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Comparison of steroid injection and platelet-rich plasma injection in the treatment of chronic lateral Epicondylitis

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Abstract

The aim of this study was to evaluate the therapeutic effect of corticosteroid injections and platelet-rich plasma (PRP) injections in the treatment of chronic lateral epicondylitis. The study group comprised of 60 patients divided into two equal groups. In the corticosteroid group (Group A; n=30), 2 ml of methylprednisolone (40 mg/ml) was injected along with 1 ml of 0.5% bupivacaine. In the PRP group (Group B; n=30), PRP was obtained from the patients' own blood and injected in a single dose. Results were calculated using pre-injection and post-injection Visual Analog Scale (VAS) and Disabilities for Arm, Shoulder and Hand (DASH) score. All patients enrolled in the study completed a 3 month follow-up. There were no complaints of any side-effects to the administered corticosteroid or platelet-rich plasma. No infection or any other complications were reported at the end of 3 months. On final follow-up, the outcome between the 2 groups was comparable in terms of VAS and DASH scores. This study concluded that PRP therapy proves to be more effective in relieving pain than corticosteroid injections in treatment of lateral epicondylitis.

Keywords: corticosteroid, growth factor, elbow pain, lateral epicondylitis, platelet-rich plasma, steroid

1. Introduction

Tennis elbow is the most common cause of elbow pain in orthopedic practice. It is most commonly seen in the age group of 40-50 years with a slight female sex preponderance. These patients usually are engaged in activities that involve repetitive extension movements at the wrist [1-4]. It is also known as lateral epicondylitis, however, inflammatory cells are not found in the affected tissue. This injury predominantly involves the origin of the short radial extensor muscle of the carpus, in which microtears develop as a result of excessive and abnormal use, with formation of immature repair tissue [5-7].

A typical patient complains of pain along the lateral epicondyle of the elbow that sometimes radiates along the entire lateral aspect of the forearm. Although it has been described as a self-limiting condition [8, 9] A large number of treatment options have been considered in treating tennis elbow including Non-steroidal anti-inflammatory drugs (NSAIDs), physiotherapy, ultrasonic therapy, stretching exercises, tennis elbow braces and customized support bands and Extracorporeal shock-wave lithotripsy (ESWL). Corticosteroid injections have also been used over the past. Recently, platelet-rich plasma (PRP) injections have also been used with promising results [10-12]

The purpose of this study was to evaluate the therapeutic effect of corticosteroid injections and platelet-rich plasma (PRP) injections in the treatment of chronic lateral epicondylitis.

2. Materials and Methods

The present retrospective study includes 60 consecutive patients diagnosed with chronic plantar fasciitis between December 2016 to September 2017. The diagnosis was done clinically by the same orthopedic team as characteristic pain lateral elbow pain with a positive Cozen's test lasting for more than a period of 6 months. All the patients had symptoms non-responsive or recurrence of symptoms following conservative and physical therapy.

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Patients with previous history of fracture or surgery on the affected elbow, those with previous history of steroid injections, infections or systemic diseases, arthritis, radiculopathy and patients on anti-platelet medication and oral steroids were excluded from the study. All patients were instructed to stop taking NSAIDs 3 weeks prior to procedure. Patients were randomly divided into two groups. The study was explained to every patient and informed consent was obtained from them prior to the procedure. Patients in Group A were administered steroids whereas in Group B were subjected to PRP therapy. The procedure was performed in the operative room under all sterile aseptic precautions. The patient was made to lie supine with the elbow flexed and hands lying over the patients abdomen. The injection site was cleaned with povidone iodine and normal saline.

In Group A, a 22-gauge needle connected to a 5cc syringe containing 2 ml of Methylprednisolone (40mg/ml) with 1 ml of 0.5% bupivacaine was prepared. The maximally tender spot on the lateral aspect of the elbow was identified by palpation. The preparation was injected and passive movements of the elbow was undertaken. Light dressing was applied.

In Group B, 30 ml of patients' blood was withdrawn and inserted into pre-packed PRP kits (Tricell) along with 5 ml of anticoagulant 10% sodium citrate. The PRP sample was prepared by a double centrifugation process. The first centrifuge was done at 3200 rpm for 4 mins. The cellular component was separated from the fluid component and a second centrifuge was then performed at 3300 rpm for 3 mins. Following this, approximately 3-4 ml was obtained. Injection was done with the same pepping technique.

After the procedure, all patients were advised to abstain from any rigorous or strainful activity with the affected limb for the first 48 hours and gradual return to activities after 1 week of the procedure. Ice fomentation on the injection site was encouraged.

Pre-procedure and on final follow-up, patients were assessed for their symptoms using Visual Analog Scale (VAS) and Disabilities of Arm, Shoulder and Hand (DASH) score. All variables of the DASH score were independently evaluated by an orthopedic junior resident. The researcher was blinded to the study purpose to avoid any bias in study treatment and/or failures.

3. Results

The present study included 60 patients equally divided into two groups. The mean age of patients in Group A was 43.16 years and in Group B was 44.44 years. Group A had 12 males and 18 females, whereas Group B comprised of 13 males and 17 females, comprising a total of 25 males (41.7%) and 35 females (58.3%). In Group A, the right elbow was affected in 20 patients whereas the left elbow was affected in 10 patients, whereas in Group B, the right elbow was involved in 17 patients and the left elbow was involved in 13 patients, comprising a total right elbow involvement in 37 patients (61.7%) and left elbow involvement in 23 patients (38.3%). Table 1 illustrates the demographic distribution of the patients in this study

At the end of 3 months follow-up, 5 patients from Group A and 1 patients from Group B were lost to follow-up. There were no complaints of any side-effects to the administered corticosteroid or platelet-rich plasma. No infection or any other complications were reported at the end of 3 months. Important fact to note that while all patients in Group B showed steady decline in symptoms, 5 patients from Group A

showed initial improvement in the first 4 weeks, and then later on the symptoms showed recurrence, however not as debilitating as in pre-procedure records.

Figures 1 and 2 compare the pre-procedure and post-procedure records of VAS and DASH scores.

Table 1: Demographic distribution of patients

Sr. No.	Group A (Corticosteroid)			Group B (Platelet-Rich Plasma)		
	Age (years)	Sex	Side affected	Age (years)	Sex	Side Affected
1	35	F	Right	29	F	Right
2	41	F	Left	44	M	Left
3	45	M	Right	47	F	Right
4	27	F	Right	28	M	Left
5	39	M	Right	48	F	Right
6	52	F	Left	38	M	Left
7	25	M	Right	40	F	Right
8	44	M	Right	44	M	Right
9	49	F	Right	48	F	Right
10	42	F	Right	31	M	Left
11	43	F	Left	42	F	Left
12	40	M	Right	46	M	Right
13	35	F	Left	45	M	Right
14	42	F	Right	45	F	Left
15	33	M	Right	45	F	Right
16	42	F	Left	48	F	Left
17	39	F	Right	42	M	Right
18	44	M	Right	40	F	Left
19	46	M	Left	39	F	Right
20	32	F	Right	51	M	Left
21	45	F	Left	45	M	Right
22	48	M	Right	50	F	Right
23	47	F	Left	45	M	Left
24	41	F	Left	49	F	Right
25	40	M	Right	42	M	Left
26	36	F	Right	55	F	Right
27	49	M	Right	34	F	Right
28	44	F	Left	43	M	Left
29	39	F	Right	51	F	Right
30	53	M	Right	45	F	Left

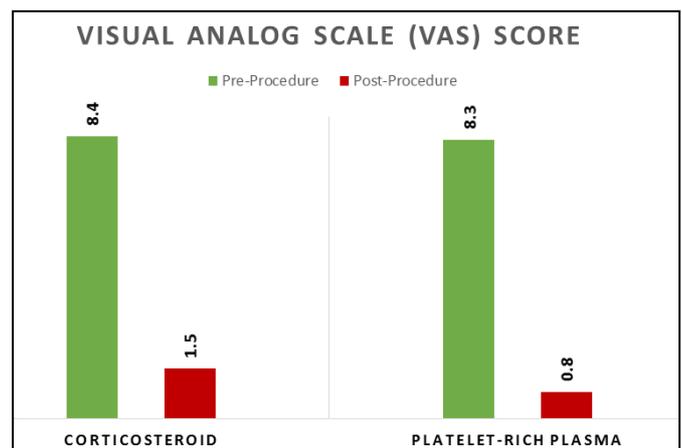


Fig 1: Comparison of pre-procedure and post-procedure VAS scores.

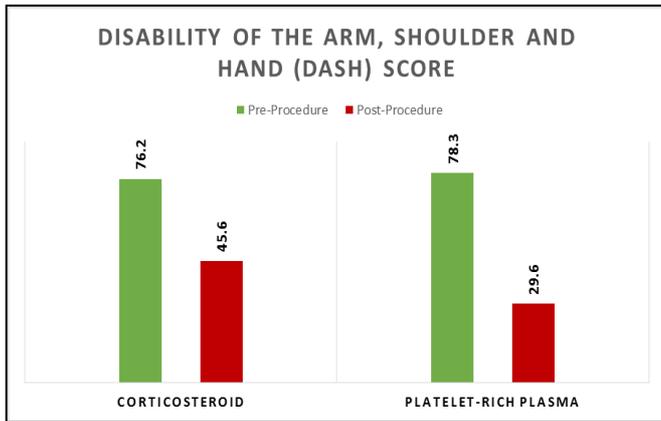


Fig 2: Comparison of pre-procedure and post-procedure Foot & Ankle Disability Index (FADI) scores.

4. Discussion

The present study aimed to compare the efficacy of corticosteroid versus platelet-rich plasma in treatment of chronic plantar fasciitis. In our study, we found significant differences between both groups relative to VAS, AOFAS and FADI scores before and 3 months after treatment.

The etiopathology of tennis elbow is debatable; histologic findings have suggested an etiology of degenerative changes, subsequent to repetitive micro-trauma due to overuse injuries causing subsequent micro-tears and degeneration. Nirschl *et al.* coined the term “Angiofibroblastic tendinosis” to describe this condition, as histological studies from the affected tissue reveals both an excess of fibroblasts and blood vessels that are consistent with neo- angiogenesis [13]. Recent studies by Ljung *et al.* showed sensory fibres containing substance-P and CGRP (calcitonin gene-related peptide) like immune reactivity in the origin of the ECRB, implying the possibility of neurogenic inflammation as a cause of the perceived pain [14].

Corticosteroid injections have been in use for a long time in treating chronic lateral epicondylitis. A study performed by by Smidt *et al.* showed early success with corticosteroid treatment in reduction of pain and grip strength [15]. These benefits did not persist and there was a high recurrence rate in the injection group. Similar results were also documented by Bisset *et al* in their study, where corticosteroid injection showed significantly better effects at six weeks but with high recurrence rates thereafter (47/65 of successes subsequently regressed) and significantly poorer outcomes in the long term compared with physiotherapy [16]. Coombes *et al.* reviewed 41 RCTs to assess efficacy and safety of corticosteroids and other injections in lateral epicondylopathy. They concluded that while corticosteroids were superior to other treatment methods in the short-term non-steroidal injections are of more benefit in the long term [17].

Platelet-rich plasma has been used to treat plantar fasciitis over the last decade. PRP, being rich in growth factors and platelets, has been hypothesized to help in healing of the plantar tissue [18-21] Evandro *et al.* performed a study on 60 patients diagnosed with chronic lateral epicondylitis treated with PRP having significant improvement in 81.7% of the patients [22]. Raeissadat *et al.* performed a study using PRP and AWB (autologous whole blood), both leading to significant improvement in pain, function and pain pressure threshold in patients with chronic lateral epicondylitis [23].

Muto *et al.* performed a study on the effect of PRP and corticosteroids on human rotator-cuff derived cells. In their study, they showed that while PRP and corticosteroids both

show a progressive decrease in inflammatory markers on target tissue, corticosteroids have shown to have an increase in degenerative markers in contrast to PRP which shows a decrease in the degenerative markers on the target tissue [24]. This may explain the predisposition of corticosteroids to rupture of the plantar fascia and also to recurrence of symptoms. Treatment with PRP has not known to have any significant long-term complications nor incidences of relapse or recurrences.

In our study, 5 patients from the corticosteroid group had given a history of recurrence of symptoms 4 weeks after the procedure. This could be consistent to the findings of Muto *et al*, with a subsequent increase in the degenerative markers and decrease in overall therapeutic effect.

Our study had a few limitations. First, we did not have a control group. Second, we did not use ultrasound guidance to administer the injections, hence we were not aware of the pre-procedure pathological tear dimension of the common extensor tendon. Hence, there were no definite guidelines to the dose of the steroid to be administered. Third, with the use of PRP, we did not measure the pre-centrifuge and post-centrifuge platelet concentration in any of the samples, hence no standard dose of administration could be quantified. And finally, our study had a short follow up period of 3 months. Hence, the long-term effects therapeutic effect as well as drawbacks of the therapy could not be studied. Another notifiable drawback of our study was the exclusion of patients previously treated with corticosteroids. It has been long argued whether patients refractory to corticosteroids can be treated with PRP injections, but such patients were excluded from our study.

5. Conclusion

Although limited by many factors, our study showed that corticosteroid and PRP both have significant therapeutic effect in treating chronic lateral epicondylitis, however PRP has been proven to be superior to corticosteroid. Our study design could be useful in larger clinical trials to determine the long-term potency and comparison amongst the 2 treatment modalities.

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