Section: Orthopaedics

Original Research Article

FUNCTIONAL OUTCOME OF PLATELET-RICH PLASMA INJECTION IN THE MANAGEMENT OF SUPRASPINATUS TENDINITIS: A PROSPECTIVE OBSERVATIONAL STUDY

Prabhakar R[1], Parasuraman K[1], Hariprakash E[1]

[1]*Department of Orthopaedics, Government Medical College and Hospitals, Cuddalore, Tamil Nadu, India.*

Received *: 12/03/2026*
Received in revised form *: 01/05/2026*
Accepted *: 15/05/2026*

Corresponding Author:
Dr. Hariprakash E,
Department of Orthopaedics, Government Medical College and Hospitals, Cuddalore, Tamil Nadu, India.
Email: dochari76@gmail.com

DOI: 10.70034/ijmedph.2026.2.428

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

Int J Med Pub Health
2026; 16 (2); 2578-2583

ABSTRACT

Background: Supraspinatus tendinitis is among the most common causes of persistent shoulder pain and functional impairment encountered in orthopaedic practice. The condition arises from a combination of repetitive overuse, degenerative changes within the tendon, and mechanical compression under the coracoacromial arch. Standard treatment approaches — including NSAIDs, physiotherapy, and corticosteroid injections — tend to offer only temporary relief without modifying the underlying pathological process. Platelet-rich plasma (PRP), an autologous preparation rich in growth factors, has emerged as a biologically driven alternative that targets tendon repair at the cellular level. The aim is to assess functional outcomes following PRP injection in patients with supraspinatus tendinitis using validated clinical tools over a six-month observation period.

Materials and Methods: A prospective observational study was conducted in 20 patients diagnosed with supraspinatus tendinitis based on clinical and ultrasonographic assessments. Each patient received a single ultrasound-guided PRP injection using the peppering technique. Outcomes were measured at baseline, 6 weeks, 12 weeks, and 6 months using the Visual Analog Scale (VAS), shoulder Range of Motion (ROM), and the Penn Shoulder Score (PSS).

Results: Mean VAS scores fell significantly from 7.8±1.2 at baseline to 1.1±0.6 at six months ($p<0.001$). Shoulder ROM improved progressively across all planes of motion. All three components of the Penn Shoulder Score — pain, satisfaction, and function — showed statistically significant gains at each follow-up visit. No significant adverse events were recorded.

Conclusion: A single PRP injection delivered under ultrasound guidance is a safe, well-tolerated, and effective intervention for supraspinatus tendinitis. It produces meaningful and durable improvements in pain and shoulder function, making it a viable option for patients who have not responded adequately to conventional conservative care.

Keywords: Platelet-rich plasma, supraspinatus tendinitis, shoulder pain, ultrasound-guided injection, Penn Shoulder Score, functional outcome.

INTRODUCTION

Supraspinatus tendinitis stands out as one of the leading contributors to chronic shoulder pain and activity-related disability in orthopaedic outpatient settings. The supraspinatus tendon, which plays a central role in stabilising and mobilising the glenohumeral joint, is particularly prone to wear and tear owing to its position beneath the coracoacromial arch and the repetitive mechanical demands placed upon it during daily activities. Patients typically report pain that worsens with overhead movement, disturbed sleep, and a gradual loss of shoulder mobility — a constellation that progressively erodes their ability to carry out routine tasks and professional responsibilities.[1,2]

Conventional management approaches such as activity modification, non-steroidal anti-inflammatory drugs (NSAIDs), physical rehabilitation, and local corticosteroid injections remain the cornerstone of initial treatment. While these strategies can reduce symptoms in the short term, they often fall short of achieving lasting recovery, and symptom recurrence is not uncommon. Of particular concern, repeated corticosteroid injections have been linked to structural deterioration of tendon tissue, raising questions about their suitability as long-term interventions.[3,4]

Against this backdrop, platelet-rich plasma (PRP) has attracted considerable interest as a regenerative option for tendon disorders. PRP is prepared by centrifuging a patient's own blood to yield a plasma fraction with supraphysiological platelet concentrations. Upon activation, these platelets release a rich cocktail of growth factors — including platelet-derived growth factor (PDGF), transforming growth factor-β (TGF-β), and vascular endothelial growth factor (VEGF) — that stimulate tenocyte activity, support collagen synthesis, promote angiogenesis, and facilitate matrix remodelling.[5,6] Because PRP is derived from the patient's own blood, it carries a favourable safety profile and minimal immunogenic risk.

Despite accumulating evidence in support of PRP, variability in preparation techniques, platelet concentrations, and leukocyte content has made it difficult to draw uniform conclusions across studies. The current investigation was designed to systematically document the functional effects of a single ultrasound-guided PRP injection in patients with supraspinatus tendinitis, using standardised outcome tools at defined follow-up intervals.

MATERIALS AND METHODS

This was a prospective observational study conducted over an 18-month period at a tertiary orthopaedic centre. Twenty patients with a confirmed diagnosis of supraspinatus tendinitis were recruited from the outpatient department. The diagnosis rested on a combination of clinical findings including positive Neer impingement sign and Hawkins-Kennedy test — alongside ultrasonographic evidence of supraspinatus tendon changes such as thickening, heterogeneous echotexture, or partial-thickness defects.

All enrolled patients received a single PRP injection administered under real-time ultrasound guidance, directed into the supraspinatus tendon using the peppering technique under strict aseptic precautions. PRP was prepared from autologous venous blood by centrifugation, achieving a platelet concentration at least four times greater than that of whole blood.

Inclusion Criteria

- Adults aged 20 years or above
- Ultrasonographically confirmed supraspinatus tendinitis
- Shoulder pain persisting for more than three months
- All conservative medications like oral medications, local or systemic corticosteroids are discontinued before 2 weeks
- No prior shoulder surgery in the preceding three months
- No active infection or inflammatory process at the proposed injection site

Exclusion Criteria

- Age below 20 years
- Platelet dysfunction or platelet count below 1 lakh/µL
- Active febrile illness within the previous two weeks
- Known malignancy or receipt of chemotherapy within the past year
- Full-thickness rotator cuff tear identified on ultrasonography or MRI
- Bleeding disorders or current anticoagulant therapy

Outcome Measures: Clinical assessments were performed at baseline, 6 weeks, 12 weeks, and 6 months. The following validated instruments were employed:

- Visual Analog Scale (VAS): A 0–10 numerical rating of pain intensity, where 0 denotes no pain and 10 the worst imaginable pain
- Shoulder Range of Motion (ROM): Active ROM measured goniometrically in flexion, extension, abduction, external rotation, and internal rotation
- Penn Shoulder Score (PSS): A composite functional score consisting of three sub-scales — pain (maximum 30), satisfaction (maximum 10), and function (maximum 60) — yielding a total of 100 points. Lower scores indicate greater disability

Statistical Analysis: Data were summarised as mean ± standard deviation (SD). Changes across follow-up time points were evaluated using repeated-measures analysis of variance (ANOVA). A p-value below 0.05 was considered statistically significant. The study received ethical clearance from the Institutional Ethics Committee, and written informed consent was obtained from every participant before enrolment.

RESULTS

Demographic Profile: The study group comprised 20 patients with a mean age of 44.8 years (SD: 10.6 years). The largest age cluster was in the 41–50-year range (35%), followed by those aged 51–60 years (25%). Male patients accounted for 70% of the cohort (n=14), while female patients comprised 30% (n=6). The right shoulder was the more commonly affected side (65%, n=13). At presentation, the mean duration of symptoms was 17.4 months (SD:

5.4 months), reflecting a predominantly chronic presentation.

Table 1: Age Distribution of Study Participants

Age Group (Years)	Number of Patients	Percentage (%)
21–30	2	10.0
31–40	4	20.0
41–50	7	35.0
51–60	5	25.0
>60	2	10.0
Total	20	100.0
Mean Age	44.8 years	—
SD	10.6 years	—

Table 2: Gender Distribution

Gender	Number of Patients	Percentage (%)
Male	14	70.0
Female	6	30.0
Total	20	100.0

Table 3: Distribution by Side of Shoulder Involvement

Side Involved	Number	Percentage (%)
Right	13	65.0
Left	7	35.0
Total	20	100.0

Table 4: Duration of Shoulder Symptoms at Presentation

Parameter	Value (Months)
Mean	17.4
Standard Deviation	5.4
Minimum	6
Maximum	24

Platelet Concentration: PRP preparation yielded a mean platelet count of 1008.5 × 10^3/µL — approximately 4.2-fold higher than the mean whole blood platelet level of 241.1 × 10^3/µL — confirming that an adequate and therapeutically relevant degree of platelet enrichment was consistently achieved.

Table 5: Platelet Counts in Whole Blood vs. PRP Samples

Sample Type	Mean (×10^3/µL)	SD (×10^3/µL)
Whole Blood	241.1	31.5
PRP	1008.5	176.3

Pain Outcome — Visual Analog Scale (VAS): Pain scores declined in a steady and progressive fashion at every follow-up visit. The mean VAS fell from 7.8±1.2 at baseline to 1.1±0.6 at six months, representing a reduction of approximately 86% — a result that was both statistically significant ($p<0.001$) and clinically meaningful in terms of patient-reported pain burden.

Table 6: VAS Pain Scores Across Follow-Up Intervals

Time Interval	Mean	SD	p-value
Baseline	7.8	1.2	—
6 Weeks	3.6	1.1	0.001
12 Weeks	1.9	0.9	<0.001
6 Months	1.1	0.6	<0.001

Shoulder Range of Motion (ROM): ROM improved significantly across all shoulder movement planes throughout the study period. The greatest proportional gains were seen in flexion and abduction — the arcs most constrained by supraspinatus pathology — which increased by approximately 67% and 87% respectively from baseline to the six-month assessment.

Table 7: Flexion ROM at Follow-Up Intervals

Time Interval	Mean	SD	p-value
Baseline	72.1°	2.5	—
6 Weeks	89.4°	4.1	<0.001
12 Weeks	103.6°	4.3	<0.001
6 Months	120.4°	5.7	<0.001

Table 8: Extension ROM at Follow-Up Intervals

Time Interval	Mean	SD	p-value
Baseline	22.1°	2.1	—
6 Weeks	25.4°	2.3	<0.001
12 Weeks	32.1°	2.7	<0.001
6 Months	36.9°	3.0	<0.001

Table 9: Abduction ROM at Follow-Up Intervals

Time Interval	Mean	SD	p-value
Baseline	60.4°	4.4	—
6 Weeks	80.7°	4.6	<0.001
12 Weeks	98.2°	4.0	<0.001
6 Months	112.8°	5.0	<0.001

Table 10: External Rotation ROM at Follow-Up Intervals

Time Interval	Mean	SD	p-value
Baseline	25.8°	2.2	—
6 Weeks	30.3°	2.4	<0.001
12 Weeks	35.4°	2.8	<0.001
6 Months	42.8°	3.1	<0.001

Table 11: Internal Rotation ROM at Follow-Up Intervals

Time Interval	Mean	SD	p-value
Baseline	32.2°	1.8	—
6 Weeks	35.3°	2.0	<0.001
12 Weeks	38.9°	2.1	<0.001
6 Months	43.0°	2.4	<0.001

Penn Shoulder Score (PSS): Statistically significant improvements were observed in all three PSS sub-scales — pain, satisfaction, and function — at each successive follow-up interval ($p<0.001$ throughout). The most rapid gains were recorded between 6 and 12 weeks post-injection, aligning with the expected peak biological activity of platelet-derived growth factors during this period.

Table 12: Penn Shoulder Score — Pain Sub-Scale

Time Interval	Mean	SD	p-value
Baseline	23.1	2.8	—
6 Weeks	11.2	2.1	<0.001
12 Weeks	5.7	1.7	<0.001
6 Months	2.3	1.2	<0.001

Table 13: Penn Shoulder Score — Satisfaction Sub-Scale

Time Interval	Mean	SD	p-value
Baseline	8.2	2.2	—
6 Weeks	5.6	1.1	<0.001
12 Weeks	2.6	1.0	<0.001
6 Months	1.2	0.7	<0.001

Table 14: Penn Shoulder Score — Function Sub-Scale

Time Interval	Mean	SD	p-value
Baseline	44.8	4.3	—
6 Weeks	27.6	3.1	<0.001
12 Weeks	15.2	1.7	<0.001
6 Months	6.1	1.4	<0.001

Table 15: Overall Penn Shoulder Score

Time Interval	Mean	SD	p-value
Baseline	76.1	5.7	—
6 Weeks	44.4	3.0	<0.001
12 Weeks	23.5	2.6	<0.001
6 Months	9.6	1.0	<0.001

DISCUSSION

The findings of this prospective observational study indicate that a single ultrasound-guided PRP injection can bring about substantial, progressive, and well-maintained improvements in pain relief, shoulder mobility, and overall functional capacity in patients with supraspinatus tendinitis. These outcomes were consistent across all follow-up intervals and align with the biological rationale underlying PRP-mediated tendon repair.[7]

The degree of pain reduction recorded in the present cohort is notable: mean VAS scores fell from 7.8 at baseline to 1.1 at six months, a reduction that is not

only statistically compelling but also clinically relevant from the patient's perspective. These figures are broadly comparable to those reported by Kim et al. (2019),[8] who documented analogous improvements following PRP administration in degenerative rotator cuff pathology, attributing the benefit to growth-factor-induced enhancement of tenocyte metabolism and collagen matrix organisation.[1] Our results are further corroborated by the systematic review conducted by Lin et al. (2020),[9] which, despite acknowledging methodological heterogeneity across included trials, identified significant pain reduction and functional improvement as consistent outcomes of PRP therapy in rotator cuff tendinopathy.[10]

A distinctive feature of the temporal response in this study was the particularly rapid improvement between 6 and 12 weeks' post-injection. This pattern is consistent with what is known about the biological lifecycle of platelet-derived mediators: growth factors released from activated platelets are most abundant in the early weeks following injection and drive an initial phase of tenocyte proliferation and collagen fibre synthesis, followed by a more gradual phase of matrix maturation and neoangiogenesis.[11,12] The continued — though more modest — recovery observed beyond 12 weeks points to an ongoing tissue remodelling process that extends well into the medium term.

Improvements in shoulder ROM across all planes were clinically significant, with the most striking gains seen in flexion and abduction — the movements most affected by supraspinatus pathology. Gains of 67% in flexion and approximately 87% in abduction between baseline and six months speak directly to the restoration of the functional capacity that patients depend on for overhead activities and daily tasks.

Compared with corticosteroid injection — which achieves symptom relief largely through anti-inflammatory pathways without modifying the underlying degenerative process — PRP offers a distinctly different mechanism of action, targeting the root pathology by actively promoting tendon repair. Kwong et al. (2021) demonstrated in a double-blind randomised controlled trial that PRP produced superior functional outcomes relative to corticosteroid injection at 12-month follow-up, without the tendon-damaging effects associated with repeated steroid use.[13] The absence of any significant adverse events in the present study further supports the safety of PRP as a first-line consideration for patients with chronic tendinopathy who have not benefited from conventional care.[14]

The limitations of this study merit acknowledgement. The single-arm design and small sample size (n=20) prevent any comparative conclusions about PRP efficacy relative to a control group. The follow-up horizon of six months, while informative, does not allow assessment of the long-term durability of the observed benefits. The absence of blinding and randomisation introduces the potential for performance and observer bias. Prospective randomised controlled trials with larger patient populations, standardised PRP formulations, and extended follow-up are needed to consolidate the evidence base and guide evidence-informed clinical recommendations.

CONCLUSION

A single ultrasound-guided PRP injection represents a safe, minimally invasive, and clinically effective treatment for supraspinatus tendinitis. In this study, it produced meaningful and progressive improvements in pain, shoulder range of motion, and patient-reported functional scores over a six-month period. The most rapid recovery was observed between 6 and 12 weeks post-injection, consistent with the known biological activity window of platelet-derived growth factors, though improvement continued through to the final follow-up.

Given its favourable safety profile and targeted biological mechanism, PRP warrants serious consideration as a treatment option for patients whose symptoms have not responded to standard conservative measures. Larger, well-designed randomised trials incorporating standardised preparation protocols and longer follow-up are encouraged to further define PRP's place within the management pathway for supraspinatus tendinitis.

REFERENCES

1. Kim SJ, Yeo SM, Noh SJ, et al. Effect of platelet-rich plasma on degenerative rotator cuff tendinopathy according to its composition. J Orthop Surg Res. 2019;14(1):408.
2. Seitz AL, McClure PW, Finucane S, Boardman ND, Michener LA. Mechanisms of rotator cuff tendinopathy: intrinsic, extrinsic, or both? Clin Biomech (Bristol, Avon). 2011;26(1):1–12.
3. Velasquez Garcia A, Ingala Martini L, Franco Abache A, Abdo G. Role of platelet-rich plasma in the treatment of rotator cuff tendinopathy. World J Orthop. 2023;14(7):505–515.
4. Coombes BK, Bisset L, Vicenzino B. Effects of corticosteroid injections, physiotherapy, or both on rotator cuff disease. JAMA. 2013;309(5):461–469.
5. Alves R, Grimalt R. A review of platelet-rich plasma: history, biology, mechanism of action, and classification. Skin Appendage Disord. 2018;4:18–24.
6. Foster TE, Puskas BL, Mandelbaum BR, Rodeo SA. Platelet-rich plasma: from basic science to clinical applications. Am J Sports Med. 2009;37(11):2259–2272.
7. Kesikburun S, Tan AK, Yilmaz B, Yasar E, Yazicioglu K. Platelet-rich plasma injections in chronic rotator cuff tendinopathy. Am J Sports Med. 2013;41(11):2609–2616.
8. Lin MT, Wei KC, Wu CH. Effectiveness of platelet-rich plasma injection in rotator cuff tendinopathy: a systematic review and meta-analysis. Diagnostics (Basel). 2020;10(4):189.
9. Filardo G, Kon E, Di Matteo B, et al. Platelet-rich plasma for tendon and ligament injuries: evidence and perspectives. Knee Surg Sports Traumatol Arthrosc. 2014;22:595–603.
10. Phadke A, Singh B, Bakti N. Role of platelet-rich plasma in rotator cuff tendinopathy. J Clin Orthop Trauma. 2019;10:244–247.

11. Jo CH, Shin JS, Lee YG, et al. Platelet-rich plasma for arthroscopic repair of rotator cuff tears. Am J Sports Med. 2013;41(10):2240–2248.
12. Kwong CA, Woodmass JM, Gusnowski EM, et al. Platelet-rich plasma versus corticosteroid injection in partial-thickness rotator cuff tears or tendinopathy: a double-blind randomized controlled trial. Arthroscopy. 2021;37(2):510–517.
13. Westner M, Defreitas T, Bredy H, et al. Effectiveness of ultrasound-guided platelet-rich plasma therapy for rotator cuff tendinopathy: randomized controlled trial and cohort study. PLoS One. 2016;11:e0147842.
14. Desouza C, Shetty V. Effectiveness of platelet-rich plasma in partial-thickness rotator cuff tendon tears: a systematic review. J ISAKOS. 2024;9:699–708.