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Original Research Article

A Hospital Based Clinical Assessment of Platelet Rich Plasma versus Corticosteroid Injection in Lateral Epicondylitis

Raja Anurag Gautam[1], Vinit Vivek[2], Rajeev Kumar Rajak[3], Prity Ranjan[4], Saumya Singh[5]

[1]Senior Resident, Department Orthopedics, Government Medical College and Hospital, Bettiah, West Champaran, Bihar, India

[2]Senior Resident, Department Orthopedics, Government Medical College and Hospital, Bettiah, West Champaran, Bihar, India

[3]Professor and HOD, Department Orthopedics, Government Medical College and Hospital, Bettiah, West Champaran, Bihar, India

[4]Consultant, Department of Radiology, BIG Apollo Spectra Hospital, Patna, Bihar, India

[5]Junior Resident, Department of Obstetrics and Gynaecology, Government Medical College and Hospital, Bettiah, West Champaran, Bihar, India

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Corresponding Author: Dr. Vinit Vivek
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Abstract

Aim: The aim of the present study was to evaluate the efficacy of autologous PRP vs steroid injection in the treatment of chronic recalcitrant lateral epicondylitis.

Methods: The present study was conducted in the Department Orthopedics, Government Medical College and Hospital, Bettiah, West Champaran, Bihar, India for five months.50 patients with signs and symptoms of chronic lateral epicondylitis not responding to conservative management like oral medication, tennis elbow belt, physiotherapy, aged between 18 and 60 years were randomized into PRP and steroid injection group based on a computer-generated block randomization chart.

Results: There was no statistically significant difference in the age distribution between the two groups. There was a statistically significant difference between the PRP and CS group at 2 weeks ($p < 0.00$), 6 weeks ($p < 0.00$), and 6 months ($p < 0.00$). At all other follow-up points, there was no statistically significant difference between the two subgroups with respect to the VAS, DASH, and Nirschl scores.

Conclusion: Platelet-rich plasma is the better treatment option to treat tennis elbow as there was no recurrence of symptoms or any associated complication till 6 months. The strength of this study lies in the fact that all the patients recruited had a chronic recalcitrant tennis elbow; they were prospectively assessed and randomized. Although the results show good efficacy of PRP compared with steroid, further validation by more subject recruitment is required. The study found to have significant improvement in terms of pain and functional outcome as assessed by VAS score, Nirschl score, and DASH score.

Keywords: Disability, Lateral epicondylitis, Pain, Platelet-rich plasma, Steroid injection

Introduction

Lateral epicondylitis, commonly referred to as 'tennis elbow' is seen to affect 1% to 3% of the general population in the 3rd and 4th decade of life. It is one of the most common causes for elbow pain. The pathogenesis of an overuse injury is thought to be a result from cumulative micro trauma that weakens the structural and vascular elements of the tendon. [1] Micro trauma to a mechanical structure occurs even if the loads are within the material's strength limits, and is due to fatigue after repetitive loads. If the muscle is weak or fatigued, the energy absorbing capacity of the whole muscle-tendon unit is reduced, and tendon stresses will increase. [2] In chronic Lateral epicondylitis (pain duration more than 3 months) there occurs vasodilatation and plasma extravasations, but without presence of any inflammatory cells.

Treatment modalities for the treatment of lateral epicondylitis include analgesics and immobilization. 90% of cases resolve spontaneously within 6-12 months. Other modalities include wrist bracing,

elbow bracing, local corticosteroid injection, shockwave therapy and modifying poor technique in sport or work [3] injection treatments have been used in the treatment for Lateral Epicondylitis. Corticosteroid Injection has been used in the treatment of Lateral Epicondylitis. [1,4] But the treatment with steroid is only seen effective in the early management. It has also got adverse side effects like atrophy and permanent structural changes of the tendon. [1,4]

Another alternative method is Platelet Rich Plasma (PRP) injection by providing safe and natural healing. Platelets release many bioactive proteins responsible for attracting macrophages, mesenchymal stem cells and osteoblasts which helps in tissue regeneration and wound healing.[1,2] Platelet rich plasma (PRP) is defined as a volume of the plasma fraction of autologous blood having a platelet concentration above base line. Platelet increase should be minimum increase of 4 times the baseline. [1,5]

Platelets, an important reservoir of growth factors in the body, play an important role in many processes such as coagulation, immune response, angiogenesis, and the healing of damaged tissues. Numerous proteins are contained in the alpha-granules of platelets: platelet-derived growth factor, transforming growth factor, platelet factor interleukin, platelet-derived angiogenesis factor, vascular endothelial growth factor, epidermal growth factor, insulin-like growth factor, and fibronectin. [6] Single or multiple injections of platelet-rich plasma (PRP) have been shown to be of significance in the management of tennis elbow. Randomized controlled trial comparing efficacy of PRP with other modalities will validate the usefulness of PRP in lateral epicondylitis (LE). [7]

The aim of the present study was to evaluate the efficacy of autologous PRP vs steroid injection in the treatment of chronic recalcitrant lateral epicondylitis.

Materials and Methods

The present study was conducted in the Department Orthopedics, Government Medical College and Hospital, Bettiah, West Champaran, Bihar, India for five months. 50 patients with signs and symptoms of chronic lateral epicondylitis not responding to conservative management like oral medication, tennis elbow belt, physiotherapy, aged between 18 and 60 years were randomized into PRP and steroid injection group based on a computer-generated block randomization chart. Patients with bony lesions at elbow (assessed by X-ray of elbow), systemic diseases (diabetes mellitus, hypertension, rheumatoid arthritis), carpal tunnel syndrome, or cervical radiculopathy were excluded from the study.

Written informed consent was taken from all the patients participating in the study. For preparation of the PRP, 18 mL of blood was drawn and was introduced into two acid citrate dextrose vacutainer tubes (BD Franklin Lakes, NJ, USA) of 8.5 mL each (with 0.5 mL of Acid citrate dextrose solution A) and then centrifuged at 1500 rpm for 6 minutes. Plasma and Buffy coat was separated under aseptic precaution into two sterile glass tubes and centrifuged again for second spin at 4500 rpm for 15 minutes (double spin method). The supernatant platelet-poor plasma was discarded and about 1 mL of PRP obtained from each tube. The platelet counts for PRP and unprocessed blood were assessed. The PRP showed mean concentration of 4× platelet compared with whole blood if four times the concentration obtained; then the sample was discarded and prepared again freshly.

The patients in the PRP group were given 2 mL of PRP prepared from autologous blood at the most tender point over the lateral epicondyle. The patients in the steroid group received 2 mL of methylprednisolone (40 mg/mL, injection tricot).

Patients were rested for 15 minutes after injection and advised not to massage. Patients were prescribed a combination of tramadol and paracetamol (37.5 mg + 325 mg) tablets for pain for 3 to 5 days following injection and discouraged later on.

Patients were assessed using a 10-point visual analog score (VAS) for pain, Nirschl score, and Disabilities of Arm, Shoulder and Hand scale (DASH) score before and after treatment at 2, 6 weeks and 3, 6 months.

Results

Table 1: Sociodemographic features of participants in both PRP and steroid groups

Characteristics		PRP (n = 25) median [interquartile range (IQR)]	Steroid (n = 25) Median (IQR)	p-value
Age		38.1 (9.3)	40.1 (8.15)	0.38
Duration of complaints (months)		6 (4–12)	6 (4–7)	0.37
Gender	Male	8	18	0.02
	Female	17	7	–

There was no statistically significant difference in the age distribution between the two groups.

Table 2: Outcome variables of participants in both PRP and steroid groups

Items	VAS (n = 50)				Nirschl (n = 50)				DASH (n = 50)			
	Steroid (n = 25)		PRP (n = 25)		Steroid (n = 25)		PRP (n = 25)		Steroid (n = 25)		PRP (n = 25)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
At presentation	4.85	1.09	4.60	0.94	3.75	0.64	3.9	0.72	53.69	5.62	57.64	6.34
2 weeks	1.0	1.03	3.10	0.79	0.85	0.99	2.75	0.79	30.82	3.01	47.30	6.45
6 weeks	0.10	0.45	2.15	0.81	0.05	0.22	1.75	0.79	29.90	1.79	38.26	4.94
3 months	0.90	1.1	1.15	0.81	0.70	0.98	0.95	0.61	31.79	1.67	31.95	2.65
6 months	2.05	1.0	.55	0.69	1.85	0.86	0.50	0.51	34.06	1.55	28.26	1.48
n = 50	0.000				0.000				0.000			

There was a statistically significant difference between the PRP and CS group at 2 weeks ($p < 0.00$), 6 weeks ($p < 0.00$), and 6 months ($p < 0.00$). At all other follow-up points, there was no statistically significant difference between the two subgroups with respect to the VAS, DASH, and Nirschl scores.

Discussion

Lateral epicondylitis is the most commonly diagnosed condition of the elbow and affects approximately 1 to 3% of the population. The condition mostly occurs in patients whose activities require strong gripping or repetitive wrist movements. Individuals between the ages of 35 and 50 years are at high risk. The dominant arm is most frequently affected. Lateral epicondylar tendinosis, also known as tennis elbow, is a condition characterized by pain in the region of the origin of common extensor tendons of the forearm from the lateral epicondyle of humerus; most typically the extensor carpi radialis brevis tendon is involved. [8] Studies show clinical efficacy can be expected with minimum increase of platelet concentration by four times the base- line concentration. [10] The healing properties of the PRP have been attributed to the presence of various growth factors like platelet-derived growth factor (PDGF), vascular endothelial growth factor (VEGF), transforming growth factor (TGF), fibroblast growth factor (FGF), epi- dermal growth factor, hepatocyte growth factor (HGF), and insulin-like growth factor-1. [9] Several investigators have found increased collagen gene expression and increased production of VEGF and HGF in human tenocytes treated with PRP. [10]

Lateral epicondylitis is a common problem with many available treatment methods. The most commonly recommended treatment is physiotherapy and bracing. Approximately 87% of the patients benefit from this combination of treatment methods. [11] Corticosteroid injection, nowadays seen as controversial, was considered the gold standard in the treatment of lateral epicondylitis. However, studies [12,13] show it is merely the best treatment option for the short term, when compared with physio- therapy and a wait-and-see policy. Often, poor results are seen after 3 months of follow-up. [14] Treatment with CSs has a high frequency of relapse and recurrence, probably because intra tendinous injection may lead to permanent adverse changes within the structure of the tendon and because patients tend to overuse the arm after injection as a result of direct pain relief. [15] There was no statistically significant difference in the age distribution between the two groups. There was a statistically significant difference between the PRP and CS group at 2 weeks ($p < 0.00$), 6 weeks ($p < 0.00$), and 6 months ($p < 0.00$). At all other follow-up points, there was no statistically significant difference between the two subgroups with respect to the VAS, DASH, and Nirschl scores.

The presence of an elevated concentration of leukocytes in the PRP is a topic of discussion nowadays. Companies that concentrate white blood cells argue that leukocytes are useful in creating an antibacterial response and have the ability to debride dead tendon tissue and jump-start healing (because they also contain growth factors). A basic study [16] in horses showed no lengthening of the inflammation phase when PRP was used to treat an acute lesion of the tendon when compared with the control group. Companies that purposely eliminate white blood cells from PRP argue that leukocytes have detrimental effects on healing tissue, because of the enzymes from the matrix metalloproteinase family that are released by neutrophils. This is, however, not proven in prospective randomized controlled studies. The treatment of tendinosis with an injection of concentrated autologous platelets may be a nonoperative alternative. Injection of autologous platelets has been shown to improve repair in tendinosis in several animal and in vitro models. [17,18] The effect of single injection PRP is shown to last longer than 1 year, while the percentage of success after a single CS injection drops from 51% at 1 year to 40% after 2 years of follow-up. [19]

Conclusion

Platelet-rich plasma is the better treatment option to treat tennis elbow as there was no recurrence of symptoms or any associated complication till 5 months. The strength of this study lies in the fact that all the patients recruited had a chronic recalcitrant tennis elbow; they were prospectively assessed and randomized. Although the results show good efficacy of PRP compared with steroid, further validation by more subject recruitment is required. The study found to have significant improvement in terms of pain and functional outcome as assessed by VAS score, Nirschl score, and DASH score.

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