

Efficacy of platelet-rich plasma versus corticosteroid injection in treatment of lateral epicondylitis of elbow

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Abstract

Introduction: Lateral-epicondylitis, or tennis elbow, is a familiar term used to describe a variety of symptoms surrounding the lateral aspect of the elbow. Lateral epicondylitis is an inflammatory condition that arises at the origin of the common extensor tendon of the forearm at or below the lateral epicondyle. This is one of the most common chronic disabling conditions in the elbow. A variety of treatment options have been proposed for lateral epicondylitis like rest, activity modification, non-steroidal anti-inflammatory drugs, counterforce braces, massage, physiotherapy, laser treatment, extracorporeal shockwave treatment, acupuncture, ultrasound treatment, and botulinum toxin type A injection. Previously, the injection of corticosteroids was considered the reference treatment in lateral epicondylitis. Currently, Platelet-rich plasma (PRP) is considered an ideal autologous biological component derived from blood. **Materials and methods:** This was a prospective study of about 160 patients including 104 females and 56 males who were diagnosed with lateral epicondylitis for the period from October 2019 to October 2021 in the Department of Orthopaedics at a tertiary care teaching hospital. The purpose of this study was to compare the effectiveness of injecting platelet-rich plasma with injecting corticosteroids for treatment for lateral epicondylitis. **Results:** The comparative study of management of lateral epicondylitis with platelet-rich plasma vs corticosteroid injection shows that a single injection of platelet-rich plasma improves elbow pain and functional activities more efficiently than injecting corticosteroids into the lateral epicondylitis. These improvements were maintained over in our follow-up period without any significant complications.

Keywords: Corticosteroid, Lateral epicondylitis, PRP, Tennis elbow.

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Introduction

Lateral-epicondylitis, or tennis elbow, is a familiar term used to describe a variety of symptoms surrounding the lateral aspect of the elbow. Lateral epicondylitis is an inflammatory condition that arises at the origin of the common extensor tendon of the forearm at or below the lateral epicondyle. This is one of the most common chronic disabling conditions in the elbow. Symptoms occur within 1% to 3% of the general population. It is common in people whose profession requires frequent rotary movements of the forearm as a carpenter, gardener, computer specialist, and knitters. Most common age of onset is 35 to 50 years with an equal male-female ratio. The dominant upper extremity is usually affected[1,2,3].

There is no proper understanding regarding the real cause of lateral epicondylitis. Now, the degenerative process is considered to occur at or below the root of the common extensor tendon of the wrist and fingers because of overuse and abnormal microvascular responses[4,5,6]. Nirschl found that the fundamental pathology responsible was in the origin of the extensor carpi radialis brevis (ECRB) tendon. However, sometimes the anteromedial edge of the extensor digitorum communis (EDC) and the inner surface of the extensor carpi radialis longus (ECRL) can also be involved[4,5].

A variety of treatment options have been proposed for lateral epicondylitis like rest, activity modification, non-steroidal anti-inflammatory drugs, counterforce braces, massage, physiotherapy, laser treatment, extracorporeal shockwave treatment, acupuncture, ultrasound treatment, and botulinum toxin type A injection.

Previously, the injection of corticosteroids was considered the reference treatment in lateral epicondylitis. Autologous blood injection, a variety of open and arthroscopic surgical management are also recommended for lateral epicondylitis[7,8,9,10,11]. Currently, Platelet-rich plasma (PRP) is considered an ideal autologous biological component derived from blood. It can be injected into different tissues, where the platelets get activated and release high levels of transforming growth factor-beta (TGF- β), platelet-derived growth factors (PDGF), fibroblast growth factors (FGF), vascular endothelial growth factors (VEGF), and the cytokines at the injected site. These growth factors liberated by platelet-rich plasma promote the healing of wounds, tendons, and bones at the cellular level[12]. Platelet-rich plasma also has high antimicrobial power[13]. The above details oblige us to carry out this study.

Materials and methods

This was a prospective study of about 160 patients including 104 females and 56 males who were diagnosed with lateral epicondylitis for the period from October 2019 to October 2021 in the Department of Orthopaedics at a tertiary care teaching hospital.

We have included the patients above the age of 18 years and the patients with pain reproduced by the resisted wrist and/or middle finger extension and tenderness over the lateral epicondyle. We have excluded the patients with bilateral elbow pain, symptoms of radio-ulnar joint osteoarthritis, symptoms of cervical radiculopathy, chronic inflammatory diseases like rheumatoid arthritis, uncontrolled diabetes, patients on anticoagulation therapy, patients with ulcers over the elbow, patients who received steroid injections within the last three months, patients with tumours in the upper arm.

Drugs used for our study – a) 2 ml autologous platelet-rich plasma versus b) 2 ml methyl prednisolone (40mg/ml). Instruments used for

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our study - Syringes, Vacutainers with 3.8 % sodium citrate, Centrifuge.

PRP preparation

The patient was placed in a convenient and comfortable position that permits sterile access to the injection site. At first, 28 ml of blood was collected from patient's contralateral upper extremity vein under

aseptic conditions into 4 vacutainers (blue) containing 3.8% sodium citrate solution. These 4 vacutainers were subjected to a 1st spin in a centrifuge at a speed of 2500 RPM for 10 minutes (Fig 1). Supernatant plasma was collected from all these vacutainers and transferred to a fresh vacutainer. This plasma was subjected to 2nd spin at a speed of 3500 RPM for 15 minutes (Fig 2). Now the platelet-rich plasma was collected[14].



Fig. 1: PRP after first spin



Fig. 2: PRP after second spin

The purpose of this study was to compare the effectiveness of injecting platelet-rich plasma with injecting corticosteroids for treatment for lateral epicondylitis

• Outcome measures

The Patient's clinical outcome was measured by using two self-report questionnaires at each review period. The severity of the lateral epicondylitis was assessed before the administration of injection with the help of visual analog scale [VAS][15] and Mayo elbow performance score [MEPS][16]. After the administration of either PRP or corticosteroid injection, follow-up on the outcome of the condition was done at 4, 8, 12 and 24 weeks will be done using the

same VAS and MEPS, which were analyzed with the help of predesigned proforma. As the patients may have discomfort at the injection site for up to 3 days, they were advised to have ice application over the injection site, limb elevation, activity modification, and oral acetaminophen for pain relief.

Results

In this study, there were 104 females with 72 right sided and 32 left sided lateral epicondylitis and 56 males with 44 right sided and 12 left sided lateral epicondylitis (Chart 1,2). The mean age was 44.3 years (chart 3).

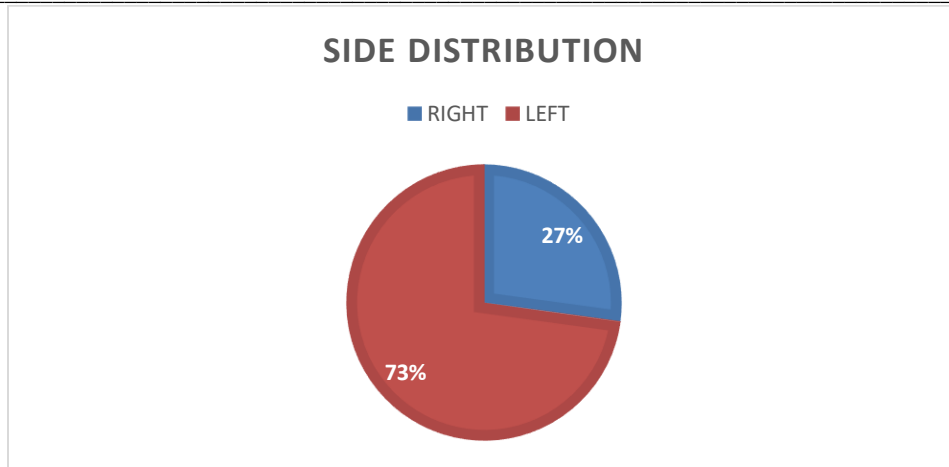


Fig. 3 Side Distribution

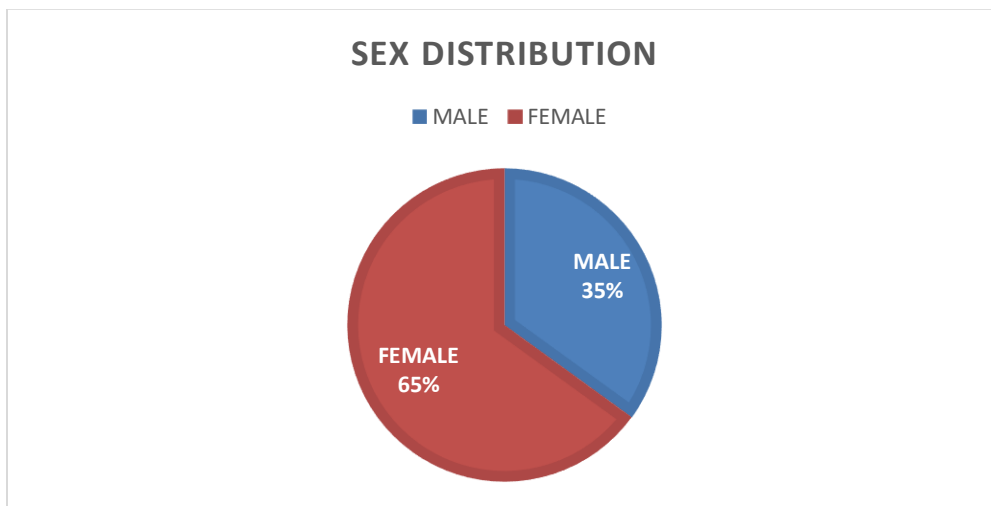


Fig.4: Sex Distribution

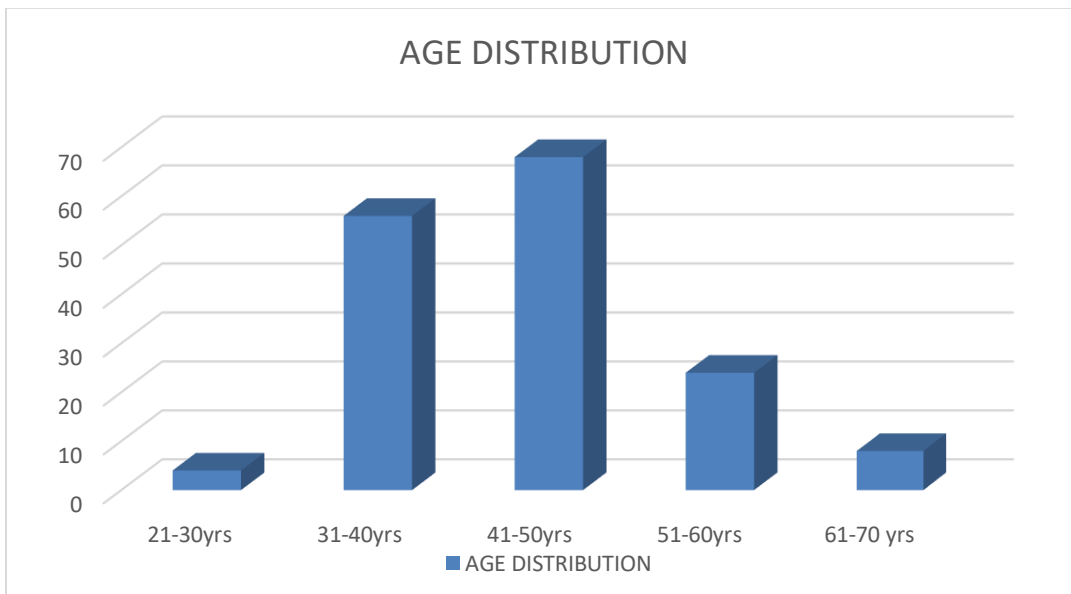


Fig. 5: Age Distribution

The mean duration of symptoms was 4.8 months. The mean visual analog scale (VAS) and Mayo elbow performance score (MEPS) was assessed in either groups prior to injection, 4, 8, 12, 24 weeks post injection and were compared. Visual Analog Scale (VAS) in corticosteroid group decreases at four and eight weeks and increases by the end of 24 weeks comparative to the platelet-rich plasma group. P-value < 0.001 indicates that the decrease in VAS score is statistically significant in the PRP group (Chart 4). Mayo Elbow Performance Score (MEPS) in the corticosteroid group increased at the fourth week and decreased slightly by the end of the twenty-four week comparative to the platelet-rich plasma group (Chart 5). P-value <0.003 indicates that increase in MEPS score is statistically significant in the PRP group. From the above curves, it is clear that

the steroid group had a steep curve than the PRP group indicating the faster relief of pain initially. But by the end of the 24 weeks follow up the steroid group shows a flat curve pattern whereas the platelet-rich plasma group shows a falling curve pattern. In this study, the visual analog scale (vas) score in the platelet-rich plasma group is decreased by 35.9 at 24 weeks when compared to the pre-injection score, whereas the visual analog scale (vas) score in the steroid group is decreased by 27.7 at 24 weeks when compared to the pre-injection score. P-value < 0.001 which is statistically significant. The mayo elbow performance score in the PRP group is increased by 43.1 at 24 weeks compared to the pre-injection score, whereas the mayo elbow performance score is increased by 36.25 at 24 weeks compared to the pre-injection score. P-value < 0.003 significant.

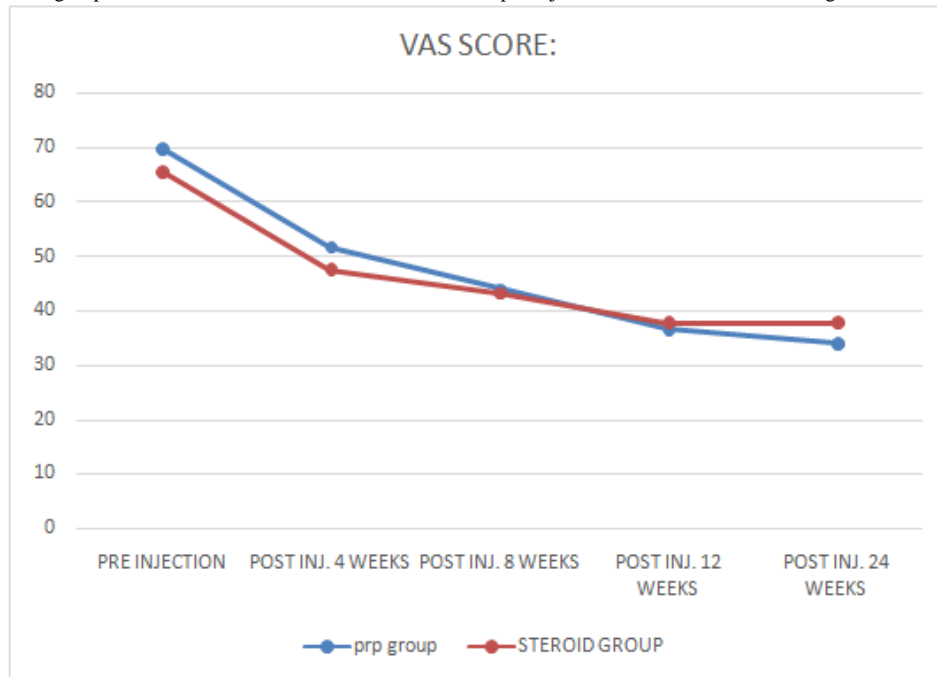


Fig. 6: VAS Score

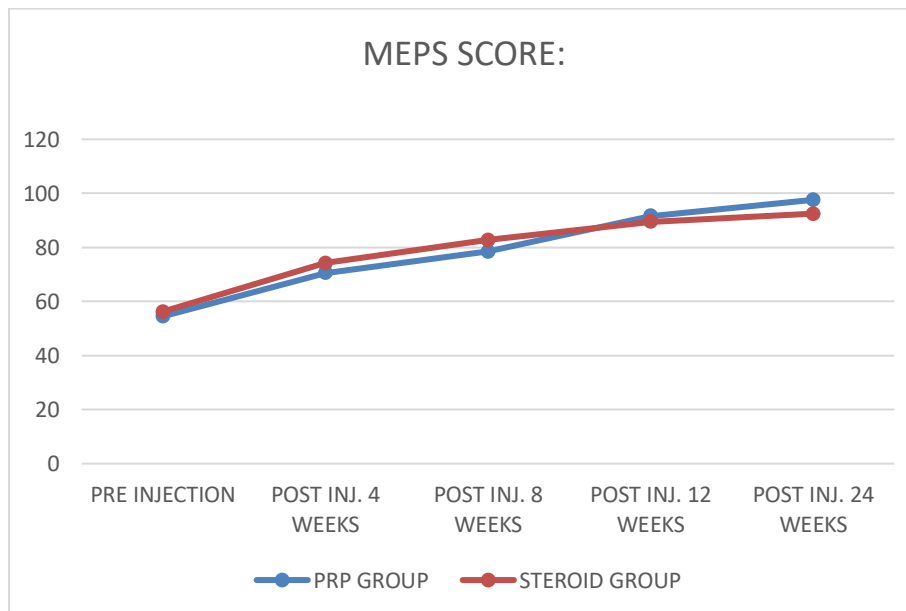


Fig.7: MEPS Score

Discussion

There are a few studies regarding the benefits of platelet-rich plasma injection over corticosteroid injection therapy for lateral epicondylitis. The main outcome parameters considered were pain and functional activities of the elbow. There is currently no long-term follow-up data on the efficacy of platelet-rich plasma. This study shows six months follow-up results using the same outcome parameters. In this study the VAS score among the platelet-rich plasma group has declined from the pre-injection score of 69.9 to 51.75 at 4 weeks, 44 at 8 weeks, 36.7 at 12 weeks, and 34 at 24 weeks which is almost similar to the study by Gosen et al March 2011, where the pre-injection VAS score of 69.0 declines to 55.7 at 4 weeks, 45.1 at 8 weeks and 40.2 at 12 weeks. In this study, the VAS score among the steroid group declines from 65.5 of pre-injection score to 47.6 at 4 weeks, 43.25 at 8 weeks, 37.8 at 12 weeks, and 37.8 at 24 weeks, whereas in the study by Gosen et al March 2011, the decline of VAS scores from the pre-injection score of 66.2 to 44.3 at 4 weeks and 38.5 at 12 weeks. Mishra et al evaluated the treatment of chronic severe elbow tendinosis with PRP. Eight weeks after treatment, patients with PRP noted a 60% improvement in their VAS scores compared to a 16% improvement in controls[17], which is comparable to our study. Peerbooms et al 2010, in a randomized trial in tennis elbow treated with platelet-rich plasma versus steroid injection: The study concluded that, according to the visual analog scale scores, 24 out of the 49 subjects (49%) in the steroid group and 37 out of the 51 subjects (73%) in the platelet-rich plasma group was treated successfully, which was significantly different. According to the Disabilities of the Arm, Shoulder, and Hand scores, 25 out of the 49 subjects (51%) in the steroid group and 37 out of the 51 subjects (73%) in the platelet-rich plasma group was treated successfully, which was also significantly different. The steroid injection group showed better results in the early period and then declined after 12 weeks, whereas the platelet-rich plasma group progressively improved which is comparable to our study[18]. Taco Gosens et al. conducted a study in which the effectiveness of PRP and corticosteroid for lateral epicondylitis was assessed in 100 patients using VAS and DASH scores. Regarding VAS scores significant difference was noted at 4 weeks supporting steroid group and 56 at 26 and 52 weeks supporting PRP group which is in agreement with the result of our study[19]. Omar AS et al. conducted a study in which PRP was compared to steroids in 30 patients with lateral humeral epicondylitis. Both VAS and DASH scores improved significantly in both groups after six weeks of treatment. Although no meaningful differences were observed between the two groups at six weeks, this is consistent with our study[20].

By comparing the results prescribed in this study to the results of the six-month follow-up, the result for the corticosteroid group is decreased whereas the outcome in the platelet-rich plasma group is maintained. A significant finding is that the platelet-rich plasma group had worse pre-injection VAS scores and better after 24 weeks. This strengthens our conclusion that platelet-rich plasma injection is better than corticosteroid injection. In this study out of 160 patients, four patients didn't return for follow-up in the platelet-rich plasma group and the post-procedure complication is negligible except for one patient who presented with paraesthesia at the steroid injection site which resolved at the twelfth week.

Conclusion

In conclusion, the comparative study of management of lateral epicondylitis with platelet-rich plasma vs corticosteroid injection shows that a single injection of platelet-rich plasma improves elbow pain and functional activities more efficiently than injecting corticosteroids into the lateral epicondylitis. These improvements were maintained over in our follow-up period without any significant complications. Corticosteroid gives better results up to the eighth week and after that, the effect decreased slightly. Long-term follow-up with more patients is needed to evaluate the lasting benefits of pain relief and functional improvement in lateral epicondylitis.

Limitations

- Uniform administration of PRP and corticosteroids in alternative patients without proper randomisation.
- Small sample size.
- The concentration of platelets in PRP has not been assessed.
- Free hand injection technique has been used.

Recommendations for further studies

- Proper randomisation of the patient groups.
- Use of large sample size.
- Increase of follow-up period.
- Use of ultrasound guided injection technique for accurate location of tendon injury.
- Assessment of concentration of platelets in PRP.

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