

## Role of Platelet Rich Plasma in the Treatment of Tennis Elbow: A Prospective Study

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### Abstract

**Aim:** To evaluate efficacy of tennis elbow treatment with platelet rich plasma

**Methodology:** The study was conducted at Department of Orthopaedics, SB Medical College & Hospital, Hazaribagh, Jharkhand, India during the period of 1 year. Patients between 20-50 years of age who had positive clinical tests (Thomson's and Cozen's test) were included in the study. About 30 ml of the patient's blood was collected. The blood sample is placed in a centrifuge to separate the PRP from the other components of whole blood. PRP was injected into the site of the maximum tenderness. The primary analysis included VAS [21] for measuring pain inpatients, local tenderness, pain on extension of the wrist, grip strength, elbow swelling was clinically assessed at different interval of follow-up, clinical and functional outcome were evaluated at final follow-up with statistical analysis. Patients were assessed after 1 week, 1 month, 6 months, and 12 months.

**Results:** This study included 100 patients out of which 73 were males and 27 were females with age range from 20 to 50 years. The average follow-up was 8 months. 47% belonged to 21-30 years of age group, 31% belonged to 31-40 years, and 22% belonged to 41-50 years of age group. Results were excellent in 81%, good in 16%, fair in 2% and poor in 1%. The mean VAS decreased continuously and significantly up to 8 months.

**Conclusion:** Based on this study, it can be recommended to treat patients with PRP before considering surgical intervention primarily because it provides a similar rate of success with lower cost and less risk. More scientific studies need to do on large scale to prove these results.

**Keywords:** Tennis elbow, lateral epicondylar tendinopathy, platelets.

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### Introduction

Tennis elbow is due to cumulative micro trauma from repetitive wrist extension and alternating pronosupination of forearm with angiofibroblastic degeneration of the common extensor origin [1]. Pain with

resisted wrist extension and local elbow tenderness are the characteristic complaints of patients who present with chronic lateral epicondylar tendinopathy (tennis elbow). This pain has been ascribed

to micro tears within the extensor carpi radialis brevis muscle and the subsequent development of angiofibroblastic dysplasia [2]. Other theories about the source of the pain include altered neurogenic pathways and up-regulation of substance P [3, 4].

Since this common disorder was first described in 1883, a wide variety of treatments has been proposed [5]. Rest, activity or equipment modification, nonsteroidal anti-inflammatory medication, bracing, and physical therapy have all been described as initial interventions. If these treatments fail to improve the pain and tenderness, second-line treatments such as cortisone injections, prolotherapy, autologous blood injections, platelet-rich plasma (PRP) injections, and needling of the extensor tendon origin have been recommended. If patients continue to report pain and dysfunction despite these measures, surgery is then considered.

Surgical options include open tendon debridement and repair, percutaneous or open tendon release, and arthroscopic debridement. Reviews of the surgical literature note few differences in the outcomes of these approaches overall, with a success rate of approximately 85% [6]. The use of PRP is a proactive therapeutic option which jumpstarts the healing process, which contains several different growth factors and other cytokines that stimulate healing of bone and soft tissue [7].

Platelets are, in part, mediators of the coagulation process, but they also contain more than 300 bioactive cytokines and growth factors that act via autocrine and paracrine mechanisms to help coordinate cellular communication [8]. Platelets also release vasoactive substances such as serotonin, calcium, histamine, and adenosine via their dense granules [9, 10]. Importantly, several preclinical studies suggest that PRP enhances human tendon cell proliferation, differentiation, and maturation [11-13]. Activation of the

platelets with thrombin and/ or calcium to initiate release of the contents of the granules ex vivo has been recommended in the wound healing literature. Recent information, however, strongly suggests that PRP without activation promotes a better healing response [14].

Platelet-rich-plasma (PRP) is nowadays widely used for tendinopathies, considered as safe, and currently supported by the strongest scientific journals [14]. However, the potential benefits of PRP are discordant, especially concerning the elbow. Even if the superiority of PRP over corticosteroids is well established [15], the efficacy of PRP in addition to tendon needling or fenestration compared to tendon needling or fenestration alone is still controversial [16-18].

#### **Materials and Methods**

The study was conducted at Department of Orthopaedics, SB Medical College & Hospital, Hazaribagh, Jharkhand, India during the period of 1 year. Patients between 20-50 years of age who had positive clinical tests (Thomson's and Cozen's test) were included in the study. Patients with arthritis of elbow, cervical spine pathology, infection, myositis, previous elbow trauma, previous steroid injection, or surgical intervention were excluded from this study.

About 30 ml of the patient's blood was collected [19]. The blood sample is placed in a centrifuge to separate the PRP from the other components of whole blood. PRP was injected into the site of the maximum tenderness.

Patients were asked to rate their pain according to visual analog scale (VAS). All cases were protected with brace initially and given anti-inflammatory agents for 1 week with cold fermentation, and then restoration of normal daily activities were allowed from the 3rd week with stretching and physiotherapy [20]. The primary analysis included VAS [21] for measuring pain inpatients, local tenderness, pain on extension of the wrist,

grip strength, elbow swelling were clinically assessed at different interval of follow-up, clinical and functional outcome were evaluated at final follow-up with statistical analysis. Patients were assessed after 1 week, 1 month, 6 months, and 12 months.

### Results:

This study included 100 patients out of which 73 were males and 27 were females with age range from 20 to 50 years. The average follow-up was 8 months. 47% belonged to 21-30 years of age group, 31% belonged to 31-40 years, and 22% belonged to 41-50 years of age group.

**Table 1: Demographic details and complications**

Variables		Number
Gender	Males	73
	Females	27
Age group (in years)	21-30	47
	31-40	31
	41-50	22
Complications	Superficial infection	5
	Nerve palsy	1
	Recurrence	0

In 5 cases, there was superficial infection seen but subsided with oral antibiotics and did not require any surgical intervention; in 1 case nerve palsy was seen which

eventually recovered fully without any intervention; and no cases of recurrence were there.

**Table 2: Signs and symptoms at different intervals of time**

Signs and symptoms	Assessment at different intervals			
	1 week	1 month	6 months	12 months
Pain	100	64	29	7
Local tenderness	98	45	12	2
Pain on extension of wrist	95	52	33	1
Elbow swelling	61	29	5	0

**Table 3: Final outcomes**

Final results (At the end of 12 months)	Number
Excellent	81
Good	16
Fair	2
Poor	1

Results were excellent in 81, good in 16, fair in 2 and poor in 1. The mean VAS decreased continuously and significantly up to 8 months.

### Discussion:

Chronic lateral epicondylar tendinopathy, also known as tennis elbow, is a common

problem seen by primary care physicians, physiatrists, and orthopaedic surgeons. Tennis elbow is a frequent cause of disability. It is often self-limiting or responsive to nonoperative measures such

as rest, anti-inflammatory medication, physical therapy, and activity modification. Home-based stretching and eccentric strengthening exercises can also be effective if the patient is compliant. In approximately 10% to 15% of patients, however, symptoms of local elbow tenderness and pain with resisted wrist extension persist. In this cohort of patients, corticosteroid injections are often considered. A survey of 400 members of the American Academy of Orthopaedic Surgeons found that 93% had administered a corticosteroid injection for this type of problem [22]. Cortisone injections have demonstrated short-term pain improvements but also result in high rates of symptom recurrence [23, 24].

The use of PRP is a proactive therapeutic option which jumpstarts the healing process, which contains several different growth factors and other cytokines that stimulate healing of bone and soft tissue [25, 26] PRP after injecting to the pathological site gets activated by collagen from the surrounding soft tissue, releasing growth factors, and cytokines [27]. These bioactive proteins and amino acid chains in turn stimulate local stem cells and enhance extracellular matrix gene expression, following which reparative cells from the vascular tissues and bone marrow then occurs.

Klein et al. [28] supported this thought with in vitro data, reporting transforming growth factor beta significantly increases Type I collagen production in tendon sheath fibroblasts. In a short-term study, using whole blood, Edward, and Calandruccio [29] reported 78% good results in treating tennis elbow with the requirement of multiple injections.

In the most recent meta-analysis focused on the management of tendinopathies, PRP was reported to be beneficial compared to others infiltrative therapies [30]. Many of the studies included comparisons between PRP and corticosteroids. Given that

corticosteroid infiltrations have been shown to be deleterious for epicondylitis [31], the authors considered that the potential observed PRP benefits reported in recent meta-analyses including corticosteroids in control group [30] should not support the use of the PRP itself in clinical practice. Rather, the efficacy of PRP in addition to tendon fenestration compared to tendon fenestration alone remains controversial. Martin et al. [17] found in a partially blinded randomized controlled trial (RCT) involving 71 patients no clinical differences at 6 months of follow-up between 2 sessions of fenestration with either saline + local anesthetic or PRP + local anesthetic.

In a similar blinded RCT involving 50 patients, Schöfl et al. [18] found no clinical differences at 6 months of follow-up. Montalvan et al. [32] found in an RCT involving 50 patients no clinical differences at 6 months of follow-up between 2 infiltrations of PRP and saline solutions. Rehabilitation was not allowed during the trial and the tendon was not fenestrated. Mishra et al. [33] reported in a blinded RCT involving 119 patients a positive clinical effect of PRP over saline solution, using a single injection with fenestration. Behera et al. [34] found similar results in a small RCT on 25 patients.[35]

### Conclusion:

Based on this study, it can be recommended to treat patients with PRP before considering surgical intervention primarily because it provides a similar rate of success with lower cost and less risk. More scientific studies need to be done on large scale to prove these results.

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