



Review article

Shoulder pain

A. Agrawal*, P. Tripathi, P. Shukla

Department of Radiodiagnosis, Mahatma Gandhi Memorial Medical College Indore, India.

*Corresponding author; Department of Radiodiagnosis, Mahatma Gandhi Memorial Medical College Indore, India.

ARTICLE INFO

Article history,

Received 15 February 2015

Accepted 18 March 2015

Available online 25 March 2015

iThenticate screening 20 February 2015

English editing 15 March 2015

Quality control 22 March 2015

Keywords,

Shoulder pain

Importance

Evaluation

Diagnosis

ABSTRACT

Shoulder pain is a common and important musculoskeletal problem. Compromised shoulder movement due to pain, stiffness, or weakness can cause substantial disability and affect a person's ability to carry out daily activities. Common shoulder disorders exhibit similar clinical features, and the lack of consensus on diagnostic criteria. This review proposes an evidence based approach using a simplified classification of shoulder problems, incorporating diagnostic techniques applicable to a primary care consultation and a "red flag" system to identify potentially serious disease.

© 2015 Sjournals. All rights reserved.

1. Introduction

Incidence:

The shoulder is the third most common site of musculoskeletal pain after low back pain and knee pain .

The prevalence of shoulder pain among general population is estimated to be between 16% and 26% with an incidence of 12-25 per thousand per year (van der Windt et al., 1995; Greving et al., 2012).

2. Sex prevalence

Shoulder pain diagnoses is associated with increasing age and a general degeneration of the body, showing a peak in age 50–60. Some studies have shown that women have a higher risk of upper extremity disorders, compared to men (age and occupation adjusted).

The new onset consultation rate was 80/10 000 per year for women and 74/10 000 per year for men (Tekavec et al., 2012). Bodin et al. reported that prevalence rates of Rotator Cuff Syndrome in males and females are 6.1% and 7.3% respectively.

Some studies indicated, impingement syndrome is more common in men, while adhesive capsulitis was more often diagnosed among women.

2.1. Pain arising from the shoulder

- Rotator cuff disorders: rotator cuff tendinopathy, impingement, subacromial bursitis, rotator cuff tear.
- Glenohumeral disorders: capsulitis ("frozen shoulder"), arthritis.
- Acromioclavicular disease.
- Infection (rare).
- Traumatic dislocation.

2.2. Pain arising from elsewhere

- Referred pain: neck pain, myocardial ischaemia, referred diaphragmatic pain.
- Polymyalgia rheumatic.
- Malignancy: apical lung cancers(Pancoast), metastases.

3. Rotator cuff injury

Rotator cuff tendinopathy is the most common cause of shoulder pain.

- The rotator cuff is a group of four muscles and tendons that help stabilize the shoulder. The rotator cuff consists of the tendons of the subscapularis, the supraspinatus, the infraspinatus and the teres minor muscles. Rotator cuff injuries can range from mild to severe. They tend to fall into one of three categories.

- 1) Tendinitis is an injury caused by overuse of the rotator cuff. Tennis players who serve overhead and painters who reach upward to paint may commonly experience this injury.
- 2) Bursitis, this typically occurs after an injury or degenerative damage to the rotator cuff.
- 3) Rotator cuff strains or tears. The tendons can overstretch (strain) or tear, partially or completely.

Rotator cuff injuries can be acute or degenerative. Acute injuries are the result of previous injuries. These can be caused by lifting objects that are too heavy, falling, or breaking the collarbone.

Degenerative injuries are due to long-term overuse. People most at risk for these injuries include:

- athletes, particularly tennis players, baseball players, rowers, and wrestlers
- people with jobs that require repetitive lifting, such as painters and carpenters
- people above 40 years of age .

Symptoms:

Common rotator cuff injury symptoms include:

- avoiding certain activities because they cause pain
- difficulty achieving full range of shoulder motion
- difficulty sleeping on the affected shoulder
- pain or tenderness when reaching overhead
- pain in the shoulder, especially at night
- progressive weakness of the shoulder

Management:

Initial treatment involves managing pain and swelling to promote healing-

- NSAID's
- Physical therapy
- Steroids (Ekeberg et al., 2009)
- Surgery, may be used if there are other problems as a large tendon tear.

4. Impingement syndrome

Subacromial impingement of rotator cuff tendons, the long head of biceps and subacromial bursa between the humeral head and structures that make up the coracoacromial arch is among the most frequent problems leading to shoulder pain.

The supraspinatus tendon is the most commonly implicated rotator cuff muscle in shoulder impingement (Buchbinder et al., 2003). It mainly derives its blood supply from the anterior circumflex humeral and suprascapular arteries. Within the supraspinatus tendon, near its insertion at the greater tuberosity, there is an avascular or 'Critical' zone. It is here 'impingement' usually occurs and this zone has been found to increase in area with advancing age (Ling et al., 1990; Lohr and Uthoff, 1990).

Aside from subacromial impingement, other less common forms of shoulder impingement include subcoracoid impingement and internal Impingement.

4.1. Classification of impingement syndrome

Shoulder impingement has been classified into primary and secondary types.

4.1.1. Primary impingement syndrome

Intrinsic causes relate to a problem with the tendon itself which occur secondary to either an acute or chronic processes. The degenerative cuff constitutes the commonest cause of cuff failure and usually occurs in the older individual following a chronic repetitive process.

The shape of the acromion, the attachment of the coracoacromial ligament and changes in the acromioclavicular joint have all been implicated as causes for extrinsic causes of primary shoulder impingement.

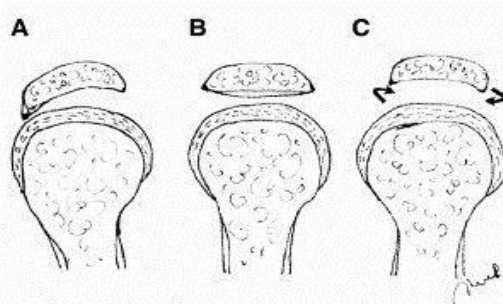
Bigliani Classification:

With regards to the acromion in particular, Bigliani et al. classified the acromion into three categories (Figure 2) with a progressive increase in the incidence of impingement from a type 1 to type 3 acromion.

Type 1: acromion is flat in shape

Type 2: more curved acromion which lies parallel to the humeral head

Type 3: the edge of the acromion is hooked and therefore may impinge on the rotator cuff on elevation of the arm. It has been demonstrated that patients with a type 3 acromion have increased risk of impingement.



Other extrinsic causes include osteophytes under the acromioclavicular joint secondary to osteoarthritis, subacromial bursitis and a thickened coracoacromial ligament, among others. These all reduce the subacromial space and can lead to cuff impingement and failure.

4.1.2. Secondary impingement

Secondary impingement is due to weakness of rotator cuff muscles leading to kinematic uncoupling between the rotator cuff muscles and deltoid. This leads to an abnormal superior translation of the humeral head and mechanical impingement of the rotator cuff on the coracoacromial arch. Patients with secondary impingement are usually younger and often participate in overhead sporting activities such as baseball or swimming.

If left untreated rotator cuff impingement may proceed to partial or complete rotator cuff tendon rupture.

Neer classified subacromial impingement in three stages:

Stage 1: Process of acute inflammation, oedema, and haemorrhage of the rotator cuff conjoint tendon. This stage is usually reversible with conservative treatment alone.

Stage 2: There is a continuation of the process, outlined in stage 1, to a more irreversible form. As the tendon becomes swollen there is increased friction further perpetuating the problem. In this stage, the rotator cuff tendon undergoes fibrosis and tendinitis.

Stage 3: There is mechanical disruption of the rotator cuff tendon in the form of either partial or complete cuff tears. In this stage, changes also occur in the coracoacromial arch such as osteophyte formation, which may also reduce the subacromial space.

5. Adhesive capsulitis of the shoulder (Frozen shoulder)

Adhesive capsulitis of the shoulder is a condition characterised by thickening and contraction of the shoulder joint capsule and surrounding synovium.

The incidence in the general population is thought to be 3-5%. Adhesive capsulitis typically affects women in the 5th to 6th decades of life, although patients with co-morbidities such as diabetes may develop the condition at earlier ages.

Clinical presentation:

Adhesive capsulitis presentation is can be broken into three distinct stages:

1) Freezing - painful stage.

As the symptoms progress, pain worsens and both active and passive range of motion (ROM) becomes more restricted.

It typically lasts between 3 and 9 months and is characterized by an acute synovitis of the glenohumeral joint.

2) Frozen - transitional stage.

Most patients will progress to the second stage. During this stage use of the arm may be limited causing muscular disuse that can last between 4 to 12 months.

There is diminishing motions with external shoulder rotation being the most limited, followed closely by shoulder flexion, and internal rotation,there eventually becomes a point in the frozen stage that pain does not occur at the end of ROM.

3) Thawing stage.

It begins when ROM begins to improve,lasts anywhere from 12 to 42 months and is defined by a gradual return of shoulder mobility.

Pathology:

Adhesive capsulitis is divided into two main types:

1) Primary or idiopathic

2) Secondary

Primary or idiopathic adhesive capsulitis refers to patients who develop the condition in the absence of preceding trauma.

Secondary adhesive capsulitis, on the other hand, may result from a number of antecedent conditions, including: major or minor repetitive trauma,surgery,endocrine (e.g. diabetes) or rheumatological conditions

Adhesive capsulitis is typically a self-limiting disease that improves over 1-2 years. Treatment options include:

-physiotherapy

-corticosteroid injections

-glenohumeral hydrodilatation

-closed manipulation under anesthesia

-arthroscopic capsular release with lysis of adhesions

6. Acromioclavicular joint disorders

Osteoarthritis – joints become painful and stiff, and is the most common cause of acromioclavicular joint disorders, tearing or stretching the ligaments in the acromioclavicular joint.

Symptoms of acromioclavicular joint disorder include:

- pain in the joint
- limited movement of the joint
- pain on the top of the shoulder

Acromioclavicular disorders usually resolve with rest and simple analgesia, unless significant traumatic dislocation is present. If symptoms persist, a local steroid injection may help.

7. How to evaluate shoulder pain

History:

- Onset, characteristics, and functional impact of shoulder pain?
- Dominant/non-dominant hand?
- Is pain at rest, on movement, or both?
- Is pain present at night?
- Does the pain affect sleeping position?
- Any neck, thoracic, or other upper limb pain?
- History of acute trauma, shoulder pain, or instability (joint dislocates or concern that might dislocate during certain movements)?
- Occupation and sporting activities?
- Other joints affected?
- Systemic symptoms of illness (fever, weight loss, rash, respiratory symptoms)?
- Significant comorbidity (diabetes; stroke; cancer; respiratory, gastrointestinal, or renal disease; ischaemic heart disease; psoriasis)?
- Current drug treatment and adverse drug reactions?

Examination:

- Examine neck, axilla, and chest wall
- Assess range of movement of cervical spine
- Inspect shoulders for swelling, wasting, and deformity.
- Palpate sternoclavicular, acromioclavicular, and glenohumeral joints for tenderness, swelling, warmth, and crepitus.
- Compare power, stability, and range of movement (active, passive, resisted) of both shoulders.
- Look for painful arc (70-120° active abduction)
- Test passive external rotation
- “Drop arm test”

8. Red flag indicators

- History of cancer; symptoms and signs of cancer; unexplained deformity, mass, or swelling: ? tumour.
- Red skin, fever, systemically unwell: ? infection
- Trauma, epileptic fit, electric shock; loss of rotation and normal shape: ? unreduced dislocation.
- Trauma, acute disabling pain and significant weakness, positive drop arm test: ? acute rotator cuff tear.
- Unexplained significant sensory or motor deficit: ? neurological lesion.

9. Plain radiography

- AP
- Lateral
- Axillary views.

Initial investigation of choice for all shoulder problems.

- Fractures
- Dislocations
- Calcific tendonitis
- Arthritis and
- Bone tumour.

Impingement views in clinically suspected impingement syndrome and/or rotator cuff tears to detect subacromial spur.

10. Ultrasonography

Ultrasound (US) has been widely used for the evaluation of the shoulder, as it is a dynamic scan.

It has high accuracy in the detection and staging of full-thickness rotator cuff tears, but less sensitive in partial-thickness tears (Alan et al., 1994; Arun, 2007).

Useful in guiding aspiration of calcium deposits or bursal injections.

Limitations:

User-dependent

Less sensitive in detecting partial thickness rotator cuff tears (Cullen et al., 2007).

-Cannot accurately evaluate the labral-ligamentous complex and other deep shoulder structures.

Advantages: no ionising radiation, non-invasive, no contrast agent, relatively inexpensive, readily available.

The examination of different structures should include both longitudinal and transverse scanning planes, followed by dynamic and bilateral evaluation.

USG can detect-

- Tears
- Partial thickness Tear
- Full thickness Tear
- Peribicipital Fluid
- Bursal Fluid
- ACJ Hypertrophy
- Calcification
- Impingement

11. Magnetic resonance imaging (MRI)

MRI is the imaging modality of choice for assessment of shoulder pain.

Multipolar images can be obtained in the axial, oblique coronal and oblique sagittal planes.

STIR images:

- water gives bright signal.
- allows evaluation of marrow pathology.

Gradient echo:

- intermediate fat signal and intermediate to bright water signal.
- for evaluation of articular cartilage and blood as well as calcification.

Proton density:

- intermediate to high fat signal and intermediate water signal.
- high resolution for evaluation of labral tears, but poor evaluation of marrow.

Demonstrates lesions as:

- Rotator cuff tears and assessment of muscle.
- Acromioclavicular joint osteoarthritis.
- Occult fractures.

- Avascular necrosis.
- Comprehensive display of soft tissue anatomy.
- Demonstration of the causes for impingement.
- Useful in characterisation and staging of bone tumours.

Advantages:

No ionising radiation.

Non-invasive.

MRI can detect:

- Tears
 - Partial thickness Tear
 - Full thickness Tear
- Peribicipital Fluid
- Bursal Fluid
- ACJ Hypertrophy
- Acromion lesions
- Labral Tears
- Bony changes
- Bone marrow edema, etc

12. Computed tomography

CT of the shoulder may be useful in complex fracture-dislocation injuries of the shoulder, as a pre-surgical tool.

Superior to plain radiographs in evaluation of complex fractures and fracture-dislocations involving the head of the humerus.

Allows planning of treatment of complex proximal humeral fractures.

References

- Alan, D., Massengill, Leanne, L., Seege, Lawrence, Y., Amilcare Gentili, Ronald, C., Shnier, Matthew, S., Shapiro, Richard, H., Gold. 1994. Labrocapsular ligamentous complex of the shoulder: Normal Anatomy, Anatomic Variation and Pitfalls of MR Imaging and MR Arthrography. *Radiographics*. 14.
- Arun Kinare, 2007. Musculoskeletal ultrasound symposium. *Indian. J. Radiol. Imaging*. 17(3), 194-200.
- Bigliani, L.U., Ticker, J.B., Flatow, E.L., Soslowsky, L.J., Mow, V.C., 1991. The relationship of acromial architecture to rotator cuff disease. *Clin. Sport. Med.* 10(4), 823-38.
- Bodin, J., Ha, C., Petit Le Manac'h, A., Sérazin, C., Descatha, A., 2012. Risk factors for incidence of rotator cuff syndrome in a large working population. *Scand. J. Work. Environ. Health.* 38(5), 436-446.
- Buchbinder, R., Green, S., Youd, J.M., 2003. Corticosteroid injections for shoulder pain. *Cochrane Database Syst. Rev.* 1, CD004016.
- Cullen, D.M., Breidahl, W.H., Janes, G.C., 2007. Diagnostic accuracy of shoulder ultrasound performed by a single operator. *Aust. Radiol.* 51, 226-229.
- Ekeberg, O.M., Bautz-Holter, E., Tveita, E.K., Juel, N.G., Kvalheim, S., Brox, J.I., 2009. Subacromial ultrasound guided or systemic steroid injection for rotator cuff disease: randomised double blind study. *BMJ.* 338, a3112.
- Greving, K., Dorrestijn, O., Winters, J., 2012. Incidence, prevalence, and consultation rates of shoulder complaints in general practice. *Scand. J. Rheumatol.* 41, 150-155.
- Ling, S.C., Chen, C.F., Wan, R.X., 1990. A study on the vascular supply of the supraspinatus tendon. *Surg. Radiol. Anat.* 12(3), 161-5.
- Lohr, J.F., Uhthoff, H.K., 1990. The microvascular pattern of the supraspinatus tendon. *Clin. Orthop. Relat. Res.* (254), 35-8.
- Neer, C.S., 1972. Anterior acromioplasty for chronic impingement syndrome of shoulder. *J. Bone. Joint. Surg.* 54A, 41-50.

- Sammarco, V.J., 2000. Os acromiale: Frequency, anatomy, and clinical implications. *J. Bone. Joint. Surg. Am.* 82, 394-400.
- Tekavec, 2012. *BMC musculoskeletal disorders.* 13, 238. <http://www.biomedcentral.com/1471-2474/13/238>.
- van der Windt, D.A., Koes, B.W., de Jong, B.A., Bouter, L.M., 1995. Shoulder disorders in general practice: incidence, patient characteristics, and management. *Ann. Rheum. Dis.* 54, 959–964.

How to cite this article: Agrawal, A., Tripathi, P., Shukla, P., 2015. Shoulder pain. *Scientific Journal of Medical Science*, 4(3), 405-412.

Submit your next manuscript to Sjournals Central and take full advantage of:

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in CABI, DOAJ, and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at
www.sjournals.com

Sjournals
Scientific Journals