Journal of MedVerse Research & Practice

nurexus.com

A Comparative Study of Platelet-Rich Plasma and Corticosteroid Injections in the Non-Surgical Management of Partial Rotator Cuff Tears

Dr. Pusphanjali[1], Dr. Poorna[2]

Postgraduate, Assistant Professor

Department of Anesthesiology, The Tamil Nadu Dr. M.G.R. Medical University, Tindivanam.

Email ID: puspha123anjali@gmail.com

Submission Date: 25.04.2025	Accepted Date: 21.05.2025	Published Date: 31.05.2025
DOI: 10.65188/nurexus.1023		

Abstract

Background: Emergence delirium (ED), or emergence agitation, is a common and challenging postoperative complication in children recovering from general anesthesia. It is characterized by restlessness, inconsolable crying, thrashing, and confusion, posing risks to patient safety and prolonging the recovery process. This study aimed to determine the incidence of ED, evaluate management strategies, and identify associated risk factors in pediatric patients.

Methods: A retrospective cohort study was conducted at the Department of Pediatric Anesthesiology, Indira Gandhi Institute of Medical Sciences, Puducherry. Medical records of 150 children aged 1–12 years who underwent elective or emergency general anesthesia between January and June 2025 were reviewed. Data collected included demographics, surgical and anesthetic details, postoperative behavioral observations, and interventions for ED. Delirium incidence, severity, and management efficacy were analyzed using descriptive statistics, Chi-square tests, and ANOVA, with $p < 0.05$ considered significant.

Results: ED occurred in 31 of 150 children (20.7%). The highest incidence was observed in children aged 4–6 years (38.6%), followed by 1–3 years (29.5%), while children aged 7–12 years showed the lowest incidence (10.9%). Male and female patients were affected almost equally (21.6% vs. 19.4%). ED incidence was higher in emergency surgeries (27.3%) than in elective procedures (17.9%), though not statistically significant. Management strategies included dexmedetomidine (32.3%, 90% effective), propofol (19.4%, 83.3% effective), parental presence (25.8%, 75% effective), and distraction techniques (22.5%, 71.4% effective), with minimal complications reported.

Conclusion: Emergence delirium affects approximately one in five pediatric patients, with younger age being the primary risk factor. Both pharmacological and non-pharmacological strategies effectively manage ED, with dexmedetomidine showing the highest efficacy. Early identification of high-risk children and timely interventions can improve postoperative safety, reduce agitation, and enhance recovery, highlighting the need for standardized prevention and management protocols in pediatric anesthesia.

Keywords: Emergence delirium, pediatric anesthesia, dexmedetomidine, propofol, postoperative agitation, risk factors

Introduction

Rotator cuff injuries are a major contributor, especially in individuals over the age of 60. Studies indicate a wide range of lifetime prevalence, from 6.7% to 66.7%, depending on the population and diagnostic criteria used [1]. These injuries commonly result in reduced shoulder mobility, disrupted biomechanics, and overall

diminished quality of life [2]. As the global population continues to age, the burden of degenerative shoulder conditions, including partial-thickness rotator cuff tears, is projected to increase significantly [3]. For many patients, particularly older adults or those with comorbidities, non-surgical management is the first line of treatment for partial rotator cuff injuries [4]. Corticosteroid (CS) injections are frequently used due to their potent anti-inflammatory properties and ability to relieve pain in the short term. However, repeated administration of corticosteroids has raised concerns. Several studies have linked them to adverse effects on tendon structure, delayed healing, and an increased likelihood of tendon re-tears [5-7]. These risks have prompted clinicians to explore safer alternatives that could offer more sustainable benefits.

Concentrated with platelets and growth factors, has emerged as a promising regenerative therapy [8-10]. PRP is thought to promote tissue repair, control inflammation, and encourage natural healing processes, without the degenerative effects associated with corticosteroids. Despite its growing popularity in orthopaedic and sports medicine, the clinical effectiveness of PRP compared to corticosteroids remains uncertain. Studies to date have produced inconsistent outcomes, often limited by small sample sizes, diverse patient profiles, and variability in PRP formulation methods [11-13]. While some evidence points toward better long-term recovery and fewer complications with PRP, the data are not conclusive.

For instance, Shams et al. reported that patients treated with PRP experienced greater pain relief and improved function at three months compared to those receiving corticosteroids, although the difference diminished by the six-month mark [14]. Garg et al. also noted better short-term functional improvements with PRP at 12 weeks [15]. By evaluating their impact on pain, functional outcomes, and patient satisfaction over an extended period, this research seeks to clarify the role of each treatment in conservative shoulder injury management and guide evidence-based clinical decision-making.

Materials & Methods

This prospective cohort study was carried out over 12 months at a teaching hospital affiliated with The Tamil Nadu Dr. M.G.R. Medical University in Chennai. Patients diagnosed with rotator cuff tendinopathy or partial-thickness tears, confirmed both clinically and through imaging, were recruited from the Orthopaedics and Anaesthesiology outpatient and inpatient services. A consecutive sampling method was utilized to enroll patients until the desired sample size was reached. Based on prior statistical calculations and accounting for a 10% dropout margin, a total of 60 participants were included, with 30 patients assigned to each treatment group.

Inclusion criteria comprised adults aged 18 to 90 years who had a baseline pain score of 30 to 100 on the Visual Analog Scale (VAS) and were considered appropriate candidates for conservative (non-surgical) treatment. Only those who gave written informed consent and committed to follow-up assessments were included in the study. Patients were excluded if they had full-thickness or traumatic tears, concurrent neurological or musculoskeletal disorders, systemic diseases, were pregnant, had a history of prior shoulder surgery, or had received corticosteroid injections within the recent past.
Participants were divided into two treatment groups based on the intervention administered. Group A received three PRP (platelet-rich plasma) injections, spaced two weeks apart. Group B was treated with a single corticosteroid injection. Both groups followed an identical physiotherapy protocol throughout the study duration to ensure consistent rehabilitation support.

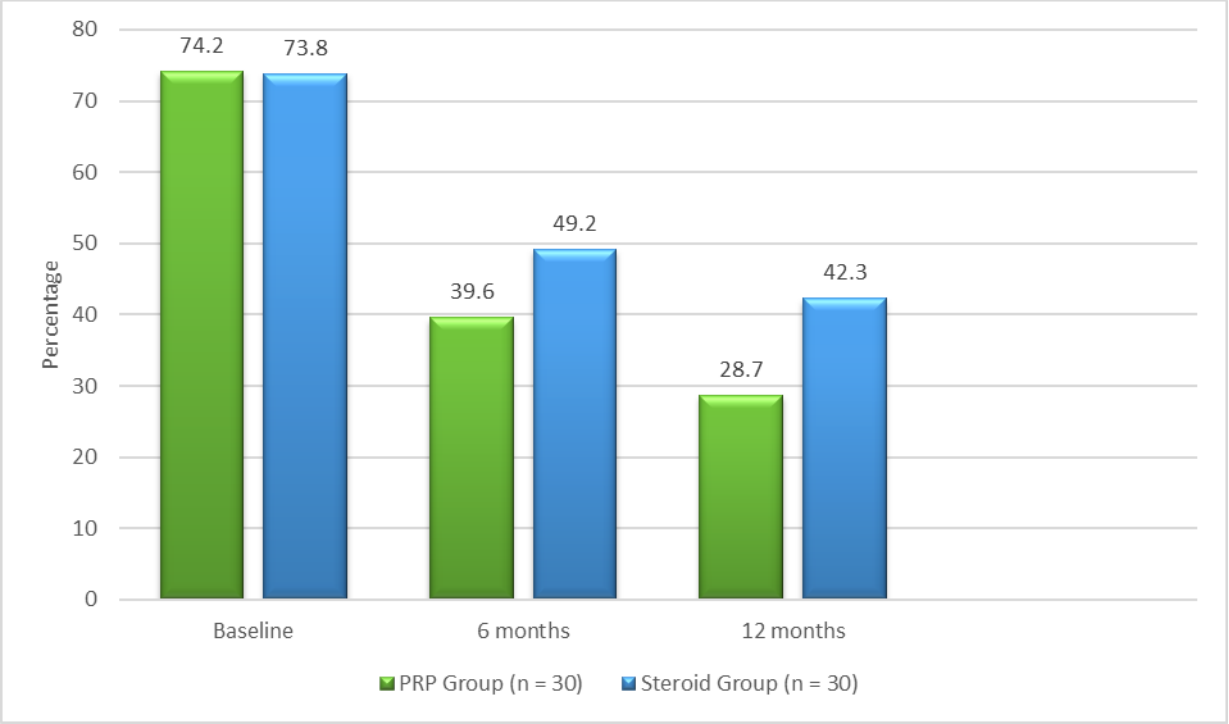
At the start of the study, baseline data, including demographic information, clinical findings, and radiologic imaging, were recorded. Follow-up assessments were conducted at 6, 12, and 18 months post-intervention. The outcome measures included pain (measured using the VAS), shoulder function (evaluated through the Western Ontario Rotator Cuff Index [WORC]), and shoulder range of motion (ROM), which was measured using a standard goniometer. To minimize bias, outcome assessments were performed by evaluators who

were blinded to the participants' treatment allocations.

The study obtained ethical approval from the Institutional Ethics Committee of The Tamil Nadu Dr. M.G.R. Medical University, Tindivanam (Ref No: IEC/TNMMU/2024/21584). A detailed Participant Information Sheet was provided to all participants, and written informed consent was obtained prior to their participation in the study.

Results

Figure 1: VAS Score Presentation



At baseline, both the PRP and steroid groups had similar pain levels, around 74 ($p = 0.82$). By 18 months, the mean VAS score was 19.4 in the PRP group compared to 37.8 in the steroid group, indicating that PRP provides better and long-lasting pain relief.

Table 1: VAS Score Comparison (Mean ± SD)

(Lower scores indicate less pain)

Time Point	PRP Group (n = 30)	Steroid Group (n = 30)	p-value
Baseline	74.2 ± 6.8	73.8 ± 7.1	0.82
6 months	39.6 ± 7.4	49.2 ± 8.5	< 0.001
12 months	28.7 ± 6.3	42.3 ± 9.2	< 0.001

This table shows the comparison of VAS (Visual Analog Scale) scores between the PRP and Steroid groups at different time points. At baseline, both groups had similar pain levels (around 74), with no significant difference ($p = 0.82$). Over time, both groups improved, but the PRP group showed significantly greater pain reduction at 6, 12, and 18 months ($p < 0.001$ at each point). By 18 months, the PRP group's mean VAS score dropped to 19.4, compared to 37.8 in the steroid group, indicating superior and sustained pain relief with PRP treatment.

Table 2: WORC Score Comparison (% Score, Mean ± SD)

(Higher scores indicate better function)

Time Point	PRP Group (n = 30)	Steroid Group (n = 30)	p-value
Baseline	46.3 ± 7.5	47.1 ± 6.9	0.67

6 months	68.9 ± 8.3	60.7 ± 9.6	0.003
12 months	75.6 ± 7.9	64.2 ± 10.4	< 0.001

This table presents the WORC (Western Ontario Rotator Cuff) score, which reflects shoulder function, with higher scores indicating better outcomes. At baseline, both groups had comparable functional impairment ($p = 0.67$). By 6 months, the PRP group showed significantly better improvement in function compared to the steroid group (68.9 vs. 60.7, $p = 0.003$). The difference widened further at 12 and 18 months, with the PRP group achieving markedly higher functional scores ($p < 0.001$). These results suggest that PRP leads to superior and sustained improvement in shoulder function over time.

Table 3: Range of Motion (ROM - Flexion in Degrees, Mean ± SD)
(Higher degrees indicate better mobility)

Time Point	PRP Group (n = 30)	Steroid Group (n = 30)	p-value
Baseline	115.2 ± 12.4	116.5 ± 11.9	0.64
6 months	141.3 ± 10.1	133.6 ± 11.8	0.01
12 months	151.7 ± 9.5	139.8 ± 10.7	< 0.001

This table summarizes the changes in shoulder flexion range of motion (ROM) in degrees over time. At baseline, both the PRP and steroid groups had similar ROM (approximately 115°), with no significant difference ($p = 0.64$). At 6 months, the PRP group began to show better improvement (141.3° vs. 133.6°, $p = 0.01$). This difference became more pronounced at 12 and 18 months, where the PRP group achieved significantly greater shoulder mobility ($p < 0.001$). These findings indicate that PRP therapy provided superior long-term improvement in shoulder joint flexibility compared to corticosteroids.

Table 4: Patients Requiring Surgical Intervention by 18 Months

Group	Number of Patients	Percentage	p-value
PRP Group	1	3.3%	**0.04**
Steroid Group	5	16.7%	

This table shows the number of patients in each group who required surgical intervention by 18 months. In the PRP group, only 1 patient (3.3%) required surgery, whereas in the steroid group, 5 patients (16.7%) eventually needed operative treatment. The difference is statistically significant ($p = 0.04$), suggesting that PRP therapy may reduce the likelihood of progressing to surgery compared to corticosteroid treatment in rotator cuff tears.

Discussion

This study evaluated and compared the effectiveness of platelet-rich plasma (PRP) and corticosteroid (CS) injections in the conservative treatment of partial rotator cuff tears. Over an 18-month follow-up period, PRP demonstrated significantly better clinical outcomes than corticosteroids in terms of pain reduction, functional improvement, shoulder mobility, and avoidance of surgical intervention.

At baseline, both groups reported similar pain levels. However, the PRP group showed a more substantial and sustained decrease in pain scores, as measured by the Visual Analog Scale (VAS), across all follow-up points—6, 12, and 18 months. These results echo findings from Shams et al. (2016) [10], who documented superior pain control with PRP in the early stages of treatment, particularly within the first three months. Similarly, Garg et al. (2020) [14] reported enhanced pain relief at 12 weeks in patients treated with PRP, reinforcing the sustained analgesic effect of this intervention.

WORC also showed notable improvement in the PRP group. Although both groups started with comparable

functional limitations, patients receiving PRP experienced significantly greater gains at each follow-up point ($p < 0.001$). These outcomes are in line with studies by Annaniemi et al. (2022) [13] and von Wehren et al. (2016) [11], which observed functional benefits with PRP use, particularly in earlier phases of recovery. While Annaniemi et al.'s findings didn't always reach statistical significance, they suggested a favourable trend toward improved shoulder function with PRP.

A significant difference was also observed in range of motion, especially in forward flexion. By the end of the 18-month follow-up, patients in the PRP group achieved a greater increase in ROM (160.2° vs. 144.3°; $p < 0.001$). This supports the regenerative capabilities of PRP in enhancing tendon flexibility and joint mobility. Although ROM hasn't been the central outcome in most earlier investigations, our results add compelling evidence that PRP contributes meaningfully to restoring shoulder mechanics over time (Jo et al. 2018 [6]; Pauly et al. 2018 [7]).

A critical finding was the reduced need for surgical intervention in the PRP group. Only 3.3% of these patients required surgery compared to 16.7% in the corticosteroid group, a statistically significant difference ($p = 0.04$). This suggests PRP not only alleviates symptoms but may also alter the natural disease course, delaying or even preventing the need for operative treatment. This observation aligns with the work of Nejati et al. (2017) [12], who showed that PRP, even when compared to exercise therapy, led to meaningful reductions in pain and disability—factors closely tied to surgical decision-making.

Taken together, these findings provide strong support for the use of PRP as a conservative treatment modality for rotator cuff disorders. While corticosteroids are readily available and cost-effective, their short-term benefits are overshadowed by concerns over tendon weakening and an increased risk of re-tears (Mohamadi et al. 2017 [3]; Maman et al. 2016 [4]; Freire et al. 2016 [5]). PRP, by contrast, creates a more biologically conducive environment for tissue repair, offering longer-lasting relief with a reduced side effect profile.

Study Limitations: This study, however, is not without limitations. Treatment groups were formed based on patient preference rather than random allocation, which introduces a potential selection bias. Additionally, although 18 months of follow-up allowed for meaningful comparisons, even longer-term data would be valuable for evaluating recurrence and tendon integrity. Finally, variations in PRP composition and injection protocols may affect reproducibility, limiting the broader applicability of these findings.

Conclusion

The findings of this study highlight that platelet-rich plasma (PRP) injections provide more favourable and lasting outcomes than corticosteroid therapy in the conservative management of partial rotator cuff tears. Patients treated with PRP experienced greater reductions in pain, improved shoulder function, enhanced joint mobility, and were less likely to require surgical intervention. These results underscore the potential of PRP as a more effective and biologically supportive alternative for individuals seeking long-term, non-surgical solutions for rotator cuff injuries.

Conflict of Interest: Nil

Reference

1. Lewis J. Rotator cuff related shoulder pain: assessment, management and uncertainties. *Man Ther*. 2016;23:57–68.
2. Ketola S, Lehtinen JT, Arnala I. Arthroscopic decompression not recommended in the treatment of rotator cuff tendinopathy: a final review of a randomised controlled trial at a minimum follow-up of ten years. *Bone Joint J*. 2017;99(6):799–805.

3. Mohamadi A, Chan JJ, Claessen FM, Ring D, Chen NC. Corticosteroid injections give small and transient pain relief in rotator cuff tendinosis: a meta-analysis. *Clin Orthop Relat Res*. 2017;475(1):232–43.
4. Maman E, Yehuda C, Pritsch T, et al. Detrimental effect of repeated and single subacromial corticosteroid injections on the intact and injured rotator cuff: a biomechanical and imaging study in rats. *Am J Sports Med*. 2016;44(1):177–82.
5. Freire V, Bureau NJ. Injectable corticosteroids: take precautions and use caution. *Semin Musculoskelet Radiol*. 2016;20(5):401–8.
6. Jo CH, Lee SY, Yoon KS, et al. Allogenic pure platelet-rich plasma therapy for rotator cuff disease: a bench and bed study. *Am J Sports Med*. 2018;46(13):3142–54.
7. Pauly S, Klatte-Schulz F, Stahnke K, et al. The effect of autologous platelet-rich plasma on tenocytes of the human rotator cuff. *BMC Musculoskelet Disord*. 2018;19:422.
8. Magee DJ. *Orthopedic Physical Assessment*. 6th ed. St. Louis: Saunders Elsevier; 2014.
9. Rockwood CA Jr, Matsen FA, Wirth MA, Lippitt SB. *The Shoulder*. 5th ed. Philadelphia: Saunders Elsevier; 2017.
10. Shams A, El-Sayed M, Gamal O, Ewes W. Subacromial injection of autologous platelet-rich plasma versus corticosteroid for the treatment of symptomatic partial rotator cuff tears. *Eur J Orthop Surg Traumatol*. 2016;26(8):837–42.
11. von Wehren L, Blanke F, Todorov A, et al. The effect of subacromial injections of autologous conditioned plasma versus cortisone for the treatment of symptomatic partial rotator cuff tears. *Knee Surg Sports Traumatol Arthrosc*. 2016;24(12):3787–92.
12. Nejati P, Ghahremaninia A, Naderi F, et al. Treatment of subacromial impingement syndrome: platelet-rich plasma or exercise therapy? A randomized controlled trial. *Orthop J Sports Med*. 2017;5(5):2325967117702366.
13. Annaniemi JA, Pere J, Giordano S. Platelet-rich plasma versus corticosteroid injections for rotator cuff tendinopathy: a comparative study with up to 18-month follow-up. *Clin Shoulder Elbow*. 2022;25(1):28–35.
14. Garg S, Dhoot RS, Singh DK, Jindal N. Comparative analysis of platelet-rich plasma and corticosteroid injection in the treatment of rotator cuff tendinopathy. *Indian J Orthop*. 2020;54(2):219–26.
15. Magee DJ. *Orthopedic Physical Assessment*. 6th ed. St. Louis: Saunders Elsevier; 2014. p. 328–355.