

2020

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An Approach to the Stiffening Painful Shoulder

This handout complements the video presentation on this topic. To maximise learning please ensure this handout is accessible during the viewing of the video.

The presentation of the stiffening, painful shoulder in adults is common to practitioners working in the field of musculoskeletal (MSK) medicine. A thorough approach in history taking and physical examination is required which will lead to a differential diagnosis. These are expanded below.

Demographic features around age are helpful. These are summarised in the table below. Do not forget calcific tendonitis as a differential diagnosis. Also, as is the case with all MSK pain, don't forget your 'red flags' – night pain, fever and neurological symptoms.

N.B It is recommended that all patients with a stiffening painful shoulder, in particular with night pain, undergo a plan x-ray series. Do not be satisfied with an MRI and/or ultrasound in your assessment.

Demographic Features

<u>Under 40 years</u>	<u>Over 40 years</u>
Shoulder (subacromial) impingement ACJoint pathology +/- long head biceps pain	As per <40 years Rotator cuff deficiency Adhesive capsulitis (F>>M) GHJoint osteoarthritis

History taking

A holistic approach in patient history taking with regards the stiffening painful shoulder should be thorough:

- Trauma - previous, acute or overuse; any activity change
- Medical – history of metabolic health disorders which may contribute to tendinopathy, osteoarthritis or generalised inflammation. This includes – diabetes (and insulin resistance), thyroid dysfunction, gout, inflammatory arthropathy, and haemochromatosis. Dietary factors are crucial here.
- Response to treatment – physical therapy may worsen GHJt OA and capsulitis when inflamed. Any response to injections?
- Check what the patient's expectations are regarding their shoulder. This will help with your education and management timeframes

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Key examination features

The principles of look, feel and move apply.

Observation

- Basic posture in particular round shoulderedness
- Ability to carry items and change clothing
- Asymmetry and swelling (ACJt, GHJ effusion); trapezius spasm
- Wasting – deltoid, scapular region
- Active range of motion (aROM) – include scapulo-humeral rhythm. Identify painful zones of aROM

Palpation

- Commence at sternoclavicular joint and move medially to ACJoint
- Long head of biceps and anterior GHJ
- Greater tuberosity
- Posterior GHJoint
- Medial scapular border
- Associated crepitus with GHJoint OA and ACJoint OA
- Associated 'trigger points' with muscular spasm

Movement

- With aROM be clear with patient instructions. Perform slowly.
- Perform 'lift-off test' for subscapularis integrity when assessing HBB (hand behind back) internal rotation
- Add passive ROM (pROM) particularly assess the 'end-feel' (see video)
- Isometric strength commencing at neutral GHJt position, elbow @ 90deg
- Check and compare side-to-side isometric power through ROM. Functional testing for sports / work is important (eg ABER for tennis serve)
- Special tests for external and internal impingement and LHB pain (see video)

Summary

When considering the stiffening painful shoulder view the patient holistically and consider previous trauma, treatments, metabolic health and inflammatory disorders

Upon physical examination key features are side-to-side differences in range of motion, joint end feel and strength are key.

The most likely differential diagnoses are as per the table above. Don't forget calcification tendinitis. X-ray all patients with a stiffening painful shoulder, in particular in the presence of night pain.

NOTES:

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Knee, Elbow, Shoulder Surgery



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Medial Meniscal Root Tears

Meniscal injury in the knee is common. There have been several large studies in recent years showing that operative and non-operative treatment can achieve similar results in the over 50-year age group. Having said that, reading the fine print in these articles, about 30% of patients fail non-operative treatment and cross over to the surgical group. They then achieve a 70% success rate with surgery. It is always worth trying non-operative treatment first though.

Unfortunately, there is a small cohort within this group who go on to develop rapid onset of severe arthritis within a year or two. It turns out that many of these people have a somewhat different type of meniscal tear called a meniscal root tear. Meniscal root tears are defined as radial tears located within 1 cm from the meniscal attachment. The menisci are attached to bone at the front and the back only with capsular attachment in between. When the meniscus tears away from its bony attachment it is biomechanically comparable to a total meniscectomy because of the loss of hoop stresses in the meniscus. This leads to increased contact pressures in the involved compartment which lead damage to the articular cartilage and the development of early osteoarthritis. With the knee in extension 50% of the, when the knee is flexed to 90 degrees up to 85% of compressive loads are transmitted through the meniscus.

There are 2 age groups of people who get meniscal root tears:

- 1) The more common is the **over 40-year age group** who usually do not have a specific injury to the knee. The might stand from a seated position, squat or have a minor twisting injury. There is often sudden sharp pain in the knee (which is more severe than the symptoms usually experienced with a degenerative meniscal tear). This is almost always a medial sided tear. The risk factors for a medial sided root tear are: varus alignment, increased age, high body mass index and female sex. There are no specific clinical examination findings to distinguish a root tear from any other meniscal tear. The patient will typically have joint line tenderness, pain with full knee flexion, a positive McMurray or Thessaly's test and perhaps pain with varus stressing in full knee extension. This was described by Seil, Duck and Pape but has not be verified in other studies.
- 2) The second is the **under 40-year age group** and is mainly associated with ACL tears. This is usually a lateral sided tear and can be addressed at the time of an ACL reconstruction (although medial sided tears can occur as well). The lateral meniscus posterior root plays an important role in stabilizing the knee anteriorly and during pivoting. In patients with a grade 3 Lachman and pivot shift we should always look more carefully for a root tear. Repairing the lateral root helps to decrease ongoing forces applied to the ACL graft.

In most large series of arthroscopic knee operations, the overall incidence of a complete meniscus root tear is about 10%. Medial sided tears are much more likely to be associated with chondral injuries than lateral sided tears. There is a classification of 5 different types of tears but this affects mainly the surgical techniques of how to fix them rather than whether to fix them or not. The medial root attachment site is about 9.6mm posterior and 0.7mm lateral to the medial tibial eminence apex (which is a very consistent landmark in the knee).

La Prade has described 5 types with 3 subtypes of number 2. Overall the type 2 tear is the most common with 2A, 2B & 2C describing the distance between the complete radial tear of the meniscus root and its attachment to the bone.

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If you look specifically at the 'middle age' group and female patients, the incidence goes up to about 20%. In the past many of these patients were diagnosed as having spontaneous osteonecrosis (SONK) but in reality, this was probably a bone stress reaction from loss of meniscal function.

Investigation

There are no specific xray findings for a root tear. Flexion weight bearing xrays are important because if the patient has Varus alignment or more advanced arthritis then surgical treatment may not be appropriate.

The diagnosis is usually made on an MRI or at the time of surgery. The MRI needs to be performed on a 3T scanner with thin slices to have a decent chance of making the diagnosis. While the MRI is very helpful at ruling out a root tear, it is not necessarily that accurate at confirming the presence of a tear which will be amenable to treatment (Diagnostic sensitivity 77%, Specificity 73%, Positive predictive value 22%, Negative predictive value 97%).

The signs to look for are: meniscal extrusion (>3mm pathologic), a radial tear in the axial plane and the 'ghost sign', which is absence of normal meniscus signal in the sagittal plane.

Treatment

In the past meniscal root tears were treated the same way as any other tear at arthroscopy. This meant that the patients underwent total or partial meniscectomy. While this does achieve short-term benefits for most patients, there is often a reasonably rapid deterioration and progression towards arthritis within a year or two.

Thanks mainly to Dr La Prade we understand the biomechanics of the injury; and repair of meniscal root injuries is the treatment of choice in the appropriate patients. The goal is to restore joint kinematics, contact pressures, and delay the development of arthritis. Since the goal of treatment of these injuries is the prevention of arthritis, surgical repair is not indicated for patients with diffuse advanced chondral changes (Outerbridge grades 3 and 4).

Non-Operative Treatment

This is reserved for older patients with high grade and diffuse arthritis and those who will not manage a period of time on crutches to allow the meniscus to heal. The usual treatments of weight loss, pain killers, anti-inflammatory tablets, cortisone injections, activity modification and possibly an unloader brace can help to relieve some of the symptoms. These patients often progress to knee replacement reasonably quickly.

Posterior Meniscal Root Repair

Anatomic repair of the meniscal root should be executed whenever possible. In my opinion the transtibial technique is the one that should be performed, drilling holes in the tibia to the meniscus attachment site, passing stitches through the torn meniscus, passing the sutures through the tibial drill hole and securing them anteriorly on the tibia. While the studies are limited they show that there is not difference in the improvement achieved in the under 50 year or over 50 year age group. The failure rate was the same with a high satisfaction rate.

Post Operative Rehabilitation

In order to protect the repair, the patient will need to be non-weight bearing for 6 weeks and only achieve unrestricted weight bearing by about 3 months. If they take full weight before this, the repair is likely to fail. We aim for 0-90° of flexion for 2 weeks and then restore full range of motion. It is best to avoid leg presses and squats > 70° of flexion for about 4 months. Sport is delayed for 6-7 months.

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Summary

Meniscal root tears are far more common than we once realised. The current push to treat all patients over 50 without surgery will mean that 10% of patients will develop advanced arthritis which could have been prevented or at least delayed.

The management of meniscal root tears is evolving and as we follow these patients for longer it will become clearer who the ideal candidate for surgery will be. We are already seeing improved clinical and radiological outcomes compared to a partial meniscectomy.

If you have a patient with pain that is worse than you expect or who has clear clinical evidence of a meniscus tear but a reasonably normal looking xray then consider getting a high-resolution MRI scan or referring them for early assessment and treatment. Holding on to them for too long may lead to damage to their articular cartilage and a missed opportunity for treatment.

NOTES:

THE FIRST TIME DISLOCATION OF THE SHOULDER

The treatment of the first time shoulder dislocation has evolved rapidly over the last 10 years due to advances in shoulder arthroscopy and orthopaedic basic sciences.

What do we know in 2020 that influences our management?

- Shoulder dislocations are common
- The risk of recurrence is very high, up to 90% in those under 20 years of age.
- That risk is highest amongst those patients with a significant labral tear.
- That high incidence is increased if the labral tear is accompanied by bony or capsular damage
- Sling immobilization has no effect in preventing recurrence.
- With each dislocation there is significant damage to the bone and articular cartilage of the joint, and as a result, a higher risk of developing osteoarthritis (up to 20% in some studies).

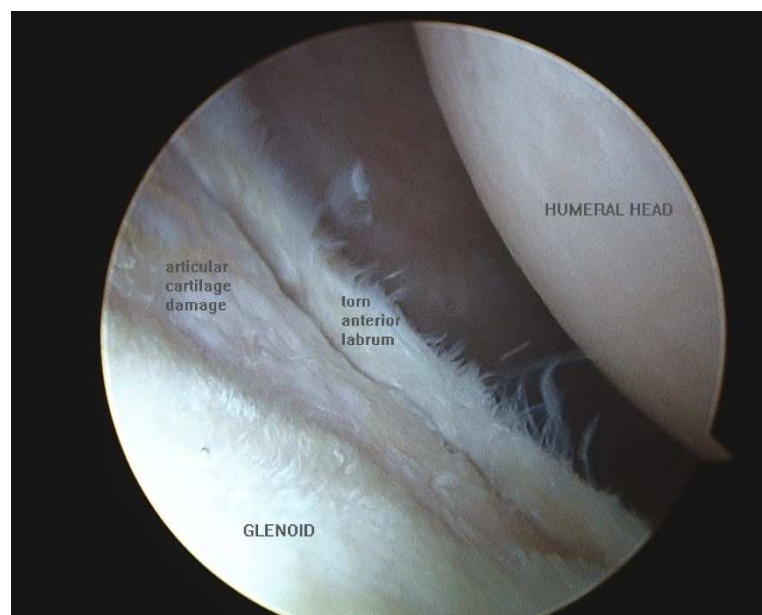


Fig 1. arthroscopic photo of first time dislocation showing labral tear and significant articular cartilage damage of glenoid.

When I see a patient who has dislocated their shoulder for the first time I take a thorough history and examine the patient looking in particular for loss of movement, loss of power (which may indicate a concurrent rotator cuff tear) and the possibility of an axillary nerve palsy. I perform the apprehension sign where the examiner abducts and externally rotates the arm to put the shoulder in the provocative position that causes a dislocation. The patient will usually indicate that they feel the shoulder is going to dislocate.

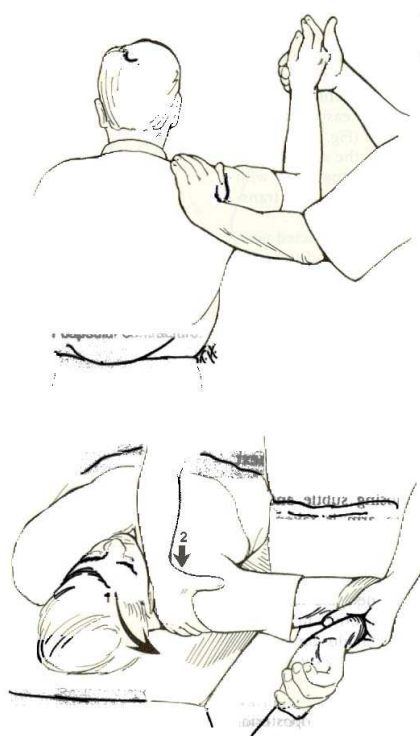


Fig 2. anterior apprehension sign.

I recommend a plain xray of the shoulder to assess bony damage to the joint. An ultrasound is unnecessary and does not contribute to the management. I always get an MRI with intraarticular gadolinium contrast unless the dislocation was in the last 48 hours when the blood in the joint acts as a contrast agent. The intraarticular contrast is needed to fully assess the labrum and rotator cuff. A CT scan is indicated if there is significant bony damage.

If there is a labral tear of significance, I recommend an arthroscopic stabilization. The only reason in the first time dislocator to do an open stabilization is if there is associated bony damage or a HAGL lesion. In such cases arthroscopic surgery is far less reliable.

In the absence of a labral tear it is reasonable to suggest a non operative course of management. In these patients the primary pathology is stretching of the capsule, and in many of these patients a 3 month course of physiotherapy to strengthen the deltoid, rotator cuff and scapula stabilizers will give them a stable shoulder. I would not recommend a sling except in the initial painful period, and I suggest to the patient that they avoid overhead and contact sport until they regain strength and stability which can take up to 3 months.

If the patient has a labral tear and is not willing to consider surgery then I suggest they use an external rotation brace for 4 weeks. This is a cumbersome brace and is poorly tolerated as it must remain on all the time. By holding the arm in external rotation, the torn labrum sits on the glenoid in its anatomical position and may heal, reducing the risk of recurrence. After the brace is removed I commence the same three month course of physiotherapy as indicated above. Patients must be made aware of the high risk of recurrence and the risks involved in contact sports and surfing.

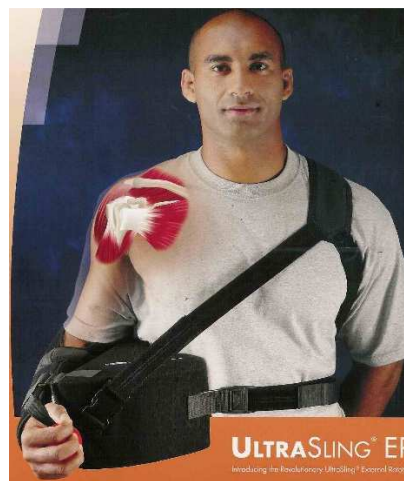


Fig 3. external rotation brace

An arthroscopic stabilization is minimally invasive surgery to reattach the labrum to the glenoid using re-absorbable screws and non absorbable sutures. In addition, a capsular plication and possibly a Remplissage procedure (filling the Hill Sachs or humeral head defect with the infraspinatus) can be done if indicated. This can be done as day only surgery. Postoperatively the patient must remain in a sling for 4 weeks and avoid sport and heavy lifting for up to 6 months during which physiotherapy is required. The success rate is in the vicinity of 90%.



Fig 4. arthroscopic labral repair

An arthroscopic stabilization is very successful in restoring the damaged anatomy of a dislocated shoulder, and in doing so reduces the risk of recurrent dislocations and developing osteoarthritis of the shoulder.

When there is significant bony damage, or a capsular avulsion, arthroscopic labral surgery is rarely indicated. In such cases an open stabilisation, with or without a Coracoid transfer (known as a Latarjet procedure), depending on the amount of bony damage, is indicated. Early indications suggest that an arthroscopic coracoid transfer, commonly known as an arthroscopic Latarjet procedure may be an alternative, but the complication rates are much higher than in an open procedure.

NOTES:

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Vertebral Body Tethering (VBT): an update as of 2020

Tethering can refer to an innate tether of the spinal cord, associated with a lowlying cord termination, thickening of the filum terminale, or a lipoma. It is a form of spinal dysraphism, a congenital anomaly that can be found in association with other spinal column congenital malformations. This is a neurological issue and requires referral to the spina bifida clinic for assessment and management.

Tethering as a form of manipulating the spinal column in scoliosis surgery is currently in vogue. It is greatly discussed in the scoliosis community as a whole, but surgeons and allied health but also in the patient forums. The utilisation of growth modulation as a potential surgical strategy has been discussed in journals since the 1950's, so it is not new. Hemi-epiphysiodesis is occasionally utilised, however vertebral staples had a high complication rate; including under correction, loosening and migration.

Bracing is an external/ non-operative form of growth manipulation, that utilises pressure points/ loads to de-rotate the curve apex. This offloads the concavity and permits growth, but needs to be worn 18-20 hours a day to have a significant treatment effect. It is also a strategy in the smaller magnitude curves, with ideally 18 months of growth remaining (minimum of 12).

Estimating growth remaining is difficult, with a combination of scoring systems available. Perhaps the most accurate is that of a Left Hand AP X-Ray, and use of the Sanders Score. This has been associated with the various growth phases present during the adolescent growth spurt.

VBT is a surgical option for the curve that is not able to be braced, with growth remaining. It is attractive, as it utilises screws placed across the vertebral body, with a flexible UHMWPE tether tensioned across the convexity. Tension is maximal across the apex, softening to either end, with the surgical aim of equal end plates at each level. Technical challenges remain as it is difficult to access above T5; high thoracic curves are inaccessible anteriorly; the diaphragm will need to be mobilised below L1; lumbar tethers often end at L4 and break more frequently (the current trend is two screws and two tethers!).

VBT surgery as a growth modulation strategy, in the un-braceable curve, is attractive to decrease progression and reduce the end magnitude of the curve. The ideal patient, and surgical timing remains to be defined, as do outcomes greater than 4 years. There are many reports of revision surgery for tether breakage, overcorrection, under correction, and conversion to Posterior Spinal Fusion (PSF)/ Anterior Spinal Fusion (ASF). Unfortunately, the bigger/ stiffer curves do not seem amenable to tethering, with most surgeons who perform VBT recommending PSF in these instances, even with growth remaining.

The gold standard for long term control remains PSF/ ASF, with good reproducible results, but the cost is loss of motion at the operated segments. This is mainly noticed with instrumentation into the lumbar spine, which is more mobile, and responsible for the significant amount of functional range.

Marketing around fusionless surgery has resulted in other alternate devices being proposed for the moderate curve, as a surgical strategy. Expansion into the skeletally mature market with strategies such as discectomy, as 'an advanced surgical technique', with the promise of motion long term, have to be met with scepticism.

NOTES:



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