Original Research

Outcome of Platelet-Rich Plasma in Sports Associated Tendon Injury and Tendinopathy: A Study from Northeastern Rajasthan

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ABSTRACT

Background: Platelet-rich plasma (PRP) is an autologous product prepared from peripheral blood that contains a platelet concentration above the baseline and a complex composition of the blood components, excluding red blood cells and a rich source of biologically active proteins and growth factors that play an important role in reducing inflammation, angiogenesis, cell migration, cell differentiation and metabolism. The treatment of Musculoskeletal soft tissue injuries and tendinopathies using PRP has received increasing attention recently and has become an interesting field. These are common in adults who take part in sports activities and represent a significant burden to society in terms of personal disability.

Objective: To evaluate the functional outcome of Platelet-Rich Plasma in sports-associated tendon injury and tendinopathy

Material and Methods: This study was a prospective study carried out in 30 patients. The patients were assessed pre-procedure and post-procedure in the form of range of movements, pain, tenderness, joint stiffness and early mobilization. The quantity of PRP given was 2 ml and the same was repeated based upon the response in follow-up period. The functional outcome of PRP treatment was evaluated with visual analogue score

Result: Maximum study participants were in 26-35 years of age group and were males. The rotator cuff tendon was most commonly affected (40%) followed by the hamstring tendon. 63.3% of patients improved within 4 weeks of PRP injection, 33.3% improved within 8 weeks and only one patient took more than 8 weeks in improvement. Only two patients were presented with a short-term increase in pain and one with skin discolouration. 73.3% of patients had excellent results following PRP, 20% had good results and 6.7% had fair results as per the VAS scoring

Conclusion: The functional outcome of Platelet-Rich Plasma in sports-associated tendon injury and tendinopathy was excellent with minimum complications.

Keywords: Platelet-rich plasma, Sports associated injury, Tendinopathy.

INTRODUCTION

Platelet-rich plasma (PRP) is an autologous product prepared from peripheral blood that contains a platelet concentration above the baseline and a complex composition of the blood components, excluding red blood cells and a rich source of biologically active proteins and growth factors that play an important role in reducing inflammation, angiogenesis, cell migration, cell differentiation and metabolism.[1] PRP improves pain, enhances healing and tissue regeneration and reduces the progression of degenerative diseases. Due to its regenerative properties, PRP has been used in many fields such as dentistry, orthopaedics, sports medicine, cosmetic surgery and dermatology.[2-5] Tendinopathy is a repetitive strain injury caused by repetitive overuse of the muscles of the body. It causes pain and functional impairment in daily activities. The treatment of this condition includes conservative therapy and surgical interventions. The effectiveness of

oral nonsteroidal anti-inflammatory agents, topical and injectable medications including corticosteroids and botulinum toxins, splinting, physical therapy, and iontophoresis has been evaluated in many studies. However, these traditional therapies do not alter the tendon's inherent poor healing properties secondary to poor vascularization.[6] Treatment of Musculoskeletal soft tissue injuries and tendinopathies using PRP has received increasing attention recently and has become an interesting field. These are common in adults who take part in sports activities and represent a significant burden to society in terms of personal disability.[7] There are many studies in support of PRP use in musculoskeletal soft tissue injuries and tendinopathies.[8]Still, there is a gap in literature in this field from the Northeastern part of Rajasthan.

METHODOLOGY

The present study was a follow-up study conducted at a Sports Complex in the Sikar District of Rajasthan as one of the authors is a regular cricket player and conducted the study between January 2023 to Dec 2023 with a follow-up period of 3 months. 30 patients were included in the study after informed written consent.

All patients need to undergo anterior-posterior (AP) and lateral radiographs as well as ultrasound and MRI to identify swelling, tears, calcification in tendon, bursae, muscle and bone.

The patients were assessed pre procedure and post procedure in the form of range of movements, pain, tenderness, joint stiffness and early mobilization.

Inclusion Criteria

1. Patient willing to provide written informed consent to participate in the study
2. Patients with chronic clinically diagnosed tendinopathy
3. Patients having duration of symptoms more than 2 months

Exclusion Criteria

1. Presence of other systemic disorder URTI, high blood pressure, uncontrolled diabetes, poor respiration.
2. Patients not willing to provide written informed consent to participate in the study.
3. Patients having history of trauma, any platelet dysfunction syndrome (Critical thrombocytopenia), any other coagulopathies (such as hypofibrinogenemia), local infection at the site of the procedure, any recent febrile or infectious disease,

Patients were assessed pre-procedure for severity of signs and symptoms, which were compared with post procedure signs and symptoms. Patients were also evaluated for following variables:

a. Range of joint movement
b. Severity of pain
c. Stability of joint
d. Ability to perform special function

The quantity of PRP given was 2 ml initially and the dose was repeated after 2 weeks depending upon the response of the patients.

PRP Preparation

The patient was placed in an appropriate and comfortable position that allows for sterility and access to the site of injection.

At first, 20 cc of venous blood was drawn with aseptic technique from the venous antecubital vein and transferred to the centrifuge.

For preparing 2 mL of PRP with concentration of 4–6 times the average normal values, 20 mL of blood was first collected from the patient's upper limb cubital vein using an 18G needle. Then 2 ml of ACD-A was added to the sample as an anticoagulant. 1 mL of the blood sample was sent for complete blood count. The rest of the sample passed two stages of centrifuge (first with 1600 rpm for 15 minutes for separation of erythrocytes and next with 2800 rpm for 7 minutes in order to concentrate platelets). The final product was 2ml of PRP containing leukocytes. The PRP quantification and qualification procedure was performed using laboratory analyzer Sysmex KX 21 and if approved, the injection was proceeded.[9]

PRP Injection

The skin of the injection site was prepped and draped and the liquid PRP was injected in a sterile condition using a 22G needle at the maximal tender point using a peppering technique spreading in a clock-like manner to achieve a more expansive zone of delivery.[9]

Outcome

1. Evaluate the functional outcome of PRP treatment with visual analogue scores.
3. Percentage of rate and type of complication after the treatment under study.

Statistical analysis: The study contained a total sample size of 30 patients. Eachvariable was recorded and analyzed using JAMOVI software. Detailed analysis was carried outwith the required mean and standard deviation of therespected variables. The association between variables was

analyzed with independent student's T test and paired T test for quantitative variables and by chi square test for qualitative variables. The significant association was considered only when p value is < 0.05.

Evaluation of Outcome

For evaluating the functional outcome of PRP treatment we used the visual analogue score.[10] This system takes into account the following parameters:

Vas score

Rating	Score	Result
No pain	0	Excellent
Mild pain	1-3	Good
Moderate pain	4-6	Fair
Severe pain	7-10	Poor

RESULTS

Maximum study participants were in 26-35 years of age group and were males. The rotator cuff tendon was most commonly affected (40%) followed by the hamstring tendon. 63.3% of patients improved within 4 weeks of PRP injection, 33.3% improved within 8 weeks and only one patient took more than 8 weeks in improvement.Only two patients presented with a short-term increase in pain and one with skin discolouration. 73.3% of patients had excellent results following PRP, 20% had good results and 6.7% had fair results as per the VAS scoring.

Table 1: Profile of study participants:

S. No	Variable	Frequency (%)
1	**Age Distribution**	
	15-25	8 (26.7%)
	26-35	12(40%)
	36-45	6(20%)
	>45	4 (13.3%)
2	**Gender**	
	Male	24 (80%)
	Female	6 (20%)
3	**Site of Tendinopathy**	
	Tendoachilis	3 (10%)
	Hamstring tendon	11 (36.7%)
	Rotator cuff tendons	12 (40%)
	Tennis elbow	4 (13.3%)

Table 2: Time interval for improvement:

Days	Tendoachilis	Hamstring tendon	Rotator Cuff tendons	Tennis elbow	Total (%)
1-4 weeks	0	9	8	2	19 (63.3%)
4-8 weeks	2	2	4	2	10 (33.3)
8-12 weeks	1	0	0	0	1 (3.4%)
Total	3	11	12	4	30

Table 3 Distribution of Complications

Complications	Tendoachilis	Hamstring tendon	Rotator Cuff tendons	Tennis elbow
Short-term increase in pain	1	0	0	1
Nerve injury	0	0	0	0
Vascular injury	0	0	0	0
Skin discolouration	1	0	0	0
Allergic reaction	0	0	0	0
Infections	0	0	0	0
Total	2	0	0	1

Table 4: VAS scoring:

Result	Number of cases	Percentage
Excellent	22	73.3%
Good	6	20%
Fair	2	6.7%
Poor	0	0%

Table 5: VAS scoring according to Tendinopathy

Result	Tendoachilis	Hamstring tendon	Rotator Cuff tendons	Tennis elbow	Total (%)
Excellent	1	9	10	2	22 (73.3%)
Good	1	2	2	1	6 (20%)
Fair	1	0	0	1	2 (6.7%)
Poor	0	0	0	0	0 (0%)

DISCUSSION

The present study aimed to evaluate the functional outcome of Platelet-Rich Plasma in sports-associated tendon injury and tendinopathy. The most common type of tendinopathy observed in our study was rotator cuff tendon (40%), followed by hamstring tendon (36.7%), followed by tennis elbow and tendoachilis. These findings were similar to the study done by Yadav and Parmar.[11]

The age group varied from 15 years to 50 years. Male predominance was observed in our study. The functional outcome i.e. pain improvement in our study was evaluated using VAS (Visual analogue Score). About 73.3% of patients in our study attained excellent VAS scores. Our results were comparable to the results obtained by Mishra and his colleagues[12], in 2006, where patients who had received PRP treatment showed 60 % improvement in their VAS pain score. In both the studies, pain improvement was not measured objectively though. Only two patients presented with a short-term increase in pain after PRP injection in our study.

Frequent and liberal use of ice, particularly in the early stages, was advised and it was helpful in controlling any discomfort from the injection. A systematic review was conducted on the use of Platelet-Rich Plasma in Sports Medicine as a New Treatment for Tendon and Ligament Injuries and it was found that PRP use in tendon and ligament injuries has several potential advantages, including faster recovery and, possibly, a reduction in recurrence, with no adverse reactions described. These results were comparable to our study results.[13] While another systematic reviews showed the contrary result and does not support PRP use as conservative treatment in orthopedics.[4,8]

One study have shown that younger age, male sex and good adherence to eccentric training can be considered predictors of better results after platelet-rich plasma therapy in Achilles tendinopathy[14] but in our study we have not studied these factors separately. International Journal of Orthopaedics Sciences the tissue repair process has been 'stalled' and treatments have been based on inciting an inflammatory response to allow the body's natural repair process to start over. Although the increase in growth factor concentration associated with PRP has been used to justify its application in the treatment of tendinopathy, platelets also have the ability to store and rapidly release a variety of other bioactive molecules, including proteases and anti- proteases, adhesion proteins, and inflammatory cytokines. Thus, the PRP injection may provide the inflammatory cytokines needed to incite an acute inflammatory response and kick-start the healing process in a compromised tissue. In addition, the proteins (albumin and globulins) and clotting factors (fibrinogen) present in the plasma portion of PRP are critical components in the early stages of wound healing, such as in creating a provisional fibrin scaffold and stimulating the inflammatory response. Although PRP contains all the elements needed to initiate and support wound repair, the precise indication (timing, dosage, and proposed mechanism of action) has yet to be precisely unraveled. Finally, even though the natural history of tendinopathy has been extensively studied and prescribed treatments have been guided by clinical signs, the level of tissue pathology and the ability of the tissue to respond to PRP (or for that matter any therapeutic intervention) could vary greatly, even in patients with similar clinical signs. A chronic condition such as tendinopathy may display a varying subset of cellular pathologies that subtly change over time, which may explain the varied results that have been reported.

CONCLUSION

The functional outcome of Platelet-Rich Plasma in sports-associated tendon injury and tendinopathy was excellent with minimum complications.

Conflict of Interest: None

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