

Role of MRI in Detecting Shoulder Pain Pathologies

Mahbuba Shirin¹, Salahuddin Al Azad¹, Husnaion Zubery²,
Deepak Kumar Verma³

¹Department of Radiology and Imaging, BSMMU, Shahbag, Dhaka, Bangladesh

²Department of Radiology and Imaging, Rajshahi Medical College Hospital, Rajshahi

³Department of Radiology and Imaging, MD Resident, BSMMU, Dhaka, Bangladesh

Abstract: Shoulder pain is a familiar problem which poses complicated diagnostic and curative challenges. It is the third most frequent musculoskeletal criticism in the general population. A compromised shoulder due to pain, stiffness or weakness causes substantial disability and affects the person's ability to carry out daily activities. The objective of the study is to evaluate the presenting pathologies using MRI in patients with shoulder pain. The cross-sectional observational study was carried out in the department Radiology and Imaging Bangabandhu Sheikh Majib Medical University, during January 2021 to June 2021. A total 80 patients with shoulder pain referred for MRI shoulder after a detailed clinical workup. The mean age was 41.40 (\pm 15.22) years. Regarding sex distribution of the 80 patients scanned 64(80%) were males. Right shoulder were predominant in 55% patients reported pain on right side, 30% on left side and 15% with bilateral involvement. Male patients with right shoulder involvement were predominate & majority patients were aged more than 40 years of age. Common MRI findings were seen in the study were suggestive metastasis, sub acromial bursitis, biceps & supra spinatus tendinitis, mild joint effusion, osteoarthritic change of AC joint, adhesive capsulitis with osteoarthritic change at right glenohumeral joint and marrow contusion.

Key word: Painful shoulder; Magnetic Resonance Imaging;

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I. Introduction

Shoulder pain is a familiar problem which poses complicated diagnostic and curative challenges. It is the third most frequent musculoskeletal criticism in the general population and accounts for 5% of all musculoskeletal consultations.¹ A compromised shoulder due to pain, stiffness or weakness causes substantial disability and affects the person's ability to carry out daily activities.²

Nonacute shoulder pain is a common medical condition, particularly in middle-aged and older adults.³ There are many causes of nonacute shoulder pain common causes listed in order from the most to the least common include rotator cuff impingement, tendinosis and tears; adhesive capsulitis; subacromial-subdeltoid bursitis; calcific tendinosis; glenohumeral and acromioclavicular (AC) osteoarthritis (OA); biceps tendinosis-tears and dislocation; instability and labral tears; paralabral cyst; distal clavicular osteolysis; internal impingement; rheumatologic disorders; tumors; stress fractures and cervical spine disease.³

Clinical examination alone is not adequate in identifying the cause of pain, thus various imaging modalities are employed to increase the accuracy of identifying the source of the pain i.e. Plain Radiography, Arthroscopy, Contrast arthrography, Ultrasonography, Computer tomography and Magnetic Resonance Imaging (MRI).⁴ MRI has major compensation over computed tomography, conservative arthroscopy and radiography because of its exceptional intrinsic soft tissue contrast, high resolution multiplanar imaging, reduced artifacts, shorter imaging time and enhanced accuracy.⁵

II. Materials and Methods

The cross-sectional observational study was carried out in the department of Radiology and Imaging, Bangabandhu Sheikh Majib Medical University, during January 2021 to June 2021 and a total 80 patients who present with shoulder pain referred for MRI shoulder after a detailed clinical workup. Images were acquired using various non-contrast enhanced sequences as per preset protocol and were analyzed for pathologies were included in this study. A structured prepared questionnaire containing the patient details, clinical history, physical examination and investigations who meet the inclusion and exclusion criteria were prepared and patients were subjected to MRI Shoulder using 3.0T Centurion imaging.

Inclusion criteria:

- 1) All patients with shoulder pain referred to Radiology and Imaging Department of BSMMU, Dhaka , Bangladesh.
- 2) Adults between 18 to 70 years of age both male and female were included in the study.

Exclusion criteria:

- 1) Patients below 18 and above 70 years of age.
- 2) Patients with history of malignancy.
- 3) Patients with previous history of operation over shoulder.
- 4) Patients who have contraindications for MRI i.e. pacemaker, metallic implants.

III. Results

The mean age was 41.40 (± 15.22) years. The youngest was 18 years and the oldest was 65 years. Those between 18-20 years were 4(5%), 21-30 years were 16 (20%), 31-40 years were 20 (25%), in the 41-50 years age group were 12(15%) and those over 50 years were 28 (35%) (Table-1). Regarding sex distribution of the 80 patients scanned 64(80%) were males and 16 (20%) were females (Figure -I). Regarding site of shoulder joint, right shoulder were predominant 55% patients reported pain on right side, 30% on left side and 15% presented with bilateral involvement (Table-2). Common MRI findings were seen in the study were suggestive metastasis (20%), sub acromial bursitis (20%), Biceps & supra spinatus tendinitis (20%), Mild joint effusion (20%), Osteoarthritic change of AC joint (16%), Adhesive capsulitis with osteoarthritic change at right glenohumeral joint (10%), Marrow contusion (10%), mildly thickened inferior glenohumeral ligament (10%), supraspinatus tendinopathy (10%), long head of biceps tendinopathy (10%), Acrominal surface (10%), sub scapularis muscle contusion (5%), Capsulitis (5%), supraspinatus and biceps tendinitis (5%), metastatic neuroblastoma of scalp (5%) and Neurofibroma were (5%) (Table-3).

Table 1: Distribution study patient according to age (n=80)

Age in years	Number	Percentage
18-20 years	4	5.0
21-30 years	16	20.0
31-40 years	20	25.0
41-50 years	12	15.0
> 50 years	28	35.0
Total	80	100.0
Mean \pm SD	41.40 (± 15.22)	Range 14-65 years

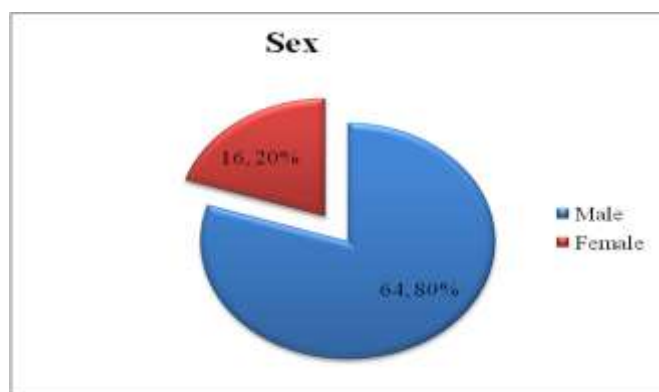


Figure 1: Sex distribution of the study patients

Table 2: Site of shoulder joint (n=80)

Site of shoulder	Number	Percentage
Left Shoulder Joint	24	30.0
Right Shoulder joint	44	55.0
Both Shoulder Joint	12	15.0

Table 3: MRI findings of the shoulder pain cases (n=80)

MRI Findings	Number	Percentage
Suggestive metastasis	16	20.00
Sub acromial bursitis	16	20.00
Biceps & supra spinatus tendinitis	16	20.00
Mild joint effusion	16	20.00
Osteoarthritis change of AC joint	12	15.00
Unremarkable	12	15.00
Adhesive capsulitis with osteoarthritic change at right glenohumeral joint	8	10.00
Marrow contusion	8	10.00
Mildly thickened inferior glenohumeral ligament	8	10.00
Supraspinatus tendinopathy	8	10.00
Bony cortical defect involving posterolateral aspect of humeral head	8	10.00
Long head biceps tendinopathy	8	10.00
Acrominal surface	8	10.00
Sub scapularis muscle contusion	8	10.00
Capsulitis	8	10.00
Supraspinatus and biceps tendinitis	4	5.00
Metastatic neuroblastoma of scalp	4	5.00
Neurofibroma	4	5.00
Comminuted fracture at greater trochanter	4	5.00

IV. Discussion

The mean age was 41.40 (± 15.22) years. The youngest was 18 years and the oldest was 65 years. Those between 18-20 years were 4(5%), 21-30 years were 16(20%), 31-40 years were 20 (25%), those in the 41-50 years age group were 12(15%) and those over 50 years were 28 (35%) (Table-1). Similar observation was found in Chaudhari and Chitnis study which observed in their study the age of the patients is between (18 - 80) years.

Harmeet Kaur studied 81 patients and included the age group ranging 16 to 72 years who presented in hospital with shoulder pain with or without restricted mobility and underwent MRI revealed that maximum numbers of cases (33.0%) were in the age group of 21-30 yrs and with the right sided involvement. There were 47 males and 34 females which having the ratio of 1.4:1 depicting significant difference in sex group.⁶ Chudasama and Khunt reported that the age distribution was in range of 15 years to 70 years with maximum population within 45-54 year range.⁵ Onyambu, and M'Arithi also found similar observations showed that out of 70 patients scanned 38 (54.3%) were males and 32 (45.7%) were females and the mean age was 48 years. The youngest was 20 years and the oldest was 86 years.⁴

Regarding sex distribution of the 80 patients scanned 64(80%) were males and 16 (20%) were females. Chudasama S, Khunt also found that the majority of the cases in their study were male. Harmeet Kaur study also agreement with our observation, they showed there were 47 males and 34 females that gave the ratio of 1.4:1 depicting significant difference in sex group.⁶ Chaudhari P, and Chitnis also supported our observations, they observed 70% were males and 30% were females.¹

Regarding site of shoulder joint, right shoulder were predominant in 55% patients reported pain on right side, 30% on left side and 15% with bilateral involvement. In Kaur et al. study, 70% patients reported pain on right side and 30% on left side which was also similar to study by Onyambu CK *et al.*⁷. Onyambu, and M'Arithi, study observed that out of total of 120 patients more common on the right shoulder 104 (86.7%) compared to the left which had only 16 (13.3%) lesions. Different lesions were picked on MRI. The patients studied showed predominance of lesions on the right shoulder. This is likely due to right handedness in majority of the people.⁴ A study by Krief and Hugué, involving 1079 patients found that 916 (85%) had right sided involvement and 163 (15%) with left sided. Sixty six (62%) of those presented with pain on the right shoulder.⁸ This study compares well with western studies which have shown the right shoulder is more affected due to right handedness. Chudasama and Khunt also reported in their study most commonly involved side was right one.⁵

In this study observed shoulder scanning by MRI, common MRI findings were suggestive metastasis

(20%), sub acromial bursitis (20%), biceps & supra spinatus tendinitis (20%), mild joint effusion (20%), osteoarthritic change of AC joint (16%), Adhesive capsulitis with osteoarthritic change at right glenohumeral joint (10%), marrow contusion (10%), mildly thickened inferior glenohumeral ligament (10%), supraspinatus tendinopathy (10%), long head biceps tendinopathy (10%), acromial surface (10%), sub scapularis muscle contusion (5%), capsulitis (5%), supraspinatus and biceps tendinitis (5%), metastatic neuroblastoma of scalp (5%) and Neurofibroma were (5%) (Table-3). In Onyambu, and M'Arithi study a total of 11(9.2%) of these lesions were seen. There were 4(3.3%) Bankart and seven (5.8%), Hill-Sach's lesions. Thirteen (10.8%) of total lesions were degenerative disease. All were seen on the right shoulder.⁴ In their study among those who had osteoarthritis five had tendinosis, four had tendon tears, two had bursitis and one had a bankart lesion.⁴ Thus there is an increase association with other pathology in those with degenerative shoulder disease. Effusion in the glenohumeral cavity was encountered in 9 (7.5%) cases. In the right shoulder, it was seen in 3 (2.5%) cases and 6 (5.0%) on the left.⁴ This is a non specific finding and its finding requires meticulous investigation to find out the specific pathology.⁹⁻¹⁰ Seven (5.8%) neoplasms were seen in this study. Four (3.3%) were benign and all were cysts seen in the labrum, humerus and supraspinatus muscle. Two cases were proved malignant, fibrosarcoma and chondrosarcoma. This compares well with a study by Schlecht *et al* that showed MRI can diagnose shoulder girdle tumors and showed soft tissue extent.¹¹ In study of Chudasama and Khunt observed that the majority of cases of chronic shoulder pain included rotator cuff injuries followed by biceps pathologies, acromio-clavicular arthritis, gleno-humeral instability, gleno-humeral arthritis and lastly miscellaneous conditions like tumors or cysts. Acromio-Clavicular Joint Arthritis (50%), Biceps Pathologies (30%), Gleno-Humeral Joint Arthritis (Infective/Inflammatory/Degenerative) (5%), Miscellaneous (Pathological Fractures Due to Tumors, Metastases Etc) (9%).⁵ It accounted for 34 (28.3%) of the total lesions seen, the supraspinatus was the mostly involved tendon with 23(19.2%) of the total lesions. This accounted for 67.4% of the tendinosis. Biceps accounting for 35.3% of the tendinosis and suscapularis had 2.8% of the total lesions.⁵

V. Conclusion

MRI of shoulders provides detailed images of the structures including bones, tendons, muscles & vessels from several angles making it preferred modality and acceptable non invasive tool for diagnosing several conditions as stated. Right shoulder had more pathology than the left and male patients were predominate, majority patients were aged more than 40 years.

VI. Recommendation

Although MRI remains an extremely useful diagnostic and imaging tool for evaluation of shoulder pathologies. Several lesions still proving diagnostic challenges. Close working with clinical colleagues can overcome certain difficulties and provide more accurate information regarding management options.

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