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ORIGINAL ARTICLE

Ultrasound-guided versus palpation-guided local corticosteroid injection therapy for treatment of plantar fasciitis

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KEYWORDS

Plantar fasciitis;
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Ultrasound;
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Pain scale

Abstract *Aim of the work:* This study aimed to assess the efficacy of ultrasound-guided versus palpation-guided local corticosteroid injection therapy for the treatment of plantar fasciitis (PF).

Patients and methods: The present study included 21 female patients with unilateral chronic idiopathic PF. The study included 10 female healthy volunteers (20 feet) as a control group. The participants were randomly assigned to receive ultrasound-guided (10 patients) or palpation-guided (11 patients) local corticosteroid injection once. The corticosteroid drug was 0.5 ml of triamcinolone acetonide (40 mg/ml). Patients were evaluated before injection and 2 weeks and 4 weeks following injection. Clinical evaluation was done by using the visual analog scale (VAS) for heel pain assessment and Plantar Fasciitis Pain/Disability Scale. Ultrasonographic evaluation was done by assessing plantar fascia thickness and echogenicity.

Results: There was a statistically significant reduction in VAS, Plantar Fasciitis Pain/Disability Scale, plantar fascia thickness and improvement in plantar fascia echogenicity after treatment in both patient groups; however, there were no statistically significant differences between both groups. The plantar fascia thickness was statistically significantly thicker in both groups in relation to control group before injection and after it by 2 weeks and 4 weeks. The plantar fascia hypoechogenicity was found exclusively among patients groups before injection. At 4 weeks after injection, the hypoechogenicity disappeared in all patients of both groups.

Conclusions: Ultrasound-guided and palpation-guided local corticosteroid injections were effective and successful in treatment of PF. Both techniques improved PF clinically and ultrasonographically without statistically significant superior results for the ultrasound-guided injection.

1. Introduction

The plantar fascia is susceptible to repetitive microtrauma at its posterior attachment at the calcaneus [1]. This leads to the development of plantar fasciitis (PF) [2]. PF is the most

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commonly reported etiology for inferior heel pain [3]. However, idiopathic PF is due to repetitive degenerative lesion to the enthesis of plantar fascia, it can be a result of inflammatory enthesopathy [1,4]. The clinical diagnosis of PF can be made easily on clinical basis. Imaging can help in the diagnosis of PF. It is recommended in chronic refractory cases for confirmation of the diagnosis [5]. Ultrasonography is the commonest method of radiological assessment [5,6].

Conservative therapy for PF is the standardized management. It is agreed that it is effective in approximately 90–95% of patients [3,7,8]. When conservative treatment fails, minimally invasive techniques such as corticosteroid injection may be used for the management of PF [2,9–11]. Local corticosteroid injection for PF can be performed by many methods. It can be palpation-guided injection, ultrasonographic-guided injection and scintigraphic-guided injection. Palpation-guided injection is the approach traditionally used [12,13].

The aim of the current study was to prospectively assess the efficacy of ultrasound (US)-guided versus palpation-guided local corticosteroid injection on the clinical and ultrasonographical responses in patients with chronic idiopathic PF.

2. Patients and methods

2.1. Patients

The present prospective study included 21 consecutive patients with unilateral chronic idiopathic PF. The patients were recruited sequentially from those attending the outpatient clinic of Physical Medicine, Rheumatology and Rehabilitation Department, Main University Hospital, Alexandria Faculty of Medicine between May 2013 and January 2015. A control group of 10 apparently healthy volunteers were included. The volunteers consisted of medical staff, their relatives and patients' relatives. Clinical diagnosis of PF was based on the presence of the following: (i) the presence of post-static dyskinesia; (ii) the presence of heel pain as sharp, shooting or dull aching pain made worse in postures with weight bearing such as in standing and walking; and the occurrence of pain with rest and in non-weight bearing positions was also included; and (iii) the presence of localized tenderness in and around the medial calcaneal tuberosity at proximal plantar fascia on physical examination [2,14,15]. All patients were unresponsive to conservative treatment for at least 3 months to be considered chronic PF. The conservative treatment included rest, non-steroidal anti-inflammatory drugs, activity modification, shoe modification, prefabricated inserts, orthosis, stretching exercises, ultrasound diathermy, transcutaneous electrical nerve stimulation and extracorporeal shock wave therapy [3,7,8,15]. The study was explained to the participants and an informed consent was given by each. The study had been approved by the local Institutional ethics committee of the Faculty of Medicine, Alexandria University, Egypt.

Patients were excluded from the study if they had received a previous corticosteroid injection for PF, or if they had any of the following: a known hypersensitivity to corticosteroids, current pregnancy, current skin or soft tissue infection at or near the injection site, heel fat pad atrophy, posterior heel pain, rheumatologic disorders, endocrine disorders, metabolic disorders, peripheral arterial insufficiency in the lower limbs, previous local surgery, or a history of local heel trauma and neurological disorders as peripheral neuropathy or tarsal tunnel syndrome [16]. Patients with a diagnosis of bilateral PF were also not enrolled in the study to exclude any potential systemic disease [4].

2.2. Methods

Demographic data collection and assessment of pain severity were done by using visual analog scale (VAS) [17]. The PF pain severity and impact on functional status were assessed using Plantar Fasciitis Pain/Disability Scale which consisted of two components one for pain and the other for functional abilities, in which the higher the score the worse is the condition and vice versa [18]. Measurement of anthropometric measures was done for all patients and control subjects. Body mass index (BMI) was calculated as weight (kg)/[height (m)]^2 [19].

Patients were evaluated clinically and radiologically. Clinical evaluation involved tenderness around the medial calcaneal tuberosity or proximal plantar fascia [14,15]. All patients were evaluated by plain radiography of the heel (lateral view) for detecting the presence of calcaneal spur or any pre-existing foot lesions. Sonographic evaluation assessed the thickness of the proximal part of plantar fascia and its echogenicity.

The patients were randomly assigned to either US-guided or palpation-guided injection groups [US group and palpation (PAL) group respectively]. Local corticosteroid injection was done using 0.5 ml (20 mg) of triamcinolone acetonide suspension. All injections were performed by the same investigator (the first researcher). Any ongoing medical treatment or physiotherapy was stopped before starting the injection therapy.

The initial baseline clinical and sonographic assessments were done before injection (preinjection assessment). Reassessment of all patients was done clinically and sonographically after injection by 2 weeks and again by 4 weeks (postinjection assessments). Searching for side effects of local corticosteroid injection and recurrence of symptoms were done in each postinjection assessment visit.

Real-time ultrasonographic examination of all patients at all time points was performed by the same sonographer (the second investigator). The examination was performed using a 10 MHz linear array transducer [Sonoline G 20 (model number: MC-12H613-ME), Siemens, Japan]. Patients were placed in a prone position with the feet hanging over the edge of the examination table, with dorsiflexion of the toes to stretch the plantar fascia so that its margins were seen clearly. Longitudinal sonographic images of plantar fascia were obtained. The sonographic diagnosis was based on the presence of plantar fascial thickening of greater than the reference cut-off value obtained from the control group, fusiform thickening of the plantar fascia close to the calcaneal enthesis and an abnormal fascial echo texture. The thickness of the plantar fascia was measured at its proximal end near its insertion to the calcaneus at its thickest portion. The presence of focal or diffuse changes in fascial echogenicity was recorded as hyperechoic or hypoechoic [20].

The injection area was sterilized with povidone-iodine solution. Injection was done through an aseptic technique to minimize infection risk. A 22-gauge needle connected to a