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Role of platelet-rich plasma in insertion tendinitis

Nibin Sunny[1], Saurabh Agarwal[2], Mahesh Navadaya[3], Mayank Kumar Singh[4]

[1]Junior Resident, [2]Professor, [3]Assistant Professor, Department of Orthopaedics, [4]Professor, Department of Pathology, Maharani Laxmi Bai Medical College, Jhansi, Uttar Pradesh, India

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ABSTRACT

Background: Platelet-rich plasma (PRP) helps in the treatment of various insertion tendinitis, and the recurrence rate will be low. In this study, we used intralesional injections of autologous PRP for the treatment of insertion tendinitis. **Aims and Objectives:** Assessment of pain relief following PRP treatment for insertion tendinitis and ascertaining the efficacy of PRP as a treatment option for insertion tendinitis. **Materials and Methods:** The study was done at Maharani Laxmi Bai Medical College, Jhansi, between January 2021 and June 2022, including 100 patients were applied for the treatment of PRP. We assessed patients before treatment and at three follow-up time points: 2, 4, and 6 months after the end of treatment. During each evaluation, three parameters were noted: Victorian Institute of Sports Assessment-Achilles (VISA-A) score, the Visual Analog Scale, and patient satisfaction according to the roles and Maudsley score. **Results:** This was a prospective trial by study design conducted on 100 patients, which included 44 patients with plantar fasciitis and 56 patients with tennis elbow. The response to PRP injection in patients with plantar fasciitis was assessed by the VISA-A score. The pre-injection VISA-A score of patients with plantar fasciitis was 56.82 (mean with SD of 18.015), which improved to 65.45 in the 2nd month (mean with SD −18.857), 4th month with 69.77 (mean with SD−19.823), and at 6 months 71.82 (mean with SD−20.829). Statistical analysis with an analysis of variance test gave a P=0.001. In our study, the patients had gradual sequential improvement in VISA-A score throughout the follow-up, with maximum improvement from the pre-injection score were observed in 2 months (65.45 with SD 18.85). **Conclusion:** Autologous PRP injection is a safe and useful modality of treatment in the treatment of insertion tendinitis.

Key words: Achilles tendinopathy; Platelet-rich plasma; Tendinopathy

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INTRODUCTION

Achilles tendinitis is otherwise called Achilles tendinopathy, which causes pain and stiffness, swelling, thickening, and weakness of the Achilles tendon, which worsens with activity and is commonly seen in sportspeople. The incidence is 7/1,00,000, having peak incidence in the age group of 20–60 years. The incidence is 35% in Indian population, having peak incidence in the age group of 20–60 years, with a predominance of females in India. This condition may affect 9% of recreational runners and cause up to 5% of professional athletes to end their careers.[1]

Platelet-rich plasma (PRP) had a biological healing capacity. PRP helps in the treatment of various insertion tendinitis, and the recurrence rate will be low. In this study, we used intralesional injections of autologous PRP for the treatment of insertion tendinitis.

Aims and objectives

- Assessment of pain relief following PRP treatment for insertion tendinitis
- Ascertain the efficacy of PRP as a treatment option for insertion tendinitis.

MATERIALS AND METHODS

Ethical

The ethical committee's approval was duly taken. Data were collected in the department of orthopedic surgery from the

Address for Correspondence:
Dr. Nibin Sunny, Junior Resident, Department of Orthopaedics, Maharani Laxmi Bai Medical College, Jhansi - 284 128, Uttar Pradesh, India. **Mobile:** +91-8009608809. **E-mail:** nibinsunny1996@gmail.com

bedside tickets of the patients after taking a short history and informed consent from the patient.

Source of data

The prospective study was done at Maharani Laxmi Bai Medical College, Jhansi, between January 2021 and June 2022, including 100 patients were applied for the treatment of PRP.

Inclusion criteria

- Age: 18 years and above
- Informed written consent
- Patients should have minimum 3 months' duration of symptoms
- Patients should undergo conservative treatment for a minimum period of 3 months
- Patients should not have had a local steroid injection in the past 2 months.

Exclusion criteria

- Signs or symptoms of other coexisting foot lesions
- Congenital or acquired deformities of the knee and ankle
- Surgery or injection therapy with corticosteroids in the past 3 months
- Systemic disorders such as diabetes
- Rheumatoid arthritis, coagulopathies
- Infection or ulcer at the injection site
- Immunodepression or neoplastic diseases
- Therapy with anticoagulants-antiaggregants
- Platelet values of fewer than 150,000/mm^3; pregnancy.

Outcome assessments

We assessed patients before treatment and at three follow-up time points: 2, 4, and 6 months after the end of treatment. During each evaluation, three parameters were noted: Victorian Institute of Sports Assessment-Achilles (VISA-A) score, Visual Analog Scale (VAS), and patient satisfaction according to the Roles and Maudsley score.

Preparation of PRP

A 20-mL venous blood sample was harvested for each treatment cycle for each tendon. The sample was centrifuged twice (the 1st time at 1480 rpm for 6 min to separate erythrocytes and the second time at 3400 rpm for 15 min to concentrate platelets) to produce 3–5 mL of PRP each. One unit will be sent to the laboratory for quality control. On average, the total number of platelets per milliliter in the PRP will be 5 times greater than that in the whole blood. The platelet concentrates also contained leukocytes, which had been concentrated 1.2 times with respect to the normal blood values. The treatment cycle consisted of three intratendinous injections of 5 mL of PRP at 2-week intervals.

Technique of infiltration

The most tender point was palpated and marked using a skin marker, and the area was prepared for injection. Under aseptic precaution using a 21 and 1 1/2-inch needle, 1 mL of PRP is injected initially over the maximum tender point and needle is partially withdrawn and multiple punctures are made in the surrounding tissue (peppering technique). The remaining 1 mL of PRP was injected into the surrounding tissue.

Platelet activation

According to Lee et al., the needling of surrounding tissue will activate the platelets by releasing thrombin from the fresh bleeding. We used this technique for platelet activation.

RESULTS

The prospective study was done at Maharani Laxmi Bai Medical College, Jhansi, between January 2021 and June 2022, including 100 patients were applied for the treatment of PRP. 44 patients with plantar fasciitis and 56 patients with tennis elbow. The response to PRP injection in patients with plantar fasciitis was assessed by VISA-A score. The pre-injection VISA-A score of patients with plantar fasciitis was 56.82 (mean with SD of 18.015), which improved to 65.45 in 2nd month (mean with SD −18.857), 4th month with 69.77 (mean with SD–19.823), and at 6 months 71.82 (mean with SD–20.829). Statistical analysis with an analysis of variance (ANOVA) test gave a P=0.001. In our study, the patients had gradual sequential improvement in VISA-A score throughout the follow-up, with maximum improvement from the pre-injection score was observed in 2 months (65.45 with SD 18.85) (Table 1).

DISCUSSION

Platelet contains biologically active substances for blood clotting, such as coagulation factors, adhesive proteins, and protease inhibitors. Platelets were also known to release growth factors such as transforming growth factor beta 1, concentrated growth factor, vascular endothelial growth factor, and platelet-derived growth factor (PDGF). These growth factors are released once the platelets were activated. These growth factors initiate the process of tissue healing by cellular proliferation and differentiation, chemotaxis, tissue debris removal, angiogenesis, and extracellular matrix formation.[2] These properties of tissue healing by platelets are used in treating degenerative enthesopathies such as plantar fasciitis and tennis elbow by direct local injection of autologous platelet-rich concentrate.

Various techniques have been described for the preparation of autologous PRP. They differ in the

Table 1: Parameters

Parameters	Number of patients	Percentage
Age (in years)		
17–30 years	17	17.00
31–40 years	33	33.00
41–50 years	31	31.00
51–60 years	15	15.00
>60 years	04	04.00
Sex		
Male	52	52.00
Female	48	48.00
Disease		
Planter fasciitis	44	44.00
Tennis elbow	56	56.00
Side		
Right	51	51.00
Left	44	44.00
Bilateral	05	05.00
Planter fasciitis VISA-A score		
Pre-injection VISA-A score	56.82±18.015	
2 months	65.45±18.857	
4 months	69.77±19.823	P=0.001
6 months	71.82±20.829	(ANOVA test)
Tennis Elbow VAS score		
Pre-injection VAS score	5.02±1.968	
2 months	3.39±1.846	1
4 months	3.09±1.610	P=0.0002
6 months	3.04±1.584	(ANOVA test)
Patient satisfaction after 2 months		
Yes	78	78.00
No	22	22.00
Patient satisfaction after 4 months		
Yes	83	83.00
No	17	17.00
Patient satisfaction after 6 months		
Yes	79	79.00
No	21	21.00

VISA-A: Victorian Institute of Sports Assessment-Achilles, ANOVA: Analysis of variance, VAS: Visual Analog Scale

duration and speed of centrifugation. The volume of PRP usually comes from about 10% of the whole blood used. Alsousou et al., used a GPS for the preparation of PRP. The PRP volume of about 5 mL was collected following 12 min of rotations at 3200 rpm.[2] Moazzocca et al., used the double centrifugation method, which separates blood first into plasma and red blood cells. The plasma formed was separated again into PRP and platelet-poor plasma by a second centrifugation.[3] In this study, Moazzocca et al.'s method of double 2 centrifugation was used.

PRP is also known as platelet-rich concentrate, autologous platelet gel, or platelet releasate.[4] The platelet counts in our samples ranged from 2 to 6 lakhs per cc. Thanasas et al., described that PRP contains a two- to eight-fold increase in platelet concentration and a 1–25-fold increase in growth factor concentration.[5] Alsousou et al., in a review article, described a concentration of 5 times the normal count as the working definition of PRP.[2]

Growth factor concentration can be assessed by an enzyme-linked immunosorbent assay. The concentration of growth factors also depends on the method of preparation of PRP. Augustus et al., found that growth factors such as hepatocyte growth factor, insulin-like growth factor-1, and PDGF will be higher in single centrifugation than in double centrifugation.[3] Since the assay of growth factors was not cost-effective, we did not do the assay of growth factors.

PRP can be divided into low white blood cell (WBC) PRP and high WBC PRP, depending on WBC concentration. Augustus et al., found that the WBC count is low in platelet-poor plasma and high in PRP.[3] They found that there was no significant difference in WBC cell types in platelet-poor plasma and PRP.[3] The concentration of WBC in PRP was a subject of debate. Some authors recommended avoid exposure of WBC to tissues so that inflammatory reactions may decrease. Bielecki et al., support the WBC presence as it has antibacterial actions and increases in growth factor release.[6]

Platelets in PRP get activated once they get released from circulation. Different techniques have been used by various authors for platelet activation. Lee et al., described that a needle prick at the time of injection will induce bleeding, which will provide the clotting factor thrombin need for activating platelets.[7] In this study, Lee et al., technique of needling was used for platelet activation.[8]

This was a prospective trial by study design conducted on 100 patients, which included 44 patients with plantar fasciitis and 56 patients with tennis elbow. Both groups of patients were selected based on the inclusion criteria and exclusion criteria described. Patients having chronic inflammatory conditions like rheumatoid arthritis are excluded from the study. Assessment of progression was done based on the numerical pain scoring system (VAS) for tennis elbow patients, the VISA scoring system for plantar fasciitis patients, and patient satisfaction according to the Roles and Maudsley score.

The mean age of the study population was 41.04 years; majority of the patients were in the age of 30–60 years, (79%). 17% of patients were under the age of 30 years; only 4% of study population was above the age of 60 years. 52% of the patients were male, and rest were female.

56% of the study population had lateral epicondylitis and 44% had plantar fasciitis. 5% of population were bilaterally affected.

The response to PRP injection in patients with plantar fasciitis was assessed by the VISA-A score. The pre-injection VISA-A score of patients with plantar fasciitis was 56.82 (mean with SD of 18.015), which improved to 65.45

in 2nd month (mean with SD −18.857), in the 4th month with 69.77 (mean with SD–19.823), and at 6 months 71.82 (mean with SD–20.829). Statistical analysis with an ANOVA test gave a P=0.001. In our study, the patients had gradual sequential improvement in the VISA-A score throughout the follow-up, with maximum improvement from the pre-injection score was observed in 2 months (65.45 with SD 18.85).

For patients with Tennis Elbow, the response to treatment was assessed with the help of VAS score. The pre-injection VAS score of patients was 5.02 (mean with SD of 1.968), which improved Ton 3.39 2nd month (mean with SD 1.846), 4th month with 3.09 (mean with SD 1.610), and 6 months with 3.04 (mean with SD 1.584). Upon statistical evaluation by ANOVA test in our study, we got P=0.0002. There was a gradual deduction in the VAS score throughout the follow-up period, with the maximum reduction from the pre-injection score observed in the 2nd month of follow-up (3.39 with SD 1.84).

Maximum patient satisfaction was observed in the 4th month of follow-up (83%) with a slight decrease in 6 months; a reduction of 4% was observed.

Limitations of the study

The study had a small sample size, a short study duration, and difficult logistics.

CONCLUSION

- Autologous PRP injection is a safe and useful modality of treatment in the treatment of insertion tendinitis
- The response of patients with plantar fasciitis was significantly better than tennis elbow to PRP injection
- Maximum benefit after PRP injection was observed at 2 months and sustained throughout the follow-up
- More trails are required to optimize the technique for separating PRP.

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Authors Contribution:
NS, SA, MKS, MN- Definition of intellectual content, literature survey, prepared first draft of manuscript, implementation of study protocol, data collection, data analysis, manuscript preparation and submission of article, concept, design, clinical protocol, manuscript preparation, editing, and manuscript revision, design of study, statistical analysis and interpretation, review manuscript, review manuscript, literature survey, coordination and manuscript revision.

Work attributed to:
Department of Orthopaedics, Maharani Laxmi Bai Medical College, Jhansi - 284 128, Uttar Pradesh, India.

Orcid ID:
Nibin Sunny- https://orcid.org/0009-0002-4408-5651
Saurabh Agarwal- https://orcid.org/0009-0006-5099-3321
Mahesh Navadaya- https://orcid.org/0000-0001-8492-075X

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