



EFFICACY OF PRP IN RECALCITRANT CHRONIC CASES OF LATERAL EPICONDYLITIS AND PLANTAR FACIITIS

Orthopaedics

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ABSTRACT

Lateral epicondylitis and Plantar Fasciitis are one of the most common musculoskeletal problems in orthopaedic practice leading to a disabling disease in its chronic form. In this study, autologous platelet-rich plasma (PRP) is used to accelerate the recovery of degenerative tissue. Introduction of platelet rich plasma (PRP) as a possible alternative to conservative and operative treatment has motivated significant researchers. This study includes total 50 patients out of which 30 patients were of lateral epicondylitis and 20 were of plantar fasciitis who visited our center with failed conservative treatment and chronic painful condition, we treated them with PRP. Results were evaluated with VAS scoring system. Among patients with lateral epicondylitis and plantar fasciitis, post-PRP injection show commendable recovery. Significant improvement was observed in VAS score measured during 1st visit and 6th month follow up. PRP is a biological option for a difficult orthopaedic problem like lateral epicondylitis and plantar fasciitis. Our study has shown that autologous PRP injection is a promising effective treatment for long term relief of chronic elbow and heel pain.

KEYWORDS

Plantar fasciitis, lateral epicondylitis, PRP, VAS score.

INTRODUCTION

Lateral epicondylitis of the elbow is one of the common orthopaedic disease that mostly affects the individuals who makes repetitive movements with their wrists and fingers^[1] with a prevalence of 1–3 % in the general population^[2]. The condition usually presents as radiating pain centering on the lateral epicondyle. Most of the patient symptoms resolve after 6 to 12 months of various conservative or minimally invasive treatments^[3-5]. This injury dominates the origin of the short radial extensor muscle of the carpus, which results as micro tears due to repetitive use, thus forming immature repair tissue^[6]. The most commonly affected muscle is the Extensor Carpi Radialis Brevis (ECRB), as originally described by Cyriax^[7]. Histopathologically, it has been shown to have a paucity of inflammatory cells such as macrophages and neutrophils. The condition is therefore considered to be a form of tendinosis, which is defined as a degenerative process^[8-9]. The treatment options range from relative rest in association with immobilization, physiotherapy, application of botulinum toxin, acupuncture, shock wave therapy, use of oral non-steroidal anti-inflammatory drugs, steroid injections and most recently use of platelet-rich plasma. Surgical procedures are only recommended when the symptoms last for more than six months and/or if other non-surgical treatment options have failed^[10-15].

Plantar fasciitis is a common pathological condition affecting the hind foot and leads to challenging situation for clinicians to treat successfully^[16]. Being an overuse injury it causes inflammation at the origin of the plantar fascia and nearby perifascial structures, like calcaneal periosteum. It causes inferomedial heel pain in adults^[17]. The primary function of the plantar fascia is to provide static as well as dynamic support to the arch of the foot^[18]. Plantar fasciitis in current scenario is considered to be due to a degenerative process rather than an inflammatory pathology^[19-20]. Histology characterizes it by infiltration with macrophages, plasma cells and lymphocytes leading to tissue destruction and repair involving immature vascularization followed by fibrosis. The normal fascia tissue is replaced by an angiofibroblastic hyper plastic tissue thus creating a self destructive cycle of degeneration^[21]. Non operative approaches include rest, heel cups, stretching, and orthotics like night splints, immobilization, non steroidal and steroidal anti-inflammatory medication, local steroid injection and physical therapy^[22]. Only 5 to 10% of the people require surgical intervention like removal of calcaneal spur, neurectomy, and plantar fasciotomy can often be a challenge to clinician for successful treatment^[23].

Recently, platelet-rich plasma (PRP) has been proposed as a potential treatment for lateral epicondylitis and chronic plantar fasciitis. The introduction of platelet rich plasma (PRP) as a possible adjunct to

conservative and operative treatment has motivated significant research into this topic^[24]. PRP is a bioactive component of whole blood with concentrations of platelets above baseline values^[25]. The platelets secrete a wide variety of cytokines and growth factors that act as chemo-attractants for reparative cells^[26-27]. In humans it has been shown that the injection of whole blood into the tendon decreases the pain^[28]. Platelet rich plasma (PRP) has been founded to increase the content of cytokines and promotes matrix synthesis and helps in tendon healing^[29]. On a histological level, light microscopy reveals both an excess of fibroblast and blood vessels that are consistent with neo angiogenesis^[30].

Hence this study was conducted to study the effects of PRP on chronic form of both lateral epicondylitis and plantar fasciitis not responding to traditional non operative treatment including local steroid injection.

MATERIAL AND METHOD

The protocol of this study has been approved by the relevant ethical committee of V.C.S.G.G Medical Science and Research Institute affiliated to HNB Medical University, Uttarakhand. All subjects gave full informed consent to participate in this study during August 2019 to January 2020. Total 50 patients accounted into the study who were not responding to the conservative treatment taken elsewhere or in our center. A thorough history was taken, subjective symptoms were recorded in a Performa patient was assessed clinically and examination was carried out. Blood investigations like complete blood picture (CBP), clotting time (CT), bleeding time (BT), and random blood sugar (RBS) were done. Pain assessment was done using VAS scoring system which was recorded before treatment and in follow up at 1st month, 3rd month and finally at 6th month.

Out of 50 patients of both sexes 30 diagnosed as having lateral epicondylitis and 20 diagnosed as having plantar fasciitis were selected based on following criteria

Inclusion Criteria for lateral Epicondylitis

1. Pain and tenderness over the lateral aspect of the elbow.
2. One of the following tests being positive: wrist extension (Cozen's test), Mill's maneuver, jar lifting test, wringing test
3. Patient with elbow pain greater than 6 months
4. Failed conservative treatment including previous local steroid injection

Inclusion Criteria for Plantar Fasciitis

1. Pain in the inferior aspect of heel that is usually worse with their first steps in the morning or after a period of inactivity (with maximal tenderness over the antero-medial aspect of the inferior heel).

2. Increased pain on passive dorsiflexion of foot.
3. Patients with heel pain greater than 6 months
4. Failed conservative treatment including previous local steroid injection

Patients with systemic conditions like anemia (hemoglobin < 7.0 g/dl), thrombocytopenia (platelets < $150 \times 10^3 \mu\text{l}$), pregnancy, local malignancy, rheumatoid disease and previous surgery or elbow/ankle dislocation were also excluded. Known case of Diabetes mellitus, osteoarthritis of elbow and ankle, Infection or ulcer at injection site, recent local trauma or any radicular pain, any previous surgeries around the foot ankle and any neurological abnormalities were also excluded.

3. Preparation of PRP: For this study 20 ml of venous blood sample was obtained from the patient and were transferred 10 ml each into two vacutainers pre-filled with acid citrate dextrose which are readily available in hospital. The vacutainers are then placed in the slot available in the centrifugation machine by maintaining the counter balance. The centrifuge was done at 4000 RPM for 13 minutes using a soft spin and supernatant layer was removed with the help of syringe thus leaving the 2/3rd for use which is approximately 5ml.

4. Concentrations of platelet: The cell count status in the concentrations of PRP was found to be 2.0 to 5.1 lakhs.

PRP Injection Technique : Procedure is explained to the patient, consent is obtained. In case of lateral epicondylitis patient is made up seated over a stool, involved elbow is identified and the site is palpated for point of maximum tenderness and marked with the help of sterile marker. Under strict aseptic precautions 2ml of local anesthetics (2% lignocaine without adrenaline) mixed with 3ml of PRP is then injected into the affected site deep in the tissue up to the bone with a 18-gauge needle by the fanning technique and bandage is applied at the injection site and patient is advised to rest in the outpatient block for approximately 1 hour. The affected hand of the patient is immobilized in elastic crepe bandage for 48 to 72 hr and the patient is strictly advised not to lift weights or participate in activities that involve wrist extension for next 3 days. After 3 days, the crepe bandage is removed, and the patient is allowed to do light daily activities.

In case of plantar fasciitis patient is placed supine over the couch, involved foot is identified and the site is palpated for point of maximum tenderness and marked with the help of sterile marker. Under strict aseptic precautions 2ml of local anaesthetic (2% lignocaine without adrenaline) mixed with 3ml PRP is then injected into the affected site deep from tissue up to the bone with a 18-gauge needle by the fanning technique and bandage is applied at the injection site and patient is advised to rest in the outpatient block for approximately 1 hour. In the mean while a crepe bandage is applied, and the patient is advised to use soft footwear and avoid sports and athletic activities for 48 to 72 hr. After 3 days, the crepe bandage is removed, and the patient is allowed to do daily activities. After the procedure, the patient is prescribed broad spectrum antibiotics (cephalosporin) and NSAID's for 3 days.

Statistical Analysis

Statistical evaluation was performed by statistical package for the social sciences (SPSS) version 21 (Demo) for Windows statistics program using pair test and data were expressed as mean $\pm$ standard deviation with p value < 0.05 was considered statistically significant

RESULTS

The mean age of Lateral Epicondylitis group was 39.24. $\pm$ 8 years with an average age of 40 (range, 31 to 49) years and it included 20 men and 10 women and plantar fasciitis group was 40.3 $\pm$ 3.2 years with an average age of 40 (range, 34 to 46) years and it included 8 men and 12 women. Mean duration of complaint in patients with lateral epicondylitis is 9.5 months ranging from (7 to 12) months and mean duration of complaint in plantar fasciitis patient is 10.7 ranging from (7 to 18) months. The mean VAS score and standard deviation in lateral epicondylitis patients during their 1st visit and at 1 month, 3 month and finally at 6 month is given in Table-1 indicating reduction in VAS at every visit. Highly significant results were observed between the scores at first visit and later visits at 1 month, 3 month and finally at 6 month as shown in Table-2.

Table-1 Compares the mean VAS score and standard deviation in

lateral epicondylitis patients during their 1st visit and at 1 month, 3 month and finally at 6 month.

parameters	VAS AT 1 st visit (pre-injection)	VAS AT 1 MONTH (2 nd visit)	VAS AT 3 month (3 rd visit)	VAS AT 6 MONTH (4 th visit)
N	Valid 30	30	30	30
	Missing 0	0	0	0
Mean	7.40	4.20	2.57	1.53
Std. Deviation	.968	.887	.971	.937

Table- 2

Mean VAS comparison between first visit and each follow up suggesting significant value

Parameters	Paired Differences				pair T test	p value
	mean	SD	Lower	Upper		
First visit v/s second visit	3.20	0.89	2.87	3.53	19.77	<.001
First visit v/s third visit	4.83	0.18	4.47	5.20	26.86	<.001
First visit v/s fourth visit	5.87	0.19	5.48	6.26	30.85	<.001

Similarly for Plantar Fasciitis the mean VAS score and standard deviation in patients during their 1st visit and at 1 month, 3 month and finally at 6 month is given in Table 3. Showing reduction in mean VAS at each follow up visit.

Table-3

Parameter		First visit (pre injection)	One month (Second visit)	Three month (Third visit)	Six month (Fourth visit)
N	Valid	20	20	20	20
	Missing	0	0	0	0
VAS Mean		8.15	4.6	3.3	1.85
Std. Deviation		0.74516	1.095445	0.801315	0.875

Highly significant results were observed between the scores at first visit and later visits at 1 month, 3 month and finally at 6 month as shown in Table 4.

Table- 4(Mean VAS comparison between first visit and each follow up suggesting significant value)

Variables	Mean difference	S.D Difference	Pair t test value	95% C.I		p value
				Lower	Upper	
First visit v/s Second visit	3.55	1.15	13.85	3.01	4.09	<.0001
First visit v/s Third visit	4.85	1.14	19.08	4.32	5.38	<.0001
First visit v/s Fourth visit	6.3	1.13	24.96	5.77	6.83	<.0001

There is commendable reduction in visual pain analogue with the scale of (10-0) from pre injection VAS (1st visit) level to post injection VAS level at each follow up visit i.e. at 1 month (2nd visit), 3 month (3rd visit) and finally at 6 month (4th visit) in both the diseased groups as shown in figure1.

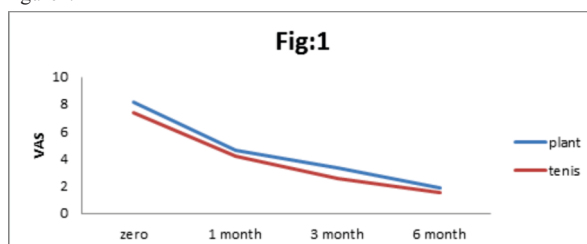


Figure1.Graph showing improvement in visual analog scale in lateral epicondylitis (tenis) and plantar fasciitis (plant)

DISCUSSION

In our study VAS score p values found to be statistically significant in each follow up ($p < .0001$). Gupta SKV et al.^[31] also showed there was a highly significant improvement in VAS score with p value ($< .0001$) in lateral epicondylitis group which were observed between the scores at first visit and later visits, i.e., 4wk and after 8wk and p value ($< .0001$) in plantar fasciitis group which were observed between the scores at first visit and later visits, i.e. 4wk and 8wk ($P < .001$). Our study coincides with the results of this study group both of which found to be highly significant.

In similar study Gautam V et al.^[32] shows significant improvement from pre-injection to the 6-month follow-up in the PRP group of lateral epicondylitis for VAS with p value ($< .0001$) which correlates with our study favoring positive results.

In similar study by Muralidharagopalan NR^[33] et al. using a visual analogue pain scale tabulates VAS at pre-injection and at 1, 6 and 12 months post-injection in plantar fasciitis patients. The visual analogue scale showed a decrease from 6 ± 1 at the pre injection levels to 1.42 ± 1.08 at one year follow-up suggesting significant p value ($< .0001$). In our study mean vas score in 1st visit decreased from 8.15 ± 0.7 at the pre injection levels to 1.85 ± 0.8 at 6 months follow up with significant observed p value of ($< .0001$).

Our study shows the efficacy of using PRP for Lateral epicondylitis and Plantar fasciitis supporting many other similar studies taken in the references conducted solely studying PRP and is effectiveness when other conservative measures fails thus improving pain as well as functional outcome.

Conclusion

Local injection of autologous plasma rich platelet appears to be a promising form of therapy for both lateral epicondylitis and plantar fasciitis. Single injection of platelet rich plasma initiate relief in pain thus helps with functional improvement subsequently. It is a low cost procedure with practically no side effects. In our study it is found to be a successful and considerable approach for both lateral epicondylitis and plantar fasciitis in its chronic form, especially for the patients who have failed to respond to traditional conservative management techniques involving local steroid injection. However sustained efficacy of this promising and safer therapeutic option should be further evaluated in long term follow up studies that includes a larger number of patients.

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Declaration

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Conflict of interest – None

Ethical Approval – Approved by ethical committee

REFERENCES

- Mishra A, Pavelko T. Treatment of chronic elbow tendinosis with buffered platelet-rich plasma. *Am J Sports Med.* 2006;34(11):1774–8.
- Verhaar JA (1994) Lateral epicondylitis. Anatomical, epidemiological and therapeutic aspects. *Int Orthop* 18(5):263–267
- Coonrad RW, Hooper WR. Lateral epicondylitis: its course, natural history, conservative and surgical management. *J Bone Joint Surg Am.* 1973;55(6):1177–1182.
- Taylor SA, Hannafin JA. Evaluation and management of elbow tendinopathy. *Sports Health.* 2012;4(5):384–393.
- Sims SE, Miller K, Elfar JC, Hammert WC. Non-surgical treatment of lateral epicondylitis: a systematic review of randomized controlled trials. *Hand (NY).* 2014;9(4):419–446.
- Regan W, Wold LE, Coonrad R, Morrey BF. Microscopic histopathology of chronic refractory lateral epicondylitis. *Am J Sports Med.* 1992;20(6):746–9.
- Ahmad Z, Siddiqui N, Malik SS, Abdus-Samee M, Tytherleigh-Strong G, Rushton N (2013) Lateral epicondylitis: a review of pathology and management. *Bone Joint J* 95B(9):1158–1164.
- Doran A, Gresham GA, Rushton N, Watson C (1990) Lateral epicondylitis. A clinicopathologic study of 22 cases followed for 2 years. *Acta Orthop Scand* 61(6):535–538
- Kannus P, Jozsa L (1991) Histopathological changes preceding spontaneous rupture of a tendon. A controlled study of 891 patients. *J Bone Joint Surg Am* 73(10):1507–1525
- Johnson GW, Cadwallader K, Scheffell SB, Epperly TD. Treatment of lateral epicondylitis. *Am Fam Phys.* 2007;76(6):843–8.
- Smidt N, van der Windt DA, Assendelft WJ, Devillé WL, Korthals-de Bos IB, Bouter LM. Corticosteroid injection, physiotherapy, or wait-and-see policy for lateral epicondylitis: a randomised controlled trial. *Lancet.* 2002;359(9307):657–62.
- Struijs PAA, Bos IBCK, van Tulder MW, van Dijk CN, Bouter LM, Assendelft WJJ. Cost

effectiveness of brace, physiotherapy, or both for treatment of lateral epicondylitis. *Br J Sports Med.* 2006;40(7):637–43.

- Olaussen M, Holmedal Ø, Lindbaek M, Brage S. Physiotherapy alone or in combination with corticosteroid injection for acute lateral epicondylitis in general practice: a protocol for a randomised, placebo-controlled study. *BMC Musculoskelet Disord.* 2009;10:152.
- Galvin R, Callaghan C, Chan WS, Dimitrov BD, Fahey T. Injection of botulinum toxin for treatment of chronic lateral epicondylitis: systematic review and meta-analysis. *Semin Arthritis Rheum.* 2011;40(6):585–7.
- Wong SM, Hui ACF, Tong P, Yu E, Wong LKS. Treatment of lateral epicondylitis with botulinum toxin: a randomized, double-blind, placebo-controlled trial. *Ann Intern Med.* 2005;143(11):793–721.
- Cornwall MW, McPoil TG. Plantar fasciitis: Etiology and treatment. *J Ortho Sports Phys Ther.* 1999;9:756–756.
- Young CC, Rutherford DS, Niedfeldt MW. Treatment of plantar fasciitis. *Am Fam Physician.* 2001;63:467–74, 477–478.
- Khan KM, Cook JL, Taunton JE, Bonar F. Over use tendinosis, not tendonitis; a new paradigm for a difficult clinical problem (part 1). *Phys Sports Med* 2000;28:172–5.
- Jarde O, Diebold P, Havet E, Boulou G, Vernois J. Degenerative lesions of the plantar fascia: surgical treatment by fasciectomy and excision of the heel spur—a report on 38 cases. *Acta Orthop Belg.* 2003;69:267–74.
- Leach RE, Seavey MS, Salter DK. Results of surgery in athletes with plantar fasciitis. *Foot Ankle.* 1986;7:156–61.
- Lemont H, Ammirati K, Usen N. Plantar fasciitis: a degenerative process (fasciosis) without inflammation. *J Am Podiatr Med Assoc* 2003;93:234–237.
- Toomey EP. Plantar heel pain. *Foot Ankle Clin.* 2009;14:229–245.
- Cornwall MW, McPoil TG. Plantar fasciitis: Etiology and treatment. *J Ortho Sports Phys Ther.* 1999;9:756–756.
- Geaney LE, Arciero RA, DeBerardino TM, et al. The effects of platelet-rich plasma on tendon and ligament: basic science and clinical application. *Op Techn Sports Med.* 2011;19:160–164.
- Creaney L, Hamilton B. Growth factor delivery methods in the management of sports injuries: the state of play. *Br J Sports Med.* 2008;42:314–320.
- Anitua E, Andia I, Sanchez M, et al. Autologous preparations rich in growth factors promote proliferation and induce VEGF and HGF production by human tendon cells in culture. *J Orthop Res.* 2005;23:281–286.
- Anitua E, Sanchez M, Nurdén AT, et al. Reciprocal actions of platelet-secreted TGF- β 1 on the production of VEGF and HGF by human tendon cells. *Plast Reconstr Surg.* 2007;119:950–959.
- Ranly D, Lohmann C, Andreacchio D, Boyan B, Schwartz Z. Platelet-rich plasma inhibits demineralized bone matrix-induced bone formation in nude mice. *J Bone Joint Surg [Am]* 2007;89:139–147.
- Marx RE. Platelet-rich plasma: evidence to support its use. *J Oral Maxillofac Surg.* 2004;62:489–96.
- Bisset L, Beller E, Jull G, et al. Mobilisation with movement and exercise, corticosteroid injection, or wait and see for lateral epicondylitis: randomised trial. *BMJ.* 2006;333:939.
- Gupta SKV, Bandari D. Autologous platelet-rich plasma injection in tennis elbow and plantar fasciitis. *Curr Orthop Pract.* 2016;27(4):405–8.
- Gautam V, Verma S, Batra S, Bhatnagar N, Arora S. Platelet-Rich Plasma versus Corticosteroid Injection for Recalcitrant Lateral Epicondylitis: Clinical and Ultrasonographic Evaluation. *J Orthop Surg.* 2015;23(1):5.
- Muralidharagopalan NR, Loganathan D, Janakiram Iyer KM, Boopathikumar KK. Functional outcomes of platelet rich plasma injections in plantar fasciitis. *Int J Res Orthop.* 2017 Jun 23;3(4):734.