

Comparison of three treatment regimens for plantar fasciitis

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ABSTRACT

Objective: Plantar fasciitis, first described by Plettner, is the most common cause of heel pain. The pathophysiology of this condition is still being studied, but it involves both anatomical factors—such as shortening of plantar flexion—and factors related to weight gain. Although literature is not conclusive on the best treatment strategy, early conservative management is recommended. The objective of this study was to compare three treatment regimens for plantar fasciitis. **Materials and Methods:** Ninety patients with plantar fasciitis were treated between March 2016 and March 2017. They were divided into 3 groups based on the treatment received: Group A (the control group) was managed with plantar fasciitis stretches; Group B was managed with steroid injections and plantar fasciitis stretches; and Group C was managed with saline injections and plantar fasciitis stretches. **Results:** Results of the comparative study were as follows (reported based on age, affected side, underlying conditions, foot shape, previous foot surgeries, post-injection pain, and visual analog scale scoring): Group A - 0.73, Group B - 1.03, Group C - 2.7. Regarding the time elapsed until patients were able to resume previous activities, results were as follows: Group A - 19.1 days, Group B - 12.63 days, Group C - 15.12 days. **Conclusions:** Our study showed the effectiveness of the three treatment regimens used. A shorter time to recovery and a lower complication rate were observed in patients treated with steroid injections, but no long-term differences were detected.

Keywords: Plantar fasciitis; steroids; stretches; saline.

Level of Evidence: IV

Fascitis plantar. Estudio comparativo entre tres esquemas terapéuticos

RESUMEN

Introducción: La fascitis plantar, descrita, por primera vez, por Plettner, es la causa más común de dolor en el talón. Su etiología continúa en estudio, participan factores anatómicos, como el acortamiento de la flexión plantar, y relacionados con el aumento de peso. Si bien no se ha publicado cuál es el mejor tratamiento para este cuadro, se recomienda el tratamiento conservador temprano. El objetivo de este estudio fue comparar tres métodos de tratamiento de la fascitis plantar. **Materiales y Métodos:** Entre marzo de 2016 y marzo de 2017, se trató a 90 pacientes con fascitis plantar, quienes fueron divididos en tres grupos, según el tratamiento recibido: grupo A o de control, ejercicios de elongación de la fascia plantar; grupo B, infiltración corticoanestésica y ejercicios de elongación de la fascia plantar, y grupo C, infiltración con solución salina y ejercicios de elongación de la fascia plantar. **Resultados:** Se mencionan los resultados comparativos sobre la base de la edad, el lado afectado, las enfermedades previas, la forma del pie, las cirugías previas del pie, el dolor posinfiltración, la escala analógica visual: grupo A: 0,73; grupo B: 1,03, grupo C: 2,7 y el tiempo hasta el retorno a la actividad previa: grupo A: 19.1 días, grupo B: 12.63 días, grupo C: 15.12 días. **Conclusiones:** Nuestro estudio demuestra que los tres tratamientos para la fascitis plantar son eficaces. La recuperación fue más rápida en los pacientes tratados con infiltración corticoanestésica, con un bajo número de complicaciones, pero sin diferencias a largo plazo.

Palabras clave: Fascitis plantar; corticoides; ejercicios; solución salina.

Nivel de Evidencia: IV

INTRODUCTION

Plantar fasciitis (PF) is the most common cause of heel pain.^{1,2} This condition was first described by Plettner³ and presents most commonly in women between 40 and 60 years old.² PF is a clinical diagnosis and complementary studies are not usually required.

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The pathophysiology of this condition is still being studied, but it involves both anatomical factors—such as shortening of plantar flexion—and factors related to weight gain.^{1,4,5}

PF is a painful condition of insidious onset in the region of the insertion of the plantar fascia in the calcaneus. PF usually manifests as a stabbing pain at the heel with prolonged standing or walking, with the first step in the morning or after a long period of resting.⁶⁻⁸

The role of complementary studies is controversial for diagnosing PF.⁸ Plantar fascia thickening evaluation through ultrasound has become a criterion for the diagnosis of PF. Plantar fasciitis is considered present if there is a plantar fascia thickness greater than 4 mm, a reduced echogenicity or both.⁹ Also, a difference of more than 1 mm between the symptomatic and asymptomatic plantar fascias is considered as a marker for PF.

PF treatment may be medical or surgical. Medical treatment for PF includes non-steroidal anti-inflammatory drugs, local cryotherapy, foot resting splints, changes in lifestyle, foot insoles, stretching exercises of the plantar fascia, steroid injections, and platelet-rich plasma injections. Patients unresponsive to medical treatment are candidates for percutaneous or endoscopic fasciotomy.¹

Although current literature is not conclusive on the best treatment strategy, early conservative management is recommended (within 6 weeks of the onset of symptoms) to hasten recovery.²

Steroid injections are popular and have a good short-term effect in PF treatment. However, long term outcomes prove it inadequate since steroid injections may cause adverse events, such as plantar fascia ruptures, fat pad atrophy, lateral plantar nerve injury, infection, and calcaneal osteomyelitis.^{8,10}

In this study, our hypothesis is that stretching exercises of the plantar fascia are effective in PF treatment, whether as a stand-alone treatment or combined with steroid injections.

Therefore, the objective of this study was to compare three treatment regimens for PF and evaluate: 1) the time elapsed until patients were able to resume previous activities, 2) the administered treatment, and 3) the results of the visual analog scale (VAS) assessment performed 30 days after treatment institution.

MATERIALS AND METHODS

A comparative prospective cohort study comparing three treatments for PF. Between March 2016 and March 2017, 90 patients were treated for PF that was diagnosed clinically on the basis of physical examination, with symptoms such as heel pain and tenderness over the plantar medial aspect of the calcaneal tuberosity, near the insertion of the plantar fascia.

Patients were divided into 3 groups based on the treatment received and a comparative analysis of their results was performed. The first 30 consecutive patients with a PF diagnose constituted Group A; the next 30 patients constituted Group B, and the remaining 30 patients constituted Group C.

Group description

Group A (control group): 30 patients followed a protocol consisting of stretching exercises of the plantar fascia. The exercises involved rolling an ice bottle under the bare foot 6 times/day for 6 min, rolling a tennis ball 6 times/day for 6 min, gastrocnemius stretching on stairs 6 times/day for 6 min, and gastrocnemius and plantar fascia stretching every time the patient went through a door.

Group B: 30 patients were treated with local injections of betamethasone dipropionate and lidocaine 2% (5 ml) and the exercise protocol prescribed for Group A. The injection was given at the point of maximum pain in the heel with a 21G x 2" needle using a peppering technique. This technique involved a single skin portal and 4 to 5 penetrations of the fascia.

Group C: 30 patients were treated with local injections of saline (3 ml) using the same approach used in Group B and the same exercise protocol prescribed for Group A.

Participant inclusion criteria included: PF and a follow-up of no less than 12 months. Participant exclusion criteria included: 1) previous foot surgery, 2) acute traumatic rupture of the plantar fascia, 3) PF in immature bones, and 4) Baxter's neuropathy.

The VAS assessment was performed 30 days after treatment institution. This tool enables to measure of the pain intensity experienced by the patient with the highest reproducibility among users. A VAS is a line which ends represent the extreme limits of a symptom. The left end represents the absence of pain or less intensity, and the right end represents the highest intensity. The patient is asked to mark the point representing their pain intensity on the line, which is later measured utilizing a millimeter ruler. The intensity is expressed in centimeters or millimeters.

The evaluation will result in:

- 1 = mild pain, if patients describe their pain as equal to or less than 3.
- 2 = moderate pain, if patients describe their pain as between 4 and 7.
- 3 = severe pain, if patients describe their pain as equal to or more than 8.

RESULTS

Group results

Group A (stretching exercises of the plantar fascia)

The group consisted of 20 women and 10 men, with a mean age of 51.03 years (range 22-82). Fifteen had left foot involvement, 6 had right foot involvement, and 9 had bilateral involvement. As to the shape of the foot, 25 were normal arch feet and 5 were flat feet. Fourteen patients suffered from hypothyroidism, 8 from hypertension, 4 from hypercholesterolemia, and 3 from diabetes. Foot concomitant conditions: Morton's neuroma in the second interdigital space (1 case); hallux valgus (1 case).

Group B (steroid-anesthetic injection)

The group consisted of 23 women and 7 men, with a mean age of 46.86 years (range 22-67). Twelve had left foot involvement, 14 had right foot involvement, and 4 had bilateral involvement. Fourteen were normal arch feet and 16 were flat feet.

Nine patients suffered from hypothyroidism, 6 from hypertension, 1 from hypercholesterolemia, and 1 from diabetes. Foot concomitant conditions: hallux valgus (4 cases); bunionette (1 case); hallux rigidus (1 case); ganglion in the lateral retromalleolar region (1 case).

Group C (saline injection)

The group consisted of 17 women and 13 men, with a mean age of 46.74 years (range 26-73). Thirteen had left foot involvement, 12 had right foot involvement, and 5 had bilateral involvement. Nineteen were normal arch feet and 11 were flat feet. Twelve patients suffered from hypothyroidism, 4 from diabetes, 4 from hypertension, and 1 from hypercholesterolemia. Foot concomitant conditions: central metatarsalgia (2 cases); hallux valgus (1 case); fifth toe supraductus (1 case).

Group comparison

1. Post-injection pain: Group B was compared with Group C. Twenty patients from Group C experienced severe post-injection pain.

2. 30-day VAS scores: Group A, 0.73 (range 0-3); Group B, 1.03 (range 0-6); Group C, 2.7 (range 0-9) (Figure 1).

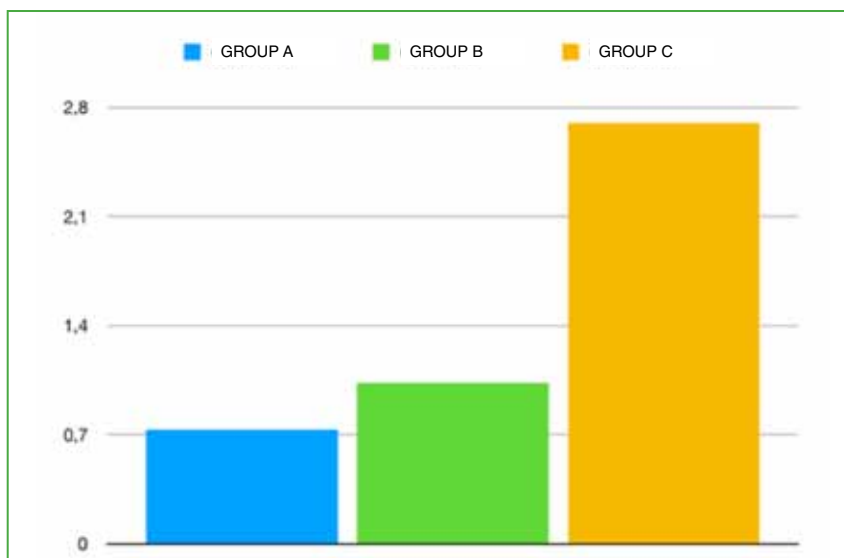


Figure 1. Visual Analog Scale assessment, per group.

3. Average time to return to pre-injury lifestyle activities: Group A, 19.1 days (range 3-180); Group B, 12.63 days (range 1-60); Group C, 15.12 days (range 2-60) (Figure 2).

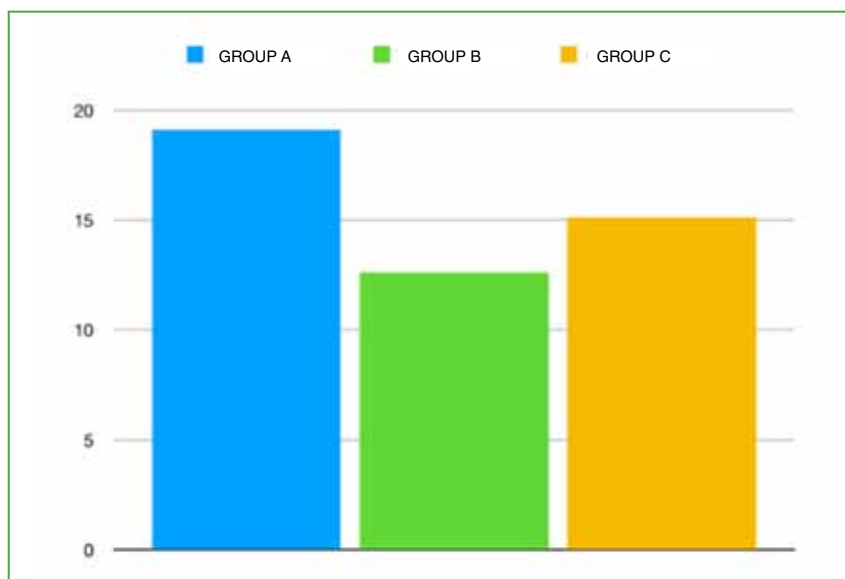


Figure 2. Return to previous activities, per group.

Five patients from Group C that did not improve with the saline injection and the exercise protocol were administered a steroid-anesthetic injection and then had a favorable course (these patients were not included in Group B after the steroid-anesthetic injection).

One patient from Group B had a non-traumatic, acute rupture of the plantar fascia 6 days after the injection. It was not possible to determine if this event was due to a complication from the injection technique or due to steroid action. The patient was prescribed stretching exercises of the plantar fascia and had a favorable course.

No patient from Group A required any additional therapy.

DISCUSSION

PF is considered a self-limiting condition since symptom resolution for 80-90% of patients takes 10-24 months.^{1,4,11} Although historically described as an inflammation, several studies define PF as a degenerative process affecting the collagen fibers or, according to Barrett, a “degenerative fasciosis” without inflammation.^{6,12}

Several risk factors associated with PF have been identified. In line with Cakir *et al.*, in our study the main concomitant condition was a thyroid dysfunction (hypothyroidism, 35 cases) followed by hypertension (18 cases) and diabetes (8 cases).

The treatments that had been studied in scientific trials are extracorporeal shock wave therapy, steroid injections, heel pads, and platelet-rich plasma.

Bordelon *et al.*¹⁵ found that 95% of the patients who received conservative treatment responded within 6-10 months. In our study, patients treated without injections progressed satisfactorily in a 19.1-day average.

Steroid injections have been the object of many studies.^{10,14,16} Clinical studies comparing them to placebo injections showed no long-term improvement. Blockey *et al.*¹⁶ as well as Crawford *et al.*¹⁴ found no differences in pain reduction between the active treatment and placebo groups.

Celik *et al.*¹⁰ conducted a comparative study between steroid-anesthetic injections and stretching exercises in the treatment of PF and reported that patients who received the injection therapy recovered in less time. Lapidus *et al.*¹⁷ reported improvement in more than 90% of the patients that had received steroid-anesthetic injections. However, 10% of patients who were treated with steroid injections experienced plantar fascia ruptures, therefore this therapy

is advised against in patients who engage in high-performance sports.^{6,10,18} In our study, the symptoms of patients treated with steroid-anesthetic injections disappeared in a 12.6-day average, thus making it the most effective in the short-term. A patient had a spontaneous plantar fascia rupture following the steroid-anesthetic injection and, after 40 days, had a good clinical course.

In our study, in line with the relevant literature,^{19,20} we found that patients treated with steroid-anesthetic injections showed more improvements in the short-term.

Saline injections to stretch the plantar fascia showed no improvements. They cause severe heel pain after its administration and produced no symptom relief. Therefore, 17% of Group C patients had to be administered steroid-anesthetic injections after 30 days (these patients were not thereafter included in Group B).

In their comparative study, Mahindra *et al.*¹ reported a 3-week-VAS score of 3.64 for the steroid group and of 7.12 for the saline group. In our study, 30-day scores were 0.73 for the exercise group, 10.3 for the steroid group and 2.7 for the saline group.

CONCLUSIONS

Our study showed the effectiveness of the three treatment regimens used. A shorter time to recovery and a low complication rate were observed in patients treated with steroid injections, but no long-term differences were detected when compared with those treated only with plantar fasciitis stretches. Although patients that received saline injections had acceptable outcomes, their outcomes were not as effective as the other two treatments.

Conflict of interest: Author claims he has no conflict of interest.

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