Section: Orthopaedics

Original Research Article

# ASSESSMENT OF NON-TRAUMATIC SHOULDER PAIN USING CLINICAL EXAMINATION AND HIGH-RESOLUTION ULTRASONOGRAPHY

*Praveen Raj Saraogi[1], Manoj Kumar Verma[1], Brajesh Ranjan[2], Paras Gupta[3]*

[1]*Associate Professor, Department of Orthopaedics, RDMC, Banda, UP, India*
[2]*Associate Professor, Department of Anatomy, RDMC, Banda, UP, India*
[3]*Professor & Head, Department of Orthopaedics, MLB Medical College, Jhansi, UP, India*

***Received*** : 23/04/2026
***Received in revised form*** : 08/06/2026
***Accepted*** : 25/06/2026

**Corresponding Author:**
**Dr. Paras Gupta,**
Professor & Head, Department of Orthopaedics, MLB Medical College, Jhansi, UP, India
Email: parasorthomlb@gmail.com

**DOI:** 10.70034/ijmedph.2026.3.34

**Source of Support:** Nil,
**Conflict of Interest:** None declared

**Int J Med Pub Health**
2026; 16 (3); 205-209

## ABSTRACT

**Background:** Non-traumatic shoulder pain is a common musculoskeletal complaint causing significant disability and functional impairment. Accurate diagnosis is essential for appropriate management. Clinical examination is widely used as an initial assessment tool; however, its diagnostic accuracy may be limited by overlapping symptoms. High-resolution ultrasonography (HRUSG) has emerged as a valuable imaging modality for evaluating shoulder pathologies. The aim is to evaluate the role of high-resolution ultrasonography in the diagnosis of non-traumatic shoulder pain and to correlate ultrasonographic findings with clinical examination.

**Materials and Methods:** A hospital-based observational study was conducted in the Department of Orthopaedics, M.L.B. Medical College, Jhansi, from November 2011 to November 2013. Seventy-five patients with unilateral non-traumatic shoulder pain underwent detailed clinical examination and HRUSG assessment. Clinical and ultrasonographic findings were compared to determine their diagnostic utility.

**Results:** Clinical examination identified supraspinatus tendon lesions in 60 (80%) patients, biceps tendon pathology in 26 (35%), and acromioclavicular (AC) joint abnormalities in 18 (24%). HRUSG revealed subacromial bursitis in 48 (64%) patients, supraspinatus lesions in 40 (54%), impingement syndrome in 30 (40%), and AC joint abnormalities in 29 (38.7%). Clinical examination demonstrated higher sensitivity for supraspinatus lesions (80%), whereas HRUSG showed greater specificity for most shoulder pathologies, including 100% specificity for infraspinatus and subscapularis lesions.

**Conclusion:** HRUSG is a valuable adjunct to clinical examination in patients with non-traumatic shoulder pain. While clinical examination remains a sensitive screening tool, HRUSG provides superior specificity and direct visualization of structural abnormalities, thereby improving diagnostic accuracy and diagnostic confidence.

**Keywords:** Non-traumatic shoulder pain, High-resolution ultrasonography, Clinical examination, Rotator cuff lesions.

## INTRODUCTION

Shoulder pain is one of the most common musculoskeletal complaints encountered in clinical practice and is a significant cause of disability and functional limitation. The prevalence of shoulder pain in the general population ranges from 7% to 26%, making it a major public health concern.[1] Rotator cuff disorders, subacromial bursitis, impingement syndrome, and acromioclavicular (AC) joint abnormalities constitute the most frequent causes of non-traumatic shoulder pain.[2,3]

The shoulder is the most mobile joint in the human body and depends on the coordinated function of the glenohumeral joint, acromioclavicular joint, rotator cuff tendons, bursae, and surrounding musculature. Because of this complex anatomy and extensive range of motion, the shoulder is vulnerable to

degenerative, inflammatory, and overuse injuries.[4] Among the rotator cuff tendons, the supraspinatus tendon is most commonly affected because of its anatomical location beneath the acromion, where repetitive compression and microtrauma may lead to tendinopathy and tears.[5]

Clinical examination remains the first-line approach for evaluating shoulder disorders and includes assessment of tenderness, range of motion, muscle strength, and special orthopaedic tests. Although clinical examination is inexpensive and readily available, overlapping symptoms among different shoulder pathologies may reduce its diagnostic accuracy.[6]

High-resolution ultrasonography (HRUSG) has emerged as a valuable imaging modality for assessing shoulder pain. It provides real-time dynamic evaluation of tendons, bursae, and joints, is non-invasive, cost-effective, radiation-free, and readily accessible. Several studies have demonstrated that HRUSG has excellent diagnostic performance for rotator cuff tears, biceps tendon pathology, bursitis, and impingement syndrome, with accuracy comparable to magnetic resonance imaging (MRI) in many situations.[7-9]

Previous investigators have reported varying degrees of agreement between clinical examination and ultrasonographic findings in patients with painful shoulder conditions.[10-12] Therefore, the present study was undertaken to evaluate the spectrum of clinical and ultrasonographic findings in patients with non-traumatic shoulder pain and to compare the diagnostic utility of clinical examination with HRUSG in detecting common shoulder pathologies.

**Aim:** To evaluate the role of high-resolution ultrasonography in the diagnosis of non-traumatic shoulder pain and to correlate ultrasonographic findings with clinical examination.

**Objectives:**

1. To assess shoulder pathologies in patients with non-traumatic shoulder pain using clinical examination and high-resolution ultrasonography.
2. To analyse the agreement between clinical diagnostic tests and ultrasonographic findings in the evaluation of painful shoulder conditions.

## MATERIALS AND METHODS

**Study Design and Setting:** This hospital-based observational study was conducted in the Department of Orthopaedics, M.L.B. Medical College, Jhansi, Uttar Pradesh, India, from November 2011 to November 2013. Patients presenting to the Orthopaedic Outpatient Department (OPD) with complaints of non-traumatic shoulder pain were evaluated clinically and by high-resolution ultrasonography (HRUSG).

**Study Population:** Patients presenting with unilateral painful shoulder and clinically diagnosed periarticular shoulder lesions were included in the study. The lesions assessed included rotator cuff impingement syndrome, rotator cuff tendinitis, rotator cuff tears, biceps tendinitis, subacromial-subdeltoid bursitis, painful arc syndrome, and acromioclavicular joint abnormalities.

**Inclusion Criteria**

- Patients presenting with unilateral non-traumatic shoulder pain.
- Clinical suspicion of periarticular shoulder lesions.
- Patients willing to undergo clinical and ultrasonographic evaluation.

**Exclusion Criteria**

- History of significant shoulder trauma resulting in fracture or open injury.
- Polyarticular pain.
- Rheumatoid arthritis, osteoarthritis, or gout.
- Frozen shoulder (adhesive capsulitis).
- Moderate to severe cervical spondylosis/spondylitis.
- Patients below 10 years of age.

**Control Group:** Age- and sex-matched individuals without any history of shoulder pain or shoulder pathology were included as controls.

**Clinical Evaluation:** A detailed clinical history and physical examination were performed for all participants. Clinical assessment included evaluation of pain, range of motion, and special shoulder tests. Rotator cuff pathology was assessed using Neer's impingement test, Hawkins-Kennedy test, Yocum's test, Jobe's (Empty Can) test, and Apley's scratch test. Infraspinatus tendon integrity was evaluated using Patte's test and resisted external rotation test. Subscapularis tendon involvement was assessed using the Lift-off (Gerber's) test and resisted internal rotation test. Long head of biceps tendon pathology was evaluated using Speed's test, Yergason's test, and Lipmann's test.

**Ultrasonographic Examination:** All subjects underwent ultrasonographic examination using a Medison high-resolution ultrasound system equipped with a 5–7 MHz linear-array transducer. The examination was performed in real time with the patient in a seated position.

Both longitudinal and transverse scans were obtained to evaluate the long head of the bicep’s tendon, subscapularis tendon, supraspinatus tendon, infraspinatus tendon, subacromial-subdeltoid bursa, acromioclavicular joint, glenohumeral joint, and posterior labrum. Comparative ultrasonographic assessment of the contralateral shoulder was also performed whenever necessary.Diagnostic criteria included tendon thickening, hypo echogenicity, fibre discontinuity, tendon thinning, bursal fluid accumulation, tendon subluxation, calcification, joint effusion, and dynamic signs of impingement. Full-thickness tears were diagnosed by complete tendon discontinuity or non-visualization of tendon fibres, whereas partial-thickness tears were

identified by focal fibre disruption involving either the articular or bursal surface.

**Outcome Measures:** Clinical diagnoses were correlated with ultrasonographic findings to determine the utility of high-resolution ultrasonography in the evaluation of non-traumatic shoulder pain and periarticular shoulder lesions.

**Statistical Analysis:** Data were entered into a structured database and analysed using appropriate statistical methods. Clinical findings and ultrasonographic diagnoses were compared, and their correlation was assessed. A p-value <0.05 was considered statistically significant.

## RESULTS

Clinical examination detected supraspinatus tendon lesions in 60 (80%) patients, making it the most common pathology. Biceps tendon pathology was observed in 26 (35%) patients, followed by AC joint abnormalities in 18 (24%), infraspinatus lesions in 15 (20%), and subscapularis lesions in 9 (12%) patients. [Table 1]

**Table 1. Clinical Examination Findings in Patients with Non-Traumatic Shoulder Pain (n=75)**

| Clinical Diagnosis | Number of Patients | Percentage (%) |
|---|---|---|
| Supraspinatus tendon lesion | 60 | 80.0 |
| Biceps tendon pathology | 26 | 35.0 |
| Acromioclavicular joint abnormality | 18 | 24.0 |
| Infraspinatus tendon lesion | 15 | 20.0 |
| Subscapularis tendon lesion | 9 | 12.0 |

HRUSG revealed subacromial bursitis in 48 (64%) patients, supraspinatus tendon lesions in 40 (54%), impingement syndrome in 30 (40%), AC joint abnormalities in 29 (38.7%), biceps tendon pathology in 23 (31%), subdeltoid bursitis in 22 (29.3%), subscapularis lesions in 10 (13.3%), and infraspinatus lesions in 6 (8%) patients. [Table 2]

**Table 2: Ultrasonographic Findings in Patients with Non-Traumatic Shoulder Pain (n=75)**

| Sonographic Finding | Number of Patients | Percentage (%) |
|---|---|---|
| Subacromial bursitis | 48 | 64.0 |
| Supraspinatus tendon lesion | 40 | 54.0 |
| Impingement syndrome | 30 | 40.0 |
| Acromioclavicular joint abnormality | 29 | 38.7 |
| Biceps tendon pathology | 23 | 31.0 |
| Subdeltoid bursitis | 22 | 29.3 |
| Subscapularis tendon lesion | 10 | 13.3 |
| Infraspinatus tendon lesion | 6 | 8.0 |

Clinical examination identified supraspinatus lesions in 60 (80%) patients compared with 40 (54%) on HRUSG. Biceps tendon pathology was detected in 26 (35%) patients clinically and 23 (31%) on HRUSG. Infraspinatus lesions were found in 15 (20%) patients clinically and 6 (8%) on HRUSG, whereas subscapularis lesions were observed in 9 (12%) and 10 (13.3%) patients, respectively. AC joint abnormalities were detected in 18 (24%) patients clinically and 29 (38.7%) patients on HRUSG. [Table 3]

**Table 3: Comparison of Clinical Examination and Ultrasonographic Findings (n=75)**

| Shoulder Pathology | Clinical Examination n (%) | HRUSG n (%) |
|---|---|---|
| Supraspinatus lesion | 60 (80.0) | 40 (54.0) |
| Biceps tendon pathology | 26 (35.0) | 23 (31.0) |
| Infraspinatus lesion | 15 (20.0) | 6 (8.0) |
| Subscapularis lesion | 9 (12.0) | 10 (13.3) |
| AC joint abnormality | 18 (24.0) | 29 (38.7) |

**Table 4. Diagnostic Agreement Between Clinical Examination and HRUSG**

| Pathology | Sensitivity of Clinical Examination (%) | Specificity of Clinical Examination (%) | Sensitivity of HRUSG (%) | Specificity of HRUSG (%) |
|---|---|---|---|---|
| Supraspinatus lesion | 80 | 84 | 54 | 92 |
| Biceps tendon pathology | 35 | 92 | 31 | 96 |
| Infraspinatus lesion | 20 | 88 | 8 | 100 |
| Subscapularis lesion | 12 | 92 | 13.3 | 100 |
| AC joint abnormality | 24 | 100 | 38.7 | 96 |

For supraspinatus lesions, clinical examination showed a sensitivity of 80% and specificity of 84%, whereas HRUSG demonstrated a sensitivity of 54% and specificity of 92%. For biceps tendon pathology, sensitivity and specificity were 35% and 92% for clinical examination compared with 31% and 96% for HRUSG. HRUSG showed 100% specificity for infraspinatus and subscapularis

lesions, while AC joint abnormalities demonstrated a sensitivity of 38.7% and specificity of 96% on HRUSG. Overall, HRUSG was more specific than clinical examination for most shoulder pathologies. [Table 4]

## DISCUSSION

The present study assessed the clinical and ultrasonographic characteristics of non-traumatic shoulder pain in 75 patients and evaluated the diagnostic agreement between clinical examination and HRUSG.

Clinical examination identified supraspinatus tendon lesions in 80% of patients, making it the most common pathology encountered. Similar observations have been reported by Naredoet al,[10] and Iagnocco et al,[11] who found supraspinatus tendon involvement to be the predominant abnormality in painful shoulder syndrome. The high frequency of supraspinatus lesions is attributable to its anatomical position beneath the acromion, making it susceptible to impingement, ischemia, and degenerative changes.[5]

Biceps tendon pathology was the second most common clinical diagnosis (35%), followed by AC joint abnormalities (24%), infraspinatus lesions (20%), and subscapularis lesions (12%). These findings support the multifactorial nature of shoulder pain and emphasize the importance of comprehensive clinical evaluation.

On HRUSG, subacromial bursitis was the most common abnormality (64%), followed by supraspinatus tendon lesions (54%), impingement syndrome (40%), AC joint abnormalities (38.7%), biceps tendon pathology (31%), and subdeltoid bursitis (29.3%). Similar patterns have been described by Farinet al,[13] and Middleton et al,[14] who reported bursitis and rotator cuff abnormalities as the predominant sonographic findings in painful shoulder disorders.

Comparison of clinical examination and HRUSG findings revealed that supraspinatus lesions were detected more frequently clinically (80%) than on HRUSG (54%). This may be due to the tendency of clinical tests to identify symptomatic tendon dysfunction rather than structural abnormalities. In contrast, HRUSG detected AC joint abnormalities more frequently (38.7%) than clinical examination (24%), highlighting its superior ability to visualize structural and inflammatory changes within the joint.

The detection rates of biceps tendon pathology were comparable between clinical examination (35%) and HRUSG (31%), indicating reasonable agreement between the two methods. Subscapularis lesions were also similarly identified clinically (12%) and sonographically (13.3%). However, infraspinatus lesions were more frequently diagnosed clinically (20%) than by HRUSG (8%), possibly reflecting nonspecific clinical signs and overlapping symptomatology.

Diagnostic agreement analysis demonstrated that clinical examination had higher sensitivity for supraspinatus lesions (80%) than HRUSG (54%), whereas HRUSG exhibited greater specificity (92% vs. 84%). Similar findings have been reported by Teefeyet al,[7] and Swen et al,[8] who emphasized the excellent specificity of ultrasonography in detecting rotator cuff abnormalities. For biceps tendon pathology, HRUSG demonstrated higher specificity (96%) than clinical examination (92%).

Notably, HRUSG achieved 100% specificity for both infraspinatus and subscapularis lesions in the present study. This finding supports previous reports suggesting that ultrasonography is highly effective in confirming the absence of pathology when sonographic findings are normal.[9,15]

The results of the present study suggest that clinical examination remains an important screening tool because of its relatively high sensitivity, particularly for supraspinatus lesions. However, HRUSG provides superior specificity and direct visualization of anatomical abnormalities, thereby improving diagnostic confidence. Consequently, the combined use of detailed clinical examination and HRUSG offers a comprehensive and reliable approach for evaluating patients with non-traumatic shoulder pain.

## CONCLUSION

The present study demonstrates that supraspinatus tendon lesions were the most common clinical finding, detected in 60 (80%) patients with non-traumatic shoulder pain, followed by biceps tendon pathology in 26 (35%) patients. On HRUSG, subacromial bursitis was the most frequent abnormality, observed in 48 (64%) patients, followed by supraspinatus tendon lesions in 40 (54%) and impingement syndrome in 30 (40%) patients. Clinical examination showed higher sensitivity for supraspinatus lesions (80%), whereas HRUSG demonstrated greater specificity for most shoulder pathologies, reaching 100% specificity for infraspinatus and subscapularis lesions. These findings suggest that HRUSG is a valuable adjunct to clinical examination and improves diagnostic accuracy in the evaluation of non-traumatic shoulder pain.

## REFERENCES


1. Luime JJ, Koes BW, Hendriksen IJM, Burdorf A, Verhagen AP, Miedema HS, et al. Prevalence and incidence of shoulder pain in the general population; a systematic review. Scand J Rheumatol. 2004;33(2):73–81.
2. Neer CS II. Impingement lesions. ClinOrthopRelat Res. 1983;(173):70–77.
3. Cofield RH. Current concepts review: rotator cuff disease of the shoulder. J Bone Joint Surg Am. 1985;67(6):974–979.
4. vanHolsbeeck MT, Introcaso JH. Musculoskeletal Ultrasound. 2nd ed. St. Louis: Mosby-Year Book Inc.; 2001.
5. Rathbun JB, Macnab I. The microvascular pattern of the rotator cuff. J Bone Joint Surg Br. 1970;52(3):540–553.

6. Leroux JL, Thomas E, Bonnel F, Blotman F. Diagnostic value of clinical tests for shoulder impingement syndrome. Rev RhumEngl Ed. 1995;62(6):423–428.
7. Teefey SA, Hasan SA, Middleton WD, Patel M, Wright RW, Yamaguchi K. Ultrasonography of the rotator cuff: a comparison of ultrasonographic and arthroscopic findings in one hundred consecutive cases. J Bone Joint Surg Am. 2000;82(4):498–504.
8. Swen WAA, Jacobs JWG, Algra PR, Manoliu RA, Rijkmans J, Willems WJ, et al. Sonography and magnetic resonance imaging equivalent for the assessment of full-thickness rotator cuff tears. Arthritis Rheum. 1999;42(10):2231–2238.
9. Patidar M, Patil A, Verma V, Kaushal L. Evaluation of painful shoulder with high-frequency sonography and comparison with the clinical diagnosis made by physical examination. Natl J Med Res. 2012;2(2):186–191.
10. Naredo E, Aguado P, Bernad M, Uson J, Mayordomo L, Gijon-Banos J, et al. Painful shoulder: comparison of physical examination and ultrasonographic findings. Ann Rheum Dis. 2002;61(2):132–136.
11. Iagnocco A, Coari G, Leone A, Valesini G. Sonographic study of painful shoulder. ClinExpRheumatol. 2003;21(3):355–358.
12. Naredo E, Aguado P, Padron M, Bernad M, Uson J, Mayordomo L, et al. A comparative study of ultrasonography and magnetic resonance imaging in patients with painful shoulder. J ClinRheumatol. 1999;5(4):184–192.
13. Farin PU, Jaroma H, Harju A, Soimakallio S. Shoulder impingement syndrome: sonographic evaluation. Radiology. 1990;176(3):845–849.
14. Middleton WD, Reinus WR, Totty WG, Melson CL, Murphy WA. Ultrasonographic evaluation of the rotator cuff and biceps tendon. J Bone Joint Surg Am. 1986;68(3):440–450.
15. Blankstein A, Mirovski Y, Givon U, Chechick A, Adunsky A, Ganel A. Ultrasonographic diagnosis in the evaluation of shoulder pain. J Musculoskelet Res. 2004;8(4):195–201.