



A STUDY OF MRI FINDINGS IN PATIENTS WITH SHOULDER PAIN

Radiodiagnosis

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ABSTRACT

Introduction: Shoulder pain is a very common complaint in orthopaedic OPD and leads to significant disability. The common causes of chronic shoulder pain are reported to be rotator cuff disorders, acromioclavicular joint disease, and glenohumeral joint disorders. Only clinical examination is not adequate in identifying the cause of pain. MRI is the best modality in depicting shoulder pathology. It has excellent soft-tissue contrast and its multiplanar capabilities make it a superior modality in shoulder imaging.

Aim And Objectives: 1. To determine the causes of shoulder pain in patients who are referred for MRI of the shoulder. 2. To determine the MRI findings in different shoulder pathologies.

Material And Methods: This cross-sectional observational study was conducted in the Department of radiodiagnosis, GMCH, Udaipur, over a period of 18 months in patients presenting with shoulder pain. Scanning was done with MRI 1.5 tesla siemens (magnetron avanto) and 3.0 tesla GE (signa) machine.

Results: Among the 60 patients, 29 (48%) were males and 31 (52%) were females. A total of 165 lesions were seen. The commonest lesion was Rotator cuff tears i.e. 47 (28.48%); followed by degenerative diseases 30 (18.18%) and 21 (12.72%) lesions are tendinosis. There were 7 (4.24%) Bankart lesion; 5 (3.03%); Hill-Sachs lesion; Malignant and bursitis were found in 4 (2.42%) cases each.

Conclusion: Since most of the shoulder lesions are from the soft tissues, MR imaging would be the appropriate imaging modality for those presenting with shoulder pain especially in non-trauma set up. After MRI, among the 60 shoulders imaged, 59 were found to have pathology.

KEYWORDS

MRI, Shoulder Pain, Degenerative Disease, Rotator Cuff

INTRODUCTION

Shoulder pain is a very common complaint in orthopedic OPD and leads to significant disability. Not enough data are available about our local population MRI findings of patients with shoulder pain. A compromised shoulder because of pain, stiffness, or weakness causes substantial disability and affects one's ability to carry out daily activities. It is not only reflecting on the person's occupation but also on his/her social life. The annual incidence of shoulder pain is an estimated 10 per 1000 population in 42-46 years age group and 21% of people over 70 years. The prevalence of self-reported cases of shoulder pain is estimated to be 16-26 %. Women seem to have more shoulder problems than men. The frequency in both sexes increases with age. If shoulder pain is present for longer than six months defined as chronic, regardless of whether the patient has previous treatment. The common causes of chronic shoulder pain are reported to be rotator cuff disorders, acromioclavicular joint disease, and glenohumeral joint disorders. Only clinical examination is not adequate in identifying the cause of pain, so various imaging modalities are added to increase the accuracy of identifying the cause of the pain. Plain radiography, arthroscopy, contrast arthrography, ultrasonography, computer tomography, and magnetic resonance (MRI) is the diagnostic modalities used. Since the common causes of shoulder pain are related to soft tissue rather than osseous lesions, so MRI is the best modality in depicting shoulder pathology. It has excellent soft-tissue contrast and its multiplanar capabilities make it a superior modality in shoulder imaging. Rotator cuff disease is one of the most common causes of shoulder pain. Besides history and physical examination, an evaluation of a patient with shoulder pain often involves an assessment of the rotator cuff with a diagnostic test such as an MRI⁽¹⁾.

Several radiological techniques are used to detect tears of the rotator cuff. Each one has limitations. The radiological diagnosis of rotator cuff tears has traditionally been performed with arthrography and recently with USG and MRI⁽²⁾. Arthrography is quite accurate in detecting complete tears but it's an invasive procedure associated with some risk and discomfort. Besides, it is not sensitive to partial tears involving the superficial surface or substance of the cuff. The diagnosis of partial tears is important because many orthopedic surgeons will do an operation to relieve the impingement of supraspinatus tendon before it progresses to fullthickness tear. They are seen with relative ease on MRI suggests that MRI may have a major role in their diagnosis⁽³⁾. MRI can provide information such as tear dimensions, tear depth or thickness and tear shape, the involvement of adjacent structures (rotator interval, long head of biceps brachii tendon, etc),

and muscle atrophy. All of which have implications on treatment and prognosis. Information about coracoacromial arch and impingement which are related to rotator cuff tears can also be obtained with MRI⁽³⁾.

AIM AND OBJECTIVES

1. To determine the causes of shoulder pain in patients who are referred for MRI of the shoulder.
2. To determine the MRI findings in different shoulder pathologies.
3. To determine the correlation between the patient's socio-demographic factors and the shoulder pathology at MR imaging.

MATERIALS AND METHOD

Method Of Collection Of Data:

- a) Study design: Cross-sectional observational study.
- b) Study place: Department of radiodiagnosis, GMCH, Udaipur.
- c) Study duration: 18 months (February 2019 to July 2020).
- d) Methodology: A cross-sectional study will be conducted over a period of 18 months (February 2019 to July 2020) in patients presenting with shoulder pain. Scanning will be done with MRI 1.5 tesla siemens (magnetron avanto) and 3.0 tesla GE (signa) machine.
- e) Sample size: 60
- f) Inclusion criteria: patients of all age groups with shoulder pain and referred for MR imaging during the period between February 2019 to July 2020.
- g) Exclusion criteria:
 1. All patients for whom MRI scan is contraindicated.
 2. Patients whose clinical condition is not feasible for MRI scan.
 3. Patients who have hypersensitivity to contrast or with derange renal functions will be excluded from the contrast study.

Materials:

After obtaining a written consent from each patient the following protocol was used. All the patients were scanned using a 1.5 Tesla and 3 Tesla MRI machine using a dedicated shoulder coil at Geetanjali medical college hospital. The scanning was done in standard orthogonal planes axial, coronal, oblique coronal, Sagittal and oblique Sagittal. T1W, T2W, T1W with fat suppression, PDW, PDW fat suppressed and STIR MR Sequences were used. In suspected labral tears, fat saturated gradient echo sequence was used. Intravenous Gadolinium based contrast media was used depending on the clinical suspicion and finding on the non-contrast images. No intraarticular contrast was used.

RESULTS**Table 1: Socio-demographic Characteristics**

		Frequency	Percentage %
Age in Years	< 30	8	13.33%
	30-45	12	20%
	46-60	21	35%
	>60	19	31.66%
Gender	Male	29	48%
	Female	31	52%
Involvement of part	Right	31	52%
	Left	29	48%

Table 1 shows that among the 60 patients, 29 (48%) were males and 31 (52%) were females. Out of 60 patients 8 (13.33%) Patients were below 30 years; 12(20%) patients were Between 30-45 years; 21 (35%) Patients were Between 46-60 years; 19 (31.66%) Patients were over 60 years.

Types Of Lesions Seen At Mr Imaging

A total of 165 lesions were seen. There was multiplicity of lesions in this study.

Table 2: Type Of Lesions Seen At MRI (N = 165)

Type of Lesion	No. of Lesion	Total %
Tendinosis	21	12.72
Bursitis	4	2.42
Rotator Cuff Tears	47	28.48
Impingement Syndrome	3	1.81
Bankarts	7	4.24
Hill-Sachs	5	3.03
Fractures	3	1.81
Dislocations	0	0
Joint Effusion	32	19.39
Degenerative Diseases	30	18.18
Septic Arthritis	3	1.81
Benign Tumours	1	0.60
Malignant Tumours	4	2.42
Metastatic Tumours	1	0.60
Other Soft Tissue Tendon Tear	4	2.42
Total		

In this study a total of 165 lesions were seen. The commonest lesion was Rotator cuff tears i.e. 47 (28.48%); 2nd most encountered lesion is Degenerative diseases 30 (18.18%). 21 (12.72%) lesions are tendinosis. There were 7 (4.24%) Bankart lesion; 5(3.03%); Hill-Sachs lesion; Malignant and bursitis were found in 4 (2.42%) cases each.

Degenerative Diseases:**Table 3: Degenerative And Other Pathologies**

Other pathology	Degenerative	P value	Joint Effusion	P value
Tendinosis	13	0.10	13	0.51
Bursitis	4	0.78	-	-
Rotator cuff tear	23	0.02	26	0.01
Impingement syndrome	1	0.82	-	-
Bankart lesions	5	0.62	6	0.61
Hill-Sachs lesions	3	0.06	4	0.76
Fracture	-	-	2	0.08

The presence of Degenerative diseases associated with rotator cuff tear was seen in 23 cases (p-value is 0.02). Other pathology like Tendinosis, Bursitis, Impingement syndrome, Bankart Lesions and Hill-Sachs lesions are not associated with degenerative diseases.

The presence of a Joint effusion associated with rotator cuff tear was seen in 26 cases (p-value is 0.01). Tendinosis, Bankart lesions, Hill-Sachs lesions and fracture are not associated with joint effusion as p value is >0.05.

Table 4: Fracture With Rotator Cuff Tear

Rotator cuff tear	Frequency	Fracture
Supraspinous tear partial	26	1
Supraspinous tear complete	5	0
Slap Tear	9	0
Infraspinatus	3	0
Subscapularis	4	0

Table 4 shows out of 47 cases of Rotator cuff tear fracture was present only in one case with Supraspinatus tear.

Table 5: Infection And Neoplasms

		Frequency
Infections	Septic Arthritis	3
	Osteomyelitis	1
	Myositis	3
Neoplasms	Benign	1
	Malignant	4
	Metastasis	1

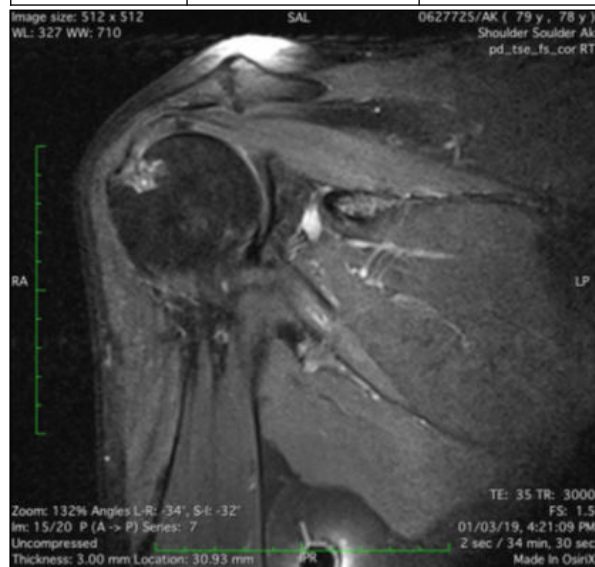


Fig. 1: Coronal T2 PD fat suppressed image of 78 years old male patient with chronic shoulder pain showing partial tear of supra-spinatus with degenerative cystic changes of lateral aspect of humerus near its attachment. There is evidence of acromio-clavicular joint arthropathy in the form of joint hypertrophy, periarticular osteophytes and subtle marrow edema.



Fig 2: Axial T2 PD fat suppressed image of 30 year old male patient with history of trauma following shoulder pain showing mild hyperintensity and fluid signal along the articular surface fibers of supra-spinatus tendon suggestive of partial thickness tear along with fluid signal along the bicipital tendon within the bicipital groove and mild atrophy suggesting changes of tendinosis. There is evidence of moderate joint effusion.

DISCUSSION

In this study, a total of 60 patients were enrolled out of which 29(48%) were males and 31(52%) were females. The mean age was 50.55 and the cohort which showed maximum incidence lie between 46-60 years with 21(35%) patients, followed by people above 60 years of age with 19(31.66%). Those between 30-45 years were 12(20%) and below 30 years were 8(13.33%).

Bongers, during a study found that girls have more incidence of shoulder pain. In a community survey of symptomatic shoulder disorders in a sample of 644 people over 70 years, Chard et al found that shoulder disorders were more common in women (25% while 17% in men).⁽⁴⁾

In this study, a total of 14 types of lesions were seen. The most common pathology was rotator cuff tears, 47 (28.48%) of this lesion were seen and were more on the right shoulder which had 31 (52%) lesions compared to the left with only 29 (48%) lesions. Joint effusion was seen in 32 (19.39%) lesions, degenerative diseases are seen in 30 (18.18%) lesions, tendinitis is seen in 21 (12.72%) lesions, Bankarts seen in 7 (4.24%) lesions, Hill-Sachs in 5 (3.03%), followed by bursitis, other soft tissue tendon tear and malignant tumour in 4 (2.42%) lesions, impingement syndrome, septic arthritis and fractures are seen in 3 (1.81%) lesions and lastly benign and metastatic tumours seen in 1 (0.60%) lesion. A study done by Krief and Huguet, involving 1079 patients showed that 916 (85%) had right-hand dominance and 163 (15%) were left-handed. Among them, 669 (62%) presented with pain on the right shoulder.⁽⁵⁾

In this study, MRI lesions like septic arthritis showed right side dominance while in malignant and metastatic tumours left side dominance is seen.

In this study, rotator cuff tears were most commonly seen lesion seen in 47 patients (28.48%) mostly involving supraspinatus tear in 31 patients in which 26 were partial tear and 5 were complete tear, slap tear in 9 patients, subscapularis partial tear in 3 patients and infraspinatus partial tear in 3 patients.

Sher et al in their study of asymptomatic individuals found that the general prevalence of tears of the rotator cuff in all age-groups was 34% and therefore the frequency of full-thickness and partial-thickness tears increased significantly with age. The increased prevalence of abnormal MRI findings consistent with rotator cuff tear in asymptomatic individuals was compatible with painless normal function and was more prevalent in individual who are over 60 years old.⁽⁶⁾

SF Quinn et al, in their study, scanned 100 symptomatic patients. Both MR imaging and arthroscopy of the shoulder were done. They combined data for complete and partial tears of the rotator cuff. Seventeen of 20 complete tears and nine of 11 partial tears were properly identified with MR imaging. Two partial tears weren't detected and three complete tears were incorrectly called partial tears at MR imaging.⁽⁷⁾

In above study number of cases of tendinosis is 13 with p value of 0.10%, bursitis cases 4 and p value 0.78%, rotator cuff tear 23 cases and value of 0.02%, impingement syndrome case 1 and p value of 0.82%, Bankart lesions cases 5 and p value of 0.62% and lastly Hill-Sachs lesions cases 3 with p value of 0.06% in degenerative diseases. Impingement (intrinsic and extrinsic) is additionally considered to be a very important causative factor for rotator cuff tears and eventually pain, noted in 39% (n=48) of the patients and was associated with rotator cuff tears in 87% of the patients suggesting results were in line with the statement given by Neer et al that 95% of rotator cuff tears were attributed to impingement.⁽⁸⁾

Joint effusion was found in total 51 patients. The presence of a joint effusion was significantly associated with rotator cuff tear was seen in 26 cases (p-value is 0.01). Other pathologies like tendinosis, Bankart, Hill-Sachs and fracture were presented with joint effusion in 13, 6, 4 and 2 cases respectively but does not show association as p-value was more than 0.05.

Fracture found in 3 cases out of them only 1 was presented with supraspinatus tear. In this study frequency of septic arthritis and myositis seen to be 3 and osteomyelitis frequency is seen to be 1. Out of 6 cases with neoplasm 4 were malignant and they were lymphoma, two chondrosarcomas and synovial sarcoma. 1 case was benign and it was bone cyst and 1 was Metastasis from carcinoma breast. N. Ooki et al studied, Cystic and soft tissue masses of the shoulder joint show relatively specific MRI features. Correlation with clinical history, radiographic findings, location of the lesions and signal intensity pattern of the lesions are important for diagnosing these lesions.⁽⁹⁾

Normal MRI findings were seen in only 1 patient out of 60 patients. 21 year old male patient presented with right sided shoulder pain since 15 days, his MRI findings were normal.

CONCLUSION

Since most of the shoulder lesions are from the soft tissues, MR imaging would be the appropriate imaging modality for those presenting with shoulder pain especially in non-trauma set up. After MRI, among the 60 shoulders imaged, 59 were found to have pathology. Rotator cuff tears were most common lesion seen in 47 patients (28.48%) mostly involving supraspinatus tear in 31 patients.

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