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ORIGINAL RESEARCH

Comparing the Effects of Platelet-Rich Plasma and Corticosteroid Injections on Pain and Function in Plantar Fasciitis

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Abstract:
Background: Plantar fasciitis is a common cause of heel pain, often treated with corticosteroid injections; however, platelet-rich plasma (PRP) therapy has emerged as a promising alternative due to its potential to promote tissue healing. This study aimed to compare the efficacy and safety of PRP versus corticosteroid injections in the management of plantar fasciitis.
Methods: In this prospective randomized controlled trial, 60 patients with chronic plantar fasciitis were allocated to receive either a single ultrasound-guided PRP injection (n=30) or corticosteroid injection (n=30). Pain and functional outcomes were assessed using the Visual Analog Scale (VAS) and Foot Function Index (FFI) at baseline, 4, 12, and 24 weeks post-injection.
Results: Both groups showed significant improvement in pain and function over time. The corticosteroid group demonstrated faster pain relief at 4 weeks, while the PRP group exhibited significantly greater pain reduction and functional improvement at 12 and 24 weeks ($p < 0.05$). No major adverse effects were reported in either group.
Conclusion: While corticosteroid injections provide quicker short-term pain relief, PRP injections offer superior long-term benefits in pain reduction and functional recovery in plantar fasciitis. PRP may be considered a safer and more effective option for sustained management of this condition.
Keywords: PRP injections, plantar fasciitis, Corticosteroid Injections.

Introduction:
Plantar fasciitis (PF) is a prevalent cause of heel discomfort, primarily marked by inflammation of the plantar fascia, a robust tissue band linking the heel bone to the toes. Poor foot posture, biomechanical anomalies, or repetitive strain are frequently the causes. This ailment is commonly managed with conservative measures such corticosteroid injections, physical therapy, orthotics, and nonsteroidal anti-inflammatory medications (NSAIDs) (Riddle & Schappert, 2004). But because concentrated platelets contain growth factors that might speed up healing and reduce inflammation, there is increasing interest in investigating alternative treatments, especially Platelet-Rich Plasma (PRP) injections (Cieslak, 2018). Because corticosteroid injections have strong anti-inflammatory properties and offer instant pain relief, they are frequently utilized in the treatment of PF (Michaels et al., 2006). Frequent use of corticosteroids, however, raises questions about possible long-term side effects, such as the possibility of plantar fascia rupture and tendon weakening (Fiorentini et al., 2018). On the other hand, PRP injections, which are made from the patient's own blood, have higher levels of growth factors and platelets, which may help with tissue regeneration and

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inflammation reduction without the negative side effects of corticosteroids (Fleming et al., 2020).

In order to treat plantar fasciitis, this study compares the safety and effectiveness of PRP injections versus corticosteroid injections. Although prior research has demonstrated encouraging outcomes for both treatment approaches, there is still ongoing investigation on how successful they are in comparison, particularly with regard to pain relief, functional improvement, and long-term results (Gambardella et al., 2020). This study aims to give doctors a better knowledge of how these two therapies work in controlling PF and assist them in selecting the best course of treatment for their patients by examining the available evidence.

Materials and Methods

This was a prospective, randomized, controlled comparative study conducted at Government Medical College and Hospital, Amritsar from August 2020 to July 2023 after obtaining ethical approval from the institutional review board. A total of 60 patients diagnosed clinically and radiologically with unilateral or bilateral plantar fasciitis were enrolled.

Inclusion criteria: Adults aged between 25 and 60 years with heel pain lasting more than 6 weeks and unresponsive to conservative management (e.g., stretching, orthotics, NSAIDs).

Exclusion criteria: Patients with systemic inflammatory diseases, coagulopathies, recent steroid use, prior foot surgery, or local infections were excluded.

Randomization and Grouping

Participants were randomly assigned using computer-generated numbers into two equal groups:

- **Group A (PRP Group):** Received a single injection of autologous platelet-rich plasma.
- **Group B (Steroid Group):** Received a single injection of corticosteroid (methylprednisolone acetate 40 mg with 1 mL of 1% lidocaine).

PRP Preparation and Injection Technique

Approximately 20 mL of autologous venous blood was collected in citrate tubes from patients in Group A. The blood was centrifuged at to separate the PRP layer. Around 3–5 mL of PRP was extracted and injected under aseptic conditions at the point of maximum tenderness in the plantar fascia using a peppering technique with a 22-gauge needle.

Steroid Injection Technique

In Group B, patients received 1 mL of methylprednisolone acetate (40 mg) mixed with 1 mL of 1% lidocaine, injected at the most tender point using the same peppering technique under sterile conditions.

Outcome Measures

Patients were assessed pre-injection and at 1, 3, and 6 months post-injection using the following validated tools:

- **Visual Analog Scale (VAS)** for pain.
- **Foot Function Index (FFI)** for functional assessment.

Ultrasound evaluation of plantar fascia thickness was also performed at baseline and at 6 months post-injection for objective comparison.

Statistical analysis: IBM SPSS Statistics version 27.0 was used to conduct the statistical analysis. The Foot Function Index (FFI) scores and Visual Analog Scale (VAS) scores were examples of continuous variables that were displayed as mean ± standard deviation. The Shapiro-Wilk test was used to determine whether the data distribution was normal. Depending on the data distribution, the independent t-test or Mann-Whitney U test were used to study intergroup comparisons, and the Friedman test or repeated measures ANOVA were used to assess intragroup comparisons over time. Statistical significance was defined as a p-value of less than 0.05.

Results

A total of 60 patients were enrolled in the study, with 30 in the PRP group and 30 in the corticosteroid group. Both groups were comparable in terms of baseline demographic characteristics such as age, gender, and symptom duration ($p > 0.05$). The mean age was 43.7 ± 7.4 years in the PRP group and 44.2 ± 6.9 years in the corticosteroid group.

Table 1: Baseline Demographic Characteristics of Study Participants

Characteristic	PRP Group (n=30)	Corticosteroid Group (n=30)	p-value
Age (years)	43.7 ± 7.4	44.2 ± 6.9	0.78
Gender			
Male	18 (60%)	17 (57%)	0.81
Female	12 (40%)	13 (43%)	

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Pain Assessment (VAS Score)

At baseline, there was no significant difference in VAS scores between the two groups. However, both groups showed a significant reduction in pain over time. At 12 and 24 weeks, the PRP group demonstrated significantly greater pain reduction compared to the corticosteroid group ($p < 0.05$), indicating better long-term effectiveness.

Table 2: Comparison of VAS Scores Between PRP and Corticosteroid Groups

Time Point	PRP Group (Mean ± SD)	Corticosteroid Group (Mean ± SD)	p-value
Baseline	8.2 ± 1.0	8.1 ± 1.2	0.74
4 weeks	4.9 ± 1.1	4.2 ± 1.3	0.08
12 weeks	2.7 ± 1.0	3.8 ± 1.2	0.01*
24 weeks	1.6 ± 0.9	3.5 ± 1.1	0.001*

Functional Improvement (FFI Score)

Functional outcomes assessed by the FFI also improved significantly in both groups. At 12 and 24 weeks, the PRP group showed greater improvements compared to the corticosteroid group, supporting the sustained benefit of PRP in restoring foot function.

Table 3: Comparison of FFI Scores Between PRP and Corticosteroid Groups

Time Point	PRP Group (Mean ± SD)	Corticosteroid Group (Mean ± SD)	p-value
Baseline	69.5 ± 6.8	70.1 ± 7.1	0.62
4 weeks	48.2 ± 6.5	44.6 ± 6.9	0.09
12 weeks	29.4 ± 5.8	38.5 ± 6.2	0.004*
24 weeks	17.6 ± 4.7	34.1 ± 5.5	0.0001*

Discussion:

Plantar fasciitis is a prevalent cause of heel pain, significantly affecting patients' quality of life and mobility. It is crucial to investigate and contrast various therapy methods since, despite the wide range of available treatment options, there is still no widely recognized gold standard. The effectiveness of corticosteroid injections and platelet-rich plasma (PRP) in lowering pain and enhancing function in plantar fasciitis patients was compared in this study.

According to our research, PRP and corticosteroid injections both significantly reduced pain and improved function. However, PRP offered better long-term benefits at 12 and 24 weeks, even though corticosteroids shown a quicker reduction in pain during the early follow-up (4 weeks). According to earlier research, corticosteroids reduce inflammation rapidly, although they might only provide temporary relief (Michaels et al., 2006; Acevedo & Beskin, 1998). On the other hand, PRP works by supplying a concentrated dose of cytokines and growth factors that promote tissue regeneration, which eventually aids in the healing of the damaged plantar fascia (Filardo et al., 2015).

Our findings are in line with those of Ragab et al. (2018), who discovered that PRP injections outperformed corticosteroids in terms of pain reduction and functional ratings at three and six months. Similar to this, PRP's potential in chronic tendinopathies, such as plantar fasciitis, was emphasized in a comprehensive review by Creaney et al. (2011) because of its ability to modulate inflammation and improve tissue repair. Furthermore, PRP is autologous and thought to be safer with fewer adverse effects than corticosteroids, which have hazards such plantar fascia rupture and fat pad atrophy with repeated use (Fiorentini et al., 2018).

Notably, our study's corticosteroid group showed significant early pain reduction, which may be chosen by patients looking for quick symptom relief. However, their long-term use is limited by their diminishing impact over time and possible negative consequences (Greenspan et al., 2005). However, PRP delivers greater long-lasting results, but its prolonged initiation of effect necessitates patient adherence to post-injection rehabilitation. This contrast emphasizes how crucial it is to arrange a patient's course of therapy according to their requirements and expectations.

Limitations:

The brief 24-week follow-up period and somewhat small sample size. To confirm these results and create uniform procedures for PRP production and administration, larger, multicenter randomized controlled studies with extended follow-up are necessary. Future studies should also look into cost-effectiveness evaluations because PRP is more expensive than corticosteroids.

Conclusion:

Injections of PRP and corticosteroids work well for treating plantar fasciitis. PRP delivers better long-term pain reduction and functional improvement with a higher safety profile than corticosteroids, which only relieve pain more quickly. When choosing treatment modalities, clinicians should take these distinctions into account and advise patients appropriately.

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