

A Retrospective Study Of Role Of Platelet Rich Plasma (PRP) Injection In Treatment Of Tennis Elbow

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ABSTRACT:

BACKGROUND:

Lateral epicondylitis, also known as 'tennis elbow' is a degenerative disorder of the common extensor origin of lateral epicondyle of humerus, first described by Runge in 1883. The annual prevalence of lateral epicondylitis is reported between 1 to 3 % among normal non-athlete population. The mainstay of treatment is non-operative and includes rest, activity or equipment modification, non-steroidal anti-inflammatory medications, bracing, and physical therapy like extracorporeal shock wave therapy. However, these traditional therapies do not alter the tendon's inherent poor healing properties secondary to poor vascularization. Platelet rich plasma has been recently the emerging biological therapy in which a large pool of signals released from platelets producing an instructional biological microenvironment for local and migrating cells for tissue regeneration.

MATERIALS AND METHODS:

This was a retrospective study undertaken in a tertiary care hospital. 30 patients (18 females, 12 males) with chronic lateral epicondylar tendinopathy treated with 3 doses of platelet rich plasma injection therapy during the period of December 2020 to April 2022 were included in the study after obtaining permission from institutional research board.

RESULTS:

All 30 patients (18 females and 12 males) were assessed on the basis of visual analogue scale (vas), tenderness, patient rated tennis elbow evaluation (prtee) score, and quick dash (disability of arm, shoulder, hand) score. At the end of mean follow up period of 10 months mean VAS score decreased to 97.34%, mean PRTEE score for pain subscale decreased to 95.22%, mean PRTEE score for functional subscale decreased to 94.39% and mean Quick DASH score decreased to 71.85% from the pre injection values. 99% patient had complete resolution of symptoms at the end of 6 months, only one patient had recurrence of symptoms. None of the patient had complications like infection or skin atrophy.

CONCLUSION:

Finding of this study shows that platelet rich plasma (PRP) injection is an effective modality of treatment in chronic lateral epicondylar tendinopathy offers better results in term of pain relief and complete remission.

KEYWORD:

Platelet rich plasma, tennis elbow, patient rated tennis elbow evaluation (prtee), visual analogue scale (vas), quick dash (disability of arm and shoulder) score

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I. INTRODUCTION

Lateral epicondylitis, also known as 'tennis elbow' is a degenerative disorder of the common extensor origin of lateral epicondyle of humerus, first described by Runge in 1883^[1]. The annual prevalence of lateral epicondylitis is reported between 1 to 3 % among normal non-athlete population^[2]. The name is misleading

because most patients are not active tennis players. The lateral epicondyle of humerus is the common origin of five extensor muscles in the forearm and the suggested pathogenesis is of overload injury and repetitive microtrauma^[3]. Rather than being a purely inflammatory condition it is suggested that there is an initial inflammatory response which is followed by degenerative changes with production of disorganised collagen which can then lead to structural failure or tearing of the tendon origin^[4]. Lateral epicondyle demonstrates Angio fibroblastic hyperplasia at the extensor origin of the forearm^[5]. The mainstay of treatment is non-operative and includes rest, activity or equipment modification, non-steroidal anti-inflammatory medications, bracing, and physical therapy like extracorporeal shock wave therapy^[3]. However, these traditional therapies do not alter the tendon's inherent poor healing properties secondary to poor vascularization^[6,7]. If these treatments fail to improve the pain, second line treatments such as cortisone injections, prolotherapy, autologous blood injections, platelet rich plasma [PRP] injections, and needling of the extensor tendon origin have been recommended^[3]. If patient continue to report pain and dysfunction despite these measures, surgery is then considered. Surgical options include open tendon debridement and repair, percutaneous or open tendon release, and arthroscopic debridement^[8].

Platelet rich plasma has been recently the emerging biological therapy in which a large pool of signals released from platelets producing an instructional biological microenvironment for local and migrating cells for tissue regeneration. PRP modulate inflammation and angiogenesis largely because of their ability to secrete high level of growth factors and chemokines^[9]. PRP may have a slightly more beneficial effect than autologous whole blood due to 3 to 5 times higher concentration of platelets in PRP than whole blood^[10].

The aim and objectives of our study is to evaluate the efficacy and to assess clinical and functional outcomes of platelet rich plasma injection therapy in patients with tennis elbow on the basis of visual analogue scale (vas), tenderness, patient rated tennis elbow evaluation (prtee) score, and quick dash (disability of arm, shoulder, hand) score.

II. MATERIAL AND METHOD

This was a retrospective study undertaken in a tertiary care hospital. 30 patients (18 females, 12 males) with chronic lateral epicondylar tendinopathy treated with 3 doses of platelet rich plasma injection therapy during the period of December 2020 to April 2022 were included in the study after obtaining permission from institutional research board. Data of the study retrieved digitally from hospital information system and from the case record form of the patients came to outpatient department for follow up consultation.

Inclusion criteria:

- Patients who have been given 3 doses of PRP injection
- Age >18 years
- Positive cozen or mills test for tennis elbow
- History of elbow pain for at least 3 months
- Pain unresponsive to conservative treatment

Exclusion criteria:

- Pregnant or lactating women
- Patients with uncontrolled diabetes mellitus
- Systemic autoimmune disease
- Blood disorders like anaemia, thrombopathy, thrombocytopenia
- Patients receiving immunosuppressive treatment
- Local steroid injection within 3 months or a oral corticosteroid treatment within 15 days
- Patients unable to comply with scheduled visits
- Other causes of elbow pain like arthritis or trauma

PRP Preparation:

Approximately 30 ml of whole blood was drawn from cubital vein of unaffected upper limb of patient by phlebotomist. 27 ml blood was transferred into 3 ml acid citrate dextrose (ACD) containing sterile test tube. Rest 3 ml blood was sent for complete blood count. Sample was sent to pathology department. Sample was processed through two staged centrifugation cycle. In 1st stage sample was centrifuged at 1500 rotation per minute for 15 minutes. Supernatant plasma was then transferred to another sterile test tube without containing any anticoagulant. This test tube was centrifuged at 3500 rotation per minute for 15 minutes. Lower 1/3rd of test tube contains platelet rich plasma and upper 2/3rd platelet poor plasma. At the bottom of the tube platelet pellets were formed. platelet pellets were suspended in a minimum quantity of leucocyte rich plasma after removing platelet poor plasma and then the tube was gently shaken. The platelet count was checked and samples with

platelet count 3 to 5 times more from its baseline were accepted. This leucocyte rich platelet rich plasma was injected within 4 hours of preparation.



Figure no. 1: Preparation of leucocyte rich platelet rich plasma

PRP infiltration:

Patient in supine position the bony anatomical landmarks were identified. The elbow was flexed to 90 degrees with the palm facing downward. Under proper aseptic precautions 1.5-2 ml L-PRP infiltrated using peppering technique (inserting the needle into the tendon, injecting some of the L-PRP, withdrawing without emerging from the skin, slightly redirecting and reinserting) with 22G needle over maximum point of tenderness (usually origin of extensor carpi radialis brevis).

Post procedure protocol:

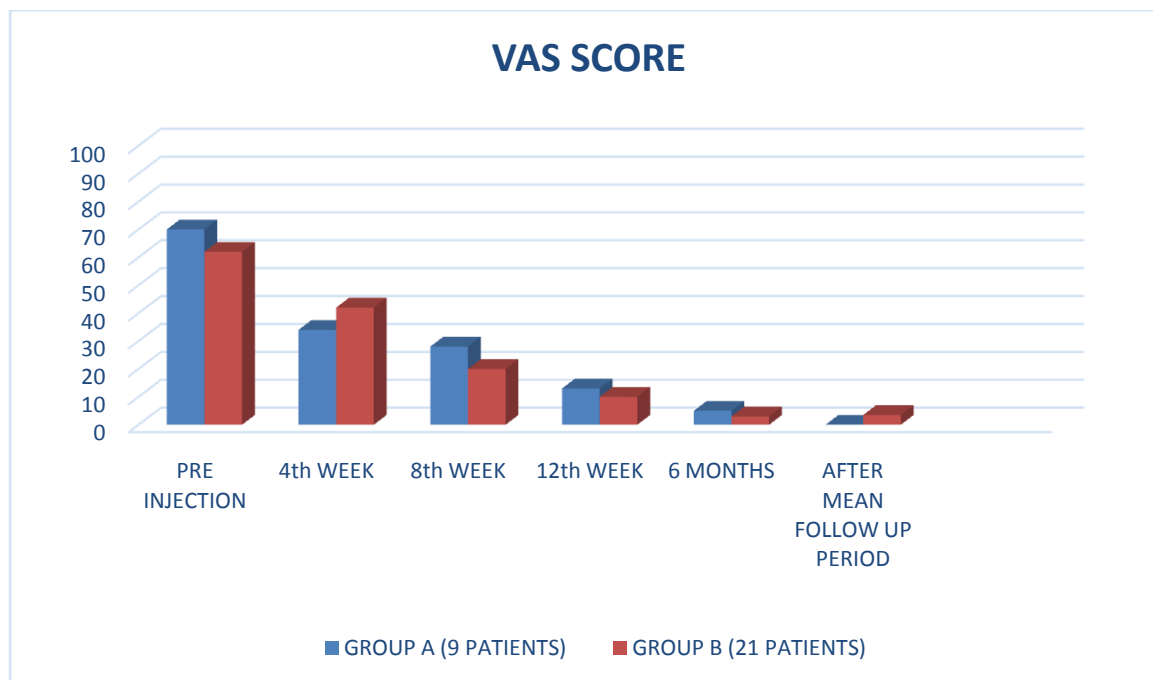
PRP injection promotes local inflammation, so patients were explained about local injection site pain and treated with ice application and opioid analgesics (oral tramadol). Patients were also prescribed oral cefixime 200 mg twice daily for 3 days to avoid infection. Anti-inflammatory drugs (NSAIDs) were avoided because of adverse effect of it on platelet concentration. Tennis elbow brace was given and patients were encouraged to return to work and for physiotherapy as soon as pain relieved.

In our study patients were given 3 PRP injection at the interval of 1 month after each injection. All the patients were followed up at 1 month, 2 months, 3 months, 6 months and 12 months. At every follow up patients were evaluated on the basis of visual analogue scale (vas), tenderness, patient rated tennis elbow evaluation (prtee) score, and quick dash (disability of arm, shoulder, hand) score.

III. RESULT

30 patients [female-18, male-12] with chronic lateral epicondylar tendinopathy and have received 3 doses of platelet rich plasma (PRP) injection were included as study sample. Mean age for male was 40 years and for female was 38 years. Out of 18 females 2 female developed symptoms of lateral epicondylar tendinopathy during post-partum period, 2 females had diabetes and 3 females had hypothyroidism. Out of 12 males 3 males had diabetes. All diabetics patients among males and females were on oral hypoglycaemics agents and their average HBA1C value was 6.5%. Right elbow (66.66%) was more affected than left elbow (33.34%). Average duration of symptoms was 3 to 5 months. All the patients were given 3 doses of platelet rich plasma (PRP) injection at the interval of 1 month after each dose and followed up at 1 month, 2 months, 3 months, 6 months and 12 months. Average follow up period was 8 to 15 months with mean follow up period was 10 months. All the patients were assessed on the basis of visual analogue scale (vas), tenderness, patient rated tennis elbow evaluation (prtee) score, and quick dash (disability of arm, shoulder, hand) score.

According to improvement in VAS score patients were divided into two groups. Group A contains 9 patients (30%), who were active young patients without any comorbidities, had 51.42% reduction in VAS score after 1st injection, 60% reduction in VAS score after 2nd injection and 81.42% reduction in VAS score after 3rd injection. Group B contains 21 patients (70%), who were old aged, manual labours, and patients with comorbidities had 32.25% reduction in VAS score after 1st injection, 67.74% reduction in VAS score after 2nd injection and 83.87% reduction in VAS score after 3rd injection. At the end of 6 months mean VAS score reduced to 93.93% from pre injection value. 1 patient working as a labour from group B had recurrence of pain after 6th month so, mean VAS score of group A at the end of mean follow up period of 10 month was 0 and mean VAS score of group B was 3.5.



Graph no. 1: VAS Score

Table No. 1: Demography

SEX	MALE 12 (40%)	FEMALE 18 (60%)
MEAN AGE:	40 YEARS	38 YEARS
SITE:		
RIGHT	8 (66.66%)	12 (66.66%)
LEFT	4 (33.34%)	6 (33.34%)
COMORBIDITIES:		
DIABETES	3 (25%)	2 (11.11%)
HYPOTHYROIDISM	-	3 (16.66%)
POST PARTUM	-	2 (11.11%)

Table No. 2: Evaluation of result

	PRE-INJECTION	AT 1 MONTH	AT 2 MONTHS	AT 3 MONTHS	AT 6 MONTHS	AFTER MEAN FOLLOW UP PERIOD OF 10 MONTHS
MEAN VAS SCORE	66	38	24	11.50	4	1.75
MEAN PRTEE SCORE	68.33	59.33	45.92	27.19	10.92	3.62
PAIN SUBSCALE	25.13	21.80	16.73	9.93	3.06	1.20
FUNCTIONAL SUBSCALE						
SPECIFIC ACTIVITIES	20.40	17.73	13.93	8.40	3.80	1.26
USUAL ACTIVITIES	22.80	19.80	15.26	8.86	4.06	1.16
MEAN QUICK DASH SCORE	37.87	32.95	27.65	22.34	16.66	10.66

At the end of mean follow up period of 10 months mean VAS score decreased to 97.34%, mean PRTEE score for pain subscale decreased to 95.22%, mean PRTEE score for functional subscale decreased to 94.39% and mean Quick DASH score decreased to 71.85% from the pre injection values.

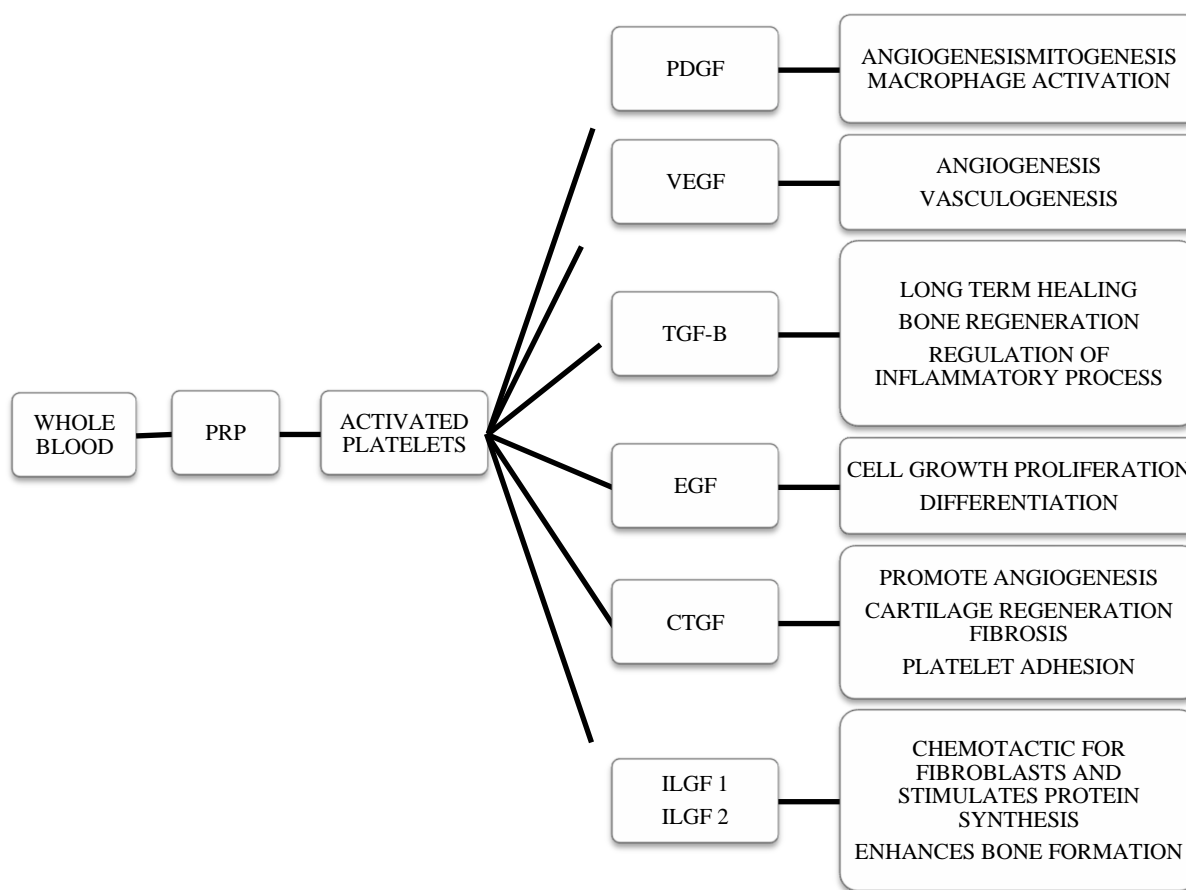
99% patient had complete resolution of symptoms at the end of 6 months, only one patient had recurrence of symptoms. None of the patient had complications like infection or skin atrophy.

In our study mean concentration of platelet in CBC was $234.45 \times 10^3/\text{ul}$ and in platelet rich plasma (PRP) was $1008.13 \times 10^3/\text{ul}$. At least 4 to 5 times higher than mean concentration of platelet in CBC.

IV. DISCUSSION

Chronic lateral epicondylar tendinopathy, also known as tennis elbow, is a common problem seen by physicians and orthopaedic surgeons. It is often self-limiting or responsive to non-operative measures such as rest, anti-inflammatory medications, physical therapy and activity modification. In tennis elbow cause of functional disability of common extensor tendon is due to decrease the collagen synthesis during one of the stages of cellular response to injury (haemostasis, inflammation, proliferation, remodelling) with changes of repair tissue from cellular to fibrous. There is a gradual change from fibrous tissue to scar like tendon tissue that interferes with the normal function of muscles originating from common extensor tendon causing impaired grip and restricted daily activity^[11]. Other treatment modalities for tennis elbow includes cortisone injections which have demonstrated short term pain improvement but high rates of symptom recurrence^[12,13]. Dexamethasone inhibits tenocyte proliferation and tendon progenitor cell recruitment with reduced collagen synthesis^[14]. It also depletes the pool of human tendon stem cells, suppresses type I collagen and enhances fatty and cartilage like tissue changes that can lead to tendon ruptures^[15]. It can also result in dermal depigmentation and causes subcutaneous atrophy that may exacerbate local elbow tenderness. An alternative injection treatment options has arisen like autologous blood, botulinum toxin, polidocanol prolotherapy, hyaluronic acid and platelet rich plasma (PRP) injections because of the limited data supporting cortisone^[16]. Botulinum toxin A works by blocking acetyl choline receptor causing temporary paralysis within the muscle. This reversible paralysis stops further microtrauma and give the tendon time to heal. There are some complications to its use like weakness to wrist extensors and decreased grip strength^[4].

Platelet rich plasma is a volume of plasma fraction of autologous blood having platelet concentrations above baseline. Platelets contains growth factors such as; platelet derived growth factors (PDGF), transforming growth factor (TGF) B, insulin like growth factor (IGF), epidermal growth factor (EGF), vascular endothelial growth factor (VEGF), and fibroblast growth factor (FGF)^[17]. These factors are released from the alpha granules after injury and bind to target cells like mesenchymal stem cells, osteoblasts, fibroblasts, endothelial cells, and epidermal cells. These receptors activate an intracellular signal protein that causes expression of a gene sequence that then directs cellular proliferation, matrix formation, osteoid production or collagen synthesis dependent on the cells activated^[18]. In lateral epicondylitis platelet rich plasma (PRP) injection would increase collagen production and cell viability and stimulate angiogenesis due to the release of the above-mentioned factors^[19]. In our study we have used leucocyte rich platelet rich plasma (L-PRP). It has been hypothesized that the leucocyte in L-PRP create an antibacterial response and debride the dead tissue allowing the tendon to regenerate using the above-mentioned growth factors^[20]. Platelet rich plasma (PRP) has the potential to inhibit inflammation, apoptosis, and metalloproteinase activity. This results in restoration of soft tissue and structural component which can withstand stress and strain and causes reduction in pain^[21].



Flowchartno. 1:Mechanism of action of platelet rich plasma in tendinopathy

V. CONCLUSION

Finding of this study shows that platelet rich plasma (PRP) injection is an effective modality of treatment in chronic lateral epicondylar tendinopathy offers better results in term of pain relief and complete remission. It is simple, minimally invasive technique, easy to carry out as outpatient procedure, it has low immune mediated reaction risk, devoid of complications like skin atrophy, tendon tear and has low recurrence rate.

LIMITATION OF STUDY

As this is a retrospective study sampling error occurs because of selection bias and small sample size. Short period of follow up is also a limiting factor for this study.

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