



PLATELET RICH PLASMA- A NOVEL METHOD IN THE TREATMENT OF LATERAL EPICONDYLITIS

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ABSTRACT

Introduction: Tennis elbow is due to defective reparative process at lateral epicondyle. With repetitive use of wrist there is a micro tear at origin of extensor carpi radialis brevis. Conventional treatment methods do not try to alter the poor healing property of the tendon. Platelet rich plasma is a new treatment option aimed at reversing this degenerative process. **Aim-** This study is designed to find out the effectiveness of platelet rich plasma in the treatment of tennis elbow **Materials & Methods-** Patients with clinical signs and symptoms of chronic lateral epicondylitis during June 2016 to October 2017 attending the Orthopaedics outpatient department of RMMCH, Chidambaram were evaluated. A prospective study was done with Platelet rich plasma for tennis elbow patients and were followed up for one year. **Results:** 25 patients with Tennis elbow were treated with platelet rich plasma injection. They were followed up for one year with Pain pressure threshold using manual algometer. The patient showed a steady improvement in PPT up to six months of follow up. After which the effects seems to have started diminishing. **Conclusion:** PRP is a new effective means to treat chronic lateral epicondylitis. PRP is superior at six months of follow up. After which the beneficial effects seems to have reached a plateau. The patients treated with PRP has shown better pain relief and improved function. Surely PRP will change the way orthopaedicians are treating tendinopathies in the future. However, further studies with longer follow up and with repeat injections are suggested to get definite conclusion.

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INTRODUCTION

Tennis elbow was historically first described in 1873 by rungue. The name was related to lawn tennis historically. It usually affects about 1-3 % of general population. Nirschl and pettrone¹ had reported that it is due to microscopic tears within origin of extensor carpi radialis brevis tendon caused due to repeated wrist movements especially extension. Pathology behind tennis elbow is the defect in reparative process at the lateral epicondyle. Tennis elbow has been really haunting orthopaedicians because of poor response to conventional methods of treatment which are not actually aimed at reversing the

degeneration. The conventional methods of treatments do not alter the tendon inherent poor healing properties. Newer treatment options include platelet rich plasma which actually accelerated the healing of tendon at lateral epicondyle. However there are quite a lot of controversies over the effectiveness of platelet rich plasma.

AIMS OF THE STUDY

The aim of this study is to study the effectiveness of platelet rich plasma in the treatment of lateral epicondylitis using pain pressure threshold measurements using manual algometer.

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MATERIALS AND METHODS

All patients with clinical signs and symptoms of chronic lateral epicondylitis during October 2016 to December 2017 attending the Orthopaedics out patient department of RMMCH, Chidambaram were evaluated.

Inclusion criterias

Criteria for inclusion in the study were clinically diagnosed lateral epicondylitis (based on symptoms, site of tenderness, and pain elicited with resisted active extension of the wrist in pronation); with duration of symptoms more than one month and pain severity with minimum score of 5 (based on 10 scale Visual Analogue Score (VAS)).

Exclusion criteria

Local infection at the site of the injection.

- History of trauma.
- Platelet dysfunction syndrome , or any other coagulopathies
- Recent use of corticosteroids during last 2 weeks.

METHODOLOGY

Ethical consideration

All patients were given a written consent explaining to them the procedure of study and that it posed no harm to their health. They were given access to the physician of the study in case of any need to contact him if any adverse reaction arises due to the injection.

Intervention

In these patients, about 5 ml of autologous blood was obtained by venepuncture. In the blood bank, the blood was centrifuged in a cooling centrifuge at 22 degrees Celsius at 1800 RPM for a period of about 10 mins to yield Platelet rich plasma. The patients were given single injection of platelet rich plasma of about 2 ml into point of maximal tenderness at lateral epicondyle under strict aseptic precautions.

All patients were observed for about 15 minutes, then sent home. Only paracetamol and T.Cefixime 200 mg BD for 3 days were prescribed. Both group were advised to avoid strenuous work. And they were taught stretching exercises to start from 3rd day. The patients were followed up on the first week, 1st month, 2nd month, 3rd month 6th month and one year using Pain pressure threshold measurement using manual algometer.



Fig 1 Cooling centrifuge

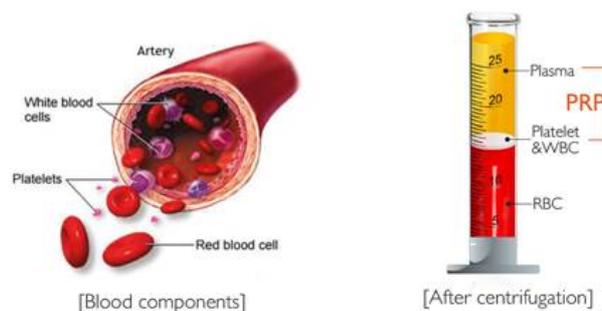


Fig 2 Platelet rich Plasma

Manual Algometer

In This study pressure pain threshold (PPT) was assessed by Dial type algometer, Orchid Scientific & Innovative India Pvt. Ltd., Nashik Maharashtra. The PPT test is precise and reliable measurement for assessing pain (Cronbach's alpha ≥ 0.92). Pressure algometry has been shown to have good validity when assessed by pain and disability questionnaires². The algometer is comprised of a gauge attached to a hard tip. Pressure was applied though the surface area of 1 cm. The instrument was placed perpendicular to the skin's surface. In each algometric assessment, we tested PPT at two different sites with 2 centimetres distance from each other at lateral epicondyle (site of maximal tenderness) and the mean of two values was considered as pain threshold. The method was demonstrated one time at each site before testing to ensure that the participants were familiar with the test. The participants were asked to indicate when the pressure became painful based on this definition: "When you feel the sensation changes from pressure to the slightest pain inform us."



Fig 3 Algometer

Each measure site was tested three times with 2 minutes between each test, but the site was changed at each measure. The scale unit was kg/cm.

RESULTS

Our study included 25 tennis elbow patients not amenable to conservative means of treatments for one month. Platelet rich plasma was given in 25 patients.

The mean age group of patients was 37.04 years (25-50).The age group 31 to 40 years dominates the series accounting for 44 %.Among 25 patients 16 patients (64 %) were male. Hence in our study male population predominated the study group constituting 62 % of total study population. The right elbow constitutes 58 %

overall. Dominant extremity is most commonly involved in tennis elbow as per our study. In our study group 28 % (n=14) are coolie and 26 % (n=13) are housewife by occupation overall. The next occupation in order is mason, 4 % (n=8).

The mean pre intervention PPT measured by manual was 10.08. At the 1st week follow up the mean PPT increased from 10.08 to 8.28. Thus the patient actually deteriorated, which can be attributed to the inflammation induced by these injected products.

However from the first month of follow up, the score has started increasing indicating improvement. The mean PPT measurement at first month was 10.92. Then at regular follow up at second month, third month and six months the mean PPT measurements were 13.76, 15.20 and 22.96 showing that the patient had gradual but steady improvement. At six months of follow up, patients who received platelet rich plasma injection had shown 128% increase in mean pain pressure threshold.

Then at our follow up at one year the mean PPT score was 22.48, which means the patients have stopped showing any further improvements after six months. Thus the peak effect of PRP was evident at 6 months and after that the beneficial effects of PRP seems to have reached a plateau or even started decreasing a little.



Fig 4 Mean Pain pressure threshold follow up

Pain relief was achieved in twenty one patients (84%) in platelet rich plasma group. Four patients had residual pain (16%) and they were not satisfied with the treatment they had received. One of the patient had mild post – injection superficial infection which subsided with oral wide-spectrum antibiotics.

DISCUSSION

The use of PRP is a proactive therapeutic option which jumpstarts the healing process, which contains several different growth factors and other cytokines that stimulate healing of bone and soft tissue.^{3,4}

Peerbooms *et al*⁵ compared the application of PRP with corticosteroid injection in the treatment of lateral epicondylitis in a population of 100 patients, finding significantly improved outcomes in the PRP group with regard to pain and function, which was comparable to our study.

Peerbooms also highlighted that initial benefits of corticosteroid injections gradually declined, whereas PRP

patients progressively improved which is also much evident in our study upto a follow up of six months.

In the results published by Mishra and Pavelko⁶ who also demonstrated a significant improvement in pain and elbow scores after PRP injection for chronic elbow tendinosis compared with a control group treated with bupivacaine/epinephrine injection. After 4 weeks, PRP-treated patients reported a mean 46% improvement in pain and 42% improvement in Mayo elbow score compared with a 17% and 20% improvement, respectively, in the control group. These improvements were maintained through 25 weeks at the time of publication. This study is similar to our study where the patients receiving platelet rich plasma had shown significant improvement in pain and functionality at 24 weeks. In our study the pain pressure threshold has improved in PRP group by a staggering 128% at the six months of follow up.

Our study is supported by Mishra *et al* in a recent study in the *American Journal of Sports Medicine*, who evaluated 140 patients with chronic epicondylar elbow pain. Of those patients, 20 met the study criteria and were surgical candidates who had failed conservative treatments. In total, 15 were treated with one PRP injection and five were controls with local anaesthetic. The treatment group noted 60% improvement at 8 weeks, 81% at 6 months, and 93% at final follow up at 12–38 months. Of note, there were no adverse effects or complications. Additionally there was a 94% return to sporting activities and a 99% return to daily activities in our study the peak beneficial effects of PRP were noted at six months much similar to our study.

In support to our study we have a RCT conducted by Thanassas *et al*⁷ in Greece. In this RCT he compared 14 patients treated with a single injection of PRP and a homogenous group treated by a single injection of autologous whole blood. Visual Analogue Scale (VAS) for pain and the Liverpool elbow score were collected up to 6 months after treatment. No statistically significant differences were shown in Liverpool elbow score, while VAS was statistically lower for PRP group only at 6 weeks. In our study we have shown pain pressure threshold to be improved at six months of follow up.

In a study conducted in Meerut, India, Gyaneshwar Tonk *et al*⁸ studied 81 patients for a period of 2 years and showed that Low-level laser therapy is better in the short term period, but on long term follow-up injection PRP therapy is better than laser therapy in lateral epicondylitis. The mean age in our study was 36.5 years however in the study by gyaneshwar the mean age was 40.45years. This study was also similar to our study in stating that the males were more commonly involved and dominant hand was mostly involved in tennis elbow. But the major difference in this study was that this study had a longer duration of follow of two years when compared to one year in our study.

In a study conducted in Osmania medical college, Telangana by Sundeep Kund *et al*⁹ studied 50 patients for a period of 2 years and showed that Treatment with PRP holds promising results with minimal risk for the treatment of Tennis elbow. This has the same number of

population studied. But this study has a follow up of about 2 years. And this study has followed a different method of PRP preparation than ours.

However our study is strongly opposed by a double blind RCT conducted by Krogh *et al*¹⁰ in 2013. Sixty patients with evidence of chronic Lateral Epicondylitis (LE) were randomized to three groups: injection of PRP, saline, or glucocorticoid. After 3 months, patients were evaluated using the Patient-Rated Tennis Elbow Evaluation (PRTEE) questionnaire. The results showed no superiority of PRP or glucocorticoid compared to saline in lowering pain level. In contrast our study has clearly showed PRP to be beneficial at six months of follow up.

Similar to above study, our study is not supported by RCT conducted by Creaney *et al*¹¹. Eighty patients had received the PRP injection. At 6 months the PRTEE did not show any statistical difference.

The limitation in our study is the small sample size and the short follow up period. In our study the lateral epicondylitis was diagnosed only clinically and not by any other diagnostic means such as ultra sonogram. Also there was no definitive protocol of Platelet rich plasma preparation and in our study there was no proper means of measuring the baseline increase in platelet count. The injection in our patients was not done under Ultra sonogram guidance. Also the patients in our study could not be blinded regarding the treatment they had received.

CONCLUSION

Treatment of lateral elbow epicondylitis is a real challenge to orthopaedicians with lots of treatment options, but none providing promising results. Newer treatment like platelet rich plasma has shown a promising future in treatment of tennis elbow. The effect of platelet rich plasma seems to have reached the plateau at six months of follow up. This has led us to emphasis on the need of repeat injection at every six months. The patients treated with PRP has shown better pain relief and improved function at a long term follow up. Surely PRP will change the way orthopaedicians are treating tendinopathies in the future.

Reference

1. Nirschl RP, Pettrone FA. Tennis elbow: the surgical treatment of lateral epicondylitis. *J Bone Joint Surg Am.* 1979; 61:832-839.

2. Creaney L, Wallace A, Curtis M, Connell D. Growth factor based therapies provide additional benefit beyond physical therapy in resistant elbow tendinopathy: a prospective, single blind, randomised trial of autologous blood injections versus platelet rich plasma injections. *British Journal of Sports Medicine.* 2011; 45(12):966-971.
3. Landesberg R, Roy M, Glickman RS. Quantification of growth factor levels using a simplified method of platelet-rich plasma gel preparation. *J Oral Maxillofac Surg* 2000; 58:297-300.
4. Smidt N, van der Windt DA, Assendelft WJ, Deville WL, Korthals-de Bos IB, Bouter LM. Corticosteroid injections, physiotherapy, or a wait-and-see policy for lateral epicondylitis: A randomised controlled trial. *Lancet* 2002; 359:657-62.
5. Peerbooms JC, Sluimer J, Bruijn DJ, *et al.* Platelet-rich plasma versus corticosteroid injection with a 1-year follow-up. *Am J Sports Med.* 2010; 38:255-262.
6. Mishra A, Pavelko T. Treatment of chronic elbow tendinosis with buffered platelet rich plasma. *Am J Sports Med.* 2006; 10(10):1-5.
7. Thanasis C, Papadimitriou G, Charalambidis C, Paraskevopoulos I, Papanikolaou A. Platelet-rich plasma versus autologous whole blood for the treatment of chronic lateral elbow epicondylitis: a randomized controlled clinical trial. *Am J Sports Med.* 2011; 39 (10):2130-4.
8. Platelet rich plasma versus laser therapy in lateral epicondylitis of elbow Gyaneshwar Tonk *et al*, *Indian Journal of Orthopaedics* July 2014, Vol. 48, Issue 4
9. Tennis Elbow Treatment with Platelet Rich Plasma: A Prospective Study-A Sundeep Kund *et al* , *International Journal of Scientific Study*, November 2015, Vol 3, Issue 8
10. Klein MB, Yalamanchi N, Pham H, Longaker MT, Chang J. Flexor tendon healing *in vitro*: Effects of TGF-beta on tendon cell collagen production. *J Hand Surg Am* 2002; 27:615-20.
