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Comparative Study of Efficacy Between Platelet-Rich Plasma vs Corticosteroid Injection in the Treatment of Lateral Epicondylitis

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ABSTRACT

Background: Lateral epicondylitis, commonly known as "tennis elbow," is a painful condition affecting the tendons on the outer part of the elbow. Managing lateral epicondylitis is essential to relieve discomfort and improve the patient's quality of life. Various treatment options are available for lateral epicondylitis, including Platelet-Rich Plasma (PRP) therapy and corticosteroid injections. The technique if proved better in pain control would be later on preferred as it will contribute significantly to reduce indoor patient burden, earlier recovery of patients and to their overall satisfaction. **Objective:** To assess and comparative effectiveness of corticosteroid injections with platelet-rich plasma injections in the management of lateral epicondylitis. **Study Design:** Randomized controlled trial (RCT). **Settings:** Department of Orthopedic Surgery, PIMS, Islamabad Pakistan. **Duration:** From December 2019 to May 2020. **Methods:** Overall, 162 adult patients having clinical features of chronic lateral epicondylitis unilateral/bilateral not responding to conservative management of either gender with age between 18-60 years were included. Patients were randomly assigned into two intervention groups. Patients of Group A underwent local steroid injections, while Group B received platelet-rich plasma (PRP) injections. Patients of the PRP group, were administered 2 mL of PRP, derived from their own blood, at the most sensitive spot on the lateral epicondyle. Patients of the steroid group, were given 2 mL of methylprednisolone (40 mg/mL). Following the injections, patients were instructed to rest for 15 minutes and advised against massaging the treated area. VAS score was calculated at baseline before giving treatment in both groups and was subsequently assessed at 6th week, 3rd month and 6th month post therapy. VAS score was compared in both groups at different time intervals using student-t test for independent samples. **Results:** Mean age in group A was 47.4 ± 7.5 years and in group B was 48.1 ± 8.2 years. In group A, 56.8% of the participants were males, and 43.2% were females, whereas in group B, 54.3% were males, and 45.6% were females. Baseline average score of VAS was almost equal among both groups at baseline (7.69 ± 1.03 and 7.74 ± 1.06) in group A and B respectively. At 6th weeks, average score of VAS in steroid group was 3.7 ± 1.79 and in PRP group was 3.23 ± 2.05 (P=0.440). At 3 months, average score of VAS in steroid group was 2.73 ± 1.48 and it was 2.53 ± 1.82 SD in PRP group (P=0.451). At 6 months, VAS average score was noted significantly decreased 2.11±1.29 compared to steroid group was 4.83 ± 2.11 (P=0.001). **Conclusion:** The study revealed that PRP injections are more effective than local steroid injections for chronic lateral epicondylitis. Initial VAS scores were similar for both treatments up to three months, but PRP showed significantly better results at the 6-month follow-up, indicating its long-term effectiveness.

Keywords: *Lateral epicondylitis, Platelet rich plasma, Steroids.*

INTRODUCTION

Lateral epicondylitis, commonly known as "tennis elbow," stands out as a prevalent and painful musculoskeletal disorder that exerts a substantial influence on both the healthcare sector and society.[1] The estimated occurrence rate in the general population is within the range of 1% to 3%.[2,3] The most significant percentage of diagnosed cases of lateral epicondylitis, approximately 64%, is linked to overuse and a notable surge in wrist and hand activity within work-related tasks.[2,4] It primarily impacts individuals between the ages of 35 and 50 who have engaged in repetitive upper limb activities, with a slight preponderance among females.[1] Although the precise pathophysiology of the condition remains uncertain, it is widely debated that lateral epicondylitis can be viewed as a degenerative process resulting from excessive muscle use, leading to tendinosis, micro-injuries, and tears in the extensor carpi radialis brevis tendon, despite the presence of local inflammatory cells. Factors that increase the risk of developing lateral epicondylitis (LE) encompass advancing age, a higher body mass index, the use of oral corticosteroids, smoking habits, and a previous history of other tendinopathies like rotator cuff conditions or De Quervain's syndrome.[5,6] Additionally, arm used predominantly is more frequently impacted than the non-dominant one.[5,6]

The numerous available treatment options for lateral epicondylitis may be linked to the limited evidence regarding the disease's origins and the absence of consensus on a definitive treatment for the condition.[1] The several of treatment options accessible for lateral epicondylitis[7,8] may be due to the limited available evidence regarding the underlying causes of the disease and the absence of consensus on a definitive management technique for this illness.

The administration of glucocorticoid injections was initially introduced in the 1950s and has demonstrated enhanced results in terms of pain relief and functional recuperation.[9,10] While local corticosteroid injections have been traditionally regarded as the gold standard, intratendinous injections can potentially lead to permanent damage to the tendon's internal structure, and superficial injection of the mixture may result in subcutaneous atrophy.[9,11] However the utilization of corticosteroid injections for managing lateral epicondylalgia is now less recommended, mainly due to the absence of long-term effectiveness,[12,13] While certain authors contend that corticosteroid injections might potentially impede the expected natural healing process that could occur with a wait-and-see approach or alternative management strategies, in addition to the observed frequent recurrences of symptoms when using them.[1] Histopathological examinations have revealed an inadequate presence of inflammatory cells like neutrophils or the macrophages in samples of the tissues, indicating that the term 'tendinosis' may be a more suitable descriptor for this condition.[1,5] However, there is a general consensus that LE is not primarily an inflammatory condition. Therefore, the debate continues regarding the suitability and ultimate advantages of this treatment. In fact, some experts are concerned that intra-tendinous CS injections might have a detrimental effect on the extended duration of the healing process and the potential to undermine the tensile strength of the affected tissues.[1,5] Lately, PRP, pulsed ultrasound and extracorporeal shock waves are becoming increasingly prominent in the field of treatments.[14] PRP is a concentrated protein derived from whole blood, primarily composed of platelets. It consists of various growth factors and other cytokines capable of promoting the healing process and amplifying the inflammatory response.[9]

According to a study, at the primary 3-month endpoint, neither the injection of PRP nor glucocorticoid demonstrated superiority over saline in terms of pain reduction for lateral epicondylitis (LE).[15] On the other hand as per a recent systematic review encompassing studies published from 2016 to 2020, corticosteroid (CS) injections were found to be more effective for providing short-term pain relief, while PRP injections were deemed more effective for achieving long-term pain relief and enhanced functional outcomes.[5] However, according to another recent metanalysis, the PRP injection did not exhibit greater efficacy than a placebo in alleviating pain and improving joint functionality in cases of chronic lateral epicondylitis.[16]

Nonetheless, patients reported enhanced outcomes following both interventions in these clinical aspects. Additional they recommended further research work to establish whether PRP injections offer a higher level of clinical effectiveness compared to a placebo.[16] Due to the existing controversies and variations in the literature regarding the treatment of lateral epicondylitis, this study has been done to assess and compare the effectiveness of two common treatment modalities: corticosteroid injections and PRP therapy. Lateral epicondylitis, often referred to as tennis elbow, is a painful situation that has the potential to significantly impact quality of life and functionality of an individual. The choice of treatment can be important in determining patient outcomes and may be helpful for clinicians in choosing the most suitable treatment option for their patients.

METHODS

This was a Randomized controlled trial (RCT), conducted at department of Orthopedic Surgery, PIMS, Islamabad after taking Ethical approval. Study was done during a

period of 6 months From December 2019 to May 2020. Patients aged between 18 and 60 years with chronic lateral epicondylitis who exhibited signs and symptoms unresponsive to conservative treatments such as oral medication, the use of a tennis elbow brace, and physiotherapy were included in the study. Individuals having acute or subacute onset of lateral epicondylitis, history of previous corticosteroid or PRP injections in the affected elbow within the last six months, patients contraindications to corticosteroid or PRP injections, history of systemic inflammatory conditions affecting the musculoskeletal system, patients with severe comorbidities, pregnancy or breastfeeding in female participants, and those who were not willing to participate in the study were excluded. Following the collection of demographic data and obtaining written informed consent from the patients, they were allocated randomly to one of the two treatment groups using sequentially numbered envelopes that disclosed their respective treatment assignments. Group A received local steroid injections, while Group B received PRP injections. In the PRP group, patients received a 2 mL injection of autologous blood-derived PRP at the most sensitive point on the lateral epicondyle. In the steroid group, patients were administered a 2 mL injection of methylprednisolone (40 mg/mL, Tricot injection). After the injections, patients were instructed to rest for 15 minutes and were advised against massaging the treated area. Patients were given a prescription for tramadol and paracetamol combination tablets (37.5 mg tramadol + 325 mg paracetamol) to manage pain for a period of 3 to 5 days following the injection. However, the continued use of these medications was discouraged. Pain levels were evaluated using a 10-point visual analog score (VAS) before and after treatment at the 0-day baseline, as well as at 6th week, 3rd month and 6th month follow-up points. Efficacy of treatment was defined as decline in VAS score of ≥2 at different intervals after the treatment (6 weeks, 3 months and 6 months). All the gathered information was entered and analyzed on software SPSS version 22.

RESULTS

A total of one hundred and sixty-two adult patients with clinical features of chronic lateral epicondylitis were comparatively studied; with mean age of 47.4 ± 7.5 years in group A and 48.1 ± 8.2 years in group B. In group A, 56.8% of the participants were males, and 43.2% were females, whereas in group B, 54.3% were males, and 45.6% were females out of 81 cases in each group along with majority of the cases had age between 41-60 years in both groups. Table. 1

Baseline average score of the VAS was almost similar among both groups at baseline with 7.69 ± 1.03 in group A and 7.74 ± 1.06 in group B (*P*=0.764). Table 2.

Table 1: Descriptive statistics of age and gender of both study groups (n=162)

Variables		Study Groups		P-value
		Steroids	PRP	
Gender	Males	46 (56.8%)	44 (54.3%)	0.752
	Females	35 (43.2%)	37 (45.7%)	
	Total	81 (100.0%)	81 (100.0%)	
Age	Mean ± SD	47.4 ± 7.5	48.1 ± 8.2	0.570

Table 2: Mean comparison of baseline VAS score among both study groups n=162

Study groups	Baseline VAS		P-value
	Mean	SD	
Steroid group	7.69	1.03	0.764
PRP group	7.74	1.06	

At six weeks, mean VAS score in steroid group was 3.7 ± 1.79 and 3.23 ± 2.05 was in PRP group (*P*=0.440). At 3rd months, mean VAS score in steroid group was 2.73 ± 1.48 and 2.53 ± 1.82 was in PRP group (*P*=0.451). However, at the 6th month, a significant difference was observed, with the PRP group showing a mean VAS score of 2.11 ± 1.29, notably lower than the steroid group's score of 4.83 ± 2.11 (P=0.001). Table 3

Table 3: Mean comparison of post-treatment VAS score among both study groups n=162

VAS SCORES	Study Groups		P-value
	Steroids	PRP	
6 Weeks (Mean ± SD)	3.47 ± 1.79	3.23 ± 2.05	0.440
3 Months (Mean ± SD)	2.73 ± 1.48	2.53 ± 1.82	0.451
6 Months (Mean ± SD)	4.83 ± 2.11	2.11 ± 1.29	0.001

The efficacy of treatment was defined as a decline in VAS score of ≥2 at different intervals after the treatment. At 6 weeks and 3 months, both PRP injection and steroid injection treatments were found to be almost equally effective in both groups without a significant difference (p<0.05). However, by the 6th month, treatment was observed to be more effective in 93.8% of the cases in the PRP group, as opposed to 67.9% in the steroid injection group (P=0.001). Table. 4

Table 4: Frequency of efficacy of treatment in both groups according to follow-up n=162

Follow Up	Efficacy	Study Groups		Total	*P*-value
		Steroids	PRP		
6th week	Yes	66 (81.5%)	68 (84.0%)	134 (82.7%)	0.678
	No	15 (18.5%)	13 (16.0%)	28 (17.3%)	
3rd month	Yes	70 (86.4%)	72 (88.9%)	142 (87.7%)	0.633
	No	11 (13.6%)	9 (11.1%)	20 (12.3%)	
6th month	Yes	55 (67.9%)	76 (93.8%)	131 (80.9%)	0.001
	No	26 (32.1%)	5 (6.2%)	31 (19.1%)	

DISCUSSION

Lateral epicondylitis is a painful condition that affects the tendons and muscles of the forearm, especially those connected to the lateral epicondyle of the humerus. Effective management is crucial for alleviating pain and restoring function. This study was designed to prospectively compare the efficacy of steroid injection and Platelet rich plasma in patients with chronic lateral epicondylitis. In the early stages of the study, the assessment at both six weeks and three months showed no significant difference in the mean VAS scores between the PRP injection group and the steroid injection group. At six weeks, the mean VAS score was 3.7 ± 1.79 for the steroid group and 3.23 ± 2.05 for the PRP group, (p-0.440), similarly, at three months, the respective mean VAS scores were 2.73 ± 1.48 and 2.53 ± 1.82, (p-0.451). These results suggest that in the short term, both treatment modalities, PRP and steroid injections, were approximately equally effective in providing relief from the symptoms of chronic lateral epicondylitis, as indicated by the decline in VAS scores. However, in this study during a six-month follow-up, the PRP group showed a significant advantage over the steroid group (mean VAS score in the PRP group 2.11 ± 1.29 compared to in the steroid group, which was 4.83 ± 2.11) (p-0.001). These findings suggests that the long-term benefits of PRP injections become more apparent compared to steroid injections in the management of chronic lateral epicondylitis. Comparatively there were several studies that have compared steroids and PRP in the treatment of LET.

Varshney A *et al*.[17] in their study, compared VAS in patients with local steroid injection versus autologous PRP and their results showed that after six months of treatment with PRP, patient's with elbow epicondylitis had a significant improvement in VAS score compared to those treated with steroids (p-<0.05). However, at one and two months after the follow up, there was no significant difference in both groups.[17] Subsequently, Li A *et al*[18] in their pooled analysis assessed the efficacy of platelet-rich plasma (PRP) and corticosteroids in treating lateral epicondylitis of the elbow. They finally enlisted seven randomized controlled trials and revealed that the VAS score was notably lower in the PRP group compared to the steroid group during the 24-week follow-up period. The researchers' conclusion was that local corticosteroid injections yielded similar results to local PRP treatments for lateral epicondylitis at the four to eight-week follow-up mark. However, in the longer-term assessment (24 weeks after treatment), PRP injections proved to be more effective in improving pain and function than injections of the corticosteroid.[18]

Consisting findings were also reported by Xu Q *et al*,[9] who compared the clinical effectiveness of PRP injections and corticosteroids in patients with lateral epicondylitis (LE). Their combined analysis demonstrated that PRP was significantly more effective in relieving pain and improving elbow joint function when evaluated at the 6-month follow-up, as opposed to local corticosteroid injections. Notably, there were no significant differences between the two groups in terms of post-injection adverse events.[9] Few other trials which showed some inconsistent result. In a randomized trial, there was no notable distinction in the reduction of pain or disability among patients who received PRP treatment compared to those who received glucocorticoid or a placebo (saline) at the three-months follwup.[15]

Furthermore, PRP injection did not result in a significant alteration in the ultrasound appearance of the affected tendons. The originally planned one-year follow-up assessment could not be carried out due to a considerable number of patients from all groups discontinuing their participation in the study. A randomized trial involving 230 patients with chronic lateral epicondylitis (LET) revealed that there was no disparity in pain scores at the 12-week mark. However, significant enhancements in pain scores and a decrease in elbow tenderness were observed at the 24-week follow-up in patients who received PRP injections when compared to those who did not receive PRP.[19]

In a randomized trial involving 100 patients suffering from chronic lateral epicondylitis (LE), it was observed that individuals who received PRP injections experienced notable and lasting enhancements in their functional abilities in comparison to those who received glucocorticoid injections. Both groups underwent physical therapy that included an eccentric strengthening regimen, and their functional progress was assessed using a validated evaluation tool. It's important to note that these studies did not incorporate a placebo control

group, and they received partial funding from a company that manufactures the centrifuge used to extract PRP.[20] In the comparison of our findings a local study by Khaliq A *et al*[27] assessed the various approaches to treating lateral epicondylitis with a focus on their effectiveness in alleviating pain. Their results showed that during the follow-up, the average pain score in the steroid group was 4.0±2.6, while in the PRP group, it was 3.5±2.61. Furthermore, 52.9% of patients in the steroid group experienced pain relief, whereas 82.3% of patients in the PRP group found the treatment effective (p=0.001).[21]

There are other studies demonstrating the efficacy of PRP in refractory cases of LE. Mishra *et al* reported a significant improvement of symptoms in 60% of patients treated with PRP after 8 weeks as compared to 16% of the patients treated with local anesthetic.[22] Hechtman *et al* treated 31 patients of refractory LE with PRP and demonstrated that ninety percent of patients observed with a 25% decrease in their most severe pain score during at least one follow-up visit, and this improvement was sustained without the need for any additional intervention for a duration of 12 months.[23]

A few other studies have also supported our findings.[24-27] Although we did not compare PRP with local anesthetics in the present study, yet our results are coherent with their results in the PRP arm. Conclusively the administration of platelet-rich plasma through local injection was established as a beneficial treatment choice when compared to local steroid injections for patients with lateral epicondylitis (LE). The major strength of our study is that it was a randomized controlled trial and we used stringent inclusion/exclusion criteria. Our study has certain limitations; firstly, the sample size was somewhat limited, but it remained adequate to make the conclusion. Secondly, it has been noticed that the duration of follow up in the present was relatively shorter as the significance of PRP therapy started appearing at six months. We suggest further studies with longer duration of follow up. Furthermore, in this study only studied the efficacy of a single PRP (Platelet-Rich Plasma) injection, while in the literature, some researchers have used multiple PRP injections with one-week intervals. However future large scale studies are recommended to explore the efficacy of multiple PRP injections. Additionally, we recommend further research that compares the efficacy of PRP with other frequently used treatment agents.

CONCLUSION

This study revealed that, for patients with chronic lateral epicondylitis, PRP injections technique observed superior and sustained pain relief compared to steroid injections. Initial VAS scores were similar for both treatments up to three months, while the delayed efficacy of PRP, becoming more prominent at the six-month mark, may be of particular interest to clinicians and patients looking for longer-lasting solutions. However, it's important to consider other factors such as cost, availability, and potential side effects when making treatment decisions. Further research and clinical trials may be needed to confirm these findings and explore the underlying mechanisms of treatment efficacy.

LIMITATIONS

Limited study sample size and follow-up duration was relatively short.

SUGGESTIONS / RECOMMENDATIONS

Future large-scale research is recommended to assess the efficacy of multiple PRP injections. Additionally, further studies comparing the effectiveness of PRP with other commonly used treatments are advisable.

CONFLICT OF INTEREST / DISCLOSURE

Non

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