



The Challenging Diagnosis of Shoulder Pain: A Workable Evaluation Algorithm for The Clinic

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ABSTRACT

Shoulder pain is common and can have a negative impact on physical and social life of a person significantly. It is important to differentiate the exact site of shoulder pathology for the appropriate management. Though arthroscopy is known to be the gold standard clinical tests, plain radiograph, MRI and ultrasound are the usual diagnostic modalities for examination of the shoulder. Aim: In our study we evaluated two easily available modalities viz. clinical examination and ultrasound exam for accurate diagnosis of shoulder impingement and periarthritis in the clinic. We compared performance of both tests with arthroscopy used as gold standard. Results: We included 32 patients of which 21 were diagnosed as impingement and 11 were diagnosed as periarthritis. Of these 10 underwent arthroscopy. Conclusion: We can conclude that clinical evaluation and ultrasound can be used effectively for diagnosis of most shoulder pathologies except for humeral head and glenoid lesions which are best detected by arthroscopy only. This is of significance in a developing country like India where time and cost effectiveness is desirable.

KEYWORDS

Shoulder pain, Impingement syndrome, Periarthritis, Ultrasound, Arthroscopy.

Introduction: Shoulder pathology would almost always present with similar symptoms of pain restriction in overhead abduction. It becomes essential to diagnose the cause as the diagnosis would impact treatment. Most common diagnoses include impingement tendinitis, cuff tear, adhesive capsulitis.

Status of diagnosis of shoulder pathologies: Clinical examination –there are myriad of tests available for the clinician to accurately evaluate the shoulder pain. These tests however would require skills and time. However the ease to perform them right there and to be able to study dynamics of patient biomechanics offer a great advantage in a co-operative patient. Of the currently available radiological modalities MRI is the most accepted modality due to the advantages of non-ionizing radiation, non-invasiveness and exquisite detailing of soft tissue, which helps in very early detection of lesions. However, cost, presence of implants, claustrophobia and patient co-operation remain the limitation to use of MRI in certain situations. Ultrasound of the shoulder being a non-invasive, cost effective modality which can also provide dynamics of the shoulder to the operator remains underutilized in most clinics due to operator dependence and probably lack of acceptance. Arthroscopy however remains the gold standard providing the orthopaedic surgeon a real-time view of the shoulder, involves minimal morbidity and has the advantage of offering a therapeutic procedure simultaneously.

Aim: In this study we compare assessment of shoulder pain with Clinical methods and Ultrasound examination, compare it with the gold standard (Arthroscopy) and highlight the advantages of each. This would help build a guide map in evaluation of shoulder pain.

Materials and Methods:

Patients with shoulder pain with clinical suspicion of shoulder impingement or periarthritis were included in the study. Patients with primary instability, recent trauma, shoulder surgery, associated cervical pain, isolated acromioclavicular or sternoclavicular pain were excluded. All patients underwent a detailed clinical examination (including Impingement tests, strength tests and instability tests) and a high resolution ultrasonographic examination by the radiologist. High resolution

short focus linear array transducer (7.5MHz) was used. Patients were then started on supervised physiotherapy and non-steroidal anti-inflammatory drugs. Patients not responding favourably to the treatment were subjected to arthroscopy under general anaesthesia and therapeutic intervention if required.

Results: Study included 32 patients between ages of 21-70 years. 27 patients were >40 years old. Of these 10 patients underwent arthroscopic examination. 11 were diagnosed as periarthritis and 21 as impingement (Table 1 about here).

Of the 32 patients done 11 patients were of periarthritis and 21 patients were of impingement syndrome. The patients of periarthritis were found to be in the age group of 42-65 years and that of impingement syndrome was found to be in range of 24 to 60 years. The difference in the age group was found to be statically significant. We observed that 81.8% and 71.43% of the patients of periarthritis and impingement presented to outdoor clinic within 3 months of onset of symptoms. It was observed that pain on overhead abduction was a common symptom in both the pathology but pain at deltoid insertion and inability to sleep on affected side was more common in periarthritis shoulder. In our group it was observed that diabetes and history of trauma was significantly associated with periarthritis shoulder ($p=0.0058$ for diabetes and $p=0.29$ in cases of trauma)

For the diagnosis of impingement syndrome, clinical diagnosis on the basis of Neer’s impingement test (sensitivity 66.7%, specificity-50%), Hawkin’s test (sensitivity 83.3%, specificity-50%), painful arc sign (sensitivity 100%, specificity-50%) were done. Diagnosis of periarthritis was done on the basis of degree of external rotation test and it was observed that 72.73% of the patients of periarthritis were found to have external rotation of <200 .

Our observations on comparing clinical examination with ultrasound examination keeping arthroscopic examination as gold standard were as follows (Table 2) : In biceps tendon pathology Yergason’s test was found to be superior (sensitivity 50%, specificity 100%) in comparison to ultrasound (sensitivity 25%, specificity-83.3%). For SLAP lesions clinical diagnosis

by O'Brien Test (sensitivity-50%, specificity 100%) was found to be superior to ultrasound examination (sensitivity 16.67% and specificity 100%). For subscapularis tendon pathology clinical examination by Gerber lift off test (sensitivity 66.7% and specificity 85.7%) and ultrasound examination (sensitivity 66.7% and specificity 100%) were comparable. For diagnosis of supraspinatus tendon pathology ultrasound (sensitivity 71.43%, specificity-100%) was found to be superior to clinical examination by Empty can sign (sensitivity 57.14% and specificity 100%). For infraspinatus and teres minor tendon pathology both clinical examination and ultrasound examination showed equal sensitivity (50%) and specificity (100%). Also for overall rotator cuff pathologies clinical examination and ultrasound examination showed same sensitivity (62.5%) and specificity (100%). Ultrasound however was not able to find humeral head pathology and glenoid articular surface pathology which were diagnosed on arthroscopy.

Discussion:

Shoulder pathology has a significant impact on one's life affecting personal and social areas. In the early 20th century Codman [1] recognized the devastating effects that rotator cuff tears have on the individual patient and society. Earlier, development of ultrasound was accompanied by the advent of arthrography. This put ultrasound on the backdrop, the advances in MRI imaging further hampered the popularity of this technique and even today most orthopaedic surgeons are comfortable not ordering an ultrasound of the shoulder. It is clear from our study that clinical examination and ultrasound have mostly potential to detect and delineate most shoulder pathologies. Clinically the painful Arc sign for impingement syndrome and the external rotation test of <20 degrees were found to be most efficient for diagnosis. We also observed that for glenoid and humeral head abnormalities both clinical examination and ultrasound were weak diagnostic tools and arthroscopy is necessary in these. Crass et al [2] showed how high resolution real time ultrasound of the shoulder demonstrated rotator cuff tears not seen arthrographically. Furthschegger A [3] further showed the importance of an ultrasound in preoperative assessment of rotator cuff tears. We also observed similar results with ultrasound for rotator cuff abnormalities. Helweg G [4] et al further showed that sensitivity of ultrasound in rotator cuff lesions was >90 % and in most cases would obviate the need for an arthroscopy or MRI. Peter B et al [5] have shown Neer and Hawkins's impingement signs to be of high sensitivity, however in our study we experienced a lower sensitivity; this could be attributed to the small sample size. Venu [6] et al showed in 276 patients for supraspinatus tendon evaluation a higher accuracy of ultrasound examination which is seen consistent in our study too. Richard Holtby et al [7] have shown that Yergason's and Speed test do not contribute much to the detection of biceps tendon pathology which was seen in our study as well. Ultrasound was found to be much more reliable except for breadth measurement [8]. However, they perform better than ultrasound for diagnosis in our study. Lilli S et al [9] showed ultrasonographic- guided preoperative marking of calcium deposits in the rotator cuff facilitate localization during arthroscopic surgery. The concept of orthopaedist performed ultrasound of the shoulder in the clinic appears very promising as per Dean W Zeigler [10] but would have medicolegal implications in a country like India. Still, ordering a shoulder ultrasound along with a sound clinical examination would serve well for most patients in the clinic. This practice would help sinologists develop and interest and expertise in the shoulder examination and would further bring up use of the modality.

Conclusion: Through this study we would like to strongly highlight the fact that a good clinical examination holds strong for diagnosis of shoulder pain in the clinic. If supplemented with the ultrasound examination accurate diagnosis could be achieved in non-invasive and inexpensive way for most patients. This would serve to be of great advantage in a developing country like India where time (due to high patient numbers) and cost restraints exist. However, arthroscopy remains the gold standard and is definitely required in cases

with suspected humeral head and glenoid labrum pathology as well as in cases where therapeutic intervention is a must.

Table 1: Patient clinical profile

Factor	Periarthritis (n=11)	Impingement (n=21)	Statistical Significance
Age >40	11(100%)	16 (76.19%)	p=<0.001
Females	6(54.5%)	8(38.1%)	p=0.38
Dominant Side	5(45.5%)	11(50%)	p=0.81
Onset of pain <3months	9(81.8%)	15(71.43%)	p=0.52
Painful overhead abduction	11(100%)	21(100%)	1(NS)
Pain at Deltoid insertion	11(100%)	5(23.8)	p=<0.001
Inability to sleep on affected side	7(63.63%)	2(9.52%)	p=<0.01
Associated trauma	4(36.4%)	4(19.04%)	p=0.29
Associated Diabetes	5(45.5%)	1(4.8%)	p<0.001

Table 2: Highlights of performance of both methods of assessment

Etiology of pain	Clinical		Ultrasound	
	Useful	Not useful	Useful	Not Useful
Periarthritis	External rotation <20 degrees	External rotation >20 degrees	-	-
Biceps Tendon pathology	Yergason's Test	-	High NPV	-
SLAP* Tear	O'Brein Test	-	-	Poor sensitivity for SLAP tear
Subscapularis tendon pathology	Gerber's lift off test	-	Fairly sensitive	-
Supraspinatus tear	Empty can sign	-	Supraspinatus tear	-
Glenoid Labrum pathology	-	-	Average sensitivity	--
Infraspinatus and Teres Minor Tendon Pathology	-	-	Average sensitivity	-
Rotator cuff tears	Average sensitivity	-	-	-
Humeral head pathology	-	-	Useful only for areas near the articular margin of superior glenoid labrum	Poor detection sensitivity
Glenoid articular surface pathology	-	-	Only for superior glenoid surface	Poor sensitivity
Impingement	Hawkin's Test Painful Arc sign	Neer's Impingement Test	-	-

***Superior Labrum Antero-Posterior Lesion**

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