

A Viewpoint on Clinical Approach towards Assessment of Chronic Shoulder Pain

Muhammad Shahid Khan¹, Denny Tijauw Tjoen Lie², Andrew Tan Hwee Chye³, Wael Azzam⁴

¹ Assistant Professor, Department of Orthopaedics, Isra University, Hyderabad, Pakistan.

³ Associate Professor & HOD, Department of Orthopaedics, Singapore General Hospital, Singapore.

² Associate Professor, Department of Orthopaedics, Singapore General Hospital, Singapore.

⁴ Assistant Professor, Department of Orthopaedic Surgery, Faculty of Medicine, Tanta University, Tanta, Egypt.

Author's Contribution

^{2,3} Conception of study

^{2,3} Experimentation/Study conduction

^{2,3} Analysis/Interpretation/Discussion

^{1,4} Manuscript Writing

^{1,2,3,4} Critical Review

Corresponding Author

Dr. Muhammad Shahid Khan,

Assistant Professor,

Department of Orthopaedics,

Isra University,

Hyderabad, Pakistan.

Email: khan.shahid1945@gmail.com

Article Processing

Received: 16/10/2021

Accepted: 03/12/2021

Cite this Article: Khan, M.S., Lie, D.T.T., Chye, A.T.H., Azzam, W. A Viewpoint on Clinical Approach towards Assessment of Chronic Shoulder Pain. *Journal of Rawalpindi Medical College*. 31 Dec. 2021; 25(4): 552-559.

DOI: <https://doi.org/10.37939/jrmmc.v25i4.1814>

Conflict of Interest: Nil

Funding Source: Nil

Access Online:



Abstract

Introduction: The shoulder joint offers a wide range of motion and therefore pathologies leading to restriction of its movements affect the routinely performed activities. Symptoms of the shoulder pathologies are often overlapping and usually are not specific to a certain pathology. Lack of consensus for the diagnostic criteria for different shoulder pathologies may lead to difficulty in selecting appropriate treatment options by the physician. This viewpoint proposes that with a targeted history, related clinical examination, and appropriate investigations, still a diagnostic algorithm can be made to conclude a diagnosis.

Material and Methods: Landmark studies on history and examination of shoulder joints were searched and identified. The databases utilized for finding the articles were Google Scholar and PubMed.

Conclusion: Symptoms of different shoulder pathologies are quite overlapping. However, with a comprehensive history, a diagnostic approach can be made by carefully digging out the proportion of a symptom in a patient's existing problem. Based on this dominant clinical finding, a differential diagnosis can be made which can then be further fine-tuned with the help of clinical examination including special provocative tests and appropriate investigations, if needed. As initial conservative management is common in most shoulder pathologies it can be started in a primary care facility with referral to a higher level of care if the patient is non-responsive.

Keywords: Shoulder pain, Differential diagnosis, orthopedic special tests.

Introduction

The shoulder joint is very versatile with regard to its mobility and therefore decrease in its arc of motion may lead to deleterious effects on the functional ability of the arm with regard to the performance of activities of daily living. Shoulder pain accounts for around 16 percent of all musculoskeletal complaints and it is the third most common cause of bone and joints consultation in primary care.¹

Shoulder problems can be divided into six major diagnostic categories including rotator cuff tendinosis, rotator cuff tears, adhesive capsulitis, glenohumeral osteoarthritis, glenohumeral instability, and acromioclavicular joint pathology. Symptomatology of the shoulder can be broadly divided into pain, weakness, stiffness, and instability. However, each of these symptoms is not specifically related to a separate pathology, instead, a symptom can be present in different pathologies. With a comprehensive history, still, a diagnostic algorithm can be made by carefully digging out the proportion of a symptom (Table 1) in different pathologies. Based on the dominant clinical finding, a differential diagnosis can be made (Table 2) which can then be further fine-tuned with the help of clinical examination including special provocative tests^{2,3,4} (Table 3) and appropriate investigations.

This article is targeted at undergraduate and postgraduate medical students. With the help of landmark studies on the assessment of chronic painful shoulder, the manuscript describes different points in history and clinical examination and helps the reader to come up with a diagnosis.

Materials and Methods

Landmark studies on the history and examination of shoulder joints were searched and identified. The databases utilized for finding the articles were Google Scholar and PubMed.

Table 1: Major shoulder pathologies and their characteristic symptoms²⁻⁸

<i>Shoulder pathologies</i>	<i>Main shoulder symptoms</i>			
	Pain	Weakness	Stiffness	Instability
Rotator Cuff Tendinosis	+++	+	+	-

Rotator Cuff tear					
• Small to medium	++	+	+/-	-	
• Massive	+	+++	+	+/-	(Pseudo)
Frozen shoulder	+	-	+++	-	
Glenohumeral osteoarthritis	++	-	++	-	
Acromioclavicular joint osteoarthritis	++	-	-	-	
Glenohumeral instability	+/-	-	-	+++	

Table 2: Integrated approach towards differential diagnosis based on dominant clinical findings²⁻⁸

<i>Dominant clinical finding</i>	<i>Differential diagnosis</i>
Stiffness	<ul style="list-style-type: none"> • Classical frozen shoulder • Tendinosis • Impingement syndromes • Early capsulitis • Partial rotator cuff tear
Pain	
Weakness	<ul style="list-style-type: none"> • Large to massive rotator cuff tear
Instability	<ul style="list-style-type: none"> • Shoulder instability disorders

Results

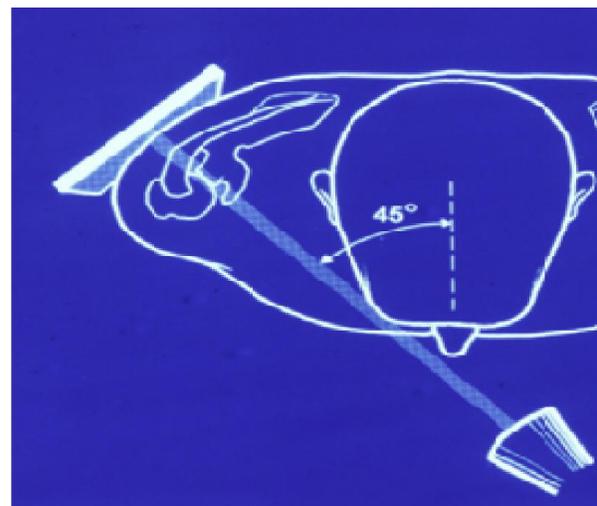


Figure 1: Radio-graphing anteroposterior view of the shoulder

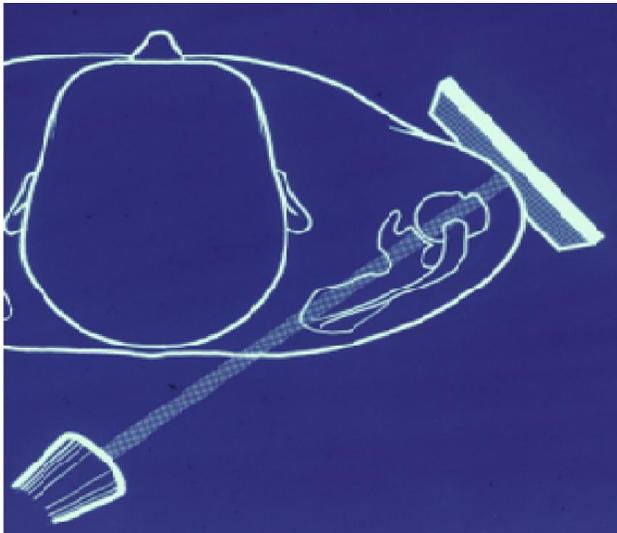


Figure 2: Radio-graphing Y-scapular view of the shoulder

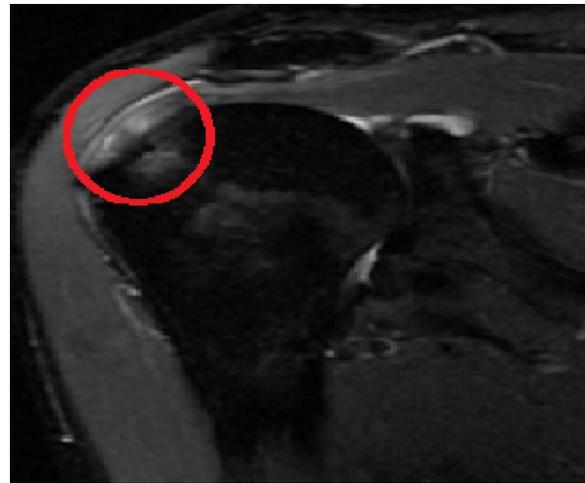


Figure 4: MRI image showing supraspinatous tendinosis

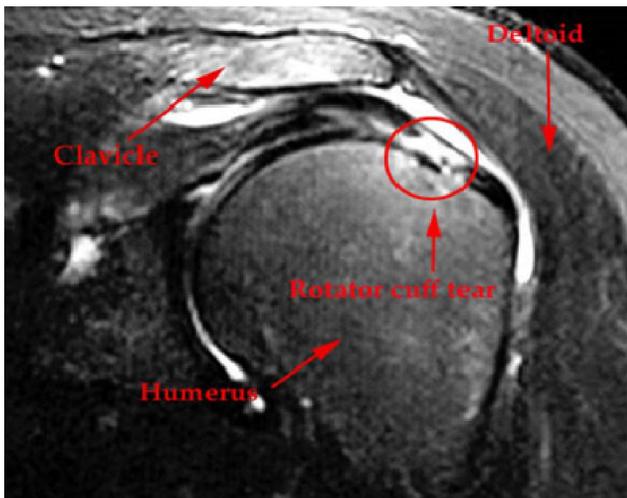


Figure 3: MRI image showing supraspinatous tear

Table 3: Provocative tests for different shoulder pathologies

Pathology & Test name	Sensitivity & Specificity	How to perform
Anterior glenohumeral instability		
Anterior apprehension ²	Sens 65.6 Spec 95.4	The test is considered positive if the patient complains of pain or apprehension when the patient’s elbow is flexed to 90° along with 90-degree shoulder abduction and rotating the shoulder externally followed by application of an anterior force from the posterior aspect of the shoulder.
Surprise test ²	Sens 81.8 Spec 86.1	With the patient in a supine position, an anterior force is applied to the shoulder with the patient’s arm in 90 degrees of abduction, 90 degrees of elbow flexion with maximum external rotation of the shoulder. Release of anterior force to the shoulder with resultant pain or apprehension indicates a

		positive test.
Bony apprehension ²	Sens 94 Spec 84	While standing behind the patient, the examiner grasps the patient's supraclavicular region with one hand and the forearm with the other hand. While flexing the patient's elbow to 90 degrees, abduct and externally rotate the shoulder to 45 degrees. A positive test is indicated by pain or apprehension in this position.
Olecranon manubrium percussion ²	Sens 84 Spec 99	The patient is asked to cross both arms with elbows flexed to 90 degrees. Percuss the olecranon while listening to the sound over the patient's manubrium with the help of a stethoscope. Repeat the procedure with percussion on the opposite olecranon. A positive test is indicated by a difference in the quality of sound on the affected versus unaffected side.
Rotator Cuff Tendinosis		
Supraspinatous pathology		
Empty can or Jobe's test ²	Sens 81 Spec 89	Patient's arms are abducted to 90 degrees and forward flexed 30 degrees with their elbow extended and thumbs facing downward. The examiner applies downward force over the forearm while the patient is asked to resist this. A positive test is indicated by the weakness of the affected shoulder in comparison to the opposite side
Painful arc ²	Sens 53 Spec 76	A positive test is characterized by complaints of pain between 60 and 120 degrees of abduction and reduction in pain once past 120 degrees of abduction
Supscapularis pathology		
Modified belly press test ²	Sens 86 Spec 91	Patient is asked to keep the hand flat on the abdomen and the elbow close to the body. While keeping the hand on the abdomen, the patient is instructed to bring the elbow forward and straighten the wrist. Flexion angle of the wrist or belly-press angle is measured by a goniometer. An angle difference of at least 10 degrees from the normal side is considered a positive test.
Lift off test ²	Sens 6-69 Spec 23-84	The patient, in the standing position, is asked to place the hand behind their back with the dorsum of the hand touching the back. The patient is instructed to raise the hand away from the back by increasing internal rotation of the humerus and extension at the shoulder. A positive test is indicated by the inability to move the dorsum of the hand away from the back.
Napoleon test ³	Sens 41 Spec 80	The patient is asked to place the hand on the belly. The test is graded as: <ul style="list-style-type: none"> • negative (or normal) if the patient can push the hand against the belly with the wrist straight • positive, if the wrist was flexed to 90° to push against the belly • Intermediate, if the wrist is flexed from 30° to 60° to do the belly press.
Bear hug ³	Sens 75 Spec 56	The patient is asked to place the palm (with fingers extended) of the involved arm on the opposite shoulder while keeping the elbow anterior to the body.

Infraspinatus and Teres minor pathology	Sens 76 Spec 57	The patient is then instructed to hold that position (resisted internal rotation) while the examiner tries to pull the patient's hand away from the shoulder with an external rotation force. A positive test is indicated by the inability to maintain the hand position against the shoulder.
Resisted external rotation test ⁴	Sens 76 Spec 57	The patient's arms are kept by his or her side in neutral flexion and abduction. The patient is instructed to rotate the shoulders externally up to 45 to 60 degrees. The examiner applies force over the dorsum of the hands thereby trying to rotate the shoulders internally while the patient is asked to resist. A positive test is indicated by pain and weakness.
Impingement syndrome	Sens 80 Spec 56	The patient's arm is forward flexed to 90 degrees followed by elbow flexion to 90 degrees as well then the shoulder is internally rotated. This leads to greater tuberosity impingement under the coracoacromial ligament. A positive test is indicated by pain.
Hawkin's Kennedy test ²	Sens 80 Spec 56	The patient's arm is forward flexed to 90 degrees followed by elbow flexion to 90 degrees as well then the shoulder is internally rotated. This leads to greater tuberosity impingement under the coracoacromial ligament. A positive test is indicated by pain.
Neer test ²	Sens 72 Spec 60	While stabilizing the scapula, the examiner raises the affected arm is forces forward elevation, resulting in the greater tuberosity impingement against the acromion. A positive test is indicated by pain.
Acromioclavicular joint pathology	Sens 57 Spec 96	While standing behind the patient, the examiner grasp the patient's arm and passively flex the patient's shoulder to 90 degrees followed by maximally adducting the patient's shoulder thereby bringing it across the patient's body towards the opposite shoulder. A positive test is indicated during the adduction motion of localized pain over the acromioclavicular joint.
cross-body adduction test ²	Sens 57 Spec 96	While standing behind the patient, the examiner grasp the patient's arm and passively flex the patient's shoulder to 90 degrees followed by maximally adducting the patient's shoulder thereby bringing it across the patient's body towards the opposite shoulder. A positive test is indicated during the adduction motion of localized pain over the acromioclavicular joint.
Glenohumeral osteoarthritis	Sens 91 Spec 57	The patient is instructed to abduct both arms to 90° in the plane of the body and to maintain this position for short time. A positive test is indicated by elevation of the whole scapula to lift the arm to 90°.
Shoulder shrug test ²	Sens 91 Spec 57	The patient is instructed to abduct both arms to 90° in the plane of the body and to maintain this position for short time. A positive test is indicated by elevation of the whole scapula to lift the arm to 90°.
Adhesive capsulitis /Frozen shoulder	Sens 95 Spec 50	As described above
Shoulder shrug test ² Labral pathologies	Sens 95 Spec 50	As described above
Crank test ² (also known as Compression rotation test / O'Brian's test)	Sens 34 Spec 75	The patient is asked to flex the shoulder to 90° then do 10° of horizontal adduction followed by maximum internal rotation of the shoulder while keeping the elbow in full extension. The patient is instructed to resist a downward force applied by the examiner. The same maneuver is repeated while keeping the shoulder and forearm in a neutral position. A positive test is characterized by pain or clicking in the shoulder with initial position and

		reduced or no symptoms with the second position.
Speeds test ²	Sens 20 Spec 78	Patient is instructed to forward flex the shoulder to 90 degrees while keeping the elbow extended and the forearm supinated. The patient is then asked to maintain this position while the examiner applies the resistance to the forearm. A positive is indicated by pain localized to the bicipital groove.
Bicep tendinopathy		
Speed test ²	Sens 49-71 Spec 60-85	As above
Yergason's test ²	Sens 14-75 Spec 78-89	The patient is instructed to flex the elbow to 90 degrees and keep the forearm pronated. The patient is then asked to actively supinate the forearm while the examiner attempts to resist this by applying an internal rotation force to a patient's wrist. A positive is indicated by pain localized to the bicipital groove.

Discussion

I. History

As in other pathologies, a detailed history is of utmost importance and this includes the patient's age, pain characteristics, profession, sports involvement, history of trauma, and comorbid conditions.

A patient's age may give us a clue regarding possible pathology. Shoulder instability and mild rotator cuff problems are common in age less than 40 years while adhesive capsulitis, moderate to severe cuff pathologies, and shoulder joint osteoarthritis are more likely after the age of 40. Pain characteristics including onset, location, duration, progression, radiation, aggravating and relieving factors are determined. Pain localized to the lateral shoulder area is usually due to rotator cuff problems while acromioclavicular osteoarthritis usually presents with pain mainly over the anterior shoulder or over the AC joint itself. Pain over the anterior aspect of the shoulder with radiation distally over the anterior aspect of the arm along bicep muscle may indicate bicep tendinopathy. Symptoms progression may point to specific shoulder pathology like adhesive capsulitis which typically show a progressive pattern of three distinct stages of pain (freezing), stiffness (frozen), and recovery (thawing).⁵ Professional history or sports involvement requiring overhead activities favors the likelihood of rotator cuff pathology whereas history of trauma, contact sports, or weight lifting points more towards acromioclavicular or glenohumeral osteoarthritis. History of previous shoulder surgery is important as it may lead to secondary adhesive capsulitis or early glenohumeral osteoarthritis. Inflammatory arthritis,

diabetes, and thyroid disorders may affect the shoulder as well so systemic inquiry regarding these problems is important.^{6,7} Night pain and sleep disturbance are common in patients with rotator cuff tears.⁸

II. Physical Examination

The physical examination can be divided into inspection, palpation, range of motion followed by special provocative tests to further narrow down the differential diagnosis.

After adequate exposure, the shoulder is inspected for scar marks, atrophy of muscles, deformity, and symmetry of both shoulders. Palpate and try to localize the tenderness which could be over the acromioclavicular joint, bicipital groove, and lateral aspect of the shoulder. Range of motion (ROM) is assessed in all directions including flexion, extension, abduction, internal rotation, and external rotation. Passive range of motion need not be performed if the patient can perform a full active range of motion. Adhesive capsulitis is characterized by loss of both active and passive range of motion. In rotator cuff pathology, active ROM is affected more and passive ROM is relatively preserved. Typically in rotator cuff disease, abduction is painful between 60 to 100 degrees which is known as a painful arc sign.⁹

III. Provocative tests

Keeping in mind the differential diagnosis based on history and clinical examination, provocative tests are performed. These tests are meant to reproduce the symptoms by performing some specific maneuvers. Combinations of these tests provide better accuracy in contrast to performing any single test to come up with

a diagnosis.² Relevant provocative tests with regard to a suspected pathology are described in Table 3.

IV. Diagnostic imaging

To further narrow down the differential diagnosis, relevant investigations are done to come up with a definitive diagnosis.

Radiographs (Figure 1-2) are usually considered first-line investigations for chronic shoulder pain. With a background history of trauma, radiographs may show evidence of bony injuries. They may show findings of osteoarthritis of the glenohumeral and acromioclavicular joints. Secondary signs of massive rotator cuff tear may be seen which include superior migration of the humeral head and sclerosis of the undersurface of the acromion.

Rotator cuff tendinosis and tears can be detected by ultrasonography. In contrast to MRI, it is a dynamic assessment that is relatively less expensive, has better patient tolerance but is highly operator dependent.¹⁰ It has a reported sensitivity of 67% for partial-thickness rotator cuff tear and 97% for full-thickness rotator cuff tear. Its specificity for partial-thickness rotator cuff tear is 94% and for full-thickness, rotator cuff tear is 96%.¹⁰ Although expensive, the use of magnetic resonance imaging (MRI) is increasingly becoming the non-invasive diagnostic modality of choice for detecting soft tissue problems around the shoulder including rotator cuff (Figure 3 and 4), bicep long head, and labral pathologies. It is the preferred test for diagnosing rotator cuff disorders.¹⁰ Reported sensitivity of MRI is 44% for partial-thickness rotator cuff tear and 89% for full-thickness rotator cuff tear with the specificity of 90% for partial-thickness rotator cuff tear and 93% for full-thickness rotator cuff tear.¹⁰ The CT scan is usually reserved to detect bony pathologies or bone stock of the shoulder, including glenohumeral instability with associated bone loss of the humeral head or the glenoid, osteoarthritis with significant erosion, occult fractures, and neoplasms.

V. Management

Typical impingement syndromes and partial-thickness rotator cuff tear are initially managed with conservative treatment of at least six months. Management consists of education regarding daily activity modification, physiotherapy, anti-inflammatory medications, and if needed subacromial corticosteroid injection. Failure to respond to this regimen needs a referral for a surgical opinion.¹¹

Rotator cuff tears involving less than 50% of the tendon thickness are usually treated arthroscopically by debridement, subacromial decompression, and acromioplasty. Repair of the rotator cuff tear is done if

the tear involves more than 50% of the tendon thickness. This can be done arthroscopically or through a mini-open approach.

Full-thickness rotator cuff tears which are clinically symptomatic, especially in the young age group, should be surgically repaired as early as possible because later repair may be more difficult to perform.¹²

Massive irreparable rotator cuff tears, especially in the elderly, can be treated by debridement, subacromial decompression, and biceps tenotomy with good pain relief.

Management of degenerative conditions such as glenohumeral arthritis or rotator cuff tear arthropathy is generally initiated with conservative management including anti-inflammatory medications and physical therapy. Failure to respond to conservative management is an indication for shoulder joint replacement surgery. Non-operative management is not, however, mandatory if severe arthritic changes are present on radiographs, as the chances of long-term symptom relief are negligible.¹³

For adhesive capsulitis, there is no consensus in the literature regarding which treatment modality; like non-operative, operative, or combined; is superior to others. There is a general consensus about non-operative management as the initial treatment of choice for adhesive capsulitis, which includes physical therapy, anti-inflammatory medications, and corticosteroid injections. Operative treatment is indicated if a conservative treatment trial of 6 months fails to provide symptom relief.¹⁴

Acromioclavicular osteoarthritis usually responds to activity modification, anti-inflammatory medications, and if needed local steroid injection.¹⁵ Failure to respond to conservative measures warrants operative treatment and resection of the distal one cm of the clavicle is often effective in relieving pain symptoms.^{16,17}

In the literature, there is little support for nonoperative treatment for patients with glenohumeral joint instability, so early surgical referral is recommended in this group of patients.¹⁵

Conclusion

Symptoms of different shoulder pathologies are quite overlapping. However, with a comprehensive history, a diagnostic approach can be made by carefully digging out the proportion of a symptom in a patient's existing problem. Based on this dominant clinical finding, a differential diagnosis can be made which

can then be further fine-tuned with the help of clinical examination including special provocative tests and appropriate investigations, if needed. As initial conservative management is common in most shoulder pathologies it can be started in a primary care facility with referral to a higher level of care if the patient is non-responsive.

References

1. Urwin M, Symmons D, Allison T, et al. Estimating the burden of musculoskeletal disorders in the community: the comparative prevalence of symptoms at different anatomical sites, and the relation to social deprivation. *Annals of the rheumatic diseases*. 1998 Nov 1;57(11):649-55. DOI: 10.1136/ard.57.11.649
2. Hegedus EJ, Goode AP, Cook CE, et al. Which physical examination tests provide clinicians with the most value when examining the shoulder? Update of a systematic review with meta-analysis of individual tests. *Br J Sports Med*. 2012 Nov 1;46(14):964-78. DOI: 10.1136/bjsports-2012-091066
3. Schiefer M, Ching-San Júnior YA, Silva SM, et al. Clinical diagnosis of subscapularis tendon tear using the bear hug semiological maneuver. *Revista Brasileira de Ortopedia (English Edition)*. 2012 Sep 1;47(5):588-92. DOI: 10.1016/S2255-4971(15)30008-2. eCollection Sep-Oct 2012.
4. Beaudreuil J, Nizard R, Thomas T, et al. Contribution of clinical tests to the diagnosis of rotator cuff disease: a systematic literature review. *Joint Bone Spine*. 2009 Jan 1;76(1):15-9. DOI: 10.1016/j.jbspin.2008.04.015. Epub 2008 Dec 6.
5. Reeves B. The natural history of the frozen shoulder syndrome. *Scandinavian journal of rheumatology*. 1975 Jan 1;4(4):193-6. DOI: 10.3109/03009747509165255
6. Cakir M, Samanci N, Balci N, et al. Musculoskeletal manifestations in patients with thyroid disease. *Clinical endocrinology*. 2003 Aug;59(2):162-7. DOI: 10.1046/j.1365-2265.2003.01786.x
7. Smith LL, Burnet SP, McNeil JD. Musculoskeletal manifestations of diabetes mellitus. *British journal of sports medicine*. 2003 Feb 1;37(1):30-5. DOI: 10.1136/bjism.37.1.30.
8. Austin L, Pepe M, Tucker B, et al. Sleep disturbance associated with rotator cuff tear: correction with arthroscopic rotator cuff repair. *The American journal of sports medicine*. 2015 Jun;43(6):1455-9. DOI: 10.1177/0363546515572769. Epub 2015 Mar 16.
9. Burbank KM, Stevenson JH, Czarnecki GR, et al. Chronic shoulder pain: part I. Evaluation and diagnosis. *American family physician*. 2008 Feb 15;77(4). doi 2008 Feb 15;77(4):453-60.
10. Dinnes J, Loveman E, McIntyre L, et al. The effectiveness of diagnostic tests for the assessment of shoulder pain due to soft tissue disorders: a systematic review. *Health Technol Assess*. 2003;7(29):iii, 1-166. DOI: 10.3310/hta7290.
11. Gartsman GM. (iii) Partial thickness rotator cuff tears—evaluation and treatment. *Current Orthopaedics*. 2000 May 1;14(3):167-72. DOI: 10.1054/cuor.2000.0103
12. Safran O, Schroeder J, Bloom R, et al. Natural history of nonoperatively treated symptomatic rotator cuff tears in patients 60 years old or younger. *The American journal of sports medicine*. 2011 Apr;39(4):710-4. DOI: 10.1177/0363546510393944. Epub 2011 Feb 10.
13. Michael Codsì, Chris R. Howe. *Shoulder Conditions Diagnosis and Treatment Guideline*. *Physical medicine and rehabilitation clinics*. 2015; 26(3):467-206. DOI: https://doi.org/10.1016/j.pmr.2015.04.007
14. Yip M, Francis AM, Roberts T, et al. Treatment of Adhesive Capsulitis of the Shoulder: A Critical Analysis Review. *JBJS reviews*. 2018 Jun 1;6(6):e5. DOI: 10.2106/JBJS.RVW.17.00165.
15. Hossain S, Jacobs LG, Hashmi R. The long-term effectiveness of steroid injections in primary acromioclavicular joint arthritis: a five-year prospective study. *Journal of shoulder and elbow surgery*. 2008 Jul 1;17(4):535-8. DOI: 10.1016/j.jse.2007.12.001
16. Montellesse P, Dancy T. The acromioclavicular joint. *Primary Care: Clinics in Office Practice*. 2004 Dec 1;31(4):857-66. DOI: 10.1016/j.pop.2004.07.011.
17. Rabalais RD, McCarty E. Surgical treatment of symptomatic acromioclavicular joint problems: a systematic review. *Clinical Orthopaedics and Related Research®*. 2007 Feb 1;455:30-7. DOI: 10.1097/BLO.0b013e31802f5450.