

Research Article

CLINICAL AND MAGNETIC RESONANCE IMAGING CHARACTERISTICS OF ROTATOR CUFF TEARS IN PATIENTS UNDERGOING ARTHROSCOPIC REPAIR

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Received 19th June 2026; Accepted 20th July 2026; Published online 30th August 2026

ABSTRACT

Rotator cuff tears are a common cause of shoulder pain and functional impairment. This study aimed to describe the clinical and magnetic resonance imaging characteristics of patients with rotator cuff tears undergoing arthroscopic repair and to explore differences between partial- and full-thickness tears. A descriptive cross-sectional study was conducted in 41 patients treated at Military Hospital 175 in 2025–2026. The mean age was 57.1 ± 8.5 years, and 53.7% were male. Limited shoulder motion was observed in 61.0%, and the Jobe test was positive in 80.5%. On MRI, full-thickness tears predominated (85.4%), with supraspinatus involvement in all tear-pattern categories; isolated supraspinatus tears accounted for 46.3%. Long-head biceps tendon and labral injuries were identified in 24.4% and 39.0%, respectively. No significant differences in selected demographic and clinical characteristics were observed between partial- and full-thickness tears (all $p > 0.05$). In conclusion, full-thickness tears with frequent supraspinatus involvement predominated in this surgical cohort. Clinical findings did not significantly differ between partial- and full-thickness tears, supporting combined clinical and MRI assessment for preoperative characterization.

Keywords: rotator cuff tear, magnetic resonance imaging, arthroscopy, supraspinatus tendon.

INTRODUCTION

Rotator cuff tears are a common cause of shoulder pain and functional impairment, particularly in middle-aged and older adults. Their prevalence increases with age, and tear progression may be accompanied by muscle atrophy and fatty degeneration, potentially leading to progressive loss of shoulder function (Coddling & Keener, 2018; Keener et al., 2019).

Clinical examination remains important for identifying rotator cuff dysfunction; however, clinical findings alone may not fully characterize the extent and morphology of the tear. Magnetic resonance imaging (MRI) provides detailed information on tear depth, tendon involvement, and associated shoulder lesions, making it valuable for preoperative assessment and treatment planning (Hsu & Keener, 2015; Heininger-Biner et al., 2000).

Data on the combined clinical and MRI characteristics of Vietnamese patients undergoing arthroscopic rotator cuff repair remain limited. Therefore, this study aimed to describe the clinical and MRI characteristics of patients with rotator cuff tears undergoing arthroscopic repair and to explore differences in selected baseline clinical features between partial- and full-thickness tears.

MATERIALS AND METHODS

Study design and participants: a retrospective descriptive cross-sectional study was conducted at Military Hospital 175 from June 2025 to June 2026. The study included patients aged ≥ 16 years who were diagnosed with a rotator cuff tear based on clinical examination and magnetic resonance imaging (MRI) and subsequently underwent arthroscopic treatment. Patients with previous shoulder surgery, sequelae of shoulder trauma or other shoulder disorders, paralysis,

shoulder stiffness, psychiatric disorders affecting cooperation, or incomplete medical records or imaging data were excluded. Convenience sampling was applied, and 41 eligible patients were included during the study period.

Data collection and clinical assessment: demographic and clinical data were collected from medical records using a standardized data collection form. Variables included age, sex, occupation, injury mechanism, affected shoulder, night pain, limitation of shoulder motion, and rotator cuff muscle atrophy. Physical examination included the Jobe, Gerber, Patte, and drop-arm tests. Previous treatments, including physical therapy, oral medication, and intra-articular injection, were also recorded.

Magnetic resonance imaging assessment: preoperative shoulder MRI was used to characterize rotator cuff lesions. MRI findings included tear depth (partial- or full-thickness tear), tendons involved, acromial morphology, long-head biceps tendon abnormalities, and associated labral lesions. Rotator cuff tear patterns were categorized according to the involvement of the supraspinatus, infraspinatus, and subscapularis tendons. MRI images were interpreted by a radiologist.

Statistical analysis: data were analyzed using SPSS version 20.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean $\pm$ standard deviation (SD), and categorical variables as frequencies and percentages. For exploratory comparisons between partial- and full-thickness tears, age was compared using the Mann–Whitney U test, while categorical variables, including sex, injury mechanism, affected side, clinical symptoms, and physical examination findings, were compared using Fisher's exact test because of the small number of patients with partial-thickness tears. All tests were two-sided, and a p -value < 0.05 was considered statistically significant.

Ethical considerations: the study protocol was approved by the Ethics Committee in Biomedical Research of Can Tho University of Medicine and Pharmacy (Approval No. 25.482.HV/PCT-HDDĐ, dated

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June 30, 2025) and was conducted at Military Hospital 175. The study was observational in nature. All collected information was used solely for research purposes, and patient confidentiality was maintained throughout the study.

RESULTS

A total of 41 patients were included. The mean age was 57.1 ± 8.5 years (range, 39–70 years), and 22 (53.66%) were male. Most patients were manual workers (70.73%), and the right shoulder was affected in 78.05% (Table 1).

Table 1. Demographic and baseline characteristics of the study population

Characteristic	n (%) or mean $\pm$ SD
Age, years	57.1 $\pm$ 8.5
Age 36–45 years	3 (7.32)
Age 46–55 years	17 (41.46)
Age 56–65 years	11 (26.83)
Age >65 years	10 (24.39)
Male sex	22 (53.66)
Female sex	19 (46.34)
Manual occupation	29 (70.73)
Intellectual/office occupation	12 (29.27)
Direct injury mechanism	29 (70.73)
Indirect injury mechanism	12 (29.27)
Right shoulder	32 (78.05)
Left shoulder	9 (21.95)

Regarding clinical presentation, limited shoulder motion was observed in 25 patients (60.98%), while night pain and rotator cuff muscle atrophy were present in 21.95% and 19.51%, respectively. The Jobe test was the most frequently positive physical examination test (80.49%), followed by the Gerber (34.15%), Patte (26.83%), and drop-arm (21.95%) tests. Oral medication was the most common previous treatment (58.54%) (Table 2).

Table 2. Clinical presentation, examination findings, and previous treatment

Variable	n	%
Night pain	9	21.95
Limited shoulder motion	25	60.98
Rotator cuff muscle atrophy	8	19.51
Positive Jobe test	33	80.49
Positive Gerber test	14	34.15
Positive Patte test	11	26.83
Positive drop-arm test	9	21.95
Previous physical therapy	8	19.51
Previous oral medication	24	58.54
Previous intra-articular injection	10	24.39

MRI showed that full-thickness tears predominated, occurring in 35 patients (85.37%). Isolated supraspinatus tears were the most common tear pattern (46.34%), while combined involvement of the supraspinatus, infraspinatus, and subscapularis was identified in 26.83%. Thus, the supraspinatus tendon was involved in all recorded tear-pattern categories. Type I acromion was most frequent (46.34%), followed by type II (41.46%) and type III (12.20%). Long-head biceps tendon abnormalities were present in 24.39% of patients, while labral lesions were identified in 39.02%, including SLAP tears in 19.51% (Table 3).

Table 3. Magnetic resonance imaging characteristics

MRI characteristic	n	%
Partial-thickness tear	6	14.63
Full-thickness tear	35	85.37
Supraspinatus only	19	46.34
Supraspinatus + subscapularis	8	19.51
Supraspinatus + infraspinatus	3	7.32
Supraspinatus + infraspinatus + subscapularis	11	26.83
Acromion type I	19	46.34
Acromion type II	17	41.46
Acromion type III	5	12.20
No long-head biceps injury	31	75.61
Partial biceps tear	6	14.63
Complete biceps tear	4	9.76
No labral tear	25	60.98
Anterior labral tear	5	12.20
Posterior labral tear	3	7.32
SLAP tear	8	19.51

Exploratory comparisons between partial- and full-thickness tears showed no statistically significant differences in age, sex, injury mechanism, affected side, night pain, limited shoulder motion, rotator cuff muscle atrophy, or the Jobe, Gerber, Patte, and drop-arm tests (all $p > 0.05$). The largest numerical difference was observed for a positive drop-arm test, which occurred in 50.0% of patients with partial-thickness tears and 17.1% of those with full-thickness tears; however, the difference did not reach statistical significance ($p = 0.107$) (Table 4).

Table 4. Exploratory comparison of baseline characteristics according to rotator cuff tear depth

Characteristic	Partial-thickness (n=6)	Full-thickness (n=35)	p-value
Age, years, mean $\pm$ SD	55.0 $\pm$ 12.9	57.5 $\pm$ 7.7	0.580
Male sex	3 (50.0)	19 (54.3)	1.000
Indirect injury mechanism	1 (16.7)	11 (31.4)	0.651
Right shoulder	5 (83.3)	27 (77.1)	1.000
Night pain	0 (0.0)	9 (25.7)	0.309
Limited shoulder motion	5 (83.3)	20 (57.1)	0.376
Rotator cuff muscle atrophy	2 (33.3)	6 (17.1)	0.578
Positive Jobe test	5 (83.3)	28 (80.0)	1.000
Positive Gerber test	3 (50.0)	11 (31.4)	0.393
Positive Patte test	3 (50.0)	8 (22.9)	0.316
Positive drop-arm test	3 (50.0)	6 (17.1)	0.107

Data are presented as n (%) unless otherwise indicated. Age was compared using the Mann–Whitney U test; categorical variables were compared using Fisher's exact test. Because only six patients had partial-thickness tears, these comparisons should be considered exploratory.

DISCUSSION

The present study characterized the clinical and MRI features of 41 patients with rotator cuff tears undergoing arthroscopic repair. The main findings were the predominance of middle-aged and older patients, frequent right-shoulder involvement, a high proportion of full-thickness tears, and consistent supraspinatus involvement. Limited

shoulder motion and a positive Jobe test were the most common clinical findings.

The mean age was 57.1 ± 8.5 years, with most patients aged 46 years or older. This is consistent with previous evidence showing that the prevalence and progression of rotator cuff tears increase with age (Yamamoto *et al.*, 2010; Codding & Keener, 2018). In addition, 70.73% of patients were manual workers and 70.73% reported a direct injury mechanism, indicating that these characteristics were common in the present surgical cohort.

Limited shoulder motion was present in 60.98% of patients, and the Jobe test was positive in 80.49%. The high frequency of a positive Jobe test is consistent with the prominent supraspinatus involvement observed on MRI. Previous studies have shown that individual physical examination tests have variable diagnostic performance and are more informative when interpreted together rather than in isolation (Park *et al.*, 2005; Hegedus *et al.*, 2008; Jain *et al.*, 2013).

Full-thickness tears accounted for 85.37% of cases. This high proportion likely reflects the selected surgical population and should not be interpreted as the prevalence of full-thickness tears in the general population. The supraspinatus tendon was involved in all MRI tear-pattern categories, with isolated supraspinatus tears accounting for 46.34%. This predominance is consistent with previous studies showing frequent supraspinatus involvement in rotator cuff disease (Tempelhof *et al.*, 1999; Hsu & Keener, 2015). Associated abnormalities were also common, with long-head biceps tendon lesions in 24.39% and labral lesions in 39.02%, highlighting the importance of evaluating associated shoulder structures on preoperative MRI.

Exploratory comparisons showed no statistically significant differences in selected demographic or clinical characteristics between partial- and full-thickness tears (all $p > 0.05$). However, these findings should be interpreted cautiously because only six patients had partial-thickness tears. Previous studies have also reported limitations in the diagnostic performance of individual clinical tests and MRI for partial-thickness rotator cuff tears (Brockmeyer *et al.*, 2017). Therefore, the absence of significant differences in our study does not imply that clinical examination lacks diagnostic value; rather, clinical findings should be interpreted together with imaging when assessing tear morphology (Park *et al.*, 2005).

This study has several limitations. It was conducted at a single center with a relatively small sample, particularly for partial-thickness tears, and included only patients undergoing arthroscopic treatment. Therefore, the findings may not be generalizable to all patients with rotator cuff tears. In addition, tear size, tendon retraction, fatty degeneration, and systematic MRI–arthroscopy agreement were not evaluated. Larger prospective studies incorporating detailed imaging and operative findings are needed to further clarify the relationship between clinical characteristics and rotator cuff tear morphology.

CONCLUSION

In this cohort of patients undergoing arthroscopic rotator cuff repair, full-thickness tears predominated, with the supraspinatus tendon involved in all MRI tear patterns. Limited shoulder motion and a positive Jobe test were the most frequent clinical findings. No significant differences in selected clinical characteristics were observed between partial- and full-thickness tears. These findings support the complementary use of clinical examination and MRI for preoperative characterization of rotator cuff tears.

ACKNOWLEDGEMENTS

The authors would like to thank the staff of Military Hospital 175 and Can Tho University of Medicine and Pharmacy for their support during this study. We also sincerely thank all patients whose clinical data contributed to this research.

REFERENCES

- Codding JL, Keener JD. Natural history of degenerative rotator cuff tears. *Curr Rev Musculoskelet Med.* 2018; 11(1):77–85. doi:10.1007/s12178-018-9461-8. PMID: 29411321.
- Yamamoto A, Takagishi K, Osawa T, Yanagawa T, Nakajima D, Shitara H, Kobayashi T. Prevalence and risk factors of a rotator cuff tear in the general population. *J Shoulder Elbow Surg.* 2010; 19(1):116–120. doi:10.1016/j.jse.2009.04.006. PMID: 19540777.
- Park HB, Yokota A, Gill HS, El Rassi G, McFarland EG. Diagnostic accuracy of clinical tests for the different degrees of subacromial impingement syndrome. *J Bone Joint Surg Am.* 2005; 87(7):1446–1455. doi:10.2106/JBJS.D.02335. PMID: 15995110.
- Keener JD, Patterson BM, Orvets N, Chamberlain AM. Degenerative rotator cuff tears: refining surgical indications based on natural history data. *J Am Acad Orthop Surg.* 2019; 27(5):156–165. doi:10.5435/JAAOS-D-17-00480. PMID: 30335631.
- Hsu J, Keener JD. Natural history of rotator cuff disease and implications on management. *Oper Tech Orthop.* 2015; 25(1):2–9. doi:10.1053/j.oto.2014.11.006. PMID: 26726288.
- Heininger-Biner K, Müller M, Hertel R. Diagnosis of rotator cuff rupture: correlation of clinical findings and magnetic resonance tomography with intraoperative findings. *Z Orthop Ihre Grenzgeb.* 2000; 138(6):478–480. doi:10.1055/s-2000-9586. PMID: 11199409.
- Hegedus EJ, Goode A, Campbell S, Morin A, Tamaddoni M, Moorman CT 3rd, Cook C. Physical examination tests of the shoulder: a systematic review with meta-analysis of individual tests. *Br J Sports Med.* 2008; 42(2):80–92. doi:10.1136/bjsm.2007.038406. PMID: 17720798.
- Jain NB, Wilcox RB 3rd, Katz JN, Higgins LD. Clinical examination of the rotator cuff. *PM R.* 2013; 5(1):45–56. doi:10.1016/j.pmrj.2012.08.019. PMID: 23332909.
- Brockmeyer M, Schmitt C, Hauptert A, Kohn D, Lorbach O. Limited diagnostic accuracy of magnetic resonance imaging and clinical tests for detecting partial-thickness tears of the rotator cuff. *Arch Orthop Trauma Surg.* 2017; 137(12):1719–1724. doi:10.1007/s00402-017-2799-3. PMID: 28942510.
- Tempelhof S, Rupp S, Seil R. Age-related prevalence of rotator cuff tears in asymptomatic shoulders. *J Shoulder Elbow Surg.* 1999; 8(4):296–299. doi:10.1016/S1058-2746(99)90148-9. PMID: 10471998.
