



PRP Vs AUTOLOGOUS BLOOD LOCAL ADMINISTRATION FOR TENNIS ELBOW, THE BETTER OPTION

Dr. Korada Anudeep Kumar Ms¹, Dr. N V Ramesh Kumar Ms², Dr. Goli Ganesh Ms³, Dr. R Shahnawaz Hussain Ms^{4*}

¹Orthopedics mail id – anudeep.kumar4@gmail.com, Asst Prof Dept of Orthopedics, Gsl Medical College

²Orthopedics, mail id – ramesh1508051@gmail.com, Asst Prof Dept of Orthopedics Gsl Medical College

³Orthopedics, Asst prof NRI Medical College Visakhapatnam, mail id – ganesh1508026@gmail.com

⁴Orthopedics, mail id – rajavalishan@gmail.com, Asst prof Dept of Orthopedics, Gsl Medical college

*Corresponding Author: Dr. R Shahnawaz Hussain MS

*Orthopedics, mail id – rajavalishan@gmail.com, Asst prof Dept of Orthopedics, Gsl Medical college

KEYWORDS

PRP(platelet rich plasma), autologous blood, local injection, tennis elbow, lateral epicondylitis.

ABSTRACT:

Introduction – Through the course of history tennis elbow has been with us and the treatment modality has also altered accordingly with time, usually affecting 1-3% of adult population[1] and more commonly affecting the dominant arm. Tennis elbow or lateral epicondylitis is a common musculoskeletal disorder of extensor origin at lateral humeral epicondyle. Typically repetitive occupational and athletic activities may incite the disease[2]. A study in 2019[1] enlists different treatment modalities such as activity modification, physical therapy, injections and very small percentage of population requiring surgical intervention – release of *extensor carpi radialis brevis* tendon either through percutaneous, arthroscopic or open approach.

The treatment option entailing local administration of chemical agents at lateral epicondyle to alleviate pain and hopefully to start healing is a topic of controversy as to what is to be given steroid or PRP. Steroid provide immediate pain relief but the effects are short term only[3], PRP injection locally according to current literature is a safe and effective way to reduce symptoms and reducing the need for surgical intervention[4]. The current literature is sparse regarding the role of autologous blood injection locally to enhance healing and decrease symptoms and need for surgical intervention. Though studies have shown its efficacy in short and mid term scenarios and that too for chronic, resistant or recalcitrant cases of lateral epicondylitis[5–9]

The objective of the current study is to assess the effectiveness of PRP vs autologous blood injected locally at lateral epicondyle through assessing the functional outcome.

Materials and methods – It's a prospective study spanning over 2 years, number of patients included in the study 72, study was conducted in a tertiary care hospital. Inclusion criteria – age 18 to 65 years, including both genders, patient with no pain relief after 3 months of conservative treatment. Exclusion criteria – pain less than 3 months duration, patients who had local steroid injection less than 2 months ago, infection at the injection site, pregnant ladies and patients without any trial of conservative treatment.

Patients were divided randomly into 2 groups, 38 injected with PRP and 34 injected with autologous whole blood, patients were assessed at 2nd, 3rd and 6th month post injection and functional outcome was evaluated using VAS score(Patient related tennis elbow evaluation)[10] and VAS(Visual analogue scale) score[11].

Results – At the end of 6 months of follow up period the PRTEE(Patient related tennis elbow evaluation) score mean was dropped from 82.41 pre injection to 22.43 and VAS score mean 8.61 to 0.84; however in autologous whole blood injection group PRTEE (Patient related tennis elbow evaluation)score did not change significantly 82.4 to 49.46 and VAS score 8.76 to 3.85 at 6 months of follow up period.

Conclusion – PRP therapy showed statistically significant improvement in healing of the chronic tennis elbow in long term, when compared to autologous blood group. Thus autologous blood injection is not a viable option for substituting PRP injection.



INTRODUCTION –

The Tennis Elbow, first described by Runge in 1873, is a condition associated with the late back hand and forced wrist extension, often seen in regular tennis players. It has been referred to by various names, including tendinosis, lateral epicondylitis, and Angio fibroblastic hyperplasia[1]. Tendonitis and epicondylitis are misnomers for inflammatory processes. Angio fibroblastic hyperplasia, a histological condition characterized by dense fibroblast populations, vascular hyperplasia, and disorganized collagen, is believed to occur in tendon damaged by repetitive micro trauma. The pain in tennis elbow is unclear, but some patients experience intense pain. Tendons involved in locomotion and ballistic performance, those with poor blood supply, and those straddling two joints are more susceptible to damage. Muscles within the forearm also fit into this category[1].

Differential diagnosis of lateral epicondylitis consists of tenosynovitis, radial tunnel syndrome, and persistent wrist pain. Differentiating between these circumstances might be challenging. The boundaries between tennis elbow and posterior interosseous nerve (PIN) compression are not clearly defined in the literature. There are different investigative and treatment modalities for tennis elbow, lateral epicondylitis is mainly diagnosed clinically Plain anteroposterior and lateral radiographs are useful for assessing bone diseases like osteochondritis dissecans, arthropathy, and loose bodies. In cases of long-standing leukemia, calcifications of ECRB insertion can be seen. Ultrasound is a valuable tool for diagnosing or ruled out lateral epicondylitis, detecting structural changes affecting tendons, bone irregularities, and calcific deposits. Neo-vascularization can be assessed using color Doppler exploration. Magnetic resonance imaging (MRI) is more reproducible and provides more information about intra-articular pathology, but its findings are not well correlated with clinical symptoms and are expensive. CT arthrography is more accurate than MRI for diagnosing capsular tears[12].

The treatment modalities include – local steroid injection, PRP injection, botulinum toxin A injection[13], Glycosaminoglycan polysulfide injection[14], hyaluronic acid injection[15] and prolotherapy[16], Acupuncture[17] and extracorporeal shock wave therapy[18]. Autologous blood injection provides a novel treatment modality for lateral epicondylitis in cases where PRP has been of limited use and resistant cases failing all remaining treatment modalities except surgical intervention[5].

MATERIALS AND METHODS –

This is a prospective study for the duration of 2 years carried out in a tertiary care center. Inclusion criteria –

age 18 to 65 years, including both genders, patient with no pain relief after 3 months of conservative treatment. Exclusion criteria – pain less than 3 months duration, patients who had local steroid injection less than 2 months ago, infection at the injection site, pregnant ladies and patients without any trial of conservative treatment.

Patients were divided randomly into 2 groups, 38 injected with PRP and 34 injected with autologous whole blood, patients were assessed at 2nd, 3rd and 6th month post injection and functional outcome was evaluated using PRTEE (Patient related tennis elbow evaluation) score[10] and VAS score[11]. The mean of PRTEE score and VAS scores were assessed at the start and at every follow up visit till 6 months duration.

Technique of infiltration of Platelet Rich Plasma:

Patient lying in supine position, the elbow is flexed to 90 degrees with forearm in pronation. The skin of the injection site was prepared and draped; 1 ml liquid Platelet Rich Plasma was injected in a sterile condition using 18Gauge needle. PRP injection given at the point of maximal tenderness at elbow using a peppering technique spreading in a clock like manner to achieve a more expansive zone of delivery.

Technique of infiltration of Autologous whole blood:

Under due aseptic precautions after preparing the parts, 1 ml of venous blood was drawn from contralateral upper limb. Then injected into the lateral epicondyle starting proximally and going along the supracondylar ridge up to the undersurface of Extensor carpi radialis brevis muscle. No anaesthetic agent is used.

All the patients after infiltration of platelet rich plasma/autologous whole blood infiltration immediately advised for tennis elbow strapping, cold fomentation for ten days and then restoration of normal activities allowed from third week with stretching exercises and physiotherapy. All the patients are advised to avoid repetitive movements of elbow and wrist during first three weeks after injection.

Follow up done on 2nd, 3rd and 6th month. Functional outcome assessed using PRTEE (Patient related tennis elbow evaluation) score and pain by VAS.

Statistical analysis –

Sample size 72 in number, who were enrolled and distributed randomly among two groups.

Formula used for calculation of sample size: -

$$n = \frac{Z_{(1-\alpha/2)}^2 + Z_{(1-\beta)}^2}{p_1(1-p_1) + p_2(1-p_2)}$$



2

$$\frac{(p_1 - p_2)}{\sqrt{p_1(1-p_1) + p_2(1-p_2)}}$$

-Primary outcome variable=presence/absence of relapse

$$\text{-Z-value for 5\% level of significance } [Z_{(1-\alpha/2)}] = 1.96$$

$$\text{-Z-value or 80\% power } [Z_{(1-\beta)}] = 0.84$$

-Effect size (d) =16%

$$P_1=80\%; P_2=95\%$$

$$N = \frac{[1.96+0.84]^2 [80(100-80) + 95(100-95)]}{(80-95)^2}$$

$$= \frac{(7.80)(1600+475)}{(15)^2}$$

$$= \frac{7.80(2075)}{225}$$

$$= 72$$

Observations' and Data were entered in MS-Excel and analysed in SPSS V21. Descriptive statistics were represented with percentages, Mean with SD or Median with IQR depends on nature of the data. Shapiro wilk test was applied to find normality. Chi-square test, Repeated ANOVA, Independent t-test and Mann-whitney u test were applied to find significance. P<0.05 was considered as statistically significant.

RESULTS – At the end of 6 months of follow up period the PRTEE(Patient related tennis elbow evaluation) score mean was dropped from 82.41 pre injection to 22.43 and VAS score mean 8.61 to 0.84; however, in autologous whole blood injection group PRTEE(Patient related tennis elbow evaluation) score did not change significantly 82.4 to 49.46 and VAS score 8.76 to 3.85 at 6 months of follow up period.

DISCUSSION –

The aim of the study is to assess the efficiency of autologous whole blood injected locally at lateral epicondyle while comparing its effects with PRP injection. The patients are assessed for pain by VAS scoring system and for functional improvement by PRTEE(Patient related tennis elbow evaluation) score measured pre injection and at 2nd, 3rd and 6th month post injection. The results of the current study show that In the autologous whole blood injection group PRTEE(Patient related tennis elbow evaluation) score was improved from 82.4 to 49.6 and VAS score improved from 8.76 to 3.85.

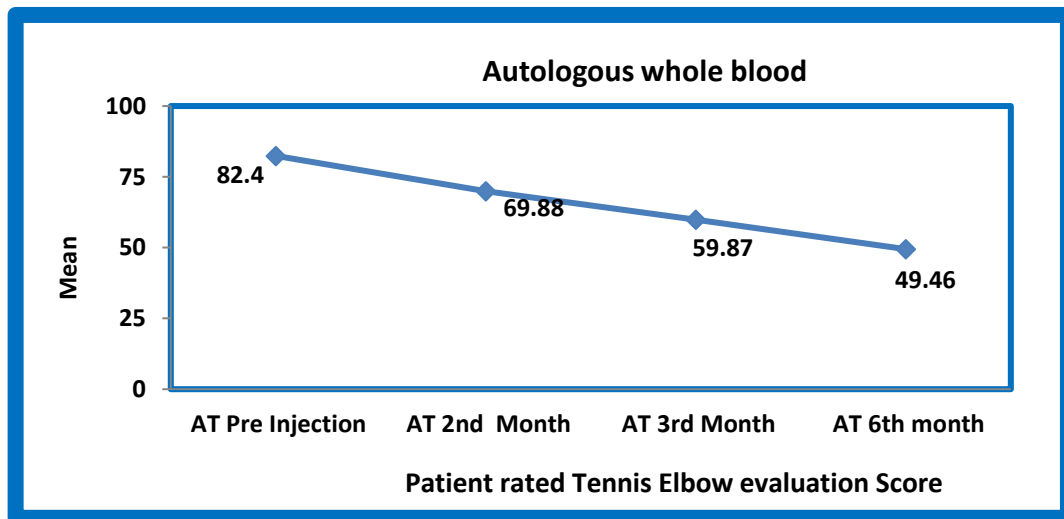


Fig 1 . PRTEE score mean at every follow up visit till 6 months for Autologous blood injection.

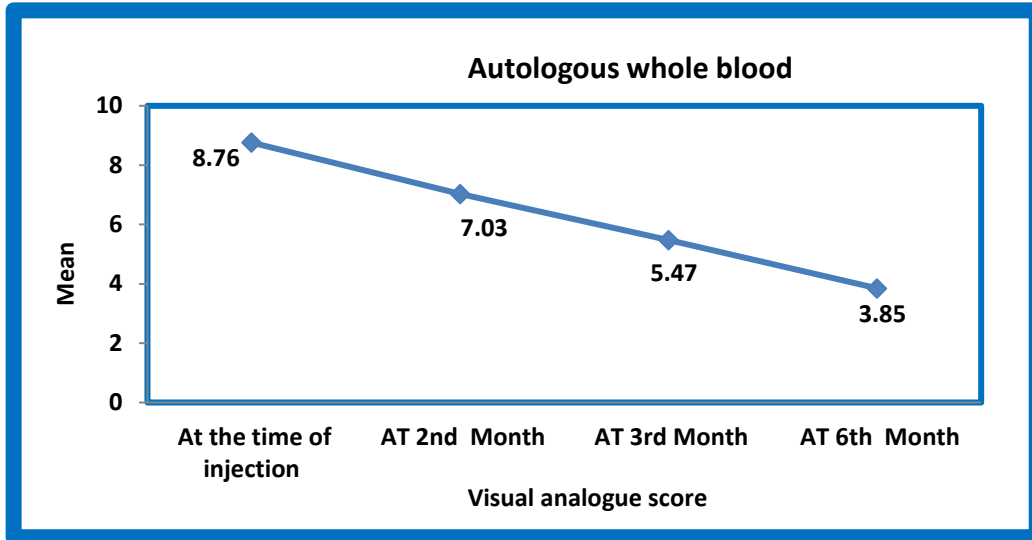


Fig 2. VAS mean at every visit till 6 months of follow up for Autologous blood injection. In PRP injection group PRTEE score mean improved from 82.41 to 22.43 and VAS score improved from 8.61 to 0.84.

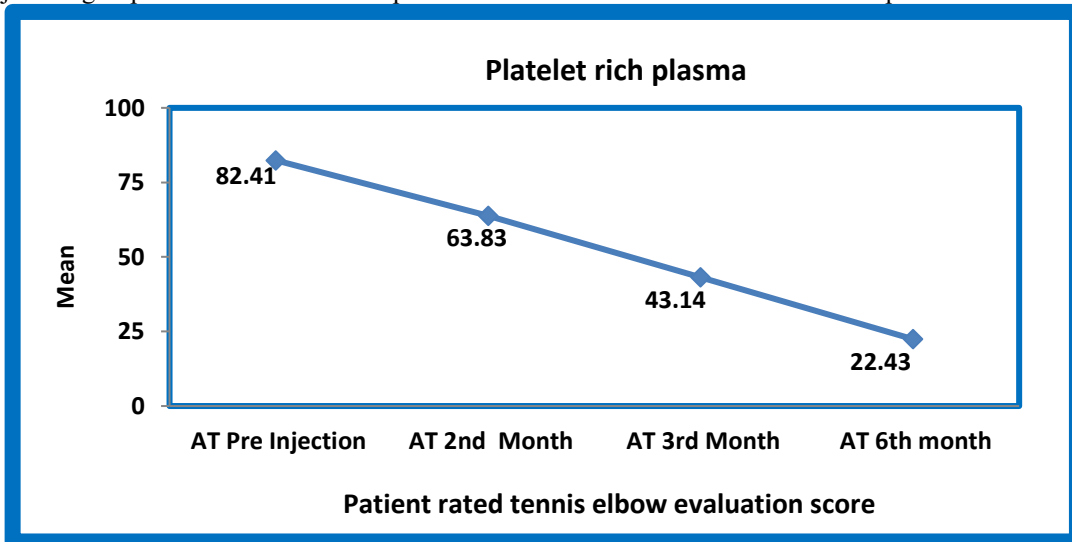


Fig 3. PRTEE score mean at every follow up till 6 months for PRP injection.

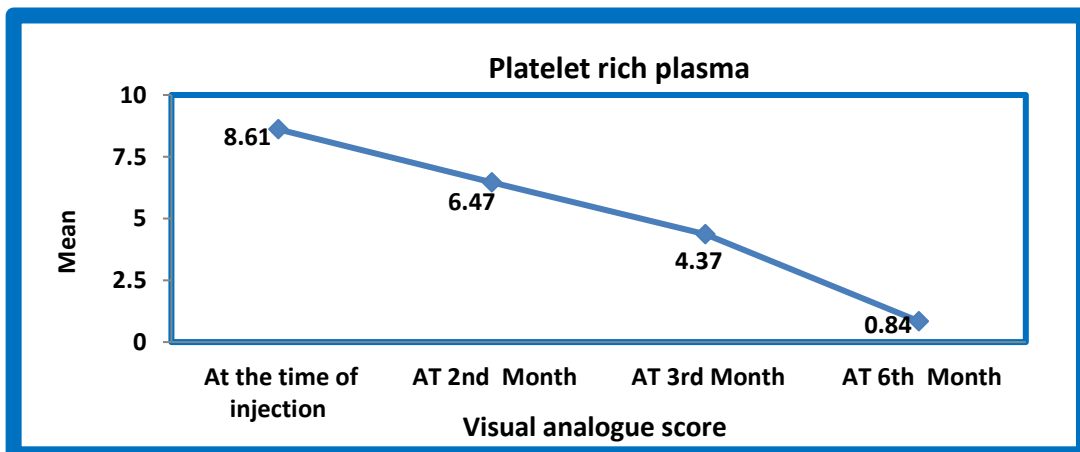




Fig 4. VAS mean of every follow up till 6 months of PRP group.

These results indicate that autologous whole blood injection is effective in bringing down the pain and improving the functional outcome in midterm, however when compared to PRP injection, autologous blood injection falls short of decreasing the pain dramatically and huge improvement in functional outcome. According to a study by Thanasas et al[19] In the short run, PRP treatment appears to be more successful than autologous blood in treating chronic lateral elbow epicondylitis in terms of pain reduction. The efficacy of the procedure may be increased by specifying the precise indications, optimal PRP concentration, amount and timing of injections, and rehabilitation regimen. Furthermore, the potential for substantial cost savings could support the use of PRP instead of autologous whole blood in cases of refractory or chronic tennis elbow.

In another study by Wolf et al[6] when treating lateral epicondylitis, autologous blood, corticosteroids, and saline injections don't work any better than placebo saline injections. Over the course of six months, patients in each injection group showed improved outcome scores. A study by Dojode [7] stated that Autologous blood injection is efficient compared with corticosteroid injection, with less side-effects and minimum recurrence rate, emphasizing its potential to decrease pain and improve the functional status. In 2011 saw the publication of a prospective randomized experiment by Creaney on the application of growth factors, specifically in sports medicine, to promote healing in musculoskeletal injuries. It is believed that autologous blood injections function by inducing an inflammatory response that attracts the nutrients required to support healing. However, there has been no evidence of a benefit in long-term follow-up, and its usage is only advised in instances that have not responded to other forms of treatment[5].

There are different treatment options for lateral epicondylitis such as – activity modifications[20] which emphasizes on shifting the force from the lateral epicondyle to the medial epicondyle when lifting and avoiding palm-down movements. Additionally, it is important to counsel LE patients to change unhealthy lifestyle choices and abstain from certain triggering activities. RICE, which stands for rest, ice, compression, and elevation, can help reduce pain in its early stages. Physiotherapy – eccentric exercises[21] focuses on stretching the musculotendinous unit with an applied load, although the results are promising but the exact mechanisms are still ambiguous. Counterforce brace – its main function is to reduce or disperse stress on Extensor Carpi Radialis Brevis origin[20,22].

Extracorporeal shock wave therapy- exact mechanism is not known, possible mechanism of action are direct stimulation of healing, neovascularization, direct suppressive effects on nociceptors and hyper stimulation mechanism blocking gate control[18,23]. Acupuncture – in the era of evidence based medicine this treatment option lacks systemic reviews and no long term outcomes have been recorded[17].

Platelet rich plasma – the exact mechanism of action is unknown, possibly works by releasing large amounts of platelet derived growth factors stimulating healing[4,19,24] these studies also suggest the limited effectiveness of PRP in short term or acute cases, however in chronic and resistant cases PRP injections does not provide optimum results[20].

Autologous whole blood injection – there are two schools of thoughts as to how it works, one states that it initiates the inflammatory response around the affected tendon, which may result in cellular and humoral mediators to induce a healing cascade[8] another school of thought states that it facilitates the delivery of growth factors inducing fibroblastic mitosis, triggering stem cells, and angiogenesis, probably promoting angiogenesis and collagen formation[5]. Whatever be the mechanism the studies show that it is effective in short term and less effective in mid-term follow up periods, the long-term results are not there in current literature. The autologous blood injection also carries the risk of increased local pain and skin reaction following injection and hence its use should be restricted to recalcitrant cases and those who are resistant to other conservative treatment modalities[6,8,9].

CONCLUSION – The current study aims at assessing the effectiveness of autologous blood injected locally at lateral epicondyle in comparison to PRP injection, the current study concludes that PRP injection is better than autologous blood injection in decreasing the pain and improving the functional status of the patient and also decreasing the need for surgical intervention. However, in recalcitrant cases who fail the first line therapies like conservative management, tennis elbow band, PRP injection; autologous blood injection provides a better option other than surgical procedures.

LIMITATIONS OF STUDY – The follow up period was only 6 months, longer follow up period may yield different result. Large sample size and multicentric study may provide for a better study. The treating doctor was the observer for the study, a third-party observer would provide a better blinding study.



FURTHER SCOPE OF STUDY – Classifying Functional outcomes based on occupation, different blood components are at play here studying the function and mechanism of action of each product or part of blood would give a better understanding.

CONFLICT OF INTEREST – NONE

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