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Injectable platelet-rich fibrin versus subacromial corticosteroid injection in the management of symptomatic partial thickness rotator cuff tears

A prospective comparative study with 1-year follow-up

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Introduction

Rotator cuff disease is the most common cause of nontraumatic shoulder pain in adults, with a population-based prevalence approaching 20% and rising sharply beyond the fifth decade of life [1, 2]. Partial thickness rotator cuff tears (PTRCT) account for nearly half of all cuff lesions identified on imaging and are an important precursor to full-thickness disease [3, 4]. Histological studies confirm that PTRCTs have essentially no intrinsic capacity to heal and progress to full-thickness tears in approximately 28–42% of cases when left untreated [5–7]. The supraspinatus tendon is involved in the vast majority of cases and articular-sided tears are nearly three times more common than bursal-sided tears [8, 9]. Symptoms include nocturnal pain, painful arc and weakness in overhead activities that disable patients in their most productive years [6, 10].

Conservative management remains the first line option for tears involving less than 50% of tendon thickness and structured physiotherapy together with image-guided injections are supported by current guidelines [11, 12]. Subacromial corticosteroid (CS) injection has been the mainstay of pharmacological care for decades because of its rapid anti-inflammatory action [13, 14]; however, multiple high-quality systematic reviews and meta-analyses now demonstrate that the analgesic benefit of CS is small and confined to 4–8 weeks, with no advantage over local anesthetics beyond this window [15–18]. Worse, basic scientific evidence indicates that CSs reduce tenocyte viability, suppress collagen synthesis and decrease tendon load-to-failure in a dose-dependent manner, raising legitimate concerns about iatrogenic tear progression [19–21]. These limitations have driven a search for biologic alternatives that not only relieve pain but also support tissue repair [11, 12].

Platelet concentrates have emerged as the most studied biologic option for tendinopathy [12, 22]. Choukroun's platelet-rich fibrin (PRF), introduced in 2001, was the first of the second-gener-

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Grammarly (Grammarly Inc., San Francisco, CA, USA) was used to refine the language, grammar, spelling, and stylistic consistency of the manuscript. We assume full responsibility for the content.

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Abstract

Background: Partial thickness rotator cuff tears (PTRCT) are a leading cause of refractory shoulder pain. Subacromial corticosteroid (CS) injection provides short-term relief but may compromise tendon integrity. Injectable platelet-rich fibrin (iPRF), a second-generation autologous biologic, theoretically promotes healing through sustained growth factor release.
Objective: To compare the efficacy of iPRF with CS injection on pain and shoulder function over 12 months in symptomatic PTRCTs.
Methods: In this study 69 patients with PTRCT confirmed by magnetic resonance imaging (MRI) were prospectively allocated to a single subacromial injection of iPRF (group 1, $n = 37$) or 40 mg methylprednisolone with 1% lignocaine (group 2, $n = 32$). The iPRF was prepared by centrifuging 10 mL of autologous blood at 700 rpm for 3 min. Visual analogue scale (VAS) and disabilities of the arm, shoulder and hand (DASH) scores were recorded at day 0 and at 1, 6 and 12 months. Of the patients 3 in the iPRF arm were lost to follow-up so that 34 and 32 patients, respectively could be analyzed.
Results: Baseline demographics and scores were comparable ($p > 0.05$). At 1 month, both groups showed comparable improvement (VAS 4.09 vs. 3.69; $p = 0.23$). By 6 and 12 months, iPRF showed significantly superior outcomes: VAS at 12 months 1.81 ± 1.24 vs. 5.18 ± 1.46 and DASH 18.4 ± 9.8 vs. 44.9 ± 9.8 (both $p < 0.001$). Responder rate (≥ 50% VAS reduction) at 12 months was 97.1% in iPRF vs. 6.3% in CS. No major complications occurred.
Conclusion: A single subacromial injection of iPRF produces durable, progressive improvement in pain and shoulder function in patients with PTRCTs, outperforming corticosteroid injection at midterm and long-term follow-up. The use of iPRF offers a safe, autologous, regenerative alternative to corticosteroids.

Keywords
Tendinopathy · Supraspinatus · Biologics · Shoulder function · Pain relief · Regenerative therapy · Nonoperative management

ation concentrates and provided a slow physiological release of growth factors from an autologous fibrin scaffold without exogenous anticoagulant or thrombin [22, 23]. In 2014, Miron et al. described injectable PRF (iPRF), obtained by low-speed centrifugation (700 rpm/60 g for 3 min) in plain plastic tubes, that yields a liquid platelet-rich and leukocyte-rich fibrin matrix usable through a fine needle [24–27]. The iPRF concentrates higher counts of platelets, monocytes and stem-cell-attracting cytokines than platelet-rich plasma (PRP) and releases PDGF, TGF-β, VEGF, IGF-1, and EGF in a sustained fashion for up to ten days [27–31]. In tendon models, PRF accelerates collagen organization, increases neovascularization, and promotes tenocyte proliferation [32–35]. Preliminary clinical data using PRF as a surgical augment have shown improved vascularity at the repair site without adverse events [36, 37].

Despite the strong biological rationale, head-to-head clinical evidence comparing iPRF with CS in PTRCTs is scarce [38, 39]. Most published comparative work has used PRP, with conflicting midterm results across small heterogeneous trials [40–42]. No published randomized clinical study has so far evaluated injectable PRF as a single-shot nonoperative treatment for symptomatic PTRCTs using validated pain and disability outcomes at 1 year [27, 28, 43]. The present prospective comparative study was designed to fill this gap by testing the hypothesis that a single ultrasound-guided subacromial injection of iPRF results in greater and more durable improvement in pain (VAS) and shoulder function (DASH) than a corticosteroid injection in patients with PTRCTs followed for 12 months [44–47].

Abbreviations

BMPs	Bone Morphogenetic Proteins
CS	Corticosteroids
DASH	Disabilities of the Arm, Shoulder and Hand
EGF	Epidermal Growth Factor
iPRF	Injectable Platelet-Rich Fibrin
IGF-1	Insulin-Like Growth Factor 1
MCID	Minimal Clinically Important Difference
MRI	Magnetic Resonance Imaging
PDGF	Platelet-Derived Growth Factor
PRF	Platelet-Rich Fibrin
PRP	Platelet-Rich Plasma
PTRCTs	Partial-Thickness Rotator Cuff Tears
RCT	Randomised Controlled Trial
ROM	Range of Motion
SD	Standard Deviation
SPADI	Shoulder Pain and Disability Index
TGF-β	Transforming Growth Factor Beta
VAS	Visual Analogue Scale
VEGF	Vascular Endothelial Growth Factor
WORC	Western Ontario Rotator Cuff Index

Material and methods

Study design and ethical considerations

A prospective, single-center, parallel group comparative study was conducted in the Department of Orthopedics of a tertiary care teaching hospital between 2025 and 2026. The study protocol was reviewed and approved by the Institutional Ethics Committee [Dr MGR-ERI/SLMCH/2025/026] and conducted in accordance with the Declaration of Helsinki. Written informed consent for both the intervention and study participation was obtained from every patient before enrolment.

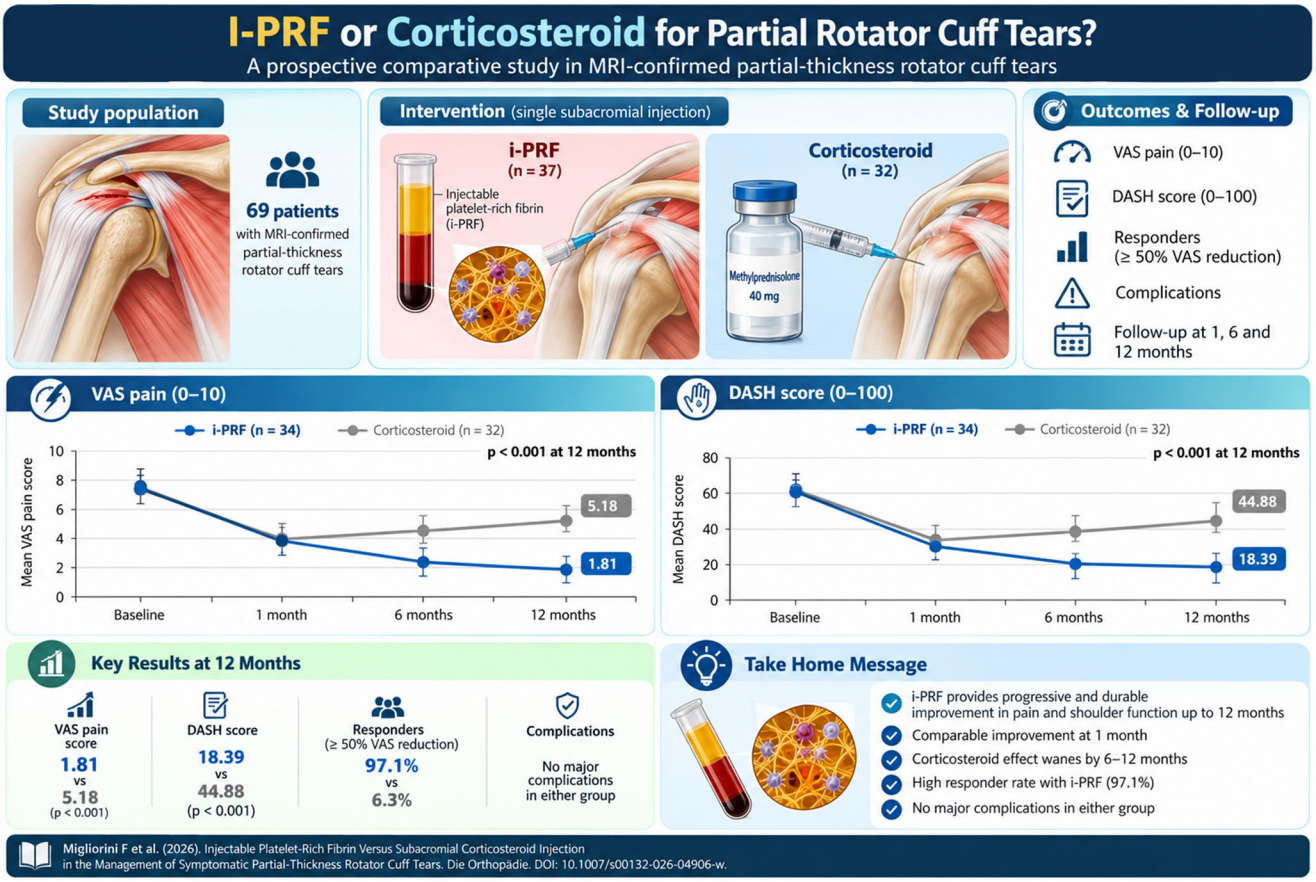
Participants

Consecutive adult patients (aged 35–70 years) presenting with shoulder pain refractory to at least 6 weeks of structured physiotherapy and oral analgesics were screened. Eligible participants had a clinical picture consistent with PTRCT (positive Hawkins-Kennedy, Neer, and empty-can tests) and a magnetic resonance imaging-confirmed partial-thickness tear of the supraspinatus tendon involving less than 50% of tendon thickness, graded by the Ellman classification [8, 9, 44]. Exclusion criteria were full-thickness tears, calcific tendinitis, adhesive capsulitis, glenohumeral osteoarthritis, prior shoulder surgery, prior subacromial injection within 6 months, pregnancy, active infection, anticoagulant therapy, hematological disorder, or platelet count below 150×10^9/L [11, 48].

Allocation and blinding

The 69 patients were allocated by alternate enrolment into 2 parallel groups: group 1 (iPRF, $n = 37$) and group 2 (CS,

Graphic abstract



n = 32) [39, 48]. Investigators performing the outcome assessment at follow-up were blinded to group allocation, while the operator administering the injection could not be blinded for technical reasons [39, 48]. In group 1 3 patients were lost to follow-up before the 6-month assessment and were excluded from final analysis, leaving 34 patients in group 1 and 32 in group 2 (**Fig. 1**).

Preparation of injectable platelet-rich fibrin

Approximately 10 mL of autologous venous blood was drawn from the antecubital vein into two plain plastic tubes (5 mL) without anticoagulant, immediately before injection [24, 25]. Tubes were centrifuged at 700 rpm (relative centrifugal force ~60 g) for 3 min in a fixed-angle tabletop centrifuge as originally described by Miron et al. [24]. The supernatant straw-colored liquid layer (iPRF) was aspirated within 5 min into a 5 mL syringe and used immediately [27, 28].

Injection technique

Patients were seated with the affected arm flexed slightly internally [49, 50]. After surgical skin preparation, an ultrasound-guided lateral in-plane approach was used to deliver the injection into the subacromial-subdeltoid bursa [49, 50]. Group 1 received 4–5 mL of freshly prepared iPRF, group 2 received 1 mL of 40 mg methylprednisolone acetate combined with 4 mL of 1% lignocaine [13, 40]. Correct intrabursal placement was confirmed by real-time visualization of fluid distribution beneath the deltoid. Two experienced orthopedic surgeons performed all injections.

Postinjection protocol

All patients received the same structured rehabilitation program starting 48 h after the injection: pendulum and passive range of motion exercises for 2 weeks, followed by progressive active and resistance exercises supervised by a physiotherapist for 6 weeks [11, 18, 39]. Paracetamol was permitted as rescue analgesia; nonsteroidal anti-inflammatory drugs were avoided in group 1 for 2 weeks to preserve the biologic effect [39, 40]. Patients were instructed to avoid heavy lifting and overhead activity for 6 weeks [41].

Outcome measures

The visual analogue scale (VAS, 0–10 cm) for shoulder pain and the disabilities of the arm, shoulder and hand (DASH, 0–100) score were the primary outcome measures and were recorded at day 0 (preinjection), 1 month, 6 months and 12 months [44, 47]. The DASH score is a validated 30-item self-administered instrument with established reliability, validity and responsiveness in shoulder pathology [44, 46]. A reduction of ≥ 1.4 cm on VAS and ≥ 10.8 points on DASH was considered the minimal clini-

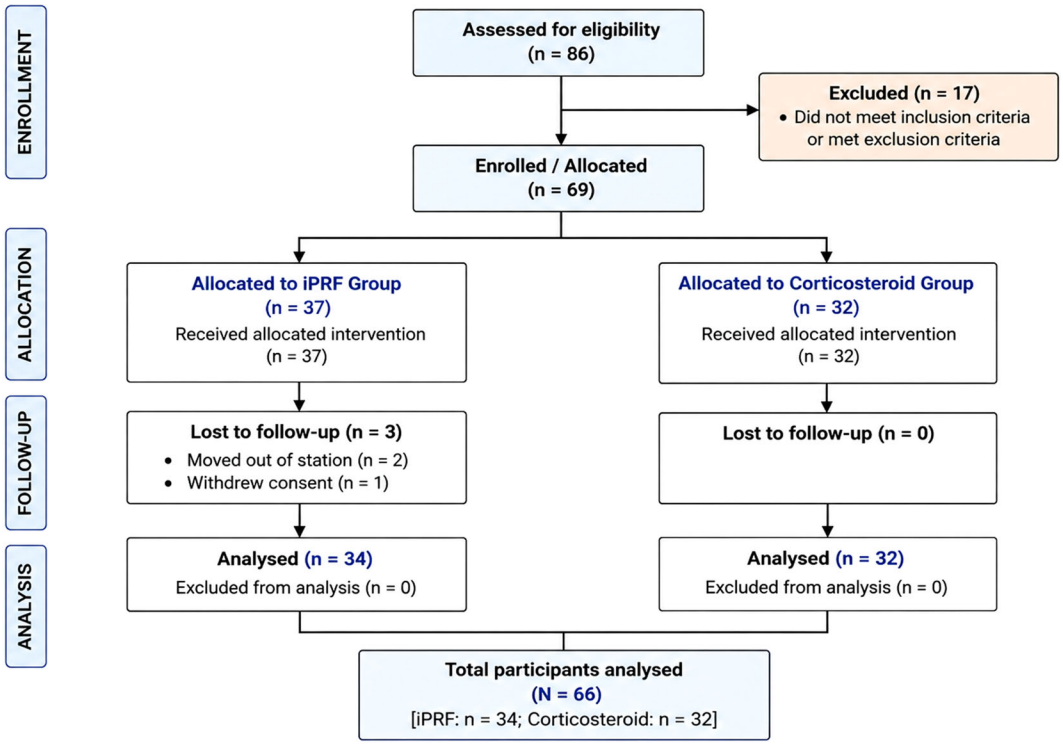


Fig. 1 ◀ CONSORT flow diagram of the study participants

Table 1 Baseline demographic and clinical characteristics of the study cohort

Variable	iPRF ($n = 34$)	CS ($n = 32$)	p-value
Age (years, mean ± SD)	52.4 ± 5.7	52.9 ± 7.5	0.74
Sex (M/F)	17/17	16/16	0.96
Side affected (R/L)	22/12	24/8	0.32
Dominant shoulder (Y/N)	27/7	21/11	0.21
Duration of symptoms (months)	6.7 ± 2.2	6.7 ± 2.8	0.98
Ellman grade I/II/III	8/20/6	6/20/6	0.84
Baseline VAS	7.33 ± 1.09	7.41 ± 1.25	0.78
Baseline DASH	57.8 ± 8.9	58.8 ± 9.0	0.67

iPRF injectable platelet-rich fibrin, *CS* corticosteroids, *SD* standard deviation, *M* male, *F* female, *R* right, *L* left, *Y* yes, *N* no, *mo* months, *VAS* Visual Analogue Scale, *DASH* Disabilities of the Arm, Shoulder and Hand

cally important difference [46, 47]. Active shoulder range of motion (forward flexion, abduction, external rotation), satisfaction (5-point Likert scale), and adverse events were recorded as secondary outcomes [45].

Imaging assessment

All patients underwent magnetic resonance imaging of the affected shoulder within 4 weeks of enrolment using a 1.5-Tesla scanner with a dedicated shoulder coil. Standard oblique coronal, sagittal, and axial T1-weighted and T2-weighted, and fat-suppressed proton-density sequences were obtained [9]. Each scan was independently reviewed by a musculoskeletal radiologist blinded to allocation and tears were classified using the Ellman grading system based on depth of involvement: grade I (< 3 mm depth), grade II (3–6 mm), and grade III (> 6 mm but less than full thickness) [8, 9]. Tear location (articular-sided, bursal-sided, or interstitial) was also recorded [4, 9].

Statistical analysis

Sample size calculation based on previous PRP versus CS data assumed a mean VAS difference of 1.5 cm with a standard deviation of 1.6cm, an α of 0.05 and a power of 80%, yielding a minimum of 30 patients per group. Data were entered in Microsoft Excel and analyzed using SPSS version 26 (IBM, Armonk, NY, USA). Continuous variables are expressed as mean ± standard deviation, and categorical variables as absolute number and percentage. Normality was confirmed using the Shapiro-Wilk test. Between-group comparisons used the independent-samples t-test; within-group comparisons used the paired t-test or repeated-measures analysis of variance. Categorical variables were compared with the χ^2 or Fisher's exact test. A 2-sided p-value < 0.05 was considered statistically significant.

Results

Baseline characteristics

Of 86 patients screened, 69 met the inclusion criteria and were enrolled. In the iPRF group 3 patients were lost to follow-up (2 moved out of the ward, 1 withdrew consent); none were lost in the CS group. The final analysis cohort comprised 66 patients (34 iPRF, 32 CS), with a mean age of 52.6 years (range 38–66 years), 50% male, and 70% involving the dominant shoulder. Mean duration of symptoms before

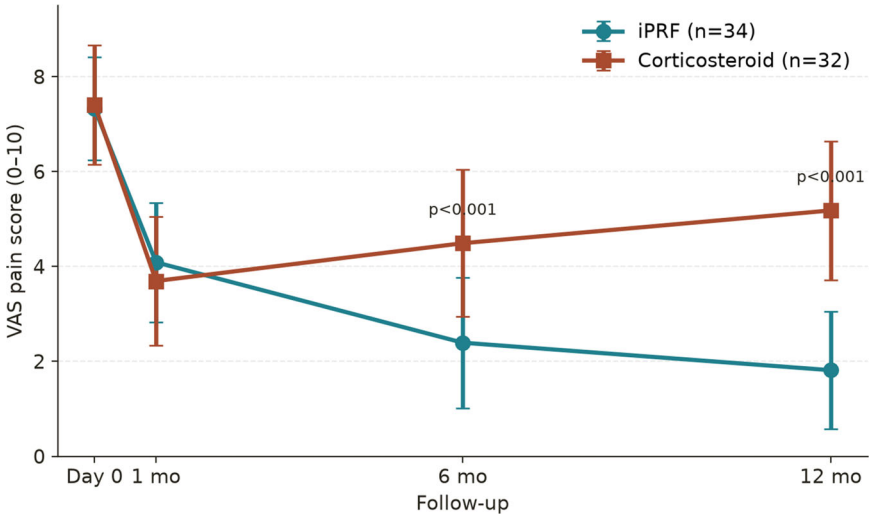


Fig. 2 ▲ Mean VAS pain scores over 12 mo (months) in iPRF (teal blue) and corticosteroid (terra) groups. Error bars represent standard deviation

Table 2 Mean VAS pain scores over 12 months follow-up

Time point	iPRF (mean ± SD)	CS (mean ± SD)	*p*-value
Day 0	7.33 ± 1.09	7.41 ± 1.25	0.78
1 month	4.09 ± 1.26	3.69 ± 1.36	0.23
6 months	2.39 ± 1.38	4.49 ± 1.55	< 0.001
12 months	1.81 ± 1.24	5.18 ± 1.46	< 0.001

iPRF injectable platelet-rich fibrin, *CS* corticosteroids, *VAS* Visual Analogue Scale, *SD* standard deviation

Table 3 Mean DASH disability scores over 12 months follow-up

Time point	iPRF (mean ± SD)	CS (mean ± SD)	*p*-value
Day 0	57.82 ± 8.94	58.76 ± 8.99	0.67
1 month	34.11 ± 10.20	33.76 ± 10.00	0.89
6 months	21.54 ± 10.07	38.36 ± 11.81	< 0.001
12 months	18.39 ± 9.82	44.88 ± 9.77	< 0.001

iPRF injectable platelet-rich fibrin, *CS* corticosteroids, *DASH* Disabilities of the Arm, Shoulder and Hand, *SD* standard deviation

injection was 6.7 ± 2.5 months. The two groups were comparable in age, sex, side affected, dominance, duration of symptoms, Ellman grade, and baseline VAS and DASH scores (all $p > 0.05$; ◘ **Table 1**).

Pain (VAS) outcomes

At day 0, mean VAS was 7.33 ± 1.09 in the iPRF group and 7.41 ± 1.25 in the CS group ($p = 0.78$). At 1 month, both groups demonstrated substantial pain relief with no statistically significant difference (iPRF 4.09 ± 1.26 versus CS 3.69 ± 1.36; $p = 0.23$). By 6 months, however, pain scores diverged markedly: the iPRF group continued to improve (2.39 ± 1.38), while the CS group regressed (4.49 ± 1.55; $p < 0.001$). At 12 months, the difference was further accentuated, with iPRF maintaining low pain levels (1.81 ± 1.24) compared with progressive return of pain in the CS group (5.18 ± 1.46; $p < 0.001$). Mean within-group reduction in VAS from baseline to 12 months was 5.51 ± 0.65 in the iPRF group versus 2.22 ± 0.75 in the CS group (paired t-test $p < 0.001$ for both). The trajectories are illustrated in ◘ **Fig. 2** and ◘ **Table 2**.

Function (DASH) outcomes

Baseline DASH scores were similar between groups (iPRF 57.8 ± 8.9 versus CS 58.8 ± 9.0; $p = 0.67$). At 1 month, both groups improved comparably (iPRF 34.1 ± 10.2; CS 33.8 ± 10.0; $p = 0.89$). The iPRF group continued to gain function up to 12 months (21.5 ± 10.1 at 6 months and 18.4 ± 9.8 at 12 months), whereas the CS group plateaued and then deteriorated (38.4 ± 11.8 at 6 months and 44.9 ± 9.8 at 12 months; $p < 0.001$ at both time points). The mean change from baseline at 12 months was 39.4 ± 6.0 in the iPRF group compared with 13.9 ± 5.7 in the CS group, far exceeding the established minimal clinically important difference of approximately 10–11 points. The DASH trajectories are shown in ◘ **Fig. 3**; ◘ **Table 3** and mean changes in ◘ **Fig. 4**.

Responder analysis

The proportion of patients achieving ≥ 50% reduction in VAS pain score served as the responder definition. At 1 month, responder rates were 32.4% in the iPRF group and 50.0% in the CS group, reflecting the rapid early action of corticosteroids. By 6 months, however, the responder rate climbed to 91.2% in iPRF and fell to 25.0% in CS; at 12 months, it reached 97.1% versus 6.3%, respectively (◘ **Fig. 5**). Active shoulder range of motion improved in both groups at 1 month but was sustained only in the iPRF group at 12 months (mean forward flexion 162° versus 134°; abduction 158° versus 128°; external rotation 71° versus 56°; all $p < 0.001$).

Subgroup observations

An exploratory subgroup analysis suggested that the magnitude of benefit in the iPRF group was broadly consistent across Ellman grades I–III, although the small number of grade III tears ($n = 6$ in iPRF, $n = 6$ in CS) precludes definitive statistical conclusions. Patients with shorter symptom duration (< 6 months) tended to show earlier improvement than those with longer-standing symptoms, in both groups. The within-group improvement in iPRF patients was substantially larger than the published minimal clinically im-

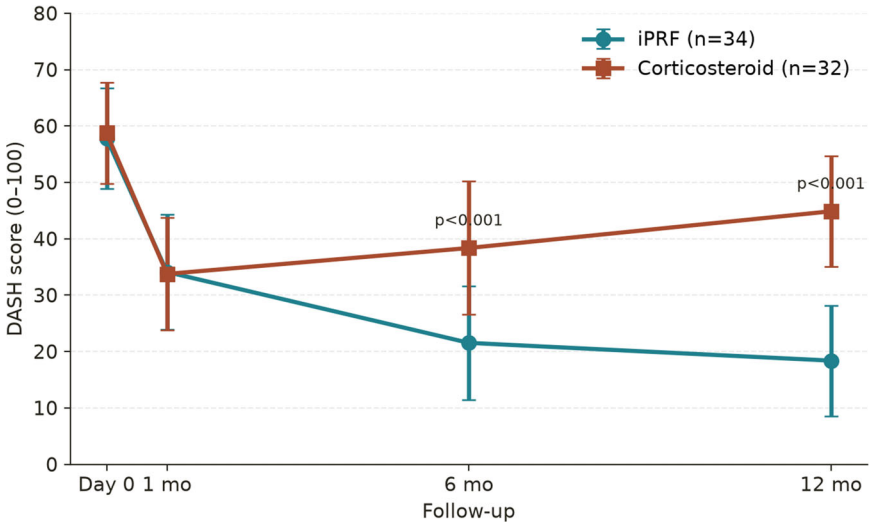


Fig. 3 ▲ Mean DASH disability scores over 12 mo (months). The iPRF demonstrates progressive improvement while CS plateaus and regresses

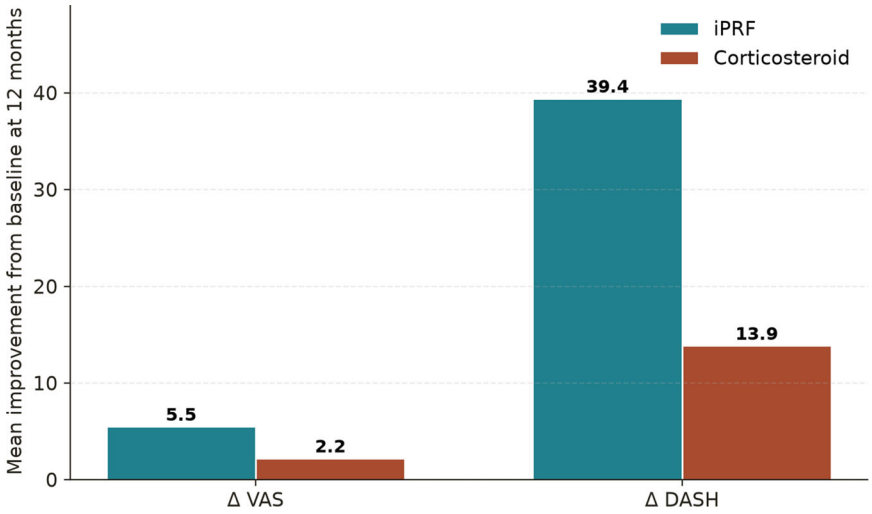


Fig. 4 ▲ Mean improvement in VAS and DASH from baseline at 12 months. The iPRF produced 2.5-fold greater improvement than CS

portant differences for VAS (1.4 cm) and DASH (10–11 points), indicating that the observed benefit is clinically meaningful and not merely statistically detectable.

Patient satisfaction and adverse events

At 12 months 30 of 34 patients (88.2%) in the iPRF group rated themselves as satisfied or very satisfied, compared with 9 of 32 (28.1%) in the CS group ($p < 0.001$). No major adverse events occurred in either group. In the iPRF group, transient postinjection soreness was reported by 6 patients (17.6%), all of which resolved within 72 h with paracetamol. In the CS group, two patients (6.3%) experienced postinjection facial flushing and one (3.1%) reported subcutaneous fat atrophy at the injection site at 6 months. None of the patients in either group developed progression to a full-thickness tear documented on follow-up imaging when symptoms warranted re-evaluation (◘ **Table 4**).

Discussion

The principal finding of this prospective comparative study is that a single subacromial injection of injectable platelet-rich fibrin produces durable, progressive improvement in pain and shoulder function in symptomatic partial-thickness rotator cuff tears. In contrast, the corticosteroid injection provides only short-term symptomatic relief that wanes after 6 months [39–41]. These results are biologically plausible and consistent with the existing literature on platelet concentrates in tendinopathy [12]. To our knowledge, this is one of the first comparative clinical studies to specifically evaluate liquid injectable PRF, rather than PRP, in partial-thickness cuff disease using validated clinical outcomes at 1 year [24, 27, 43].

Corticosteroids exert their analgesic effect through suppression of the pro-inflammatory cascade in the subacromial bursa and surrounding tendon [12, 14]. Multiple randomized trials and meta-analyses confirm that this effect is genuine but transient, with significant pain relief at 4–8 weeks dwindling to no measurable advantage over local anesthetic by 12–26 weeks [13–18]. Our finding of equivalent VAS and DASH scores at 1 month in both groups is consistent with this short-term equivalence reported by Cook et al. and the Cochrane reviews of Buchbinder et al. and Mohamadi et al. [13, 16, 17] The early gain in the corticosteroid arm was, however, paralleled by a steady regression at 6 and 12 months, a pattern observed by Kesikburun et al. and Ibrahim et al. in their comparative PRP versus CS trials [39].

Beyond loss of benefit, accumulating basic science evidence cautions against the structural impact of corticosteroids on the cuff [19–21]. In vitro studies have demonstrated that triamcinolone and methylprednisolone reduce tenocyte viability, increase apoptosis, and decrease type I collagen expression. Animal studies have shown that intratendinous corticosteroid reduces ultimate load to failure by up to 30% at 2 weeks, although these biomechanical effects are partly reversible by 3–4 weeks. Clinical data corroborate these concerns: one prospective series reported a 17% incidence of full-thickness tears at 12 weeks after CS injection, while a recent retrospective cohort showed increased revision and conversion to surgery rates with repeated injections. In our cohort, although no patient progressed to full-thickness tearing during the 12-month window, the deteriorating functional curve in the

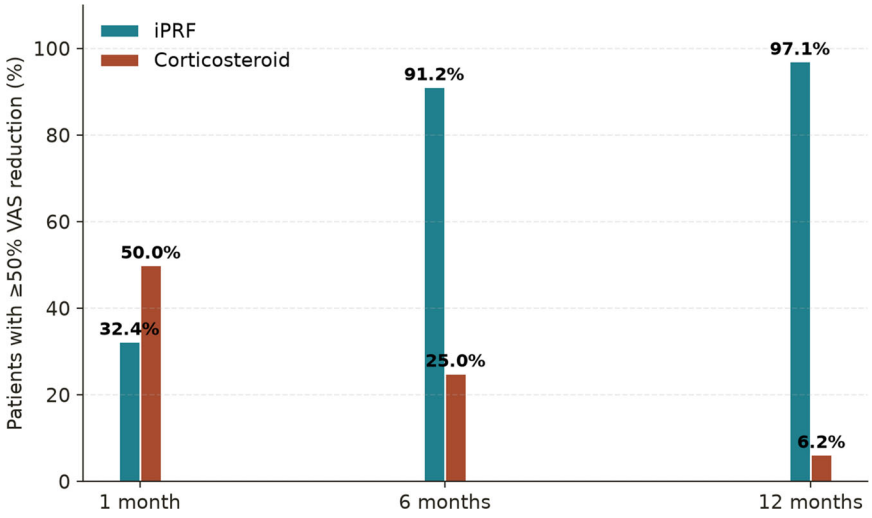


Fig. 5 ▲ Responder rates (proportion of patients achieving ≥ 50% reduction in VAS) at 1, 6, and 12 months

Table 4 Responder rates, range of motion, satisfaction, and adverse events at 12 months

Outcome	iPRF ($n = 34$)	CS ($n = 32$)
Responder (≥ 50% VAS ↓) at 1 month	11 (32.4%)	16 (50.0%)
Responder (≥ 50% VAS ↓) at 6 months	31 (91.2%)	8 (25.0%)
Responder (≥ 50% VAS ↓) at 12 months	33 (97.1%)	2 (6.3%)
Forward flexion at 12 months (°)	162 ± 12	134 ± 18
Abduction at 12 months (°)	158 ± 14	128 ± 19
External rotation at 12 months (°)	71 ± 8	56 ± 11
Patient satisfaction (very satisfied/satisfied)	30 (88.2%)	9 (28.1%)
Post-injection soreness	6 (17.6%)	0 (0%)
Facial flushing	0 (0%)	2 (6.3%)
Subcutaneous fat atrophy	0 (0%)	1 (3.1%)
Progression to full-thickness tear	0 (0%)	0 (0%)

iPRF injectable platelet-rich fibrin, *CS* corticosteroids, *VAS* Visual Analogue Scale

CS arm hints at exactly the kind of biological compromise these laboratory studies predict [19–21].

Injectable PRF fundamentally differs from corticosteroids in its mechanism of action. Prepared by low-speed centrifugation in plain plastic tubes, iPRF preserves a higher concentration of platelets, leukocytes, monocytes, and the entire fibrin matrix while remaining injectable for 10–15 min [24, 26]. This liquid platelet-rich and leukocyte-rich fibrin matrix releases PDGF, TGF-β, VEGF, IGF-1, EGF and BMPs in a sustained physiological gradient for up to 10 days, in contrast to PRP, in which most growth factors are released within the first 60 min [29–31]. Wang et al. demonstrated that iPRF stimulates greater dermal fibroblast migration, proliferation, and type I collagen synthesis than PRP [27]. In tendon injury models, PRF has been shown to accelerate collagen organization, increase neovascularization, and improve histological healing scores compared with controls. These molecular and histological effects credibly explain the slower onset and superior durability of clinical benefit observed in our iPRF group [27, 38].

Our results align well with the broader PRP versus CS literature in PTRCTs [38–41, 48, 51]. Kesikburun et al. randomized 40 patients with chronic rotator cuff tendinopathy to PRP or saline and reported significant improvement in WORC, SPADI, and shoulder ROM at 12 months k [39]. In a double-blind RCT, Shams et al. compared a single subacromial PRP with CS injection in 40 patients with PTRCTs and showed superior Constant-Murley and SPADI scores in the PRP arm at 6 months [40]. Schwitzguebel et al., in a double-blinded RCT of 80 patients with interstitial supraspinatus tears, found that PRP outperformed saline at 1 year for SPADI but not Constant scores [41]. Cai et al., comparing PRP with hyaluronic acid, and Nejati et al., comparing PRP with exercise, both showed superior midterm function with PRP [51, 52]. Most importantly, the landmark double-blind RCT of Lin et al. demonstrated that PRP delivered short-term pain superiority over CS at 3 months without sustained benefit at 12 months, supporting the principle that biologic injections begin slowly and persist longer [48]. Our iPRF data extend this trend: the qualitative pattern of late biologic benefit mirrors PRP literature, but the magnitude of separation at 6 and 12 months is greater than typically reported with PRP, consistent with the slower, more physiological growth factor release kinetics of iPRF [27, 30, 31].

The clinical implications of our findings are substantive. A single shot of iPRF, prepared inexpensively from the patient's own blood in approximately 10 min using equipment available in any orthopedic clinic, produced clinically meaningful improvement that persisted at 12 months in 97% of patients. Compared with PRP, iPRF requires no anticoagulant, no activator, and a single low-speed spin, making it cheaper and easier to standardize [24–27]. In healthcare environments where surgical access is limited and the cost of repeated CS injections (with their attendant tissue risk) is high, iPRF represents a pragmatic, autologous, and safe alternative [11, 12, 18]. Importantly, our complication profile was excellent: transient postinjection soreness in the iPRF arm but no infections, dysglycemia, or steroid-induced flares [24, 41].

Several limitations should be acknowledged. First, although this was a prospective comparative study, it was not a true randomized controlled trial; alternate allocation may introduce selection bias even though baseline characteristics were comparable. Second, the single-center design and modest sample size restrict generalizability and preclude subgroup analysis

by Ellman grade or tear location. Third, routine posttreatment imaging was not performed because the study endpoints were clinical; structural healing on serial MRI would strengthen biological plausibility. Fourth, the operator was unblinded for technical reasons. Fifth, the 12-month follow-up, while adequate to demonstrate divergence, cannot determine whether the iPRF benefit will be maintained beyond 2 years or whether a second injection might further improve outcomes [53, 54]. Sixth, the present protocol used a single dose of iPRF; the cumulative effect of repeated injections, as has been suggested for PRP in chronic tendinopathies, remains unexplored [38, 41, 53]. Future adequately powered randomized double-blinded trials with serial MRI, biomarker analysis, cost-effectiveness modelling, and longer follow-up are warranted to confirm these findings and to delineate the optimal volume, frequency, and patient selection for iPRF in cuff pathology [38, 53, 55].

Conclusion

In patients with symptomatic partial thickness rotator cuff tears, a single ultrasound-guided subacromial injection of injectable platelet-rich fibrin produced significantly greater and more durable improvement in pain (VAS) and shoulder function (DASH) than corticosteroid injection at 6 and 12 months, while preserving an excellent safety profile. Corticosteroid injection retained its role as a short-term analgesic but lost its benefit by 6 months and was associated with deteriorating function thereafter. Given its autologous origin, simple chair-side preparation, low cost, and favorable safety profile, injectable platelet-rich fibrin should be regarded as a promising, biologically based first-line nonoperative option for partial rotator cuff tears, and warrants confirmation in larger multicenter randomized controlled trials with imaging endpoints.

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Declarations

Conflict of interest. G. Chellamuthu, M. Jeyaraman, N. Jeyaraman, F. Migliorini and P. Thiagarajan declare that they have no competing interests.

Ethical standards. All procedures performed in studies involving human participants or on human tissue were in accordance with the ethical standards of the institutional and/or national research committee and with the 1975 Helsinki declaration and its later amendments or comparable ethical standards (Dr MGR-ERI/SLMCH/2025/026). Written informed consent for both the intervention and study participation was obtained from every patient before enrolment.

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Zusammenfassung

Injizierbares plättchenreiches Fibrin im Vergleich zur subakromialen Kortikosteroid-Injektion bei der Behandlung symptomatischer Partialrupturen der Rotatorenmanschette. Eine prospektive Vergleichsstudie mit 1-Jahres-Follow-up

Hintergrund: Partialrupturen der Rotatorenmanschette (PTRCT) sind eine der Hauptursachen für persistierende Schulterschmerzen. Eine subakromiale Injektion von Kortikosteroiden (CS) sorgt zwar für kurzfristige Linderung, kann jedoch die Struktur der Sehne beeinträchtigen. Injizierbares plättchenreiches Fibrin (iPRF), ein autologes biologisches Präparat der zweiten Generation, fördert theoretisch die Heilung durch die anhaltende Freisetzung von Wachstumsfaktoren.
Ziel: Vergleich der Wirksamkeit von iPRF mit einer CS-Injektion hinsichtlich Schmerzen und Schulterfunktion über einen Zeitraum von 12 Monaten bei symptomatischen PTRCT.
Methoden: In dieser Studie wurden 69 Patienten mit einer mittels Magnetresonanztomographie (MRT) bestätigten PTRCT prospektiv einer einmaligen subakromialen iPRF-Injektion (Gruppe 1, $n = 37$) oder 40 mg Methylprednisolon mit 1 % Lignocain (Gruppe 2, $n = 32$) zugewiesen. Das iPRF wurde durch Zentrifugieren von 10 ml autologem Blut bei 700 U/min für 3 min hergestellt. Die Werte auf der visuellen Analogskala (VAS) sowie die DASH-Scores (Disabilities of the Arm, Shoulder and Hand) wurden am Tag 0 sowie nach 1, 6 und 12 Monaten erfasst. Von den Patienten gingen 3 aus der iPRF-Gruppe aus dem Follow-up verloren, sodass 34 bzw. 32 Patienten analysiert werden konnten.
Ergebnisse: Die demografischen Daten und Werte zu Studienbeginn waren vergleichbar ($p > 0{,}05$). Nach einem Monat zeigten beide Gruppen eine vergleichbare Verbesserung (VAS 4,09 vs. 3,69; $p = 0{,}23$). Nach 6 und 12 Monaten zeigte iPRF signifikant bessere Ergebnisse: VAS nach 12 Monaten $1{,}81 \pm 1{,}24$ vs. $5{,}18 \pm 1{,}46$ und DASH $18{,}4 \pm 9{,}8$ vs. $44{,}9 \pm 9{,}8$ (beide $p < 0{,}001$). Die Ansprechrate (≥ 50 % VAS-Reduktion) nach 12 Monaten betrug 97,1 % bei iPRF vs. 6,3 % bei CS. Es traten keine schwerwiegenden Komplikationen auf.
Schlussfolgerung: Eine einmalige subakromiale Injektion von iPRF führt bei Patienten mit PTRCT zu einer dauerhaften, fortschreitenden Verbesserung von Schmerzen und Schulterfunktion. In der mittelfristigen und langfristigen Nachbeobachtung übertrifft sie die Kortikosteroid-Injektion. Die Anwendung von iPRF bietet eine sichere, autologe und regenerative Alternative zu Kortikosteroiden.

Schlüsselwörter
Tendinopathie · Supraspinatussehne · Biologika · Schulterfunktion · Schmerzlinderung · Regenerative Therapie · Konservative Behandlung

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