

# Summary of an evidence-based guideline on soft tissue shoulder injuries and related disorders—Part 1: Assessment

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## ABSTRACT

**AIM:** To provide a succinct summary of the diagnosis of soft tissue injuries to the shoulder for primary health care practitioners based on the New Zealand guideline.

**METHODS:** A multidisciplinary team developed the guideline by critically appraising and grading retrieved literature using the Graphic Appraisal Tool for Epidemiology (GATE). Recommendations were derived from resulting evidence tables.

**RESULTS:** Diagnostic ultrasound is a valid tool for the diagnosis of a full thickness rotator cuff tear. If a significant tear is suspected, referral for diagnostic ultrasound is recommended. There is a paucity of evidence for the diagnosis of soft tissue shoulder injuries and most recommendations are based on the consensus of the guideline team.

**CONCLUSION:** Assessment relies on thorough history-taking and physician examination with appropriate referral where there is evidence of serious damage or the diagnosis remains unclear.

**KEYWORDS:** Shoulder, shoulder pain, diagnosis, soft tissue injuries

## Introduction

Soft tissue shoulder injuries rank within the top three injury sites for nearly all major sport and recreational activities.<sup>1</sup> Not only do they represent a significant cost to the Accident Compensation Corporation (ACC), if poorly managed they can result in significant disability and loss of quality of life. In 2003 ACC commissioned a guideline for the diagnosis and management of common soft tissue shoulder injuries to reduce identified variation in diagnosis and management and to improve outcomes for claimants.<sup>2</sup>

The diagnosis and management of shoulder injuries is one of the most challenging areas of musculoskeletal medicine. Pathologies and their

clinical manifestations vary widely from person to person and pathologies often co-exist, further compounding the diagnostic complexity.

This paper is the first of a two-part series which summarises the evidence for the diagnosis of soft tissue shoulder injuries based on the evidence-based guideline *The diagnosis and management of soft tissue shoulder injuries and related disorders*.<sup>2</sup> This guideline was developed in New Zealand (NZ), led by Effective Practice, Informatics & Quality improvement (EPIQ), University of Auckland under the auspices of the New Zealand Guidelines Group (NZGG). The guideline was endorsed by the Royal New Zealand College of General Practitioners, the NZ Orthopaedic Asso-

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ciation, the NZ Society of Physiotherapists Inc., the NZ Association of Musculoskeletal Medicine, Sports Medicine NZ and the Royal Australasian and New Zealand College of Radiologists.

The aim of this paper is to provide a succinct summary of the assessment of soft tissue injuries to the shoulder in a form that is readily accessible to primary health care practitioners.

## Method

The target group for the guideline is primary care practitioners. In NZ this group includes primary care medical practitioners, physiotherapists and osteopaths who are able to assess soft tissue injuries of the shoulder and decide initial management.

A broad-based multidisciplinary team (orthopaedic surgery, general practice, musculoskeletal radiology, musculoskeletal medicine, sports medicine, emergency medicine, physiotherapy, osteopathy) was convened in 2003, including nominated professionals and representatives for Maori, Pacific people and consumers.

The team met on two occasions over a 12-month period. There were numerous consultations between members of the group throughout the guideline process, including several additional small group meetings to discuss various aspects of the guideline.

This guideline summary addresses the diagnosis and referral of adults with the following shoulder injuries. Adolescents were also included for shoulder instabilities given that dislocation and recurrent dislocation are more common in this age group. Five pathological groupings were considered as reflective of the main soft tissue disorders seen in primary care. These were:

1. **Rotator cuff disorders** (including impingement, subacromial bursitis, tendinosis, painful arc syndrome, partial, full thickness and massive tears of the rotator cuff, long head of biceps rupture and calcific tendonitis)
2. **Frozen shoulder** (also known as adhesive capsulitis)

## WHAT GAP THIS FILLS

**What we already know:** Shoulder injuries are both common and difficult to diagnose.

**What this study adds:** The evidence base to diagnosis of soft tissue injuries to the shoulder is limited. This review offers recommendations largely based on expert consensus. Assessment relies on thorough history-taking and physician examination, with appropriate referral where there is evidence of serious damage or the diagnosis remains unclear.

3. **Glenohumeral instabilities** (acute and recurrent dislocation, labral injuries and other instabilities)
4. **Acromioclavicular (AC) joint injuries** (including stress osteolysis, osteoarthritis and dislocation)
5. **Sternoclavicular (SC) joint injuries** (including sprains, dislocation and arthritis and related conditions).

The guideline specifically excluded fractures, inflammatory conditions, degenerative conditions, endocrinological and neurological conditions, hemiplegic shoulder and chronic shoulder pain including occupational overuse disorders.

The following diagnostic and referral questions were considered by the team:

- What aspects of the history are diagnostic—e.g. mechanisms of injury; a sensation of ‘popping out’?
- What symptoms are diagnostic, e.g. location of pain; dead arm?
- What aspects of the clinical examination / specific tests are valid and reliable for the diagnosis of the included shoulder conditions?
- What are the red flags?
- What imaging is appropriate to use in making the diagnosis?
- What are the appropriate plain films to use in the diagnosis of soft tissue injuries?
- What is the place of diagnostic ultrasound?
- What are the indications for referral for further evaluation?

For each question a comprehensive literature search was undertaken in all major electronic

databases (Medline, CINAHL, EMBASE, AMED, SPORTdiscus and Current Contents). Relevant Internet sites were searched, including PEDro, NHS clinical trials, Health Technology Assessments for NHS, Bandolier and National Guideline Clearing House. Reference lists of included studies were checked for additional studies. Only published studies in the English language were considered for inclusion.

Quality was assessed using the Generic Appraisal Tool for Epidemiology (GATE) available at: <http://www.epiq.co.nz> (modified since this guideline was developed).

Diagnostic studies were included only if they had at least 35 or more participants which represented an appropriate spectrum or defined clinical group, included blind independent assessment of the new test and reference standard and compared the reference test with the new test in at least 90% of people.

Evidence from the relevant studies was summarised into evidence tables ([http://www.nzgg.org.nz/guidelines/0083/040610\\_Final\\_Guideline\\_methodology\\_and\\_evidence\\_tables\\_dia%E2%80%A6.pdf](http://www.nzgg.org.nz/guidelines/0083/040610_Final_Guideline_methodology_and_evidence_tables_dia%E2%80%A6.pdf)). Recommendations were developed using the SIGN 'Considered Judgement' process. (SIGN Guideline development process: <http://www.sign.ac.uk/guidelines/fulltext/50/compjudgement.html>).

Grading is based on the strength of the evidence and does not indicate the relative importance of the recommendations.

## Results

There is a paucity of evidence for the diagnosis of soft tissue shoulder injuries. Recommendations have therefore been based primarily on the consensus of the guideline development team (Table 1).

Routine x-rays and diagnostic ultrasound are the imaging techniques available to NZ primary health care practitioners. Referral to a specialist is required for other diagnostic imaging procedures including MRI and MR arthrography, which are the additional diagnostic imaging techniques most commonly used for soft tissue injuries of the shoulder. The evidence for these modalities has therefore not been included for this summary.

### 'A' recommendation for the diagnosis of soft tissue shoulder injuries

#### Diagnostic ultrasound

If a significant rotator cuff tear is suspected, refer for diagnostic ultrasound. Diagnostic ultrasound should be undertaken by a radiologist with appropriate expertise using equipment with sufficient resolution.

Table 1. Evidence summary—diagnosis

Evidence summary	
<b>History</b>	There is no evidence that any particular aspect of the history is both reliable and valid for the diagnosis of any shoulder injury.
<b>Physical examination</b>	There is no evidence that any specific diagnostic test is both valid and reliable for the diagnosis of any soft tissue shoulder injury.  There is no evidence that any particular combination of tests is useful in the diagnosis of shoulder disorders.
<b>Radiography</b>	No validated clinical decisions rules were located for the use of plain radiography for soft tissue shoulder injuries.
<b>Diagnostic ultrasound</b>	There is good evidence that diagnostic ultrasound is a valid diagnostic tool in the diagnosis of full thickness rotator cuff tears in a secondary care setting with a likelihood ratio of 13.6 (95% CI 9.13-18.95). <sup>5</sup>  Its ability to rule out rotator cuff disease is yet to be determined and there is no conclusive evidence for the validity of diagnostic ultrasound in the diagnosis of partial tears. <sup>5</sup>  There is insufficient evidence to determine the validity of diagnostic ultrasound for rotator cuff tears in a primary care setting.

### Consensus recommendations for the diagnosis of soft tissue shoulder injuries

#### 1. Carry out a full clinical assessment, including a neurological examination if required

The clinical manifestations of shoulder disorders are many and varied. A thorough clinical examination will help establish an accurate and definitive diagnosis (Table 2).

#### 2. Exclude red flags and other significant structural damage

People with red flags and other significant structural damage require urgent referral to a specialist (Table 3).

#### 3. Screen for extrinsic causes of shoulder pain

The site of pain may not be the source of the problem. Noting the onset, periodicity, site, character, radiation, associated symptoms and relieving and aggravating factors will alert the clinician to the severity of the disorder and the possible source of pain (Table 4). Provide appropriate treatment or refer to a specialist for further evaluation and management.

#### 4. Establish a provisional diagnosis

The clinical diagnosis of shoulder disorders is difficult. There is often overlap between commonly described conditions and variation in presentation of symptoms. The following key points should be kept in mind when diagnosing acute soft tissue shoulder disorders:

- **Rotator cuff disorders:**
  - Age >35 years
  - Upper arm pain/night pain
  - Painful arc
  - Limited active range of movement (ROM)
  - Full passive ROM
  - Possible weakness
  - +ve impingement sign.
- **Frozen shoulder**
  - Gradual onset
  - Increasing severity of pain
  - Global limitation active and passive ROM
  - Possible diabetic

Table 2. Clinical assessment of the shoulder

History			
Inquiry		Key Features	Consider
Age	>35 year < 35 years		Rotator cuff Instability
Mechanism of injury	Fall/direct trauma Fall onto point of shoulder Abduction/external rotation Head away (traction)		Clavicle fracture AC joint Rotator cuff/dislocation  Brachial Plexus
Pain location/ radiation	Above shoulder joint Upper arm/deltoid Anterior upper arm Below elbow (shooting) Night Pain		AC Joint Rotator cuff Biceps tendonitis Nerve/neck Rotator cuff tendon
Physical examination			
Action		Key features	Consider
Look	Asymmetry/deformity  Wasting Bruising Scars		Dislocation/fracture/AC joint dislocation Rotator cuff tear/nerve injury Dislocation/fracture Previous injury/surgery
Feel	SC joint/clavicle/AC joint Long head biceps  Greater tuberosity Spine of scapula		Local tenderness/prominence Local tenderness bicipital groove Local tenderness/fracture Local tenderness/fracture
Test active ROM	Limited active/full passive  Painful arc		Rotator cuff disorder (impingement/tear) Rotator cuff disorder
Test passive ROM	Limited active <i>and</i> passive Hypermobile/positive apprehension		Frozen shoulder Instability
Test strength	Weak abduction/wasting deltoid Weak abduction/external rotation Weak internal rotation		Axillary nerve injury (dislocation) Rotator cuff tear  Subscapularis/pectoralis major tear
Special tests	There is no evidence that any specific test is both valid and reliable for the diagnosis of shoulder injuries.		
Neurological examination			
Level	Motor	Sensory	Reflex
C5	Deltoid/biceps	Upper arm	Biceps
C6	Wrist extension	Thumb	Brachioradialis
C7	Wrist extension/finger extension	Middle finger	Triceps
C8	Finger grip	Fifth finger	None
T1	Hand intrinsic	Medial elbow	None

- **Anterior/recurrent dislocation**
  - History of trauma
  - Pain and muscle spasm
  - Empty space below acromion
  - Humeral head anterior
  - Limited movement
  - Plus/minus +ve x-ray confirmation.
- **Instability disorders**
  - Age <35 years
  - History of dislocation/subluxation
  - Overhead work/sports
  - Catching pain on activity
  - +ve apprehension
  - Increased laxity and pain on testing.
- **AC joint sprain**
  - Younger
  - Contact sport
  - Fall on the shoulder
  - Pain and localised tenderness over the AC joint
  - Prominence over AC joint
  - Cross chest test painful.

#### 5. Obtain necessary and appropriate imaging

##### *Indications for x-ray*

- Strong suspicion of fracture
- Dislocation in those aged >40 years

Table 4. Possible extrinsic causes of shoulder pain

##### **Screen for the following:**

- Cervical spine disorders
- Nerve disorders
- Nerve root irritation
- Nerve compression/entrapment
- Brachial plexus injuries
- Neuralgic amyotrophy
- Inflammatory disorders
- Rheumatoid arthritis
- Polymyalgia rheumatica
- Complex regional pain syndrome
- Myofascial pain syndrome
- Scapulothoracic articulation
- Thoracic and rib injuries
- Visceral disorders

Table 3. People requiring urgent referral for specialist evaluation

##### **Red flags** (signs or symptoms which alert the clinician to serious pathology)

- Unexplained deformity or swelling
- Significant weakness not due to pain
- Suspected malignancy
- Significant unexplained sensory/motor deficit
- Pulmonary or vascular compromise

##### **Other significant structural damage**

- Displaced or unstable fracture
- Failed attempt (x2) reduction of dislocated shoulder
- Massive tear of the rotator cuff (>5 cm)
- Isolated rupture of subscapularis or pectoralis major
- Severe dislocation GH, AC or SC joints
- Undiagnosed severe shoulder pain

- Consideration of surgery as management option (plain films are best requested by a specialist where surgery is being considered as a management option.

##### *Recommended views*

- AP glenoid fossa (Grashey View)
- Either outlet or lateral scapular
- Axial.

##### *Indications for diagnostic ultrasound*

Refer for diagnostic ultrasound where the clinical diagnosis is uncertain and it is important to exclude a significant rotator cuff tear.

#### 6. Refer for specialist referral where appropriate

Appropriate and timely referral for a specialist evaluation is important where indicated to achieve optimal outcomes.

Early referral is recommended for the following:

- Two or more traumatic dislocations
- Recurrent posterior/other instabilities
- Where the diagnosis is in doubt.

A number of specialist groups are competent to evaluate shoulder problems. The decision about to

whom to refer a patient will vary depending on the nature of the shoulder injury, the availability of specialist groups and the preferences of the patient and referring health professional.

## Discussion

While there is an abundance of diagnostic tests in clinical practice, this guideline indicates that no one test or combination of tests has been shown to accurately and reliably discriminate soft tissue shoulder disorders. However diagnostic ultrasound is a modality available to primary care practitioners and this has been found to be useful in confirming a diagnosis of a full thickness rotator cuff tear, but less useful for partial thickness rotator cuff tears.

Since the publication of the guideline two systematic reviews relevant to the diagnosis of key shoulder pathologies have been published. The first investigated the diagnosis of instability and labral tears,<sup>3</sup> and the second the diagnosis of superior glenoid labral lesions only (SLAP lesions).<sup>4</sup>

The first review evaluated tests to distinguish between shoulder instability classified on the basis of degree (subluxation or dislocation) and direction (anterior, posterior, inferior or multidirectional) and labral lesions classified on the basis of location and type of tear.<sup>3</sup> This review evaluated four provocation and three laxity tests for instability of the shoulder, and 14 tests for labral tears. The evidence suggests that the relocation and anterior release tests are best for establishing the diagnosis of instability while the biceps load I and II test, the pain provocation test of Mimori and the internal rotation resistance strength tests are best for the diagnosis of a SLAP lesion. It should be noted that these studies were all located in specialised care centres and may have limited applicability to primary care. Limitations regarding methodology of individual studies were also noted.

The second review evaluated nine tests for superior glenoid labral lesions (SLAP lesions) from 11 studies.<sup>4</sup> The authors concluded that physical examination cannot provide a definitive diagnosis for SLAP lesions at this stage. Limited reliability due to the inherent difficulties in performing

these tests and the heterogeneity of the patient populations studied contributed to the lack of evidence for any one test or combination of tests to accurately diagnose SLAP lesions.

Even with this additional evidence, the evidence base to diagnosis of soft tissue injuries to the shoulder is limited. Assessment relies on thorough history-taking and physician examination, with appropriate referral where there is evidence of serious damage or the diagnosis remains unclear.

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## COMPETING INTERESTS

None declared