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A Comparison of the Effectiveness of Corticosteroid Injection versus Platelet-Rich Plasma Therapy for Treating Plantar Fasciitis

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Abstract

Introduction: One of the most frequent reasons of heel discomfort is plantar fasciitis. In this prospective trial, the effectiveness of platelet-rich plasma (PRP) versus local corticosteroid injections for treating plantar fasciitis was examined.

Method: Patients were divided into two groups of 30 each at random (group A and group B). In groups A and B, patients received local corticosteroid injection therapy and autologous PRP injection therapy, respectively. Clinical evaluation, which included the visual analogue pain scale, subjective rating using the modified Roles and Maudsley score, functional outcome score by the Foot and Ankle Outcome Instrument (FAI) core scale, and the American Orthopaedic Foot & Ankle Society (AOFAS) ankle-hindfoot scale, was performed prior to the injection as well as at 2 months, 4 months, and 6 months following the injection. Ultrasonography was used to gauge the thickness of the plantar fascia for the radiological examination. The two groups' average ages, sexes, and body mass indices were similar.

Results: Visual analogue score, modified Roles and Maudsley score, FAI core scale, AOFAS ankle-hindfoot score, and plantar fascia thickness significantly improved post-injection in both groups. With the provided data, no discernible difference in improvement between the aforementioned variables in the 2 groups could be seen.

Conclusion: PRP or steroid injections were found to be equally beneficial in treating plantar fasciitis.

Keywords: Heel, Pain, Platelet-Rich Plasma, Steroid Injection

Introduction

The most frequent cause of heel discomfort in adults is plantar fasciitis, which is frequently characterised as an overload of the plantar fascia [1,2]. It is characterised by a slow onset of severe pain along the medial aspect of the heel that gets worse with the first step in the morning

or when an activity is started and gets better as the person warms up. Plantar fasciitis has a complex aetiology that is still poorly understood. Repeated microtrauma to the plantar fascia at its origin can be caused by poor biomechanics and differences in the structure of the foot [3], which can cause inflammation and degeneration. The prevalence of plantar fasciitis is higher among sedentary people, athletes, and people who engage in running sports. [4,5].

In female runners with a history of plantar fasciitis, Pohl et al. [3] found that a lower arch height and higher vertical ground response force load rate were related. Reduced ankle dorsiflexion, an elevated body mass index (BMI), and weight-bearing activities at work are some additional risk factors for plantar fasciitis [6]. Plantar fascia stretching exercises, strapping, extracorporeal shock wave therapy, nonsteroidal anti-inflammatory medications (NSAIDs), arch supports, and heel pads are a few of the treatment options for plantar fasciitis that primarily aim to relieve inflammation. When noninvasive, conservative treatments for refractory plantar fasciitis fail, corticosteroid injections are frequently used instead. They have been demonstrated to successfully lessen heel discomfort in those with plantar fasciitis [7, 8]. Corticosteroids have a strong anti-inflammatory action that may expedite the pain-relieving process. Additionally, they are able to stop ground material proteins and fibroblast growth [9]. However, it has been demonstrated that the use of corticosteroid injections for the treatment of plantar fasciitis is linked to the rupture of the plantar fascia, infection, alteration of skin pigmentation, injury to the peripheral nerves, muscle damage, postinjection flare, and atrophy of the fat pad [10]. Platelets, a source of autologous growth factors, are concentrated in platelet-rich plasma (PRP). In a number of contexts, the cytokines found in the platelet's -granules have been demonstrated to promote fibroblast migration and proliferation, upregulate vascularization, and boost collagen deposition [12]. Based on these characteristics, the PRP injection should promote healing and stop the degenerative processes that impair the plantar fascia's origin.

In order to examine the effectiveness of local corticosteroid injection and PRP in the treatment of plantar fasciitis, a prospective randomized study was carried out.

Method

The study was carried out from June 2020 to May 2021 across a 1-year period. The ethical and scientific committee of the hospital granted its approval. The orthopaedic outpatient department was contacted for patients with a primary diagnosis of plantar fasciitis who met the inclusion and exclusion requirements. The diagnosis of plantar fasciitis was done on the basis of clinical evidence in accordance with the recommendations for plantar fasciitis provided by McPoil et al [6]. Plantar fasciitis was diagnosed based on the following clinical signs: palpable tenderness in the plantar medial heel region, pain that is worse with prolonged weight-bearing but is most noticeable with the first few steps after a period of inactivity, and pain that is frequently brought on by a recent increase in weight-bearing activity. Height, weight, age, sex, and the kind of shoes worn were all noted. A thorough history of prior treatments, any foot injuries, and the existence of any systemic diseases was kept on file. In addition to regular tests, a lateral radiograph of the afflicted side's heel was obtained to rule out any associated pathology,

and an ultrasonogram was used to determine the plantar fascia's thickness.

Patients were divided into two groups of 30 each (group A and group B), with group assignments created by a computer and contained in sequentially numbered opaque envelopes to maintain blinding. In groups A and B, patients received local corticosteroid injection therapy and autologous PRP injection therapy, respectively.

The modified Roles and Maudsley scoring system is a 4-point, subjective patient evaluation of pain and activity restrictions. The results were categorised as excellent (no pain, unlimited walking pain-free, patient satisfied with treatment outcome), good (symptoms significantly reduced, patient satisfied with treatment outcome, ability to walk pain-free for more than 2 hours), fair (symptoms somewhat reduced, pain tolerable compared to before treatment, patient slightly satisfied with treatment outcome), and poor (symptoms the same or worse, patient unsatisfied). The American Academy of Orthopedic Surgeons (AAOS) Foot and Ankle Outcome Instrument (FAI) core scale and the American Orthopaedic Foot & Ankle Society (AOFAS) ankle-hindfoot scale were used to calculate the functional outcome score. Using ultrasound, the thickness of the plantar fascia was measured as part of the imaging evaluation.

The SPSS 17.0 version of the Statistical Package for the Social Science system was used for statistical analysis. If the data are skewed, continuous variables are reported as mean SD or median. Frequencies and percentages are used to represent categorical variables. The Student t test was used to compare normally distributed continuous variables between the groups. Depending on the situation, the Fisher exact test was used to compare nominal categorical data between the groups. The Mann-Whitney U test was used to compare continuous variables with nonnormal distribution. A P-value of less than 0.04 was considered to represent a significant difference for all statistical tests.

Results

The mean age of the patients in the PRP and steroid group was 37.6 ± 10.2 and 38.8±9.4 respectively (P =0.580). In the PRP group, the number of male and female patients was comparable (n = 30 each), however the number of male patients in the steroid group was higher (n =17 vs. n =13; P =0.174). In the steroid group, the mean BMI was 24.4 ± 3.2 kg/m2, but in the PRP group, it was 23.6 ±3.3 kg/m2 (P = 0.281). Both groups' average pain levels were equal in terms of length of time (P = 0.653). (Table 1).

Parameter	Group A (Steroids)	Group B (PRP)	P- value
Gender			
Male	17	16	0.174
Female	13	14	
Age (years)			
Mean ± SD	38.8±9.4	37.6 ± 10.2	0.580
BMI, kg/m2			
Mean ± SD	24.4 ± 3.2	23.6 ±3.3	0.281
Duration of pain			
Mean ± SD	7.5±2.2	72. ±2.8	0.653

In the steroid group, the mean preinjection VAS score was 8.5±1.0, while in the PRP group, it was 8.3 1.1; however, this difference was not statistically significant (P =0.037). Following injection, the VAS score values in both groups showed a lower trend on successive follow-ups **(**Table 2).

Table 2: Evaluation of Steroid and Platelet-Rich Plasma (PRP) Groups Using the Visual Analog Scale (VAS)

Steroid			PRP		
VAS Score	Mean ± SD	P Value	Mean ± SD	P Value	P Value (PRP vs Steroids)
Pre-injection	8.5± 1.0		8.4 ± 1.1		0.337
At 2 month	5.6 ± 2.6	<0.002	6.4 ± 1.6	<0.002	0.105
At 4 month	4.3 ±2.7	<0.002	5.1 ± 2.4	<0.002	0.220
At 6 month	3.2 ± 2.7	<0.002	3.1 ± 2.5	<0.002	0.595

With the data at hand, this drop in VAS score from each follow-up to the preinjection score was statistically significant. However, given the available data, there was no statistically significant difference in VAS scores between groups A and B.

Using modified Roles and Maudsley scores, the procedure results were evaluated subjectively. After two months of injection, only 19 patients in the steroid group and 15 patients in the PRP group assessed the outcome as good to excellent; at six months, these numbers rose to 31 and 28, respectively. But using the available data, no discernible difference between the two groups' scores at the 2-, 4-, and 6-month follow-ups could be found.

The mean ankle-hindfoot scores prior to injection in the PRP group (70.5±12.3) and steroid group (70.1±10.1) were comparable (P = 0.671).With the numbers provided, no discernible difference between the scores of the 2 groups at the 2-, 4-, and 6-month follow-ups could be found despite the large postinjection improvement in each group's score at each follow-up. Standardized and normative scores make up the two components of the FAI. Standardized scores are calculated with a "0" representing a poor result/worse health and a "100" representing the highest result/health. Higher scores are used to indicate better functioning when calculating normative scores. The mean normative score of 49 for the general/healthy population serves as the baseline for all scores.

The preinjection standardised mean score for the steroid group was 65.2±8.1 and for the PRP group it was 67.5±7.7. These results were similar between the two groups (P = 0.195). In both groups, the standardised mean scores steadily rose and were nearly identical at every follow-up. No discernible difference could be found between the scores of the two groups using the data at hand. Preinjection normative scores for the PRP and steroid groups were, respectively, 27.1±6.3 and 29.1±6.2, which were both lower than the mean normative score for the general/healthy population. On each follow-up after injection, the normative scores in both groups rose comparably and came quite close to the normative levels for the general/healthy population. With the provided data, no discernible difference between the preinjection and postinjection ratings for each follow-up between the two groups could be seen.

Prior to the injection, the plantar fascia's thickness (as determined by ultrasonography) was 5.0 ±1.3 mm in the steroid group and 5.2 ± 1.1 mm in the PRP group. With the supplied data, no discernible difference between the preinjection thicknesses of the 2 groups could be found. The plantar fascia thickness was decreased post-injection on the first and second follow-ups to 3.± 1.4 mm and 3.0±1.2 mm in the steroid group, and to 4.4±1.1 mm and 3.8±1.1 mm in the PRP group, respectively. This observation demonstrates that during the first two follow-ups, the steroid group's plantar fascia thickness decreased dramatically in comparison to the PRP group. Given the available data, the difference in plantar fascia

thickness between the steroid and PRP groups on the first and second follow-ups was statistically significant. Even though the plantar fascia thickness in the steroid and PRP groups was further decreased to 2.7 mm and 3.1 mm, respectively, on the third follow-up, the difference in thickness between the 2 groups at the 6-month follow-up was no longer statistically significant (P = 0.147).

PRP or corticosteroid injections did not cause any issues for any of our patients.

Discussion

The majority of obese people experience plantar fasciitis, according to certain research [14,15], while others [13] even claim that the average BMI of patients with plantar fasciitis is around 30 kg/m. In the current study, individuals with plantar fasciitis had a mean BMI of 24.0 kg/m2. The low socioeconomic strata of the patients in our study group may be the cause of the low average BMI in our study population when compared to other studies. There is no evidence in the literature linking sex to plantar fasciitis. There was a little male preponderance among the 60 patients in the current study, with 42.4% of them being female and 57.4% being male, although this difference was not statistically significant. Uncertainty surrounds the pathogenesis of plantar fasciitis. Increased vascularity, an overabundance of ground substance proteins, localised regions of fibroblast proliferation, and broken collagen fibres are frequent pathological characteristics [16]. A non-specific inflammatory response has also been observed in plantar fasciitis, according to various investigations [17]. It has been demonstrated that corticosteroids reduce the expression of ground substance proteins and fibroblast proliferation [18]. The evidence also supports the usefulness of corticosteroid injection in the short- and long-term management of plantar fasciitis [19]. Steroids were successful in the current study in lowering the VAS score compared to the preinjection status and gradually improving it at each follow-up until 6 months postinjection.

Recent research suggests that plantar fasciitis is more likely to be a degenerative condition than an inflammatory one [20]. Histological analysis of the plantar fascia obtained following heel spur surgery for persistent plantar fasciitis validated this observation. The findings include vascular ectasia of the bone marrow and myxoid degeneration with fragmentation and degeneration of the plantar fascia. These results supported degenerative fasciosis over inflammation [16]

PRP, which is a concentrated form of platelets that are a source of autologous growth factors like insulin-like growth factor-1 (IGF-1), transforming growth factor-beta (TGF-beta), vascular endothelial growth factor (VEGF), platelet-derived growth factor (PDGF), and basic fibroblast growth factor (bFGF), aids in cellular migration, collagen synthesis, and angiogenesis, which promotes tendon and ligament healing [22]. It is PRP is a safe, effective treatment option for plantar fasciitis, according to the literature [13, 14]. While some research have showed that the outcomes of either treatment are comparable [13,14], a few recent studies have demonstrated greater results of PRP compared to corticosteroids for the treatment of plantar fasciitis [20]. The results of this study support the claim that injections of PRP and corticosteroids are equally effective at lowering the VAS score (postinjection on subsequent follow-up).

Although both groups' functional outcome scores significantly increased at the subsequent follow-up in the current study, there was no statistically significant

difference in scores between the groups. In line with the aforementioned observations, the results of the functional evaluation performed using the FAI showed no differences in functional outcome scores across the groups.

In our study, both approaches to treating plantar fasciitis were equally successful. Although steroid injection is a quicker and more affordable way to treat plantar fasciitis, it is not without risk. Risks include plantar fasciitis rupture, infection, skin pigmentation changes, peripheral nerve damage, muscle damage, post-injection flare, and fat pad atrophy. On the other hand, PRP injection therapy necessitates the time-consuming process of phlebotomy to acquire blood and prepare PRP. The pricey equipment is regarded as safer because patients avoid the problems of steroid injection. The small patient population, brief follow-up, and absence of a control group in this study were all limitations. Future research that includes a control group, a larger patient population, and a longer follow-up period may offer more clarity on the effectiveness of the two therapy approaches. The fact that this trial was not blinded is another drawback. This is due to the way PRP is obtained and the fact that the authors didn't think sham phlebotomy made sense in this study's context.

Conclusion

According to the findings of this study, steroid or PRP injection therapy for treating plantar fasciitis is equally beneficial.

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