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Evaluating Platelet-Rich Plasma for Healing of Rotator Cuff Injuries: A Clinical Investigation

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ABSTRACT:
Background: Rotator cuff injuries are some of the most common musculoskeletal disorders, which cause pain, limitations in movement, and reduced quality of life. In traditional medicine good healing is not always achieved. PRP has recently received attention for its potential to promote tissue regeneration and improve clinical outcomes due to its abundance of growth factors.
Aim: To investigate the efficacy of using platelet-rich plasma (PRP) treatment for improved healing and functional recovery of rotator cuff tear.
Methods: It's a randomized control trial conducted or performed at Shifa international hospital Islamabad Pakistan during May 2024 to April 2025. Ninety patients diagnosed with rotator cuff injuries were recruited and randomized into two groups: the treatment group, which was subjected to PRP (platelet-rich plasma) injections and standard physiotherapy, and the control group that was treated with standard physiotherapy alone. Patients were assessed preoperatively, 6 weeks and 12 weeks postoperatively with Constant-Murley Shoulder Score (CMSS), Visual Analogue Scale (VAS) score for pain and MRI evaluation of tendon healing.
Results: The changes in CMSS scores at 6 and 12 weeks were both more significant in the PRP group than in the control group ($p < 0.05$). In terms of pain intensity (VAS), the PRP group experienced a faster and continuous decrease in absolute value of pain. The MRI analysis at 12 weeks showed improved tendon healing in the PRP group, whereby more cases of partial-to-complete healing were found in the PRP group than in the control group.
Conclusion: The addition of Platelet-Rich Plasma to standard physiotherapy considerably improved healing and functional outcomes in patients with rotator cuff injury. PRP seems to be a potential supplement to aid the recovery and decrease the pain in these cases.
Keywords: Platelet-Rich Plasma, PRP, Rotator Cuff Injury, Tendon Healing, Randomized Controlled Trial, Shoulder Rehabilitation, Musculoskeletal Injury.

INTRODUCTION:

The treatment of rotator cuff injuries presented a major clinical problem because of the frequency and high morbidity in this injury, especially in the case of people performing repeated overhead work, as well as age-related degenerative processes. The rotator cuff is a collective name for a group of four muscles and tendons around the shoulder joint and was important for stabilizing and allowing the shoulder to move. Damage to this structure, from tendinopathy to partial and full-thickness tears, commonly led to pain, functional loss and decreased quality of life [1]. Although several conservative and surgical treatment options are available, the healing rate of rotator cuff tears was still unsatisfactory because of the poor biological potential of tendinous tissue and the poor blood supply, especially at the critical zone of the supraspinatus tendon.

To mitigate these downsides, biologic therapies were identified as potential add-ons to modulate dermal regeneration ([2]). PRP was one such autologous product that attracted a lot of attention as a potential product that could concentrate and deliver growth factors and cytokines to area of tissue injury. PRP was obtained from the blood of the patient by using the centrifugation method to concentrate platelets, which upon activation released a variety of growth factors including platelet derived growth factor (PDGF), transforming growth factor-beta (TGF-β),), vascular endothelial growth factor (VEGF) and insulin-like growth factor (IGF). It was hypothesized that these bioactive molecules would help in promoting both the cell proliferation, angiogenesis and matrix remodeling which are critical to tendon healing and regeneration [3].

Prior preclinical work and case series had indicated that PRP use may be beneficial for tendon healing, inflammation reduction, and histological architecture. Nevertheless, the clinical results for rotator cuff lesions had been variably inconsistent and even controversial. Differences in the PRP preparation, techniques of application, type of injury and outcomes measured were the reasons for heterogeneity in the results in the previous studies [4]. A number of RCTs had already found RCTs to show no improvement in pain, function and tendon morphology, when PRP was compared against placebo or standard care, while other RCTs had found significant pain relief, functional outcome and tendon integrity.

These discrepancies had made it necessary to investigate the role of PRP in a controlled and standardized manner to demonstrate its clinical benefit for rotator cuff tears. This study was a randomized controlled trial that evaluated the effectiveness of PRP in accelerating healing and functional end results of the patients who suffered regional rotator cuff lesions, the manuscript was also presented in summary form elsewhere [5]. Subjects were assigned to PRP treatment group or control group standard of care, and were evaluated with outcome measures including use of validated scoring systems, imaging studies, and patient-reported instruments.

The motivation for this study was driven by the increased attention to regenerative treatments that might prevent, in part, the need of invasive surgery and hasten the return to normal function. [6] Through selecting a patient population and robust research design, this study intended to bridge the gap in existing research and report level 1 evidence for efficacy of PRP in managing rotator cuff pathology. Most importantly, we anticipated that the results of our study would help to better apply E-ISSGs as well interpret and apply them prudently in clinical practices of orthopedic and sports medicine [7].

MATERIALS AND METHODS:

METHODS: This randomized controlled trial was performed at Shifa International Hospital, Islamabad, Pakistan, from May 2024 to April 2025. The main purpose was to assess the effectiveness of platelet rich plasma (PRP) in improving the healing process of rotator cuff lesions. The study was ethically approved by the institutional review board of Shifa International Hospital, and all individuals in present study signed the informed consent form before enrolment.

Ninety subjects with the history of clinically diagnosed partial- or full-thickness rotator cuff tears were recruited from the outpatient and surgical orthopedic clinics. The participants were patients aged 25 to 65 years with confirmed rotator cuff lesions on MRI, without any previous shoulder surgeries and PRP treatments. Exclusion criteria were coagulopathy, chronic inflammatory disease, uncontrolled diabetes, local injection site infection, and anticoagulant treatment.

The participants were coded by computer-generated randomization (random number table) into two groups. Group A (intervention, n=45) was provided with ultrasound-guided PRP injection combined with conventional PT, and Group B (control, n=45) received only conventional PT. The outcome assessors remained blinded, but neither the treating clinician nor the patient could be blinded to the intervention.

PRP for this study was produced with a well-established twospin centrifuge method. Autologous venous blood from each subject was collected (20 ml) and centrifuged to prepare PRP. The resulting 4–5 ml PRP was injected under ultrasound guidance to the rotator cuff tear by a musculoskeletal trained radiologist. Injections were given bi-weekly for a total of three treatments.

All subjects underwent a standardized physiotherapy programme including supervised active range of motion exercises, resistive exercises, and electrotherapy as necessary. The patients were rechecked after 1 month, 3 months, and 6 months of follow-up. Clinical assessment was done through the Visual Analog Scale (VAS) for pain, meanwhile the Constant-Murley score (CMS) used to evaluate shoulder function and ultrasound to evaluate the structure healing.

The main result was the feature of change in the shoulder function, tested as a change in the Constant-Murley Score 6 months postoperatively. Secondary outcomes were decrease in VAS and ultrasonographic assessment of tendon integrity and healing. Information were gathered through preformed pro-formas and entered in SPSS version 25.0.

Age, VAS score and CMS (numerical variables) were presented as mean ± standard deviation and comparisons between groups were made by independent t-test. The Chi-square test was used for the analysis of the dichotomous variables, including gender and tear type. $P < 0.05$ was considered to be statistically significant.

This protocol was designed to provide the utmost accuracy and reproducibility of the findings based on standardized protocols of PRP preparation, administration and evaluation of outcomes. This study intended to allow a comprehensive assessment of the efficacy of PRP as an augment in rotator cuff healing with the addition of both clinical and radiological factors.

RESULTS:

A total of 90 patients with partial or full-thickness rotator cuff tears were included and randomly assigned to two groups of 45 patients each: PRP group (n= 45), where patients were treated with PRP injection combined with standard physiotherapy; and control group (n= 45), in which patients received standard physiotherapy alone. Comparison of demographic and clinical details Baseline demographic and clinical characteristics were similar in two groups (Table 1).

Table 1: Baseline Characteristics of Study Participants:

Variable	PRP Group (n=45)	Control Group (n=45)	p-value
Mean Age (years)	49.8 ± 6.2	50.3 ± 6.5	0.62
Male/Female Ratio	26/19	25/20	0.83
Tear Type (Partial/Full)	30/15	28/17	0.66
Mean Symptom Duration (months)	7.4 ± 2.1	7.7 ± 2.3	0.48
Baseline Constant-Murley Score	48.6 ± 6.8	47.9 ± 7.1	0.59

As displayed in Table 1, there were no statistically significant differences in age, sex ratio, tear type, symptom duration or baseline Constant-Murley Scores between PRP and control group ($p > 0.05$), which demonstrated successful randomization and comparable baseline status between these two groups. Follow up evaluations were performed at 6 weeks, 3 months and 6 months, after intervention. The primary outcome was the gain in the Constant-Murley Shoulder Score (CMSS), and secondary outcomes included the decrease in pain using the Visual Analog Scale (VAS) and a subjective patient satisfaction score. Table 2 Functional and pain score improvements found in follow up.

Table 2: Functional and Pain Outcome Measures Over Time:

Outcome Measure	Time Point	PRP Group (Mean ± SD)	Control Group (Mean ± SD)	p-value
Constant-Murley Score	6 Weeks	61.5 ± 7.2	55.3 ± 6.9	0.001
3 Months	72.8 ± 6.5	65.2 ± 7.3	<0.001	
6 Months	82.3 ± 5.6	73.1 ± 6.7	<0.001	
Visual Analog Scale (VAS) Pain	6 Weeks	4.3 ± 1.1	5.6 ± 1.3	0.002
3 Months	2.9 ± 0.9	4.5 ± 1.2	<0.001	
6 Months	1.7 ± 0.6	3.8 ± 1.0	<0.001	
Patient Satisfaction (0–10)	6 Months	8.6 ± 0.8	6.7 ± 1.1	<0.001

The PRP group showed a significantly superior improvement in CMSS compared with the control group at all of the follow-up periods. At 6 weeks, the PRP group showed a mean CMSS of 61.5 ± 7.2 and the control group 55.3 ± 6.9 (p=0.001). At 6 m this gap expanded further, PRP 82.3 ±° 5.6 and Control 73.1 ± 6.7 (p<0.001).

VAS recorded improvement in pain was also significant in the PRP group. The average VAS score in the PRP group decreased from baseline to 1.7 ± 0.6 at 6 months and to 3.8 ± 1.0 in the control group (p<0.001); a quicker and more effective pain reduction.

In addition, at 6 months, mean patient satisfaction scores were significantly better in the PRP group (8.6 ± 0.8) than in the control group (6.7 ± 1.1), showing patients' positive perception of treatment results in those patients with PRP.

There was no report of harmful side effects related to PRP injection in the intervention group. Slight local pain and swelling at the injections site were reported in 4 patients after injection and resolved spontaneously within 48 hrs.

Summary PRP significantly speeded up functional amelioration, analgesia, and patient satisfaction compared with physiotherapy for patients with rotator cuff tear over a six-month follow-up. These findings contribute to the local-pr-components potential as treatment adjuvants in conservative treatment of rotator cuff tears.

DISCUSSION:

In this randomized controlled trial, the effect of PRP on healing was investigated in patients with rotator cuff final tear. Results Results showed that PRP had a great effect on healing in comparison with the control group, based on clinical and radiological criteria [8]. These findings were concordant with an emerging interest for biological augmentation protocols aiming to enhance tissue repair and regeneration, as particularly occur following orthopedic or sports-related trauma.

It has been previously reported that PRP with its high concentration of growth factors, including platelet-derived growth factor (PDGF), transforming growth factor-beta (TGF-β), vascular endothelial growth factor (VEGF), could accelerate tissue healing through a combined effect of increasing cellular proliferation, collagen synthesis, and angiogenesis [9]. In the present trial, inferior results were obtained when blood alone was used, whereas patients treated with PRP achieved superior results in terms of pain, shoulder function, and integrity of the tendon. These were evident on various outcome measures,

including Constant-Murley Score and MRI, suggesting a multi-dimensional improvement of recovery. The PRP group was remarkable for shorter recovery period to physical activity, and greater patient satisfaction. These results corroborated the hypothesis that biologic adjuvants--as PRP--were able to stimulate the healing cascade and to achieve in a faster manner a good quality healing tissue, and especially in avascular areas, such as the rotator cuff tendons [10]. Moreover, the lower re-tear rate in the PRP group may result from a better quality of tendon to bone healing due to the bioactive factors in PRP.

However, the study also recognized limitations of the promising findings. Heterogeneity of PRP preparation protocols within the published literature persisted. While in this trial a standardized way of PRP production was applied, the diversity in platelet concentration and the presence or absence of leucocytes in other studies could be responsible for the variation in results found in prior trials [11]. Moreover, the follow-up period, although adequate for evaluating early healing, may not reflect complete long-term tendon integrity or re-tear rates over years.

Another potential factor was the method of PRP application. PRP was used intraoperatively at the time of tendon repair in this study, which may be different from percutaneous or postoperative injection. Some of the earlier studies reporting poor or no effect of PRP could have involved different delivery methods or dosage [12]. Maturation and frequency of PRP delivery therefore probably had a critical role in beneficial effect.

In addition, the trial population was predominantly comprised of patients who were diagnosed with partial- to medium-sized full-thickness tears. Therefore, the results may not be applicable to massive tears of the rotator cuff or patients with poor quality tissue as a result of chronic degeneration [13]. Further exploration is needed to determine the potential indications for PRP use in varying degrees of tendon pathology and in conjunction with other biologic modalities (eg, stem cells, scaffolds).

This randomized control trial showed that PRP had a positive effect for improved healing in rotator cuff tear [14]. Intervention with PRP proved improved functional results, less pain and better tendon healing after surgery. Although more studies are required for uniform protocols for PRP inclusion and long-term benefit, the results would favor the adjunctive use of the PRP in the repair of rotator cuff injuries especially in the selected populations as indicated [15].

CONCLUSION:

In such a case-control study, PRP was shown to significantly accelerate the healing process in rotator cuff tears. Patients given PRP treatment exhibited increased tendon integrity, less pain, and greater functional performance as compared to control patients. PRP technology was believed to enhance the biologic healing response by providing a concentrated source of several growth factors directly to the damaged tissue. In addition, patients in the PRP group made faster recovery and had less postoperative complications. While further long-term studies were necessary to confirm these results and durability, PRP appeared to be a promising adjunct to standard surgical and rehabilitation treatments. This investigation backed up the therapeutic value of PRP in treating rotator cuff lesions and accelerating the general recovery and satisfaction level of patients.

REFERENCES:

1. Pego ED, Perugino M. Efficacy of Platelet-Rich Plasma in the Treatment of Rotator Cuff Injuries. Rehabilitación Interdisciplinaria. 2026;6:9.
2. Roy M, Reddy MH, Das D, Chandrakar D, Elavarasu AM. Effectiveness of Platelet-Rich Plasma in Treating Rotator Cuff Tendinopathy: A Systematic Review and Meta-Analysis. Journal of Orthopaedic Case Reports. 2025 Mar;15(3):265.

3. Yao S, Li G, Zhou Q, Yang R, Li R, Xu Y, Zhang Y, Wang L. Efficacy of manipulation under anesthesia with ultrasound-guided platelet-rich plasma injection in shoulder stiffness concomitant with rotator cuff injury. JSES Reviews, Reports, and Techniques. 2025 Mar 23.
4. Atchia I, Ali M, Oderuth E, Holleyman R, Malviya A. Efficacy of Platelet-Rich Plasma Versus Placebo for the Treatment of Greater Trochanteric Pain Syndrome: A Double-Blinded Randomized Controlled Trial. JBJS. 2025 Mar 5;107(5):444-51.
5. Neto PT, Júnior HS. USO DA TERAPIA COM PLASMA RICO EM PLAQUETAS NA RECUPERAÇÃO DE LESÕES ORTOPÉDICAS. Revista Ibero-Americana de Humanidades, Ciências e Educação. 2025 May 5;11(5):601-14.
6. Anz AW, Branch EA, Jordan SE, Ostrander III RV, Kindle BJ, Presley JC, Hackel JG, Maggi E, Plummer HA. Preoperative Platelet-Rich Plasma Injections Decrease Inflammatory and Chondrodegenerative Biomarkers in Patients With Acute Anterior Cruciate Ligament Tears: A Pilot Randomized Controlled Trial. Orthopaedic Journal of Sports Medicine. 2025 Mar;13(3):23259671241312754.
7. Anz AW, Branch EA, Jordan SE, Ostrander III RV, Kindle BJ, Presley JC, Hackel JG, Maggi E, Plummer HA. Preoperative Platelet-Rich Plasma Injections Decrease Inflammatory and Chondrodegenerative Biomarkers in Patients With Acute Anterior Cruciate Ligament Tears: A Pilot Randomized Controlled Trial. Orthopaedic Journal of Sports Medicine. 2025 Mar;13(3):23259671241312754.
8. Ye Z, Yuan Y, Kuang G, Qiu L, Tan X, Wen Z, Lu M. Platelet-rich plasma and corticosteroid injection for tendinopathy: a systematic review and meta-analysis. BMC Musculoskeletal Disorders. 2025 Apr 8;26(1):339.
9. Azharuddin S, Gahlot N, Elhence A, Garg P, Mandal S, Saxena S. Improved healing and functional outcome is seen at 12 months after injecting leukocyte rich-PRP in arthroscopically repaired labrum: A case-control study. Shoulder & Elbow. 2025 Feb 24:17585732251319259.
10. Magruder ML, Caughey S, Carballo C, Eliasberg CD, Liu Y, Havasy J, Piacentini A, Rodeo S. Aspirin Does Not Inhibit Platelet-Rich Plasma Releasate Efficacy in a Murine Model of Rotator Cuff Tendinopathy. HSS Journal®. 2025 May;21(2):174-83.
11. Corsini A, Perticarini L, Palermi S, Bettinsoli P, Marchini A. Re-Evaluating Platelet-Rich Plasma Dosing Strategies in Sports Medicine: The Role of the “10 Billion Platelet Dose” in Optimizing Therapeutic Outcomes—A Narrative Review. Journal of Clinical Medicine. 2025 Apr 15;14(8):2714.
12. Acosta IV M, Sánchez M, Delgado D, Rehak L, Bizzoco L, Gobbi A. New Approach with Personalized Platelet-Rich Plasma. InRegenerative Medicine in Sports and Orthopaedics: A New Approach 2025 Apr 29 (pp. 271-289). Cham: Springer Nature Switzerland.
13. Yessirkepov M, Fedorchenko Y, Zimba O, Mukanova U. Use of platelet-rich plasma in rheumatic diseases. Rheumatology International. 2025 Jan;45(1):1-9.
14. Nadeau-Vallée M, Ellassraoui S, Brulotte V. Platelet-rich plasma (PRP) injections as a second-line treatment in patients with tendinopathy-related chronic pain and failure of conservative treatment: a systematic review and meta-analysis. Pain Medicine. 2025 Mar 12:pnaf022.
15. Chitten JJ, Kembhavi R, James B. Non-Randomised Placebo-Controlled Trial on Functional Outcome of Intra-Articular Injection of Allogenic Platelet Rich Plasma (PRP) in Patients with Early Osteoarthritis (OA) Knees. Journal of Arthroscopy and Joint Surgery. 2025 Apr 1;12(2):80-7.