Section: Orthopaedics

Original Research Article

REVIVING WRIST FUNCTION: PLATELET-RICH PLASMA IN DE QUERVAIN'S TENOSYNOVITIS TREATMENT

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Received : 13/11/2024
Received in revised form : 03/01/2025
Accepted : 19/01/2025

Keywords:
Platelet Rich Plasma (PRP), De Quervain's Tenosynovitis, wrist.

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DOI: 10.47009/jamp.2025.7.1.21

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

Int J Acad Med Pharm
2025; 7 (1); 100-105

Abstract

Background: De Quervain's tenosynovitis is a painful condition caused by inflammation of the tendons in the first extensor compartment of the wrist, commonly triggered by repetitive hand movements. Traditional treatments like corticosteroid injections and splinting often provide temporary relief but may have limitations or side effects. Platelet-rich plasma (PRP) therapy, derived from the patient's own blood, contains growth factors that promote tissue healing and regeneration. This study aims to evaluate the effectiveness of PRP injections in improving pain and function in patients with De Quervain's tenosynovitis, offering a promising alternative to conventional treatment options. This is to study aimed to evaluate the efficacy and functional outcome of autologous Platelet Rich Plasma (PRP) injections in patients with De Quervain's tenosynovitis, a condition characterized by pain and inflammation in the first extensor compartment of the wrist, often due to repetitive hand movements. **Materials and Methods:** A total of 35 patients, aged 18 to 60 years, with a diagnosis of De Quervain's tenosynovitis who had not responded to conservative treatment for at least 3 months were included. All patients were treated with autologous PRP injections prepared by centrifuging the patient's own blood to concentrate platelets. Follow-up evaluations were performed at 2 weeks, 4 weeks, 3 months, and 6 months using Visual Analog Scale (VAS) for pain and Quick DASH (QDASH) scores for functional outcomes. **Result:** The mean age of patients was 37.8 years, with a higher prevalence in females (85.7%) and the most common age group being 30-50 years. Significant improvements in pain and function were observed after PRP treatment. Mean VAS score decreased from 7 (SD 1.16) pre-injection to 0.34 (SD 0.53) at 6 months. Similarly, the mean QDASH score improved from 77.04 (SD 4.38) pre-injection to 21.55 (SD 3.50) at 6 months. A total of 74.28% of patients reported complete pain relief at 6 months, and 91.4% of patients required only one PRP injection. Mild pain exacerbation post-injection was reported by 62.8% of patients, lasting 3-7 days. The platelet concentration in PRP was 3–4 times higher than that in whole blood. **Conclusion:** PRP injections are a safe, effective, cost-efficient, and minimally invasive treatment for De Quervain's tenosynovitis. The treatment resulted in significant pain relief and functional improvement, with a low recurrence rate and fewer complications compared to traditional corticosteroid injections. PRP therapy offers a promising alternative for patients who have not responded to conservative management.

INTRODUCTION

Fritz de Quervain first described De Quervain's disease in 1895,[1] as a condition characterized by pain over the radial styloid, worsened by thumb adduction and wrist ulnar deviation. It results from impaired gliding of the Abductor pollicis longus (APL) and Extensor pollicis brevis (EPB) tendons due to thickening of the extensor retinaculum at the first extensor compartment.[2] The pathophysiology involves degenerative changes, including fibrocartilaginous metaplasia, mucopolysaccharide deposition, and neoinnervation, rather than true inflammation.[3,4]

De Quervain's tenosynovitis is most prevalent in people aged 30–55 years, with Finkelstein's test

ISSN (O): 2687-5365; ISSN (P): 2753-6556

being the most sensitive diagnostic test.[5,6] Imaging, such as radiographs, sonography, or MRI, may be used to rule out other causes of wrist pain. Initial treatment involves conservative measures like splinting, activity modification, and NSAIDs, with corticosteroid injections considered if symptoms persist.[7,8]

Platelet-rich plasma (PRP) is derived from the patient's own blood, making it a safe, autologous option without risks of disease transmission or immunogenic reactions.[8] PRP contains numerous growth factors that may aid in tissue healing, and its complications are typically minor, such as hematoma, bleeding, or infection. While PRP has shown success in treating certain tendinopathies, it may also be effective for De Quervain's tenosynovitis.[9]

PRP offers a conservative, minimally invasive alternative for treating De Quervain's tenosynovitis, avoiding the side effects of NSAIDs or steroids and reducing the need for surgery.[10,11] Its autologous nature promotes faster recovery with less post-treatment morbidity.[12,13] This study aimed to evaluate the efficacy of PRP as a novel treatment for De Quervain's tenosynovitis.[14,15]

Aims and Objectives

Aim is to evaluate the efficacy and functional outcome of Autologous Platelet rich plasma (PRP) injection in patients with De Quervain's tenosynovitis.

- To determine demographic [sex and age] distribution of patient with Quervain's tenosynovitis.
- To prospectively evaluate the symptomatic pain relief with PRP injections.
- To assess the improvement in pain scale in terms of Visual analogue score (VAS) and functional outcome in terms Quick DASH scores.

MATERIALS AND METHODS

Inclusion criteria

The study included patients aged 18 to 60 years, comprising both males and females, who were diagnosed with De Quervain's tenosynovitis. Eligible participants were those who had not shown improvement despite undergoing conservative treatment for at least three months and had a positive Finkelstein's test. Additionally, only patients who provided informed consent for treatment with autologous PRP injections were included in the study.

Exclusion criteria

Exclusion criteria for the study included patients under 18 years of age and those who had used analgesics within 72 hours prior to PRP therapy. Patients who had received a corticosteroid injection at the treatment site within the past month or had undergone surgical treatment for De Quervain's tenosynovitis were also excluded. Additional exclusions applied to individuals with conditions such as rheumatoid arthritis, gouty arthritis, seronegative arthropathies, reactive arthritis, or systemic disorders like HIV, Hepatitis B or C, coagulation and bleeding disorders, septicaemia, or local infections at the procedure site. Lastly, patients who declined PRP treatment as per the study protocol were not included.

PRP (Platelet Rich Plasma) Preparation

Various methods have been used to prepare and administer PRP, with some investigators relying on specialized kits and others using manual centrifugation with an anticoagulant to extract PRP from whole blood. There is no clear evidence to suggest that any specific kit or method produces superior PRP. While some studies have used calcium chloride to activate platelets and stimulate growth factor release, most rely on endogenous platelet activation after injection. Regardless of the preparation method, achieving a platelet concentration 4 to 6 times higher than that of whole blood is considered crucial for optimal treatment outcomes. In this study, a two-step method was developed and characterized to maximize platelet purity, recovery, and yield for PRP preparation.

Method of PRP Preparation and Infiltration

PRP is prepared by centrifuging autologous blood to achieve a higher platelet concentration than the original sample. A total of 20 ml of venous blood is drawn from the unaffected limb and mixed with 1 ml of ACD-A anticoagulant in each of two sterile tubes (1:10 ratio). The first centrifugation (soft spin) is performed at 1500 rpm for 10 minutes, yielding three layers: an upper platelet and WBC-rich layer, a middle buffy coat layer, and a bottom RBC layer. The upper two layers are transferred to a new sterile tube for a second centrifugation (hard spin) at 3000 rpm for 15 minutes, after which the platelet-poor plasma (PPP) in the upper 2/3rd is discarded, and 2–3 ml of platelet-rich plasma (PRP) is carefully aspirated. PRP is kept sterile at room temperature and administered within four hours of blood collection, with samples of both whole blood and PRP sent for quantitative platelet analysis.

RESULTS

A total of 40 patients with De Quervain's tenosynovitis fulfilled the inclusion criteria, out of these 5 patients lost follow up, so the remaining 35 patients were selected for the study. 35 patients with De Quervain's tenosynovitis were treated with autologous Platelet rich plasma (PRP) therapy. All the cases were observed during follow up and final outcome was evaluated based on VAS for pain and Quick DASH score for pain and functional outcome. Most of the patients were in the age group 30-50(65.7%). The youngest in the series at the ti me of study was 20 years and the oldest patient was 56 years. The average age in the series was 37.8 ± 9.77 years. In our study, out of 35 patients 30(85.71%) were female and 5(14.28%) were male.

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Most of the patients involved in our study were house workers (62.8%), Labourer (11.42%), Farmer (11.42%) and others including computer operator, tailors, teachers, (14.28%) by occupation. Right side was involved in 11 cases (68.5%) while left side was involved in 11 cases (31.4%). Out of the 35 participants, 30 participants (85.7%) had their Dominant wrist affected and 5 (14.28%) had their non-dominant wrist affected. Mean VAS score at 3 month follow up was 1.85 (SD 1.14) which was excellent as it decreased from pre – injection mean VAS score of 7 (SD – 1.16). 12 (34.28%) patients had no pain while 23 patients (65.7%) had mild a pain. In 2 patients, there was some benefit but desired benefit not achieved as one patient was computer operator and another one was teacher, due to continuation of repetitive movements of forearm and wrist. There was consistent improvement in mean score during each follow up and each score was statistically significant when compared to previous follow up.

Mean VAS scoring at 6 months of follow up was 0.34 (SD-0.53) which was excellent as it dropped down from pre – injection mean VAS score of 7 (SD – 1.16). 26 (74.28%) patients had no pain while 9 patients (25.7 %) had mild a pain at the final follow up in our series. There was consistent improvement in mean score during each follow up and each score was statistically significant when compared to previous follow up. In our study, functional and pain scoring system used was QDASH scoring system. Pre injection mean score was 77.04 (SD 4.38) where maximum score was 86.36 and minimum score was 70.45. The mean QDASH scoring at the end of 6 months of follow up was 21.55 (SD – 3.50) which was excellent. There was consistent improvement in mean score during each follow up and each score was statistically significant when compared to previous follow up. Out of 35 patients, 22 patients (62.8%) reported exacerbation of pain following PRP injection which lasted for 3-7 days and was treated with rest and ice fomentation for few days. In our study, the mean platelet concentration of the PRP samples was found to be 938.42 x 103/µl and mean CBC concentration was 224.25 x 103/µl. Mean platelet concentration is approximately 4-5 times the mean CBC concentration in the final PRP Samples. It was seen that 32 patients (91.4%) received 1 PRP injection, 2 injections were given in 3 patients (8. 5%).maximum benefit was also seen after 2 injections.NO patient was given 3rd injection.

Figure 1: Centifugation machine used in our study

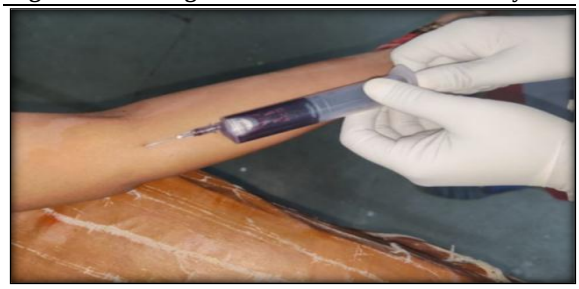

Figure 2: Venipuncture to collect 20 ml blood

Figure 3: Sterile Vacutainer tube containing 1.5ml of anticoagulant ACD-A solution

Figure 4: Anticoagulated whole blood in sterile vacutainer tube

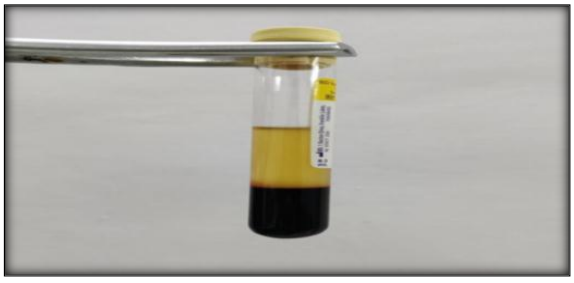

Figure 5: Result of second spin: collection of platelet pellets along with few RBCs at the bottom of the tubes PRP ready

ISSN (O): 2687-5365; ISSN (P): 2753-6556

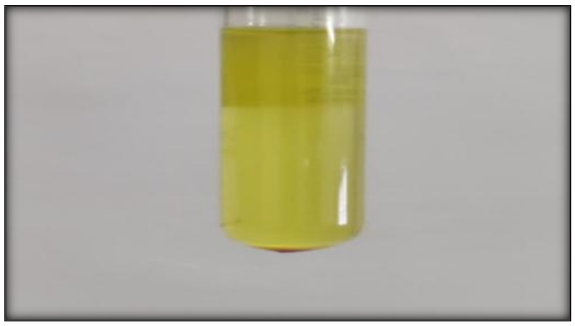

Figure 6: Result of second spin: collection of platelet pellets along with few RBCs at the bottom of the tubes PRP ready

Pre procedural precautions

The cases will be investigated for the usage of NSAIDs 72 hours prior and steroids 4 weeks prior to PRP injection. The severity of pain is traced using standard scoring criteria in the pre-procedural period.

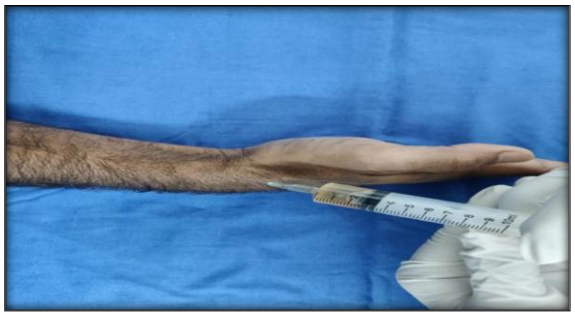

Figure 7: Image showing autologous PRP injection technique for De Quervain tenosynovitis

With aseptic precautions, the pathological site is painted and draped.

After identification of the site of maximum tenderness and without any further delay, about 2 ml of PRP will be injected into the pathological site before PRP coagulate to form a gel. The sterile dressing and crepe bandage will be applied at the injection site.

Post procedural care and follow up

All the patients will be advised not to lift weight for minimum of 2 weeks and the pain was combated with paracetamol and ice pack application. The patients were followed up for pain and range of movements at the end of **2 weeks, 4 weeks, 3rd and 6th month**. Functional evaluation will be done by using the Visual Analogue Scale (VAS) for pain and Quick DASH score. All patients will be followed up for complications and the recorded data will be subjected for statistical analysis.

Protocol for disease recurrence -The patients who reported recurrence of symptoms were offered a second dose of autologous PRP injection after 4 weeks of first injection. The time interval of 4 weeks for second dose were due to formation of collagen and proliferation of fibroblasts in the pathological site of the disease process.

Table 1: Age wise distribution of cases.

Age in years	Number of cases	Percentage
20 – 30	9	25.7
31 – 40	12	34.28
41 – 50	11	31.42
51 - 60	3	8.5
Total	35	100

Table 2: Mean Vas Scoring

	Pre – Injection VAS	2week VAS	4th week VAS	3rd month VAS	6th month VAS
MEAN VAS	7	6.34	3.94	1.85	0.354
SD	1.16	1.18	1.18	1.14	0.53

Table 3: Mean Qdash Scoring

	Pre – Injection QDASH	2week QDASH	4th week QDASH	3rd month QDASH	6th month QDASH
Mean QDASH score	77.04	66.08	48.43	35.04	21.55
SD	4.38	6.08	4.15	3.91	3.50

DISCUSSION

De Quervain Tenosynovitis is a condition characterized by stenosing tenosynovitis of the tendons in the first extensor compartment of the wrist, which is often triggered by repetitive hand movements such as cooking, typing, knitting, gardening, and lifting children.[16] It is more common in individuals who frequently use their hands, increasing their risk of developing this painful condition. Platelet-rich plasma (PRP) therapy, which involves concentrating platelets from a patient's own blood, has shown promising results in treating tendinopathies, including Achilles, elbow, patellar, and rotator cuff tendinopathies.[17-19]

PRP accelerates tissue healing by enhancing the body's natural response to injury, which progresses through four phases: haemostasis, inflammation, proliferation, and remodelling.[20,21] Platelets play a crucial role in these stages by mediating inflammation and promoting tissue regeneration through growth factors, particularly angiogenic and

ISSN (O): 2687-5365; ISSN (P): 2753-6556

mitogenic factors.[22-25] The composition and formulation of PRP influence its effectiveness in tissue repair.[26-30]

In our study, the mean age of patients was 37.8 years, with the highest incidence occurring between 30 and 50 years. The majority of participants were women (85%), likely due to the repetitive nature of household tasks, which contribute to micro-trauma in the wrist.[31] Most of the patients (62.8%) were houseworkers, followed by laborers and farmers. Notably, 74.28% of the participants experienced complete pain relief at the 6-month follow-up, with a significant reduction in pain scores (VAS and QDASH). Although 62.8% of patients reported increased pain after the injection, the overall improvement was substantial.

The mean platelet concentration in PRP was significantly higher than in whole blood, showing a 3–4 fold increase. The majority of patients (32 out of 35) required only one PRP injection. In conclusion, PRP injections proved to be a safe, effective, cost-efficient, and minimally invasive treatment for De Quervain Tenosynovitis, with fewer complications compared to corticosteroid injections and a low recurrence rate.[32]

CONCLUSION

Platelet Rich Plasma (PRP) injection for treating De Quervain Tenosynovitis of the wrist provides a promising alternative to traditional treatments. The technique is minimally traumatic, reduces the risk of immune-mediated rejection, and avoids complications such as hypoglycaemia, skin atrophy, and tendon tears that are often associated with corticosteroid injections. PRP is simple to acquire and prepare, making it an easy procedure to perform in an outpatient setting, and it is cost-effective. Patients experience significant pain relief, with a low recurrence rate of symptoms. This study demonstrates that PRP injection addresses the underlying pathophysiology of De Quervain Tenosynovitis effectively, offering a valuable solution for patients who have not responded to conventional nonsurgical approaches.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556