Evaluation of Functional Outcome of Single Dose Intralesional Autologous Blood Vs Corticosteroid Injection in Chronic Plantar Fascitis

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ABSTRACT

Introduction: Plantar fascitis is one of the main underlying causes of acute and chronic heel pain. Diagnosis is mainly based on clinical symptoms and most of the time diagnostic imaging is not required routinely. Corticosteroid injection and autologous blood injection has been a possible means of treatment. Injection of autologous blood can help stimulate a healing response in chronic tendon disorders. **Aims:** To compare the functional outcome of single dose intra-lesional injection of autologous blood and corticosteroid in chronic plantar fascitis. **Methods:** This study was done in Nepalgunj medical college and teaching hospital during the period of March 2023 to August 2023 in the department of orthopedics. Sixty patients were enrolled in the study with 30 patients in each group. The patients were selected according to our inclusion and exclusion criteria and diagnosis made on clinical examination alone. The pain status was noted on the visual analog scale and the activity level noted based on the Nirschl stage. The final outcome was based on our scoring system based on the pain status and the activity level at two, four- and twelve-weeks' duration and graded into four categories as excellent, good, and acceptable and poor. **Results:** We found that in chronic plantar fascitis, local intralesional steroid injection gives better pain relief and faster return to activities of daily living compared to autologous blood injections. In our study we found that 17.85% had excellent outcome, 35.72% had good outcome and 12% had acceptable outcome in steroid group, whereas in autologous blood group 7.40% had excellent, 22.22% had good and 70.37% had acceptable outcome respectively. **Conclusion:** Intralesional steroid injection in chronic plantar fascitis have shown to achieve better functional outcome than autologous blood injection.

Keywords: Autologous blood, Corticosteroid, Intra-lesional injection, Nirschl stage, Visual analog scale

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INTRODUCTION

Plantar fascitis (PF) is the most common cause of heel pain.[1] It is an inflammation of the fascia of the plantar surface of the foot usually at the calcaneal attachment.[2] About 10% of people worldwide experience heel pain at some point in their lives.[3] Plantar fasciitis is diagnosed on the basis of a history of pain on taking the first few steps in the morning, worsening pain with weight bearing and pain and tenderness to palpation over the medial calcaneal tubercle.[4,5] The modality of treatment constitutes of anti-inflammatory drugs, physiotherapy, foot splints/braces, extracorporeal shock wave, steroid injections, autologous blood injections, nitroglycerin patches and surgical procedures.

Many studies and papers have been written in the support of corticosteroid injection as a reliable and quick pain killer.[6] Corticosteroids are known to inhibit proliferation of fibroblasts and to decrease the synthesis of ground substances. Autologous blood injections on the other hand target the plantar fascitis in order to heal it and bring out pain relief resultantly.[7] The use of autologous blood which contains various growth factors is thought to heal through collagen regeneration and angiogenesis. The degranulation of the alpha granules in the platelets releases many different growth factors that play a role in tissue regeneration processes. Platelet derived growth factor, transforming growth Factor-P, vascular derived endothelial growth factor, epithelial growth factor and insulin-like growth factor are examples of such growth factors.

The intention behind this study was to compare the functional outcome of these two injections, autologous blood, and steroid in plantar fasciitis.

METHODS

This is a prospective, comparative study of patient who attended Orthopedic OPD at Nepalgunj medical college, Kohalpur during the time spanning March 2023 to August 2023, patient meeting inclusion criteria were randomly allocated on the basis of alternate patient to each group, either autologous blood injection or corticosteroid injection as treatment. Both groups were analyzed with visual analogue scale (VAS) for pain and Nirschl staging for activity level at presentation, two-week, four week and twelve-week post injection intervals and results were tabulated. All patients were treated on OPD basis.

Inclusion Criteria: Unilateral heel pain more than six weeks, those patients failed to improve with oral analgesics, foot wear modification and physiotherapy modalities for more than four weeks.

Exclusion Criteria: Bilateral heel pain, has undergone previous local injections, not willing for follow-up, Patients with medical illnesses like diabetes and hypertension.

Technique: Patients were positioned supine and the heel involved was thoroughly scrubbed and painted with povidone-iodine solution. Point of maximum tenderness was located by palpation at the level of medial process of calcaneal tuberosity and injection was performed. Pain of the participants was assessed by most widely used and accepted Nirschl staging and "visual analogue scale."

Nirschl staging.8

0 – no pain

1 – mild pain with exercise which resolves within 24 hours

2 – pain after exercise which exceeds 48 hours

3 – pain with exercise, but allows normal activity

4 – pain with exercise which interferes with normal activities

5 – pain with heavy activities of daily living, but able to do light activity

6 – pain with light activities of daily living and intermittent rest pain

7- pain with heavy activities of daily living, but able to do light activity.

After the procedure was completed, before getting discharged the patients were kept under observation for 15 minutes for hemodynamic stability. Final outcome of both the group is assessed at two-, four- and twelve-week follow-up, based upon the following outcome:

Excellent: No pain, full movement and activity.

Good: Occasional pain, full movement and activity.

Acceptable: Some discomfort after prolonged activity.

Poor: Pain limiting activity.

Injection Technique: In case of autologous blood injection, 2 ml of the venous blood was drawn from antecubital vein from the patient him/ herself and mixed with 1 ml of 2% lignocaine. In case of steroid, 2 ml of methyl prednisolone amounting to 80 mg was mixed with 1 ml of 2% lignocaine. Sterile aseptic precautions were followed. The site of maximum tenderness in the heel was located by careful palpation. The injection was made through the medial aspect of the foot. After the injection, patient was allowed to follow our post-injection protocol.

Post-Injection Protocol: Ice therapy and compression bandage, advised not to take NSAID'S for at least four weeks' post-injection and no activity restrictions was done.

Figure 1: Autologous blood injection site

Figure 2: Steroid injection site

Follow-Up:

All the patients were followed up at two, four and twelve-weeks post-injection. At follow up, pain was assessed using the visual analog scale and Nirschl stages and compared with their respective pre-injection levels. Final Outcome was measured based on the pain and activity levels and graded into four categories. Patients were also observed for complications if any at the injection site.

RESULTS

Total 60 cases of unilateral plantar fasciitis meeting the inclusion criteria were involved in this study, out of which total of five patients did not return for the final follow-up at twelve weeks which included two in the steroid group and three in the autologous blood group were excluded from study. There were 15 (27.27%) males and 40 (72.73%) females. The male to female ratio was 1:2.66. Sex distribution is shown in the table I below.

Sex	Number
Male	15 (27.27 %)
Female	40 (72.73%)
Total	**55 (100%)**

Table I: Sex distribution

The mean age of patient was 43.56 and ranging from 21 years to 67 years. The age wise distribution of patient is shown in table II. The right foot was involved in 16 (29.10%) and the left foot was involved in 39 (70.90%) subjects. The mean duration of symptoms was 6.12 months.

	Number	Percentage
21-30 years	8	14.54
31-40 years	21	38.18
41-50 years	12	21.81
51-60 years	9	16.36
>60 years	5	9.10
Total	**55**	**100**

Table II: Age distribution

The median pre-injection scores in autologous blood injection group were 7 VAS and 5 Nirschl scoring while in steroid injection group it was 7 VAS and 6 Nirschl score respectively.

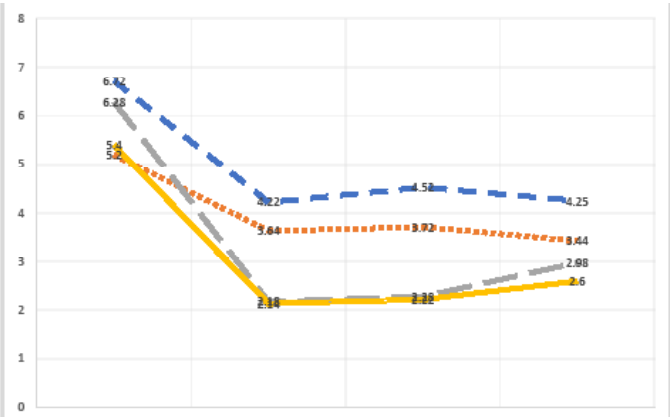

Figure 3: VAS and Nirschl scoring pre and post injection in blood injection group and steroid group

From the above curve it is clear that the autologous blood group followed a gentle curve during the 2 weeks after injection compared to that of the steroid curve. At the end of 12 weeks, the effect is still sustained shown by its down coming curve pattern. Similarly, it is clear that the steroid group had a steep curve during the 2 weeks after injection compared to that of the autologous blood group curve. At the end of 12 weeks, the effect has started slowly weaning off shown by its up going curve pattern.

According to the final outcome assessment scoring, the results at post-injection 12 weeks were as follows in table III.

	Autologous blood group	Steroid group
Excellent	2 (7.40 %)	5 (17.85 %)
Good	6 (22.22 %)	10 (35.72 %)
Acceptable	19 (70.37 %)	12 (42.85 %)
Poor	0	1 (3.57%)
Total	**27**	**28**

Table III: Final outcome based on pain and activity level

DISCUSSION

Plantar fasciitis means inflammation of plantar fascia at its attachment, but recent studies indicates it as a degeneration of the plantar fascia rather than true inflammation which was supported by the findings of pathologist that only very few inflammatory cells were found in specimens received from cases of chronic plantar fasciitis.[9] In this study we found that patients who received corticosteroid showed quicker improvement and probably to a greater extent compared to intralesional autologous blood injection over three months post injection. Furthermore, other studies have shown that once plantar fasciitis becomes chronic, the response to any form of treatment is unpredictable.[10]

Several modalities of treatment of chronic plantar fasciitis are there, classified as conservative and invasive treatment. Initially treatment is started with combination of conservative management including rest, ice pack application, NSAID'S and footwear modifications.[11,12] Intralesional injections like corticosteroids, autologous blood, platelet rich plasma and botulinum toxin are given. Various studies show advantages and disadvantages of one treatment option over the other.[13]

The efficacy of corticosteroid in treating chronic inflammation has been well demonstrated.[14] While autologous whole blood contains platelets with growth factors like platelet derived growth factor, vascular endothelial growth factor and fibroblast growth factor that promotes healing. It stimulates the healing process and lead to partial modification of the damaged tissue, induces angiogenesis, increase growth factor expression and cell proliferation.[15,16]

Martin et al studied the effect of intra-lesional autologous blood injections in chronic plantar fasciitis in over 200 patients and reported good results in about 80%. In our study, in the autologous blood group, 22.22 % had good and 70.37 % had acceptable outcomes.[9] In a study by O Malley and colleagues, patients with chronic PF who received corticosteroid injection showed improvement quicker and probably to a greater extent at four weeks, but the response was similar to autologous whole blood injection at longer follow-up.[17] In a clinical trial conducted by Jain et al on 60 heels with intractable chronic plantar fasciitis, autologous whole blood was as effective as steroid injection at achieving symptom relief at three and six months after injection, and its effect lasted longer than corticosteroid injection.[18] According to the recent meta- analysis by Tsikopoulos K and colleagues, corticosteroids were marginally superior to autologous blood in pain reduction on PF at two to six weeks.[19] In our study, in the steroid group, 35.72% had good, 42.85% had acceptable and 17.85% had excellent outcomes. In our study, one patient in the steroid group had poor outcome and was advised another intra-lesional injection of the same substance.

Lee TG and Ahmad TS conducted a comparative study between autologous blood and corticosteroid injection in chronic plantar fasciitis and found corticosteroids were much better in the speed and the overall outcome of recovery compared to autologous blood.[20] From our results we found that autologous blood has late and sustained beneficial effect whereas Steroid injections provide faster and better relief of pain compared to autologous blood, but the beneficial effect is only short lived. There were no any complications in both the group. The main limitation of this study is single hospital-based study, small sample size and duration of follow-up. Also, in this study patient were not blinded to the treatment they received which could be the source of bias.

CONCLUSION

We conclude that in chronic plantar fasciitis: local intra-lesional steroid injection gives better pain relief and faster return to activities of daily living compared to autologous blood injections.

REFERENCES

1. Buchbinder R. Plantar fasciitis. New England Journal of Medicine. 2004 May 20;350(21):2159-66
2. Dirckx JH. Stedman's concise medical dictionary for the health professions: illustrated. 4th edn. Baltimore, MD: Lippincott Williams & Wilkins 2001.
3. Heel pain—plantar fasciitis: revision 2014. Martin RL, Davenport TE, Reischl SF, McPoil TG, Matheson JW, Wukich DK, et al. J Orthopaedic Sports Physical Therapy 2014;44(11): A1-A33.
4. Lemont H, Ammirati KM, Usen N. Plantar fasciitis: a degenerative process (fasciosis) without inflammation. Journal of the American Podiatric Medical Association. 2003 May 1;93(3):234-7.
5. Grawford F, Atkins D, Edwards J. Interventions for treating plantar heel pain. Cochrane Database Syst Rev 2000;(3):CD000416.
6. Ultrasound-versus palpation-guided injection of corticosteroid for plantar fasciitis: a meta-analysis. Li Z, Xia C, Yu A, Qi B. PLoS One 2014; 9(3):e92671.
7. Tseng WC, Uy J, Chiu YH, Chen WS, Vora A. The Comparative Effectiveness of Autologous Blood-derived Products Versus Steroid Injections in Plantar Fasciitis: A Systematic Review and Meta-analysis of Randomized Controlled Trials. PM&R. 2021 Jan;13(1):87-96.
8. Nirschl RP, Ashman ES. Elbow tendinopathy: tennis elbow. Clin Sports Med. 2003; 22(4):813-836.
9. Arun S. A comparative study between single dose intralesional autologous blood and corticosteroid injection in chronic plantar fasciitis: A Short term follow-up study (Doctoral dissertation, Coimbatore Medical College, Coimbatore).
10. Martin, RL; Irrgang, JJ; Conti, SF: Outcome study of subjects with insertional plantar fasciitis. Foot Ankle Int. 19:803 – 811, 1998.
11. Craig C.Young,Darin S.Rutherford,Mark W.Niedfeldt Am Fam Physician.2001.Feb.1; 63(3):467-75
12. Wolgin, M, Cook C, Graham, C, Mauldin D. Conservative Treatment of Plantar Heel Pain: Long-term Followup." Foot Ankle Int, 1994, 15:97-102.
13. Kalaci A, Çakici H, Hapa O, Yanat AN, Dogramaci Y, Sevinç TT. Treatment of plantar fasciitis using four different local injection modalities: a randomized prospective clinical trial. Journal of the American Podiatric Medical Association. 2009 Mar 1;99(2):108-13.
14. Foster ZJ, Voss TT, Hatch J, Frimodig A. Corticosteroid injections for common musculoskeletal conditions. American family physician. 2015 Oct 15;92(8):694-9.
15. Sandrey MA. Autologous growth factor injections in chronic tendinopathy. Journal of athletic training. 2014 Jun 1;49(3):428-30
16. Vahdatpour B, Kianimehr L, Ahrar MH. Autologous platelet-rich plasma compared with whole blood for the treatment of chronic plantar fasciitis; a comparative clinical trial. Advanced biomedical research. 2016 Jan 1;5(1):84.
17. O'malley MJ, Vosseller JT, Gu Y. Successful use of platelet-rich plasma for chronic plantar fasciitis. HSS Journal®. 2013 Jul;9(2):129-33.
18. Jain K, Murphy PN, Clough TM. Platelet rich plasma versus corticosteroid injection for plantar fasciitis: a comparative study. The Foot. 2015 Dec 1;25(4):235-7.
19. Tsikopoulos K, Tsikopoulos A, Natsis K. Autologous whole blood or corticosteroid injections for the treatment of epicondylopathy and plantar fasciopathy? A systematic review and meta-analysis of randomized controlled trials. Physical Therapy in Sport. 2016 Nov 1;22:114-22.
20. Intralesional autologous blood injection compared to corticosteroid injection for treatment of chronic plantar fasciitis. A prospective, randomized, controlled trial. Lee TG, Ahmad TS. Foot Ankle Int. 2007 Sep; 28(9):984-90.