



Efficacy of autologous platelet rich plasma vs corticosteroid injection in lateral epicondylitis

¹Dr. Musheer Ahmed, ²Dr. Khaja Fasiuddin

¹Senior Resident, Department of Orthopaedics, Dhanalakshmi Srinivasan Medical College and Hospital, Siruvachur, Tamil Nadu, India

²Senior Resident, Department of Orthopaedics, SVS Medical College, Mahaboobnagar, Telangana, India

Corresponding Author

Dr. Musheer Ahmed

Senior Resident, Department of Orthopaedics, Dhanalakshmi Srinivasan Medical College and Hospital, Siruvachur, Tamil Nadu, India

Received: 02Sept, 2023

Accepted: 25Sept, 2023

ABSTRACT

Background: Lateral epicondylitis is the most common chronic disabling painful condition of the elbow. Elbow pain and tenderness with resisted wrist extension are common manifestations in lateral epicondylitis. Recent studies have suggested platelet rich plasma (PRP) to be a safe and effective therapy for tennis elbow.

Aim and Objective: To compare the effectiveness of single dose injection of autologous platelet rich plasma with a single dose of corticosteroid injection in treatment of lateral epicondylitis and to measure the outcome.

Study Design: Randomized controlled trial.

Methods: A total of 40 patients with lateral epicondylitis were treated at Department of Orthopaedics, Dhanalakshmi Srinivasan Medical College and Hospital, Siruvachur, Tamil Nadu over 3 months from January 2023 to March 2023. All patients had minimum three months of symptoms. Randomization and allocation to the trial group were carried out by a lot method. The platelet rich plasma (PRP) was prepared from venous whole blood. After receiving a local anesthetic, all patients had single dose injection of autologous platelet rich plasma or a single dose corticosteroid injection in their extensor tendons at elbow through a pepperering needling technique. The primary analysis included visual analog scale (VAS) pain scores and Disabilities of the Arm, Shoulder and Hand (DASH) outcome scores.

Results: The PRP group was more often successfully treated than the corticosteroid group. When baseline VAS and DASH scores were compared with the scores at 12 weeks follow up, both groups showed improvement across time (intention-to-treat principle). However, the VAS and DASH scores of the corticosteroid group have not shown improvement, while those of the PRP group showed improvement at the end of 12 weeks (as treated principle). There were no complications related to the use of PRP.

Conclusion: Treatment of patients with lateral epicondylitis with PRP reduces pain and increases function significantly, exceeding the effect of corticosteroid injection at the end of 12 weeks follow up.

487



Key words: Lateral epicondylitis, platelet, platelet rich plasma (PRP), corticosteroid, tennis elbow

DOI Number: 10.48047/nq.2023.21.7.nq23045

NeuroQuantology2023;21(7):487-495

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non-Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

INTRODUCTION

Lateral epicondylitis is an inflammatory condition that occurs at the origin of the common extensor tendon of forearm over the lateral epicondyle. It is the most common chronic disabling painful condition of the elbow. It causes symptoms in 1% to 3% of the general population. It is common in people whose occupation requires frequent rotary motion of the forearm like carpenter, gardener, computer workers and knitting workers. The age of onset of lateral epicondylitis is between 35 and 50 years with an equal male to female sex ratio. The dominant upper limb is most commonly affected^{1,2,3}. The actual cause of lateral epicondylitis is not clearly understood. Now it is considered that degenerative process occurs at the common extensor tendon origin of the wrist and fingers due to overuse and abnormal microvascular responses^{4,5,6}. Nirschl observed that the basic pathology was in the origin of the extensor carpi radialis brevis (ECRB) tendon. But sometimes the anteromedial edge of extensor digitorum communis (EDC) and the deep surface of extensor carpi radialis longus (ECRL) may also be involved.

Various modalities of treatment have been recommended 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 injection of corticosteroids was thought to be the gold standard treatment in lateral epicondylitis. The autologous blood injection and different types of open and arthroscopic operative treatment are also advised for lateral epicondylitis^{7,8,9,10,11}.

At present, platelet rich plasma (PRP) is considered as an ideal biological autologous blood derived component. It can be injected to

different tissues where, platelet is activated and it releases high levels of transforming growth factors-beta (TGF- β), platelet derived growth factors (PDGF), fibroblast growth factors (FGF), vascular endothelial growth factors (VEGF) and cytokines at the injected site. These growth factors released from platelet rich plasma promote healing of wound, tendons and bone at cellular level¹². In addition, platelet rich plasma has high antimicrobial potency and this property may prevent infections¹³. These details make us to conduct this study.

AIM AND OBJECTIVES

To compare the effectiveness of single dose injection of autologous platelet rich plasma with a single dose of corticosteroid injection in treatment of lateral epicondylitis and to measure the outcomes.

MATERIALS AND METHODS

This is a prospective study of about 40 patients includes 26 females and 14 males who were diagnosed as lateral epicondylitis were treated at Department of Orthopaedics, Dhanalakshmi Srinivasan Medical College and Hospital, Siruvachur, Tamil Nadu over 3 months from January 2023 to March 2023.

The present study attempts to compare the effectiveness of platelet rich plasma injection versus corticosteroid injection as a treatment for lateral epicondylitis.

DRUGS USED

1. 3-4ml autologous platelet rich plasma.
2. Triamcinolone acetonide (40mg/ml).

(1ml (40mg) of Triamcinolone acetonide is taken with 2ml of Lignocaine (2%).

PLATELET RICH PLASMA PREPARATION

The platelet rich plasma preparation has been done using desktop size centrifuge apparatus. 27 ml of whole blood is withdrawn from the patient

with 18 gauge needle. Blood is equally divided into three parts (nine ml each) which is then added to three pre filled test tubes, each containing one ml of 3.8% of sodium citrate solution. The blood is centrifuged at 1500 rpm for 15 minutes. By the end of the procedure the whole blood is separated into three layers such as platelet poor plasma (PPP), platelet rich plasma (PRP) and red blood cells (RBC). Platelet rich plasma is withdrawn from the middle layer.

INCLUSION CRITERIA

1. Age eligibility for study: 18 years and above.
2. Genders: Both male and female.
3. Duration of pain over lateral epicondyle more than three months.
4. Lateral elbow pain that is maximum at the lateral epicondyle and the pain is aggravated

with pressure on the lateral epicondyle and resisted wrist dorsiflexion.

EXCLUSION CRITERIA

1. Steroid injection within the last three months.
2. Chronic inflammatory disease like Rheumatoid arthritis.
3. Fibromyalgia.
4. Pain in hand or shoulder or neck in the same upper limb.
5. Uncontrolled diabetes and systemic hypertension.
6. On anticoagulation therapy.
7. Ulcers over the elbow.
8. Tumors in upper limb.
9. Healthy volunteers.



489

PRP Preparation



Steroid Preparation mixed with 2 ml of 2% Lignocaine

INJECTION PROTOCOL

Patients who met the inclusion criteria were randomly allocated into two groups by a lot method. Consent was obtained from the patients after explaining the study, benefits and complications of the procedure and regarding the need for regular follow up. Fresh blood was drawn from the platelet rich plasma (PRP) group patients (about 27 ml) and anticoagulant (three

ml) is added. Then blood was centrifuged at 1500 rpm for approximately 15 minutes and 3-4 ml of platelet rich plasma was prepared. Pre injection and post injection score were calculated.

INJECTION TECHNIQUE

The procedure was done on an outpatient basis. Once the exact location was determined by

assessing the maximum tenderness point clinically, the patient was injected with a local anesthetic drug (Lignocaine) under sterile technique. Platelet rich plasma group was injected with 3-4 ml platelet rich plasma, using a “peppering” technique in a clock wise manner to better cover the affected area of lateral epicondyle.

Triamcinolone acetonide (40mg/ml). One ml (40mg) of Triamcinolone acetonide is taken with two ml of Lignocaine (2%). It was injected in the maximum tenderness point deep into the tendon. The patient was then observed for 15 to 20 minutes and then discharged. After the injection, patient was allowed to follow our post injection protocol.



PRP Injection



Steroid Injection

POST INJECTION PROTOCOL

Since the patients may experience discomfort at the site of the injection for up to three days, they are advised to have ice fermentation over the injection site, limb elevation, activity modification and oral acetaminophen for pain relief.

FOLLOW UP

All the patients were followed up at fourth, eighth and twelfth week of post injection. One patient did not return for final follow up in platelet rich plasma (PRP) group. At follow up, pain was assessed according to Visual Analogue Scale (VAS) and Disabilities of the Arm, Shoulder and Hand (DASH) score and compared with pre injection score levels.

Final outcome was measured based on the pain reduction from the pre injection level.

Patients were observed for post injection complications.

COMPLICATIONS

1. In steroid group one patient had paraesthesia at the injection site of elbow at fourth week post injection but it disappeared at twelfth week with observation.

2. No case of infection, cellulitis was observed.
3. No neurovascular injury noted.

ANALYSIS OF DATA

PATIENTS

Between the abovementioned period, 40 cases of lateral epicondylitis who met the above criteria were included for the study. There were 26 females with 18 right side lateral epicondylitis and 8 left side lateral epicondylitis and 14 males with 11 right side lateral epicondylitis and 3 left side lateral epicondylitis. The mean age was 44.3 years and the range was 30 to 67 years. The mean duration of symptom was 4.8 months.

RESULTS

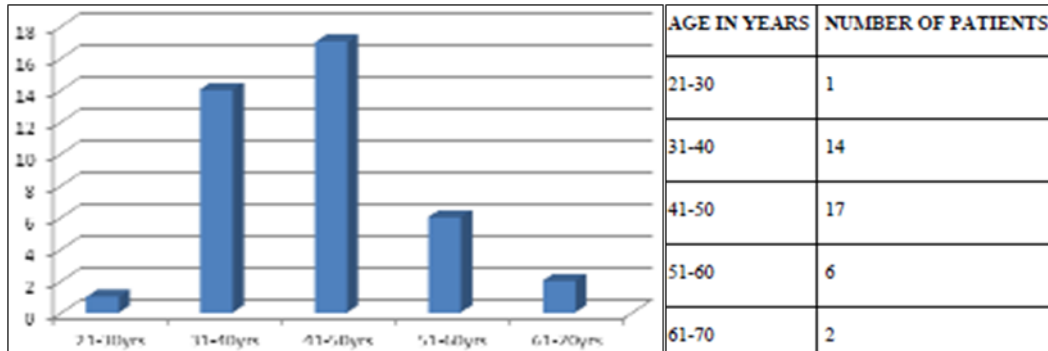
SEX DISTRIBUTION

MALE: 14.
FEMALE:26.

SIDE DISTRIBUTION:

RIGHT: 29.
LEFT: 11.

AGE AND DURATION OF SYMPTOMS



PRE-INJECTION SCORE

The average pre injection scores were:

1. PLATELET RICH PLASMA INJECTION GROUP

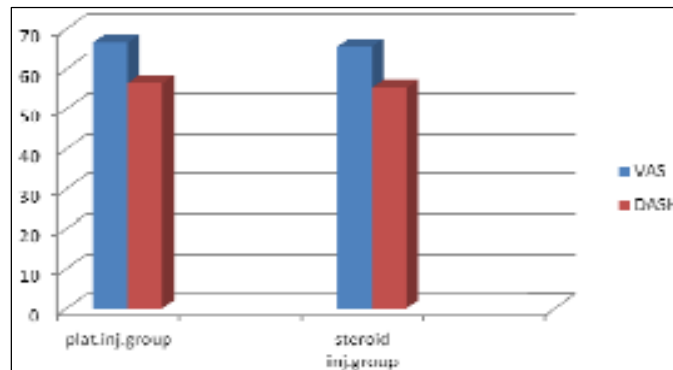
a. **VAS:** 66.6

b. **DASH:** 56.4

2. STEROID INJECTION GROUP

a. **VAS:** 65.5.

b. **DASH:** 55.2.



POST INJECTION SCORE

The average post injection scores at 4 weeks were:

1. PLATELET RICH PLASMA INJECTION GROUP:

a. **VAS:** 54.5.

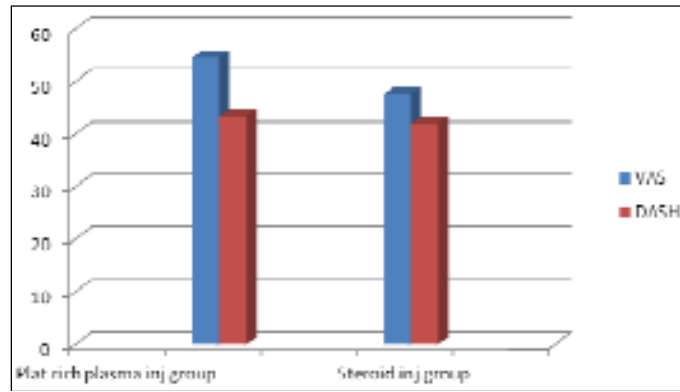
b. **DASH:** 43.4.

2. STEROID INJECTION GROUP:

a. **VAS:** 47.6.

b. **DASH:** 42.0.





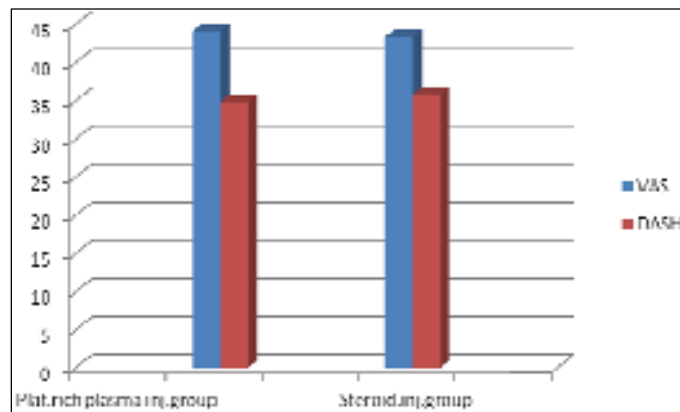
THE AVERAGE POST INJECTION SCORES AT 8 WEEKS WERE

1. PLATELET RICH PLASMA INJECTION GROUP

- a) VAS: 44.1.
- b) DASH: 34.8.

2. STEROID INJECTION GROUP

- a) VAS: 43.3.
- b) DASH: 35.8.



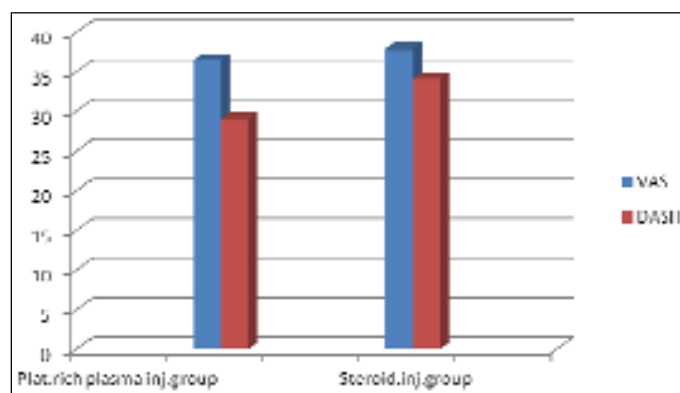
THE AVERAGE POST INJECTION SCORES AT 12 WEEKS WERE

1. PLATELET RICH PLASMA INJECTION GROUP

- a. VAS: 36.5
- b. DASH: 29.1

2. STEROID INJECTION GROUP

- a. VAS: 37.8.
- b. DASH: 34.0.



All the relevant data's were analyzed. The average Visual Analogue Scale (VAS) and Disabilities of the Arm, Shoulder and Hand

(DASH) scores in both the groups of pre injection, four, eight and 12 weeks post injection are shown in the below tables:

PLATELET RICH PLASMA GROUP

Pre injection score		Post injection score (4 weeks)		Post injection score (8 weeks)		Post injection score (12 weeks)	
VAS	DASH	VAS	DASH	VAS	DASH	VAS	DASH
66.6	56.4	54.5	43.4	44.1	34.8	36.5	29.1

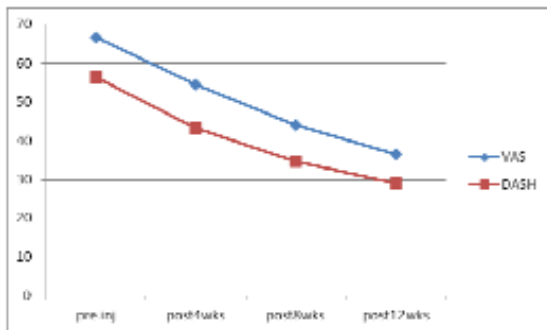
STERIOD GROUP

Pre injection score		Post injection score (4 weeks)		Post injection score (8 weeks)		Post injection score (12 weeks)	
VAS	DASH	VAS	DASH	VAS	DASH	VAS	DASH
65.5	55.2	47.6	42.0	43.3	35.8	37.8	34.0

The effects of our injection observed with the Visual Analogue Scale (VAS) and Disabilities of the Arm, Shoulder and Hand (DASH) scores in

the both the groups is depicted in a graph given below.

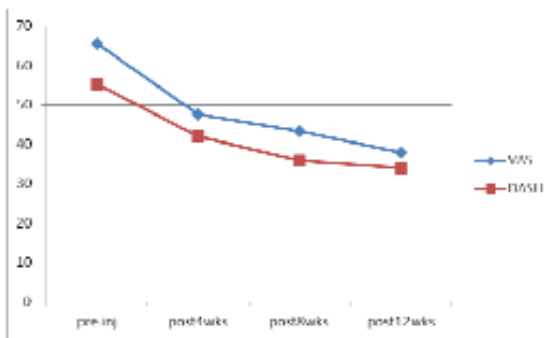
PLATELET RICH PLASMA GROUP



PLATELET RICH PLASMA GROUP

Pre injection score		Post injection score (4 weeks)		Post injection score (8 weeks)		Post injection score (12 weeks)	
VAS	DASH	VAS	DASH	VAS	DASH	VAS	DASH
66.6	56.4	54.5	43.4	44.1	34.8	36.5	29.1

STERIODS GROUP



STERIOD GROUP

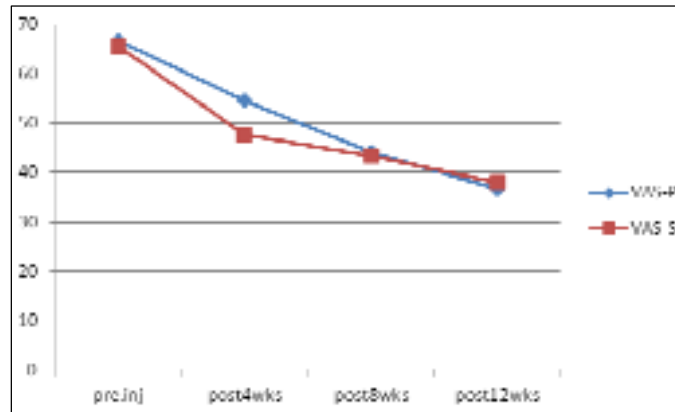
Pre injection score		Post injection score (4 weeks)		Post injection score (8 weeks)		Post injection score (12 weeks)	
VAS	DASH	VAS	DASH	VAS	DASH	VAS	DASH
65.5	55.2	47.6	42.0	43.3	35.8	37.8	34.0

From the above curves, it is clear that the steroid group had a steep curve than PRP group indicating the faster relief of pain initially. But at

the end of 12 weeks follow up the steroid group shows flat curve pattern whereas the platelet rich plasma group shows falling curve pattern.

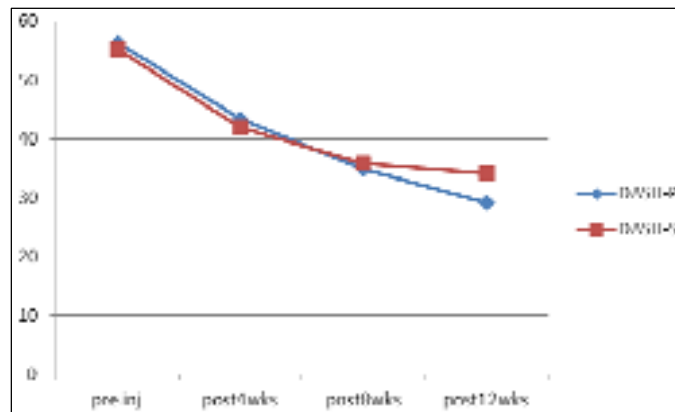
VAS COMPARISON IN BOTH PLATELET RICH PLASMA GROUP AND STERIOD GROUP





Visual Analogue Scale (VAS) in corticosteroid group increases at the end of 12 weeks comparative to platelet rich plasma group. In platelet rich plasma group decreases at four and eight weeks and

DASH COMPARISON IN BOTH PLATELET RICH PLASMA GROUP AND STERIOD GROUP



Disabilities of the Arm, Shoulder and Hand (DASH) score in corticosteroid group decreases at fourth week and increases at the end of twelfth week comparative to platelet rich plasma group.

In this study, the visual analogue scale (vas) Score in platelet rich plasma group is decreased by 30.1 and the disabilities of the arm, shoulder and Hand (dash) score is decreased by 27.3 at 12 weeks Compared to the pre injection score.

Whereas the visual analogue scale (vas) score, in steroid group is decreased by 27.7 and the Disabilities of the arm, shoulder and hand (dash) Score is decreased by 21.2 at 12 weeks compared to the pre injection score.

CONCLUSION

In conclusion, the comparative study of treatment of lateral epicondylitis with platelet rich plasma versus corticosteroid injection shows that a single injection of autologous platelet rich plasma improves elbow pain and

functional activities more effectively than corticosteroid injection in lateral epicondylitis. These improvements were maintained over in our follow up period without any significant complications. Corticosteroid gives better results up to eighth week and after that pain decreased slightly.

REFERENCES

1. Nirschl RP, Pettrone FA. Tennis elbow: the surgical treatment of lateral epicondylitis. *J Bone Joint Surg Am.* 1979;61(6):832-839.
2. Jobe FW, Ciccotti MG. Lateral and medial epicondylitis of the elbow. *J Am Acad Orthop Surg.* 1994;2(1):1-8.
3. Hong QN, Durand MJ, Loisel P. Treatment of lateral epicondylitis: where is the evidence? *Joint Bone Spine.* 2004;71(5):369-373.
4. Nirschl RP. Elbow tendinosis/tennis elbow. *Clin Sports Med.* 1992;11(4):851-870.

5. Smith RW, Papadopolous E, Mani R, Cawley MI. Abnormal microvascular responses in a lateral epicondylitis. *Br J Rheumatol*.
6. Wang JH, Iosifidis MI, Fu FH. Biomechanical basis for tendinopathy. *ClinOrthopRelat Res*. 2006;443:320-332.
7. Assendelft WJ, Hay EM, Adshead R, Bouter LM. Corticosteroid injections for lateral epicondylitis: a systematic overview. *Br J Gen Pract*. 1996;46(405):209-216.
8. Edwards SG, Calandruccio JH. Autologous blood injections for refractory lateral epicondylitis. *J Hand Surg Am*. 2003;28(2):272-278.
9. Smidt N, Assendelft WJ, Arola H, *et al*. Effectiveness of physiotherapy for lateral epicondylitis: a systematic review. *Ann Med*. 2003;35(1):51-62.
10. 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(9307):657-662.
11. Wong SM, Hui AC, Tong PY, Poon DW, Yu E, Wong LK. Treatment of lateral epicondylitis with botulinum toxin: a randomized, double-blind, placebo-controlled trial. *Ann Intern Med*. 2005;143(11):793-797.
12. Sampson S, Gerhardt M, Mandelbaum B. Platelet rich plasma injection grafts for musculoskeletal injuries: a review. *Curr. Rev Musculoskelet Med*. 2008;1(3-4):165-174.
13. Everts PA, Overdevest EP, Jakimowicz JJ, *et al*. The use of autologous platelet-leukocyte gels to enhance the healing process in surgery, a review. *SurgEndosc*. 2007;21(11):2063-2068.