Case study

A 23 year old male professional cricket player with a three week history of right shoulder pain

Leah Hearle

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Presenting complaint

A 23 year old semi professional Cricketer presented with a 3 week history of right shoulder pain spent the winter playing cricket in Australia. He recently returned to England for pre-season indoor training. The injury occurred while in Australia and was sustained during a throw. He felt pain immediately but was able continue playing. Post-match, he initially consulted a physiotherapist, not playing again due to both the pain and returning to England. Since his return, he has been unable to resume training and he is very anxious about a poor start to the season.

History

The initial injury occurred 3 weeks ago whilst throwing* the ball overhead with his right arm during the late cocking and acceleration phase of the throw, using considerable force.* Attempting to throw from the cover fielding position at the non-strikers end stumps to run a batsman out with a direct hit. The shot was made during a game under pressure. He felt a sharp pain immediately over the anterior aspect of the right shoulder* but was initially able to continue playing with only minor discomfort*.

Sports specific aspects

He has played cricket since the age of six to a high level since early teens. He trains five days a week and competed professionally throughout university.

Behaviour of present complaint

There is a constant pain in the right shoulder*; feels a very sharp* “catching” pain on certain movements. Despite resting for 2 weeks, he has been unable to resume normal training and perform daily activities without pain. He is right hand dominant. He is in a lot of discomfort and is unable to do any exercise that involves the shoulder joint. He has attended training but this is limited to a gentle cardio workout. He did not report any feeling of joint instability at the time of injury; he denies any numbness, paresthesia or radiating neck pain. There was no bruising or swelling at time of incidence.

Aggravating factors

- Overhead movements* associated with joint line pain.
- Reaching backwards putting on coat can feel a very sharp pain on this movement.
- Pain if lying on his right side at night.

Easing factors

- Ice
- NSAIDs
- Rest

Other history

- Recently increase in amount of play previously had a break from playing over winter.
- No relevant/significant past medical or social history.
- No fall or previous history of trauma to arm.

Drug history

- Ibuprofen 400mg.

Body charts

Figure 1. Body chart shows the area of constant and sharp pain

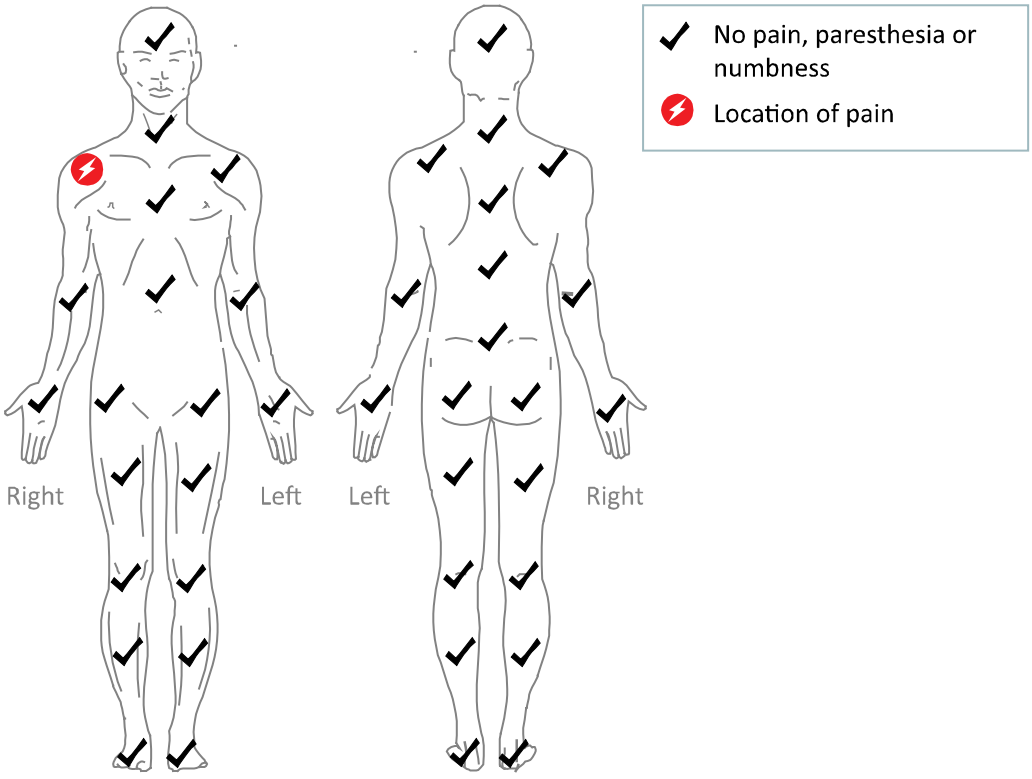


Figure 2. Diurnal visual analogue scale showing constant shoulder pain over 4 weeks

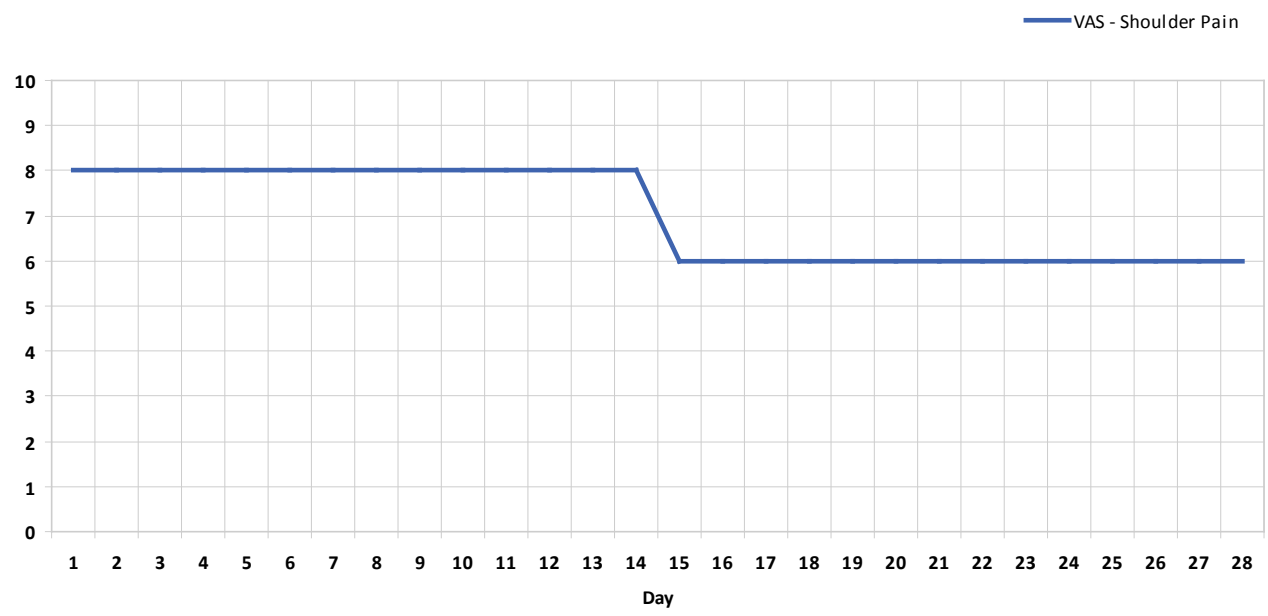
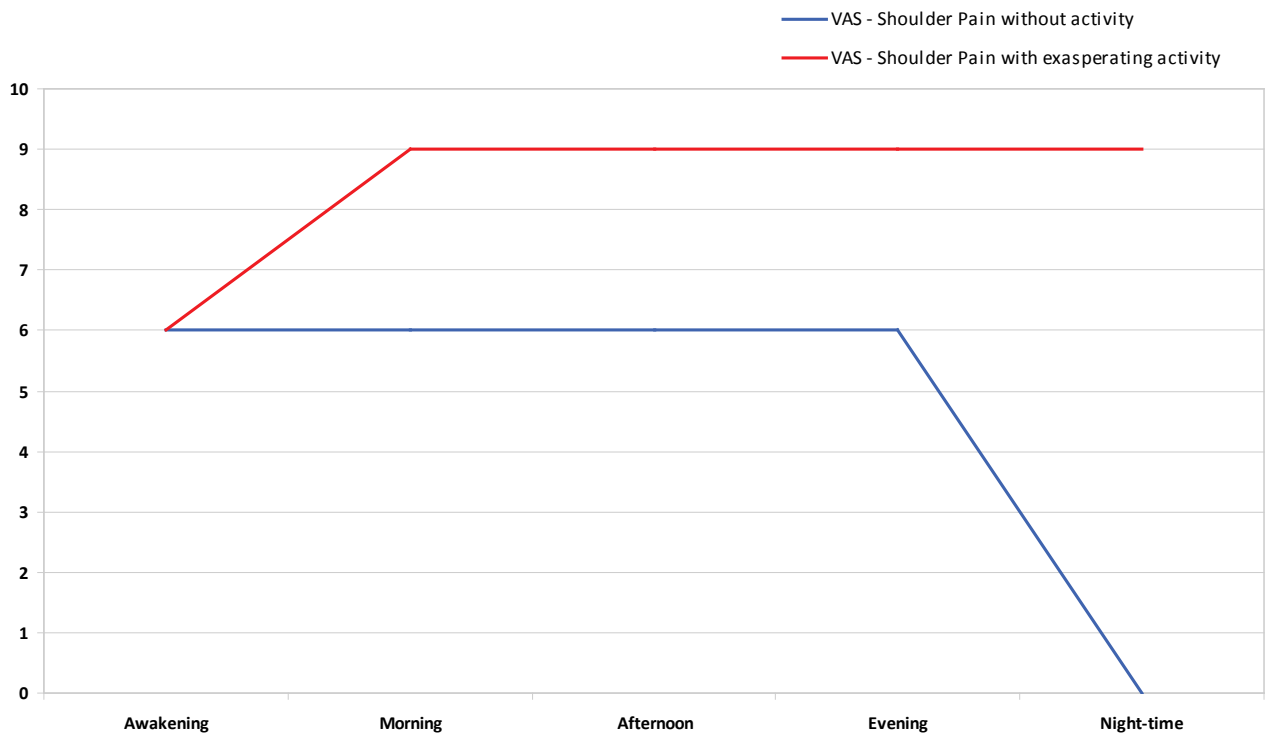


Figure 3. Diurnal visual analogue scale showing pain over the duration of a typical day



He is current in constant pain 6/10 on VAS scale only present at night unless he moves in his sleep or positions awkwardly as in day time, aggravating activity produces a sharp pain (9/10).

Hypotheses

Rotator cuff pathology (supraspinatus, infraspinatus, teres minor, subscapularis).

Subacromial bursitis.

Labral tear (SLAP lesion).

Biceps pathology.

GHJ instability.

Greater tuberosity fracture.

Examination findings

Table 1. Examination findings

Observation	Findings	
Standing	Elevated right shoulder. Presenting anterior head posture.	
Palpation	Localised tenderness over Right GHJ supraspinatus/ upper trapezuis muscle	
Active movements	Right GHJ	Arm pain elicited and reduction of range of movement at 170° of flexion, pain at 80° of abduction movement inhibited by pain above 110°. There is reduced external rotation especially right and pain on external rotation when abducted at 90° and pain on horizontal extension. There is reduced internal rotation.
	Scapula	Scapula dyskinesis on eccentric control reduced external rotation and upward scapular rotation on shoulder abduction.
	Cervical, Thoracic and Lumbar Spine	Normal, painless ROM.
Passive movements	Reduced internal rotation posterior pain at the end of range. Sharp pain external rotation with shoulder abduction.	
Objective measures	Resisted isometric movement; pain inhibition on abduction and external rotation.	
Functional tests	Asked if able to demonstrate throwing a ball overhead, he declines for fear of the pain.	
Negative findings	There is no evidence of neural involvement. He has no other joint pain.	

Table 2. Results of clinical orthopaedic tests[1]

Orthopaedic tests	Implication	Positive	Negative
Hawkins Kennedy test	Subacromial impingement syndrome	×	

Orthopaedic tests	Implication	Positive	Negative
Empty can test	Supraspinatus	×	
Subscapularis lift off test	Subscapularis		×
Biceps Load II test	SLAP		×
Speed's test	Labral pathology or biceps tension		×
Lateral rotation 'lag test'	Teres and infraspinatus		×
Apprehension	GHJ instability		×
Neer's sign	Impingement	× Pain end of ROM fwd flexion	
Drop arm test	Supraspinatus tear	×	
Lift-off test	Subscapularis dysfunction		×
Sulcus sign	Inferior joint laxity		×
Active Compression Test of O'Brian	SLAP	× Pain elicited no clunk	

Summary

In summary, clinical examination and orthopaedic tests revealed evidence of rotator cuff lesions. Active testing revealed weakness on abduction and rotation and resisted isometric movement was painful and weak on abduction and lateral rotation. Drop arm and empty can test where both positive further indicating a rotator cuff lesion. There was tenderness on palpation over supaspinatus muscle.

Possible indications of rotator cuff tear include constant pain and night pain (reportedly positional), loss of motion and weakness on abduction and external rotation.

Positive clinical testing implicating impingement syndrome included Hawkins Kennedy test.

Retesting empty can test improved strength and decrease in pain with manual scapula retraction. There is observed Scapula dykinesis.

Table 3. The intrinsic and extrinsic factors affecting joint function

Extrinsic factors	Intrinsic factors
Increase in volume and training intensity	Traumatic injury affecting shoulder joint
Tired as last game of the winter season	Scapula dykinesis
	Posterior capsular contracture

Hypotheses with prediction levels

Table 4. Hypotheses with prediction levels

Hypotheses	Prediction level
Supraspinatus tear or Supraspinatus tendinopathy	50%
Subacrominal Impingement with subacromial bursitis.	30%
SLAP lesion	20%

Hypotheses justification

Shoulder pain is a common complaint in cricket[2], as it involves a repetitive overhead use of the arm when throwing[3]. In the athlete, pain and dysfunction due to excessive overhead use or abnormal positioning of the shoulder is common and can result from multiple pathologies[4].

This patient may be suffering with a single or multiple conditions. Subacromial impingement syndrome (SIS) is the most common disorder of shoulder[2] in which is characterised by oedema and haemorrhage of the rotator cuff and subacromial bursa and is common in patients under the age of 25 years[5]. This patient demonstrates symptoms, associated with this syndrome, which was implicated in clinical tests. However, clinical testing is not conclusive[6]. This patient's increase in training load may have resulted in inflammation of the rotator cuff from this overuse, and can result in secondary impingement. Tendon thickening reduces the depth of the subacromial space. The supraspinatus muscle contracts to decelerate internal rotation of the arm; the throwing action may have resulted in trauma due to a pre-existing weakness, which allowed the humeral head to migrate superiorly resulting in a secondary impingement[5].

The rotator cuff is under significant stress during overhead athletics[7]. This can result in rotator cuff injuries, which are often multi-factorial, due to a combination of tensile overload and impingement. Identification of symptomatic rotator cuff disease can also be challenging in this group of athlete because abnormalities of the rotator cuff are common in asymptomatic throwers and rotator cuff pathologic conditions often occur in conjunction with other injuries[7]. In clinical examination symptoms associated with rotator cuff tears were identified including a positive impingement sign and weakness in external rotation[7].

On examination scapular corrective manoeuvres helped reduce pain on the empty can test with scapular retraction, this implies that the scapula is involved in the shoulder injury[8].

However scapular dyskinesis is a non-specific response to a painful condition in the shoulder rather than a specific response to certain glenohumeral pathology[8 9]. Research has shown that patients with SIS have demonstrated a decreased upward scapular rotation, a decreased posterior tilt, and a decrease in external rotation[9]. These kinematic deviations are consistent with possible reductions of the subacromial space[9 10].

A consistently downwardly rotated scapula associated with cricketers with shoulder pain may predispose these athletes to ongoing injury through impingement and also through increased load on the rotator cuff muscles acting at the glenohumeral joint during throwing[11].

Another possible predisposing factor associated with a throwing athlete has been hypothesized to be due to repetitive forces on the posterior-inferior capsule resulting in hypertrophy and limited internal rotation[12]. Impingement is believed to develop most often in overhead athletes when the posterior capsule is theorized to become contracted, shifting the humeral head posterior and superior during the late cocking phase of throwing, and entrapping the articular side of the supraspinatus tendon between the humeral head and glenoid/labrum[13].

Posterior capsular contracture is a common cause of shoulder pain[14]. This may be the initial pathologic event leading to rotator cuff tear[14] and Impingement syndrome or a capsular injury affecting the Superior labrum anterior to posterior (SLAP) tears[14 15 16].

SLAP tears and partial under surface tears of the rotator cuff are common in experienced throwers, may be adaptive, and are only occasionally symptomatic[17 18].

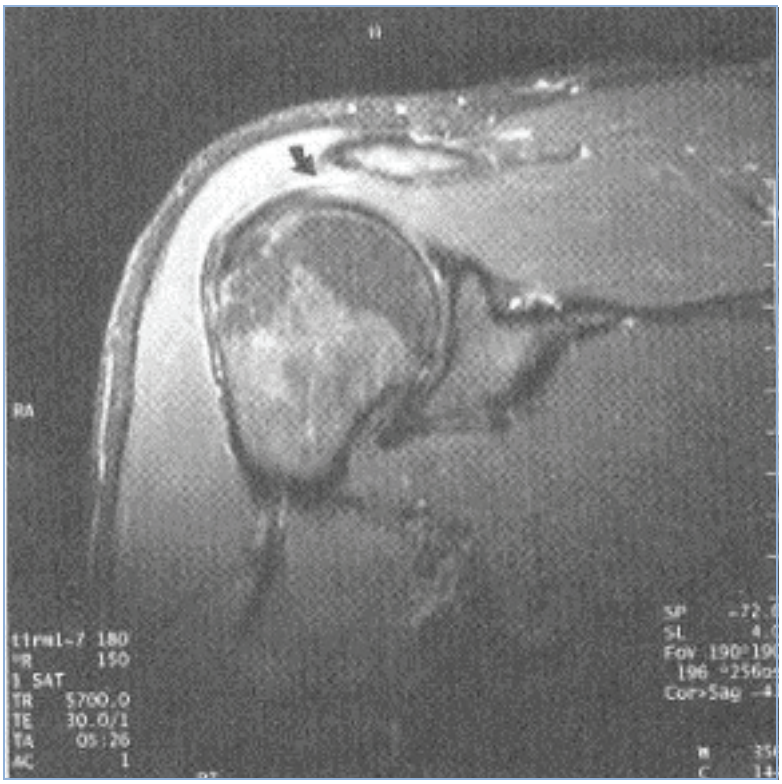
The most common mechanisms in a throwing injury resulting in a SLAP lesion is due to excessive traction on the labrum, through the long head of the biceps in shoulder cocking and abnormal posterosuperior humeral head translation in cocking due to glenohumeral internal rotation deficit and excessive scapula protraction[19]. The most common clinical complaints of a SLAP lesion associated with this patient's symptoms include pain, greater with overhead activity, and a painful "catching" in the shoulder. Clinical testing including the Biceps Load II test was not positive in implicating this condition. However no tests have demonstrated diagnostic utility when diagnosing any SLAP lesion[20].

Further Investigation

There are no clear guidelines for diagnostic imaging of articular and soft tissue pathologies of the shoulder. However, several methods are used including magnetic resonance imaging (MRI), magnetic resonance arthrography (MRA) and ultrasound.

For the shoulder impingement syndrome and rotator cuff tears, MRI and ultrasound have a comparable accuracy for detection of full-thickness rotator cuff tears. MRA and ultrasound might be more accurate for the detection of partial-thickness tears than MRI[21 22].

Figure 4. Showing a MRI of the shoulder with mild tendinopathy of the supraspinatus and some fluid in the subacromial bursa (arrow) consistent with an impingement syndrome[23]



MRI or ultrasound could equally be used for detection of rotator cuff tears, although ultrasound may be better at picking up partial tears and is also more cost effective[21 24]. However, as Rotator cuff disease is often multi-factorial – likely in this patient's case. Primary impingement within the coracoacromial arch, degeneration of the rotator cuff tendons and trauma may be contributing factors. These conditions can be detected in the athlete using MRI[25].

In regard to SLAP lesion Results from MRI demonstrate a low sensitivity and high specificity and is not a reliable diagnostic tool[25]. Advances in soft-tissue imaging techniques using MRA improved accuracy in diagnosing SLAP tears. However, the definitive diagnosis of suspected SLAP tears is confirmed on arthroscopic examination**Error! Bookmark not defined. Error! Bookmark not defined.**. However this is an invasive procedure and should be avoided**Error! Bookmark not defined.**.

Table 5. Showing the most effective imaging methods in aiding the diagnosis of this patients shoulder pain

Investigation	Rotator cuff (Supraspinatus) tendon tears	Bursitis /Impingement Syndrome	SLAP lesion
MRI	×	×	
Ultrasound	×	×	
MRA	×	×	×

In summary, MR arthrography is the most sensitive and specific technique for diagnosing rotator cuff tears and SLAP lesion. Ultrasound and MRI are comparable in both sensitivity and specificity for rotator cuff pathology and impingement buy not sensitive for SLAP lesion.

Management and Treatment

Table 5. Showing the conservative treatment plan for Rotator cuff tedinopathy, Impingement Syndrome and SLAP lesionError! Bookmark not defined.

Phase	Supraspinatus Tendinopathy and Impingment Syndrome	SLAP lesion
Phase one	**RICE** Avoid aggravating acitivity (overhead activity), apply Ice locally, (poor evidence; NSAIDs, Ultrasound). A single Corticosteroid injection (may reduce sportspersons symptoms enough for rehabilitation program)	**NSAIDs** Conservative treatment is usually unsuccessful in overhead sportsman's
Phase two	Correction of predisposing or associated abnormalities, GHJ instability, muscle weakness, incoordination, soft tissue tension, impaired scapulo-humeral rhythm and training errors. Strengthen external rotators, as they are relatively weak. Stretch posterior capsule associated with the reduced internal rotation. Correction of possible training error may involve the assistance of the club coach.	Scapula stabilization exercises and stretching program. Restore all range of motion, neuromuscular control, dynamic stability and proprioception. Restore full strength, power and endurance

This player has predisposing/intrinsic factors to his injury. These should be addressed independently to positive or negative investigative findings. As part of rehabilitation programme the scapula dyskensis should be addressed before return to the field[26]. Educating the need for rehabilitation is very important as

Professional cricketers generally play on with shoulder injuries without missing matches, though their performance, especially during fielding, is often compromised[Error! Bookmark not defined.].

Initial management of posterior capsular contracture should be nonsurgical, emphasizing range-of-motion stretching with the goal of restoring normal motion. For patients who fail nonsurgical management, arthroscopic posterior capsule release can result in improved motion and pain relief. Management involves regaining internal rotation such that the loss of internal rotation is not greater than the increase in external rotation. In the athlete who fails nonsurgical management, a selective posteroinferior capsulotomy can improve motion, reduce pain, and prevent further shoulder injury**Error! Bookmark not defined.**.

Due to likely hood of multi-factoral pathology affecting the rotator cuff of this throwing athlete, treatment can be problematic.

Surgery is necessary for rotator cuff tear for which conservative treatment fails. Surgical results typically correlate with tear severity. Partial-thickness tears treated with arthroscopic debridement and management of concomitant pathologic conditions seem to have fairly good outcomes, with most athletes able to return to activity at their pre-injury level**Error! Bookmark not defined.**. However, full-thickness tears have very poor outcomes in the overhead athlete**Error! Bookmark not defined.**.

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