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**K Parasuraman**  
Assistant Professor, Department of Orthopaedics, Rajah Muthiah Medical College, Chidambaram, Tamil Nadu, India

**A Senthilnathan**  
Professor, Department of Orthopaedics, Rajah Muthiah Medical College, Chidambaram, Tamil Nadu, India

**K Vijaya Shankar**  
Assistant Professor, Department of Orthopaedics, Rajah Muthiah Medical College, Chidambaram, Tamil Nadu, India

**P Krishna Balaji**  
Post Graduate, Department of Orthopaedics, Rajah Muthiah Medical College, Chidambaram, Tamil Nadu, India

**Corresponding Author:**  
**A Senthilnathan**  
Professor, Department of Orthopaedics, Rajah Muthiah Medical College, Chidambaram, Tamil Nadu, India

## A prospective study to assess the effectiveness of corticosteroid injection in the treatment of chronic plantar fasciitis

**K Parasuraman, A Senthilnathan, K Vijaya Shankar and P Krishna Balaji**

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### Abstract

**Introduction:** Corticosteroids have been used to treat plantar fasciitis since 1950's [19]. Steroids are known to inhibit the proliferation of fibroblasts and synthesis of ground substances. The beneficial effect of steroid injection is due to the above action in addition to its anti-inflammatory role.

**Materials and Methods:** 25 patients with unilateral chronic plantar fasciitis who were not responding to conservative management for 6 weeks were included in this study. The study was done at the Orthopaedics department at RMMCH, Annamalai University, from October 2020 to October 2021. Functional outcome was evaluated using visual analog score [VAS] and Foot and ankle ability measure [FAAM] scores at 0,4,8,12 and 24 weeks. Plantar fascia thickness was measured pre-injection and 6 months post-injection using ultrasound.

**Results:** Patients had a pre-treatment VAS score of 8.30 and FAAM score of 29.96 after 6 months of follow-up, the score improved to 3.85 and 70.18, respectively. Pre-treatment Plantar fascia thickness was 5.76 mm, 6 months follow-up study showed the thickness of 4.56 mm.

**Conclusion:** Corticosteroid injections are effective in the treatment of chronic plantar fasciitis that, gives rapid relief in pain symptoms and increases the functional outcome.

**Keywords:** VAS, FAAM, Corticosteroids

### Introduction

Plantar fasciitis is used to describe the heel pain caused by an inflammation of the plantar fascia due to one-off tear in the fascia or damage from repetitive micro trauma [1-6]. Plantar fasciitis is common in athletes [5], obese individuals, tight tendo-achilles and improper footwear and on prolonged standing. Patients have complaints of sharp pain, insidious in onset with maximal tenderness along the anteromedial aspect of calcaneum. Pain is more severe in morning, after first step from bed and after prolonged sitting or inactivity.

Corticosteroids have been used in the treatment of plantar fasciitis since 1950's. Steroids are known to inhibit the proliferation of fibroblasts and the synthesis of ground substances. The beneficial effect of steroid injection is due to the above action in addition to its anti-inflammatory role. The advantages of using steroid injections include low cost [21,25], and gives rapid relief in pain symptoms. However, many are concerned about the potential complications of steroid injection, which may offset its benefits [7, 20, 22, 30].

Various treatment options include Rest, NSAIDS, stretching protocols, foot orthotics, physiotherapy, ESWT, Cortico-steroids, autologous blood. PRP injection has also been included in recent times. Surgical management has been reserved for recalcitrant cases of plantar fasciitis.

### Materials and Methods

The study was conducted at the Department of Orthopaedics, RMMCH, Annamalai University, Chidambaram from 2020-2021. 25 patients with unilateral chronic plantar fasciitis who were not responding to conservative management for 6 weeks were included in this study. Ethical committee clearance was obtained.

Informed written consent was obtained from all patients who were willing for the treatment and follow-up. Patients were diagnosed with chronic plantar fasciitis based on their history, radiological evaluation and ultrasonic evaluation of PF thickness.

#### Inclusion criteria

1. Unilateral heel pain >6weeks.
2. Has taken conservative treatment with oral analgesics, foot wear modification and physiotherapy for >4 weeks with no improvement in symptoms.
3. Not undergone any previous local injections in the heel.
4. Willing for follow-up
5. Normotensive and normoglycemic patients

#### Exclusion criteria

1. Bilateral heel pain
2. Has undergone previous local injections
3. Not willing for follow-up

4. Patient with other medical illness
5. Achilles tendon pathology and foot deformity
6. Patients who have had previous foot surgery

#### Corticosteroid injection:

Different corticosteroid injections were used in various studies. It includes long-acting steroids like dexamethasone and betamethasone. Some studies investigated the use of intermediate acting steroids like methylprednisolone [21-25], prednisolone, triamcinolone. In our study, we used 2ml of injection methyl prednisolone acetate [40 mg/ml]

#### Ultrasonic Evaluation of Plantar Fascia Thickness:

A diagnostic ultrasound machine with a 4 cm wide transducer head and 8 MHz probe was used [1]. The thickness of the plantar fascia (fig: 1) was measured at the thickest portion from the base of the medial calcaneal tubercle, where a bright echogenic line was easily visible. Plantar fascia thickness of more than 4mm was considered abnormal [12-14].



**Fig 1:** Ultrasonic evaluation of plantar fascia thickness

#### Injection Protocol

The procedure was done on an OPD basis under strict aseptic precautions. Patient in supine position, the site of maximal tenderness over the medial calcaneal tubercle was identified. [fig 2] 2cc of 2 ml lignocaine was injected into the skin before

steroid (fig: 2) application. A ‘peppering’ technique ie., spreading in a clockwise manner was used to achieve a more expansile zone of delivery over the plantar fascia [a single portal and 4 to 5 passes through the fascia itself].



**Fig 2:** Cortico steroid injection technique

**Post Injection Protocol**

The patients were monitored for 60 minutes after injection for any adverse reactions. Advised to limit their use of the feet and use of NSAIDS for 48 hrs.

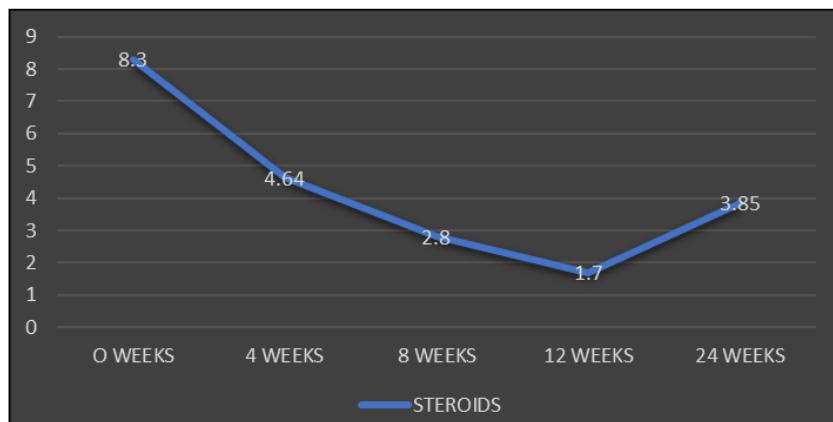
After 48 hrs, patients were given foot stretching protocols to follow for 3 weeks. At 4 weeks, patients were allowed to proceed with sporting or recreational activities. Any type of foot orthoses was not advised.

**Assessment of Outcome**

Patient outcome was assessed using VAS score based on pain scale and FAAM [FOOT AND ANKLE ABILITY MEASURE] for assessment of pain and functional outcome.

**Results**

**VAS Score:** The baseline VAS score<sup>15</sup> was 8.30, 12 weeks follow-up VAS score was 1.70. After 24 weeks, the final score was 3.85[graph and table: 1]



**Graph 1:** Vas Score Comparison

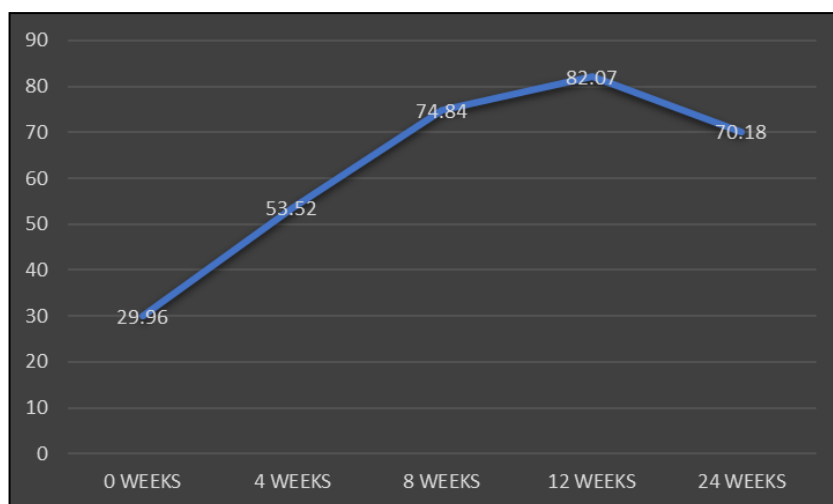
**Table 1:** VAS score comparison

Time interval	Mean	Standard error mean	P-value
0 weeks	8.30	0.074	<0.001
4 weeks	4.64	0.168	<0.001
8 weeks	2.80	0.221	<0.001
12 weeks	1.70	0.056	<0.001
24 weeks	3.85	0.142	<0.001

**FAAM Score**

The baseline FAAM score was 29.96,12 weeks follow up

score was 82.07 After 24 weeks, the final score was 70.18[graph and table: 2]



**Graph 2:** Faam Comparison

**Table 2:** FAAM Comparison

Time interval	Mean	Standard error mean	P-value
0 weeks	29.96	0.763	<0.001
4 weeks	53.52	0.764	<0.001
8 weeks	74.84	0.745	<0.001
12 weeks	82.07	0.786	<0.001
24 weeks	70.18	0.658	<0.001

### Ultrasonic evaluation of plantar fascia thickness

In PRP group, the mean plantar fascia thickness before injection was 5.76 mm. After 24 weeks, the mean thickness was 4.56mm. There was a reduction in plantar fascia thickness in all patients.

### Discussion

Corticosteroid injections have been in use for a long time in the treatment of plantar fasciitis. In a study performed by Saba<sup>[17]</sup> and El-Sherif they found steroids to be an effective method for treating plantar fasciitis with significant symptomatic relief at 4 weeks follow-up.

McMillan *et al.* did study where dexamethasone was shown to have good response when compared to the placebo group at 4 weeks follow up. A significant difference was seen at 12 weeks follow up in both steroid and control groups<sup>[12, 18]</sup>.

Tatli and Kapasi found high frequency of recurrence and relapse in patients who received steroid injection. Steroid injection predispose the tissue to fragility and subsequent rupture<sup>[19]</sup>. Acevedo and Beskin did studies on 765 patients with plantar fasciitis in which 51 patients suffered a plantar fascia rupture, our study did not show any rupture<sup>[20]</sup>.

The type of corticosteroids used for plantar fasciitis may vary, as there is limited evidence to suggest the superiority of one agent over the other. A meta-analysis by Gaujoux-viala *et al.* found no differences in efficacy between the various types of corticosteroids used.

Mark W. Scio, Joost C. Peerbooms *et al.* did studies on 'peppering' technique for the application of steroid injection, which was found to be effective, so we followed the same method<sup>[10]</sup>.

Both ultrasound<sup>[10]</sup> and MRI helps in measuring the thickness of plantar fascia. In our study, we used ultrasonic evaluation because it is cost-effective and well tolerated by the patients. Matthew V. Smith, Sandra Klein *et al.*<sup>[11]</sup> studied FAAM score as the effective tool to analyze the functional outcome of the patient. It is sensitive to overall health status and comorbidities.

Aksahin *et al.*<sup>[16]</sup> did a comparative study on corticosteroid vs PRP injection for the treatment of plantar fasciitis. 60 patients divided into 2 groups were included in this study and declared no significant difference between both groups after 3 weeks and 6 months follow up<sup>[8]</sup>.

In our study the baseline VAS score was 8.30 and after 12 weeks follow up the score drastically reduced to 1.70. After 24 weeks, the VAS score had a surge to 3.85. The baseline FAAM score was 29.96 and 12 weeks follow-up score increased to 82.07. After 24 weeks follow-up the score reduced to 70.18. Both scores were based on the subjective analysis and it was found to be statistically significant at all stages.

The short term up follow-up was found to be satisfactory with significant improvement in VAS and FAAM score. 24 weeks follow-up shows a decrease in functional outcome and pain relief. The baseline mean plantar fascia thickness was 5.76mm and after 24 weeks follow up the thickness reduced to 4.56mm.

Out of 25 patients, 3 patients had no improvement in symptoms even after 24 weeks of follow up. Those patients were managed with analgesics and physiotherapy<sup>[20, 22, 30]</sup>. Heel fat pad atrophy, calcaneal osteomyelitis and plantar fascia rupture were the feared complications anticipated. In our study no patients reported those complications.

### Conclusion

Chronic plantar fasciitis is a difficult condition to treat.

Corticosteroids was found to be more effective in relieving the symptoms, increases the functional outcome in short term follow up.

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