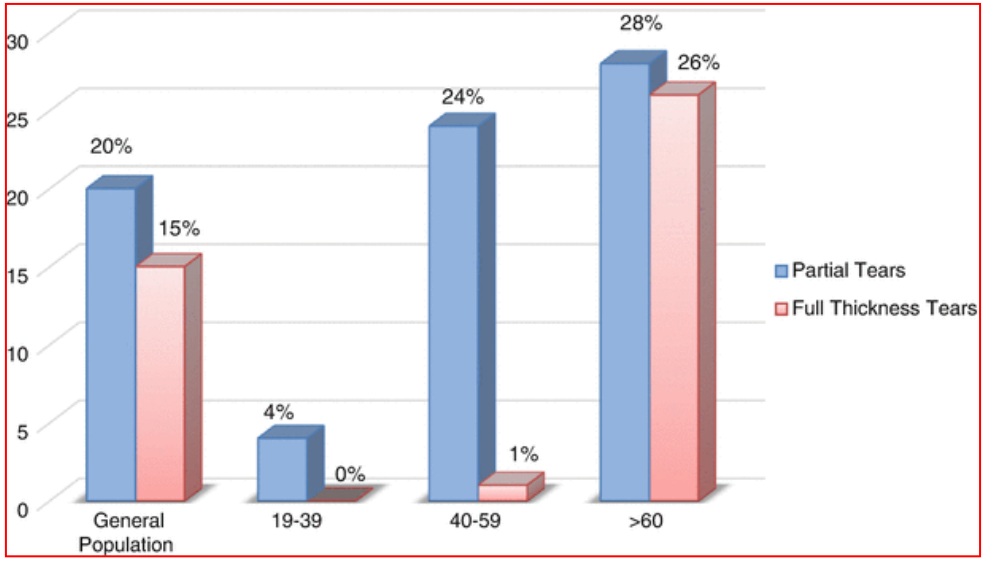


2) Large (> 1cm) deposits

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

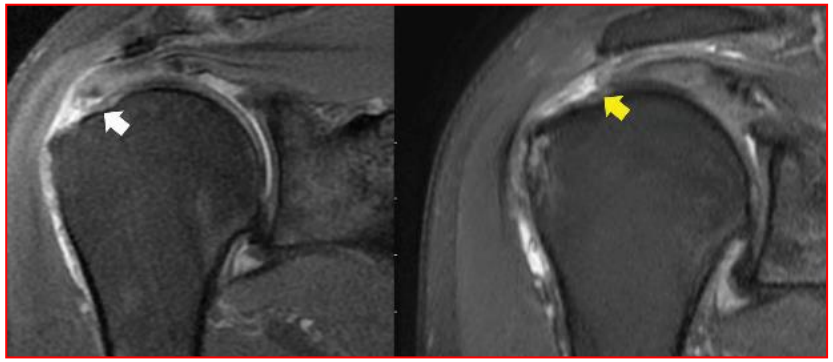
Partial Thickness RC Tears

- Can be traumatic (especially articular surface) but most aren't
  - not uncommon > 40 years
  - not necessarily the cause of a patients symptoms (considered part of the normal ageing process)

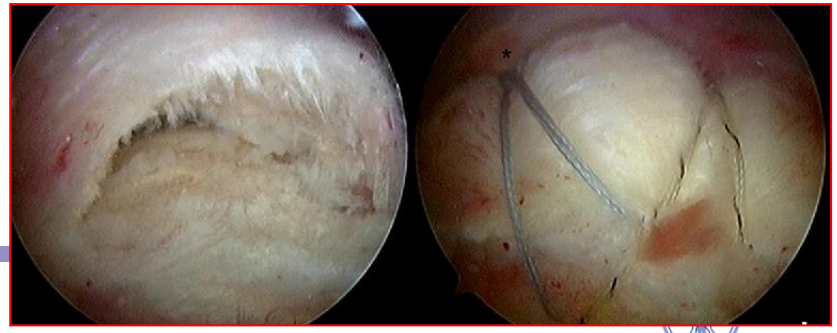


Partial Thickness RC Tears

- Treatment as for SA impingement syndrome (ie. non-operative) unless tear is significant or patient has failed to respond to extensive trial of non-op treatment (usually > 6 months)

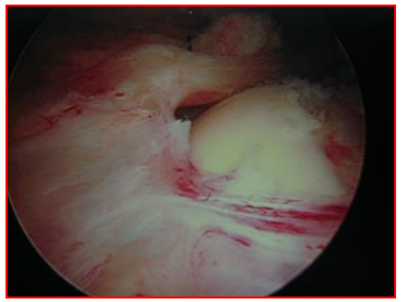


- Tear considered significant if:
  - AP dimension > 1cm and
  - depth of tear > 50 % tendon thickness
    (in which case tear is more likely to progress to full thickness)



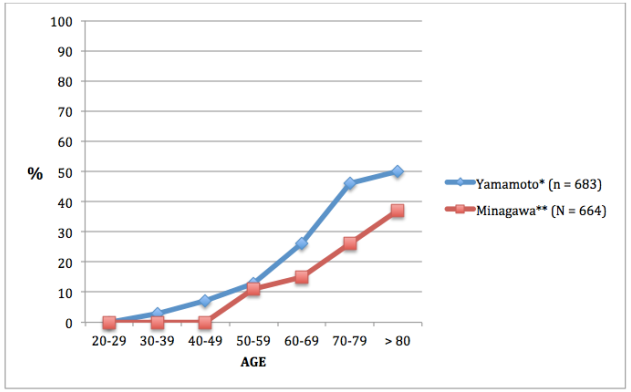
- If surgery required treatment usually involves converting to a full thickness tear and then repair

Full Thickness RC Tears



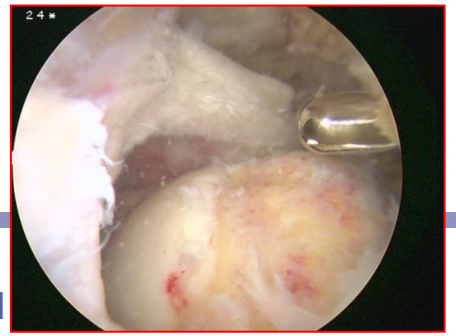
- Not all patients disabled with a RC tear
  - high incidence asymptomatic tears in general population
  - incidence increases with each decade of age
- Hence not all RC tears require surgery

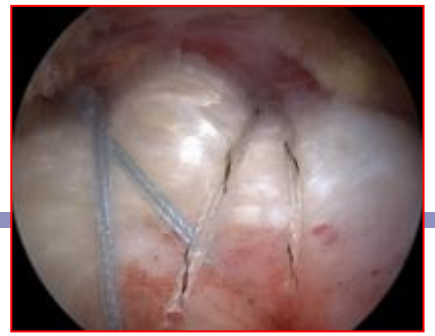
Fig. 3 Prevalence of rotator cuff full tears in the general population according to age. Information from studies of acceptable quality* and studies of non-acceptable quality** that had similar results.



<u>However</u>

- RC tears never heal without surgery
- Hence in symptomatic patients surgery can be a very good option





Full Thickness RC Tears

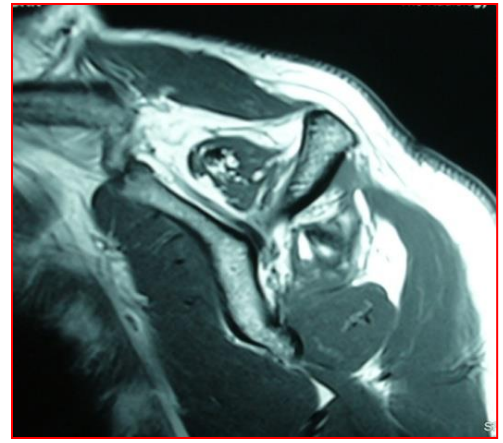
History and Examination

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




Natural History of RC Tears

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



- Why some patients develop symptoms with a full thickness RC tear and others do not remains unanswered

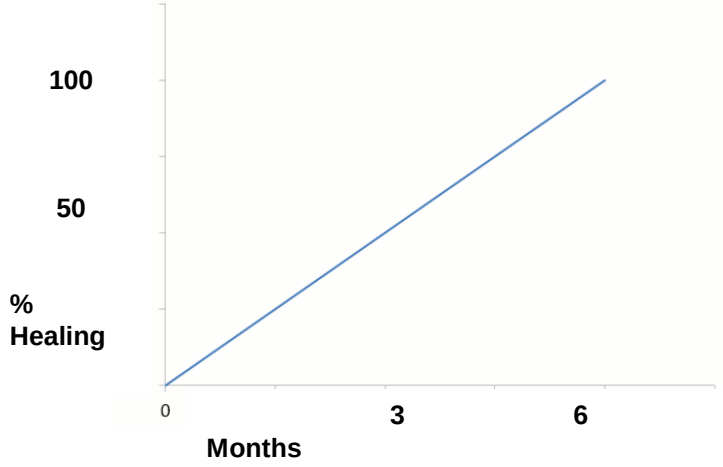
Indications for Surgery

- Basically the patient who has pain and/or functional limitations that interfere with quality of life and have not responded to non-operative measures

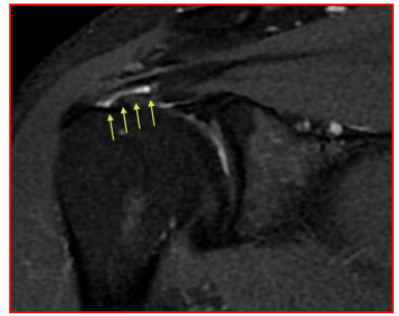
<u>Considerations</u>

- age of patient (young)
- small versus large tear size
- acute versus chronic

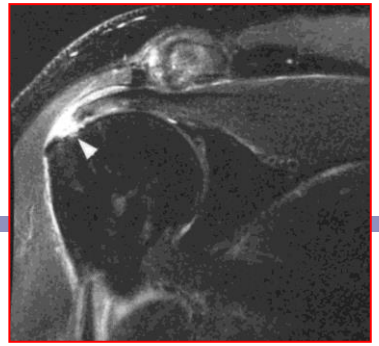
- Remember long post-op rehab (biology of healing)



Take Home Points



- SA impingement syndrome very common
- In the absence of significant structural pathology should always be treated non-operatively
- 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 is an incidental finding
  - treat as for impingement unless deposit very large (consider barbotage)
- Full thickness RC tears consider early referral



Glenohumeral Arthritis

- Not a typical cause of shoulder pain
  (soft tissue causes more common)
- Many different types of arthritis
  (osteoarthritis and RC tear arthropathy most common)
- Predominant symptoms are pain and loss of motion
  (same as for frozen shoulder)
- Diagnosis relies on imaging studies to confirm the pathology and determine its extent
  - plain radiographs should **always** be obtained

Treatment

- Initial treatment always non-operative - analgesia, gentle exercise, avoiding provocative activities, intra-articular cortisone injection
- Consider role of supplements (glucosamine and chondroitin sulphate)
- Newer biologics remain to be proven (PRP, stem cell treatment)

- Surgery for the patient who has pain and/or functional limitations that interfere with quality of life and have not responded to these measures

AC Joint OA

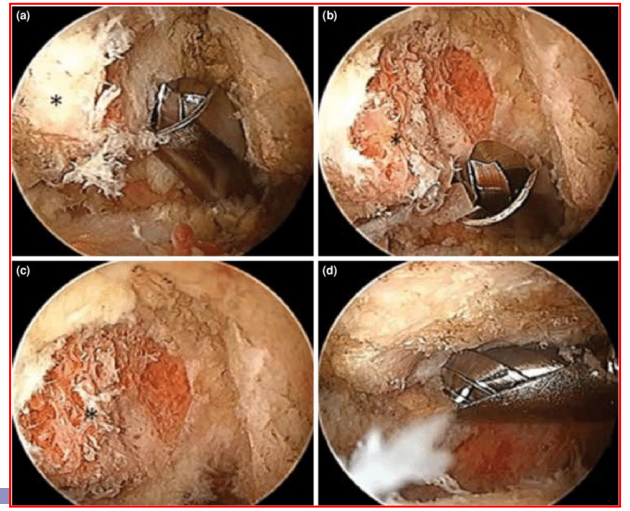
- Superficial location and relationship to shoulder predisposes the AC joint to traumatic injury
- In addition biomechanics of shoulder girdle require the AC joint to transmit large loads across a very small surface area
- As a result degenerative changes in the AC joint are almost universal

- Symptoms and signs usually localise to AC joint but patient may have associated SA impingement syndrome
- Diagnostic uncertainty resolved by direct LA +/- cortisone injection into the AC joint, usually under USS guidance

Treatment

- AC joint OA common radiographic finding in patients
  > 40 years age
  - poor correlation with clinical symptoms
  - symptoms may occur in isolation in ‘younger’ patients
  - when symptomatic in older patients often associated with concurrent RC pathology

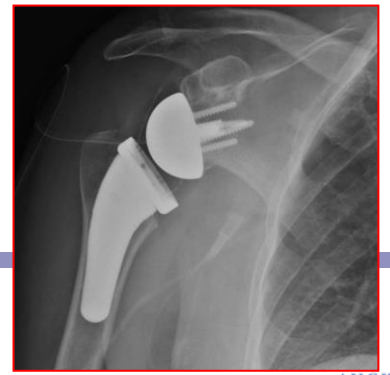
- Resection of the distal clavicle (arthroscopic or open) surgical treatment of choice



Take Home Points

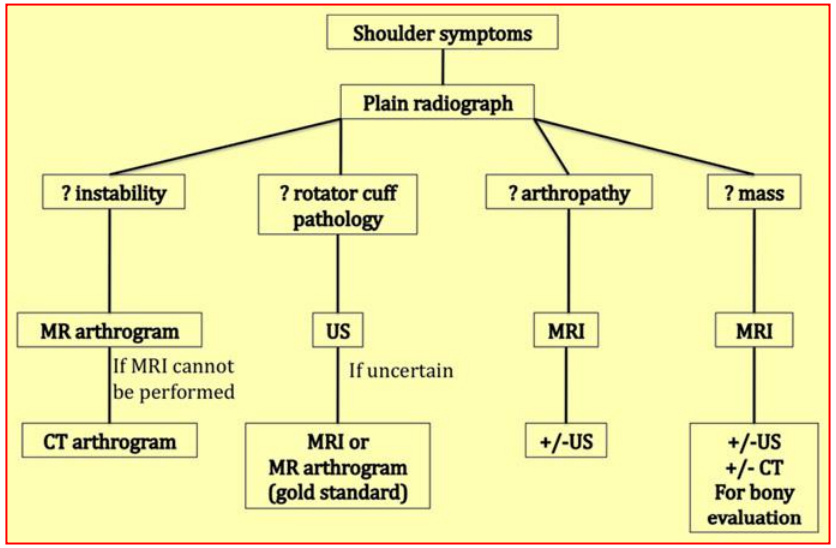
- Soft tissue problems most common cause of a painful shoulder but should always consider bony pathology too, especially in elderly
  - always obtain plain X-rays
- Remember even if bony pathology is seen it does not necessarily mean this is the cause of the patient symptoms (AC joint)
  - usually always need soft tissue imaging too

- Initial treatment for arthritis around the shoulder girdle remains non-operative
- Surgery good option for those that do not respond

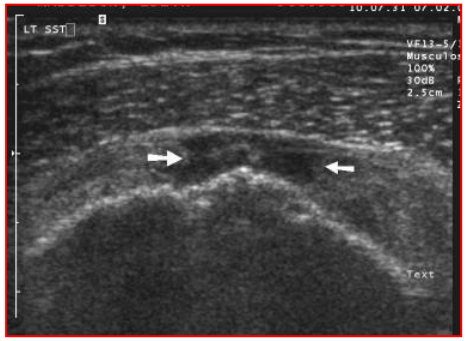


Summary

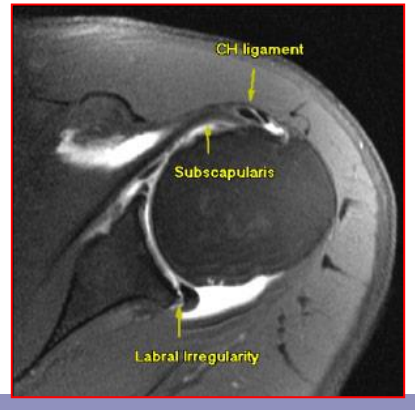
- Diagnosis of the painful shoulder can be challenging
- Careful history and examination most important part of the assessment
- Imaging studies confirmatory and should always be interpreted in the context of the clinical findings



Summary



- Plain radiographs should **always** be performed
- USS only really useful when strong suspicion of full thickness RC tear (not indicated < 40 years)
- If concerned about possibility of intra-articular pathology then referral for MRI appropriate



Summary

- Try to remember the common causes of shoulder pain and have index of suspicion when considering diagnosis (common things occur commonly)

- <u>Age of patient</u> very important to consider
  - under 20 consider psychosocial stressors, especially in females
  - 20 to 40 consider instability / labral / biceps pathology and AC joint osteolysis
  - 40 to 60 consider RC conditions and frozen shoulder
  - over 60 consider glenohumeral and AC joint arthritis

Summary

- Surgery rarely first line of treatment for SA impingement syndrome, RC calcification, low grade partial thickness RC tears, adhesive capsulitis (frozen shoulder), and AC joint problems
  - manage these with decsribed non-operative treatment measures

- Early referral appropriate for shoulder instability, suspicion of occult labral pathology, high grade partial thickness RC tears, full thickness RC tears, and glenohumeral arthritis
  - surgery may not be immediately indicated but at least an informed discussion can be had

Thank You