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A comparative study of activated platelet rich plasma versus local corticosteroid injection for the treatment of lateral epicondylitis: A randomised study

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Abstract

Background: Lateral epicondylitis (Tennis elbow) is due to degeneration in common origin of extensor group of muscles of forearm. The objective of our study was assessment of efficacy of activated platelet rich plasma and local corticosteroid injection for the treatment of lateral epicondylitis.

Methods: 50 patients with chronic lateral epicondylitis were included in the study and randomised into 2 groups. Group 1 was treated with a single injection of 2 ml of autologous platelet rich plasma (4.8 times of plasma) with 1 ml of calcium chloride as activator and group 2 patients were infiltrated with 2 ml of local corticosteroid (methylprednisolone acetate 80 mg) mixed with 1 ml of 2 % lignocaine, followed by elbow strap, stretching and strengthening exercises along with oral non-steroidal anti-inflammatory drugs for both groups. Pain and functional outcomes were assessed using visual analogue scale (VAS) and NIRSCHL staging at 0, 1, 3, 6, weeks and 4 months and 8 months.

Results: Pain variables including VAS and NIRSCHL scores improved significantly in both groups at short and intermediate duration, but long-term activated platelet rich plasma showed better improvement in regard to pain severity, functional outcome and recurrence rates.

Conclusion: Both platelet rich plasma and local corticosteroid injection are effective to treat chronic lateral epicondylitis., But platelet rich plasma is better in both short-term and long-term follow-up in tennis elbow with no post injection exacerbation of pain in PRP cases.

Keywords: lateral epicondylitis, platelet rich plasma (PRP), corticosteroid injection

Introduction

Lateral epicondylitis (tennis elbow) is commonly encountered in orthopaedic practice and it is the 2nd most frequently diagnosed musculoskeletal disorder in the neck and upper extremity^[1]. Incidence of tennis elbow is between 4 to 7 per 1000 cases per year in general practice, which peak between the ages of 35 and 54 years (mean 42 years approx)^[2]. An epidemiological study reported that 87% of cases involved the dominant arm^[3]. The most frequently used term is probably tennis elbow implying a relationship with repetitive mechanical load while using forceful grip as in playing tennis^[4]. The aetiology and pathogenesis of tennis elbow is not known, but the condition is considered to be an overuse injury of degenerative nature^[5].

The majority of orthopaedic applications of platelet rich plasma will fall into 4 categories: chronic tendonopathies, acute ligamentous injuries, muscle injuries and augmentation of other treatment modalities like bone grafting.

Platelet rich plasma had a biological healing capacity which is found useful in healing inflammatory disorders and could produce useful results in tennis elbow. There are systematic reviews from the cochrane library for treatment of tennis elbow, using shockwave therapy (ESWT), acupuncture, orthotic devices, deep transverse friction massage, surgery and non-steroidal anti-inflammatory drugs^[6].

Most reviews conclude little scientific evidence for the treatment due to small sample size and difference in study designs, patient selection, follow-up periods and different outcome measure. The evidence for or against good effects of any treatment is not clearly defined. The purpose of this study was to evaluate the efficacy and role of injecting activated platelet rich plasma at site of lateral epicondylitis by comparing with local corticosteroid injection.

Methodology

Study site: All confirmed patients of lateral epicondylitis willing for the treatment attending government medical College and Rajindra hospital.

Study design: Single blinded randomized controlled trial comparing the efficacy of PRP injection with local corticosteroid injection.

Sample size: A sample size of 50 patients randomly allotted into 2 groups (1 and 2) of the 25 cases each
Time frame of study: June 2018 to July 2019

Inclusion criteria:

- 1) Age greater than 18 years
- 2) A diagnosis of lateral epicondylitis

Exclusion criteria:

- 1) Patients who received PRP or steroid injections in the 3 months prior to study treatment
- 2) History of trauma
- 3) Previous surgery for lateral epicondylitis
- 4) Presence of other causes of elbow pain

Each patient was assessed by history and clinical examination. In some cases, radiological imaging investigations were carried out to conform the diagnosis and to identify any exclusion criteria. This included testing for tenderness over the lateral epicondyle just distal to it, a positive Cozen's test, Mill's manoeuvre, wringing test, Maudsley's test.

Procedure

PRP preparation: Group 1 was designated to receive to 2 ml of PRP with calcium chloride activator injected. For preparing 2 ml of PRP, 20 ml of blood was 1st collected from the cubital vein using an 18-gauge needle. Then, 2 ml of ACDA was added. One ml of blood sample was sent for complete blood count. The rest of the sample passed the 2 stages of centrifuge (1st 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 undergoes quantification and qualification using laboratory analyser Sysmex KX21 and if approved, the injection was proceeded.

Injection techniques: The elbow was flexed to 90° with forearm pronated. With patient supine posture, elbow, was painted and draped. The bony landmarks were identified. The elbow was flexed to 90° with the palm facing down. The needle introduced proximal to lateral epicondyle along the supracondylar ridge and gently advanced into the undersurface of the extensor carpi radialis brevis while

infusing the PRP prepared as described above. Then, after 2 minutes, Mill's manipulations were done. With forearm in maximum pronation and wrist in maximum plantar flexion, the elbow was repeatedly extended and stretched 6 to 7 times, and then a small adhesive sterile dressing was given at injection site, which was advised to be removed after 2 days. Patients were advised to give rest to the upper limb for 3 days and after that, no restriction of activity is advised. Oral non-steroidal anti-inflammatory drugs were given for 7 days. Controls were injected with 2 ml of local corticosteroid (methyl prednisolone acetate 80 mg) mixed with one ml of 2% lignocaine in the same technique as described above.

Outcome evaluation: Outcome is measured using VAS score (ranging from 1-10) and NIRSCHL staging of lateral epicondylitis (Table 1).

Table 1: NIRSCL staging system scoring

Score	Staging
1	Mild pain with exercise, resolves within 24 hours
2	Pain after exercise, exceeds within 48 hours
3	Pain with exercise, does not alter activity
4	Pain with exercise, alters activity
5	Pain with heavy activities of daily living
6	Pain with light activities of daily living, intermittent pain at rest
7	Constant pain at rest, disrupts sleep

Observation

Total 50 patients were included under the present study. Age encountered in the study patients ranged from 20 to 60 years, with a mean age of 43.3 years. Out of 50 participants, 27 (54%) were males and 23 (46%) were females. Out of 50 participants, 40 (80%) had their dominant elbow affected and 10 (20%) had non-dominant elbow affected. Mean duration of the condition in all 50 patients suffering from lateral epicondylitis was 8.62 weeks (Table 2).

Table 2: Demographic data of the study groups

	Group 1	Group 2
Age (yrs) (Mean)	44.2	42.6
Duration of condition (weeks)	8.4	11.4

Clinical evaluation done for all patients. A baseline VAS Score and NIRSCHL staging of the pain at lateral epicondyle was recorded. Cases were treated with PRP injection and controls with local corticosteroid injection. After the procedure, patients were asked to report immediately, if any increase in pain was there and were asked to follow-up at one week, 3 weeks and 6 weeks and after that 4 months and 8 months (Table 3). If pain persisted, analgesics were given and was advised to be taken only, if there is severe pain.

Table 3: Mean scores (SD) of the two groups of patients

		Baseline	3 weeks	6 weeks	4 months	8 months
VAS Score Mean (SD)	Group 1	7.08 (0.99)	5.62 (1.15)	2.08 (0.28)	1.73 (0.12)	1.24 (0.8)
	Group 2	7.54 (0.73)	4.60 (1.19)	2.34 (0.77)	1.6 (2.18)	2.9 (0.6)
	p-value	0.07	p<0.001	0.138	0.208	p=0.043
NIRSCHL score Mean (SD)	Group 1	5.41 (0.5)	4.73 (0.6)	1.68 (0.20)	1.65 (1.15)	1.80 (1.1)
	Group 2	5.95 (0.76)	4.65 (1.46)	1.67 (0.57)	1.34 (0.82)	2.5 (0.79)
	p-value	0.057	p<0.001	0.52	0.278	0.037

Group 1: PRP group; Group 2: CS group; VAS score: Visual Analogue Scale Score (1-10); NIRSCHL score: NIRSCHL staging of pain score (1-7)

Discussion

Tennis elbow is a common problem encountered in orthopaedic practice. Majority of the treatment modalities used for its management lack scientific rationale [7]. Non-operative treatment is successful in 95% of patients with tennis elbow. The non-operative treatment of lateral epicondylitis includes rest, non steroidal anti-inflammatory drugs, bracing, physical activity, extracorporeal shock wave therapy and botulinum toxin injection. Injection of corticosteroids, whole blood and platelet rich plasma (PRP), and various types of surgical procedures have also been recommended. Injection with corticosteroids has been used since the 1950s and has been the treatment of choice for many years.

There have been many randomised controlled trials that have compared platelet rich plasma injection with autologous whole blood and autologous whole blood with local corticosteroid injection, and PRP with steroid injection. However, results as to whether Platelet Rich Plasma, autologous whole blood or local corticosteroids is more beneficial are still unclear. Hechtman *et al.* in a similar study using PRP, treated 31 patients with lateral epicondylitis not responding to conservative treatment for 6 months [8]. The overall success rate was 90% (28 of 31 elbows). Two cases had elective surgery 1-month post-injection and 29 cases continued follow-up. The patient satisfaction score also improved from 5.1 ± 2.5 at 1 month to 9.1 ± 1.9 at last follow-up [8].

Arirachakaran A *et al.* did a systematic review and network meta-analysis of randomised controlled trials, conducted with the aim of comparing relevant clinical outcomes between the use of PRP, autologous blood and corticosteroid injection. [9] He concluded that the network meta-analysis provided additional information that PRP injection can improve pain and lower the risk of complications, whereas autologous blood injection can improve pain, disabilities scores and pressure pain threshold but has a higher risk of complications. The level of evidence of the study was level 1 evidence [9].

Age encountered in the study ranged from 20 to 60 years, with a mean age of 43.3 years. Peak incidence at 4th decade of life was seen, this was similar to the study done by Labelle H *et al.* [10], which observed mean age of 42 years. Another study conducted by Dojode C *et al.* observed mean age to be 46.7 years [11].

The mean age of patients in the PRP group was 44.2 years and in corticosteroid group was 42.6 years. This is the probably working age group, so most commonly affected.

Out of 50 participants, 27 (54%) were males and 23 (46%) were females. So it's more common in males. Two more studies by Nirschl RF *et al.* and Dojode C *et al.* had more number of male patients [11, 12].

Out of 50 participants, 40 (80%) had their dominant elbow affected and 10 (20%) had non-dominant elbow affected. So, dominant extremities were more commonly involved. In other two studies, one had dominant elbow involvement in 84% patients and in other, in 78.6% patients, dominant elbow was involved [12]. It is caused by repetitive activity. Hence, dominant extremity is involved more.

Conclusion

Autologous PRP injection is a very promising alternative to steroid injection. While counting the advantages of PRP injection, it is safe to use, well-effective to reduce pain in the long-term, with low recurrence rates. It has no deleterious and serious complication of steroid injections like post-injection

exacerbation of pain and skin atrophy or necrosis at injection site. On the contrary, PRP injection is costly and difficult to make, as compared to steroid injection. However, a longer study with bigger sample size is needed to compare the effectiveness of PRP.

Conflict of interest: No Conflict of interest

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