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Magnetic Resonance Imaging Evaluation of Rotator Cuff Pathologies in Patients Presenting with Shoulder Pain at a Tertiary Care Hospital in Kathmandu, Nepal

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ABSTRACT

Background

Chronic shoulder pain is a common musculoskeletal complaint associated with functional disability. Magnetic resonance imaging (MRI) plays a crucial role in identifying underlying structural abnormalities, particularly those related to rotator cuff pathology. This study aimed to find the demographic, clinical, and MRI characteristics of patients with chronic shoulder pain at a Tertiary Care Hospital in Kathmandu, Nepal.

Methods

A hospital-based descriptive cross-sectional study was conducted in the Department of Radiology, Kathmandu Medical College, Kathmandu, Nepal, over a period from 2081 to 2082 B.S. A total of 154 patients with clinically suspected chronic shoulder pain who underwent shoulder MRI were included. Data on socio-demographic and clinical variables were collected using a structured proforma. MRI findings were analyzed descriptively using SPSS version 20.

Results

The mean age of patients was 45.9 ± 18.0 years, with a predominance of the 35-65 years age group (66.23%). Males constituted 59.09% of cases. Housewives were the most affected occupational group (37.7%). The mean duration of pain was 10.04 ± 4.8 months, and 63.6% had prior treatment history. The right shoulder was more frequently involved (70.78%), and most patients presented with moderate to severe pain. MRI revealed rotator cuff pathology in 43.51% of cases, with supraspinatus tendon involvement being most common (69%). Partial tears of the supraspinatus were the predominant lesion (55.22%), while bursitis and acromioclavicular joint arthropathy were also noted.

Conclusions

Rotator cuff pathology, particularly supraspinatus tendon involvement with partial-thickness tears, is the leading cause of chronic shoulder pain. Early MRI evaluation is essential for accurate diagnosis and appropriate management.

Keywords: Shoulder pain; Rotator cuff pathology; Magnetic resonance imaging; Supraspinatus tear; Partial-thickness tear; Nepal.

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INTRODUCTION

Shoulder pain is a common musculoskeletal complaint and a major cause of pain, disability, and reduced quality of life worldwide.[1] It has an annual incidence of 14.7 per 1,000 individuals and a lifetime prevalence of up to 70%.[2-6] Rotator cuff pathologies, including tendinopathy, partial- and full-thickness tears, and degenerative changes, account for a substantial proportion of shoulder pain cases, particularly among individuals engaged in repetitive overhead activities and manual labor.[1, 3, 7]If not diagnosed and managed appropriately, these conditions may lead to persistent pain, functional impairment, and chronic disability.[3, 6]

Clinical history and physical examination are the primary approaches for the evaluation of shoulder pain. However, these methods may have limited accuracy in identifying the specific rotator cuff pathology and determining the extent of structural involvement.[4, 8] Magnetic resonance imaging (MRI) has emerged as a valuable diagnostic modality owing to its excellent soft-tissue contrast and multiplanar imaging capability.[5, 8] It enables detailed assessment of the rotator cuff tendons and adjacent structures, facilitating the detection of inflammation, tendinopathy, partial- and full-thickness tears, and degenerative changes.[5, 8, 9]

With the increasing burden of chronic shoulder disorders, early and accurate diagnosis is essential for appropriate treatment planning and prevention of long-term disability.[10] Therefore, this study aimed to evaluate MRI findings of rotator cuff pathologies among patients presenting with shoulder pain at a tertiary care hospital in Kathmandu, Nepal.

METHODS

Study Area

The study was carried out in the Department of Radiology, Kathmandu Medical College, Kathmandu, Nepal.

Study Design

A hospital-based descriptive cross-sectional study was conducted to assess the clinical and radiological characteristics of patients with chronic shoulder pain.

Sample size and sampling

The study population consisted of patients with clinically suspected chronic shoulder pain who underwent magnetic resonance imaging (MRI) of the shoulder during the study period. A total of 154 patients fulfilling the inclusion criteria and having complete MRI records were included in the study. A convenient sampling technique was applied, and all eligible patients meeting the inclusion criteria during the study period were enrolled.

Data Collection

The study was conducted from 2081 to 2082 B.S. Ethical approval was obtained from the Institutional Review Committee (IRC), of Kathmandu Medical College (Ref No. 10042026/17) prior to the commencement of the study. Confidentiality of patient information was strictly maintained, and data were used only for academic and research purposes. The study adhered to the principles of the Declaration of Helsinki and institutional ethical guidelines.

Data were collected using a structured proforma developed to extract socio-demographic and clinical information from hospital records. MRI findings were retrieved from radiology reports and imaging archives. Variables included age, sex, occupation, duration of pain, comorbidities, affected side, previous treatment history, and pain severity (VAS score). The study variables included socio-demographic factors (age, sex, occupation), clinical characteristics (duration of pain, comorbidities, affected shoulder side, previous treatment history), and pain severity measured using the Visual Analogue Scale (VAS). Radiological variables included MRI diagnosis, rotator cuff tendon involvement (supraspinatus, subscapularis, infraspinatus, teres minor), and type of tear (partial or complete).

Data Analysis

Data were entered and analyzed using SPSS version 20. Descriptive statistics were used to summarize categorical variables as frequencies and percentages, while continuous variables were expressed as mean

and standard deviation. Results were presented in tabular form.

RESULTS

The present study analyzed 154 patients with chronic shoulder pain and observed that the mean age was 45.9 ± 18.0 years, with a clear predominance of middle-aged individuals (35-65 years), accounting for 66.23% of the sample. Younger patients (≤35 years) comprised 22.73%, while only 11.04% were aged ≥65 years. Males were more commonly affected than females (59.09% vs 40.91%), yielding a sex ratio of 1.4:1. In terms of occupation, housewives represented the largest group (37.7%), followed by farmers (22.1%), manual laborers (19.5%), office workers (11.7%), businesspersons (5.8%), and others (3.2%). The mean duration of pain was 10.04 ± 4.8 months, with most patients (62.3%) reporting symptoms within 10 months, indicating relatively early healthcare-seeking behavior in a majority of cases. Comorbid conditions were frequently observed, particularly diabetes mellitus (44.81%) and hypertension (31.17%), while other comorbidities accounted for 24.03%. The right shoulder was more commonly affected than the left (70.78% vs 35.06%). A considerable proportion of patients (63.6%) had received previous treatment prior to presentation. Regarding pain severity, nearly half of the patients reported moderate pain (48.1%), followed closely by severe pain (40.3%), while only a small proportion experienced mild pain (11.7%) (Table 1).

Table 1: MRI Findings of Shoulder Pathologies among Study Participants (n=154)

Characteristics	Frequency n (%)
Age (years)	
≤35	35 (22.73)
35-65	102 (66.23)
≥65	17 (11.04)
Mean±SD	45.9 ± 18.0 years
Sex	
Male	91 (59.09)
Female	63 (40.91)
Sex ratio	1.4::1
Occupation	
Housewife	58 (37.7)
Farmer	34 (22.1)
Manual labor	30 (19.5)
Office worker	18 (11.7)
Business	9 (5.8)
Others	5 (3.2)
Duration of pain (months)	
≤10	96 (62.3)
11–18	42 (27.3)
≥18	16 (10.4)
Mean±SD	10.04 ± 4.8 months
Comorbidities	
Diabetes mellitus	69 (44.81)
Hypertension	48 (31.17)
Others	37 (24.03)
Affected Side	
Right shoulder	109 (70.78)
Left shoulder	54 (35.06)
Previous treatment history	
Yes	98 (63.6)
No	56 (36.4)
Pain severity (VAS)	
Mild (1-3)	18 (11.7)
Moderate (4-6)	74 (48.1)
Severe (7-10)	62 (40.3)

MRI findings demonstrated that rotator cuff pathology was the most common abnormality, accounting for 43.51% (n = 67) of cases. A normal MRI was reported in 22.73% of patients, indicating a substantial proportion without structural abnormalities detectable on imaging.

Other pathological findings included bursitis (15.58%) and acromioclavicular joint arthropathy (7.14%), followed by synovitis (3.90%). Less frequent conditions such as adhesive capsulitis, biceps pathology, and synovial chondromatosis were each observed in 1.30% of cases. Among patients diagnosed with rotator cuff pathology (n = 67), the supraspinatus tendon was most frequently involved, accounting for 69% of cases. The subscapularis tendon was the second most commonly affected (22%), followed by the infraspinatus (6%). This pattern highlights the predominant vulnerability of the supraspinatus tendon in rotator cuff disease.

The distribution suggests that posterosuperior cuff structures are more commonly affected compared to the anteroinferior components.

Regarding the nature of rotator cuff involvement, partial thickness tears were the most frequent lesion pattern. Partial tear of the supraspinatus was the predominant finding, observed in (65.67%) of cases, followed by partial tear of the subscapularis (14.93%). Complete tears were less common, with complete supraspinatus tear occurring in (10.45%) of cases. Other less frequent lesions included partial tear of the infraspinatus (8.96%) and complete tears of subscapularis (2.99%) and infraspinatus (1.49%) (Table 2).

Coronal MRI images of the shoulder demonstrating common rotator cuff pathologies. Figure 1 shows increased signal intensity and mild thickening of the supraspinatus tendon at the critical zone near its insertion on the greater tuberosity, consistent with supraspinatus tendonitis.

Figure 2 demonstrates a focal discontinuity with increased signal intensity within the supraspinatus tendon, suggestive of a rotator cuff tear, along with mild fluid accumulation in the adjacent subacromial–subdeltoid bursa. These images illustrate the spectrum of supraspinatus tendon abnormalities identified on MRI in patients presenting with shoulder pain.

Table 2: Distribution of Rotator Cuff Tendon Involvement and Type of Tendon Tear Among Patients with Rotator Cuff Pathology (n=154).

RC tendon involved	Frequency n (%)
Partial tear of supraspinatus	37 (55.22)
Partial tear of subscapularis	10 (14.93)
Complete tear of supraspinatus	7 (10.45)
Partial tear of infraspinatus	6 (8.96)
Complete full tear of suprasp	4 (5.97)
Complete tear of subscapularis	2 (2.99)
Complete tear of infraspinatus	1 (1.49)
MRI diagnosis	
Rotator cuff pathologies	67 (43.51)
Adhesive capsulitis	2 (1.30)
Bursitis	24 (15.58)
Acromio-clavicular joint arthropathy	16 (7.14)
Biceps pathologies	2 (1.30)
Synovial chondromatosis	2 (1.30)
Synovitis	6 (3.90)
Normal study	35 (22.73)
Distribution of rotator cuff pathologies RC tendon involved (n=67).	
Supraspinatus	46 (69)
Subscapularis	15 (22)
Infraspinatus	6 (9)
Involvement of rotator cuff pathology RC tendon involved (n=67).	
Partial tear of supraspinatus	44 (65.67)
Partial tear of subscapularis	10 (14.93)
Complete tear of supraspinatus	7 (10.45)
Partial tear of infraspinatus	6 (8.96)
Complete tear of subscapularis	2 (2.99)
Complete tear of infraspinatus	1 (1.49)

DISCUSSION

The present study included 154 patients with chronic shoulder pain, with a predominance of middle-aged individuals (66.23%), which is consistent with the findings of Jiang L et al., who reported that rotator cuff pathologies were more prevalent among individuals aged 30–60 years.[10] The mean age of the participants in the present study was 45.9 ± 18.0 years. This was

Figure 1: Diagnosis (Supraspinatus tendonitis at critical zone)

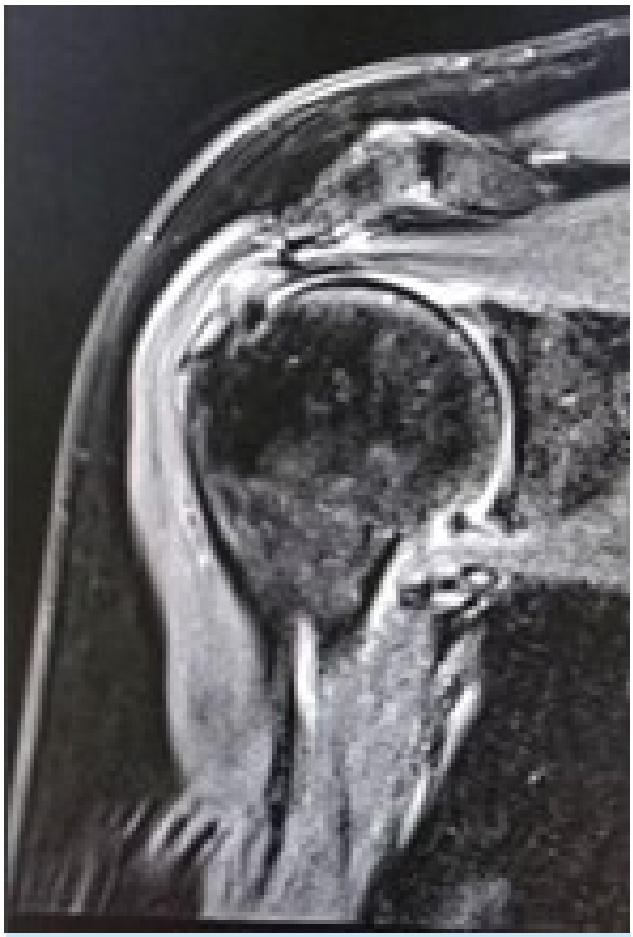

Figure 2: Diagnosis (Partial thickness tear at bursal side of supraspinatus tendon with tendinosis)

slightly higher than the mean age reported by *Karki et al.,*[11] (42.82 years) but lower than that reported by *Krief et al.,*[12] (52 years). Males were slightly more affected than females (59.09% vs 40.91%) with sex ratio 1.4::1. Occupational distribution showed that housewives (37.7%) were the most affected group, followed by farmers (22.1%) and manual laborers (19.5%).

The majority (62.3%) of patients presented within 10 months of symptom onset, while a substantial proportion had a history of previous treatment (63.6%). Comorbid conditions were frequently observed, particularly diabetes mellitus (44.81%) and hypertension (31.17%). The right shoulder was more commonly affected than the left (70.78% vs 35.06%). The findings of the present study are consistent with those reported by Krief,[12] who observed an association between rotator cuff pathology and right-hand dominance. However, our findings differ from those of *Jiang L et al.,*[10] who reported no significant association between hand dominance and the side of rotator cuff pathology. Rotator cuff-related shoulder pain (RCRSP) is a broad clinical condition that encompasses a spectrum of disorders involving the rotator cuff and is one of the most common causes of shoulder pain.[10]

Regarding pain severity, moderate pain was most common (48.1%), followed by severe pain (40.3%), while mild pain was least frequent (11.7%).

In the present study, rotator cuff pathologies were the most common MRI finding, with the supraspinatus tendon being the most frequently affected, followed by the subscapularis, infraspinatus, and teres minor tendons. These findings are consistent with those reported by *Kari et al.,*[11] and *Krief et al.,*[12] Rotator cuff tears have a multifactorial etiology, with both intrinsic and extrinsic factors contributing to their development. The supraspinatus tendon is particularly vulnerable because of its anatomical location, relatively poor vascularity, and exposure to repetitive mechanical stress.[12, 13]

Among rotator cuff cases, supraspinatus involvement was most common (69%), followed by subscapularis (22%), infraspinatus (6%). Partial-thickness tears of the supraspinatus were the most frequent lesion (65.67%), followed by partial subscapularis tears (14.93%), while complete tears were comparatively less common.[8, 11-16]

The distribution of acromial morphology observed in the present study is comparable to that reported by *Guo X et al.,*[17] They also reported that rotator cuff pathologies were more common in individuals with type II and type III acromion, with type III showing the strongest association with rotator cuff tears and tendinosis. Our findings are consistent with these observations, supporting the role of acromial morphology as an important factor associated with rotator cuff pathology.[12-17]

Limitations

This study was conducted in a single tertiary care hospital, which may limit the generalizability of the

findings. The hospital-based design and relatively small sample size may introduce selection bias.

Conclusions

Chronic shoulder pain most commonly affects middle-aged individuals with male predominance and is frequently seen among housewives, farmers, and manual laborers. Most patients present within a few months of symptom onset, and many have a history of prior treatment. Diabetes mellitus and hypertension are the most common associated comorbidities. The right shoulder is most commonly involved, and moderate to severe pain is most frequently observed, indicating significant functional limitation. MRI most commonly reveals rotator cuff pathology, while a smaller proportion of patients show normal findings or other shoulder disorders. Among rotator cuff lesions, the supraspinatus tendon is most commonly affected, followed by the subscapularis, infraspinatus, and teres minor. Partial-thickness tears are the most common type of rotator cuff injury, while complete tears are less frequent.

Ethics approval: Ethical approval was obtained from the Institutional Review Committee (IRC), of Kathmandu Medical College (Ref No. 452) prior to the commencement of the study.

Conflict of interest: The author declares no conflict of interest.

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Availability of data and materials: All data analysed during this study will be made available upon reasonable request from the corresponding author.

Author contributions

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