Original Article

Platelet-rich plasma in the treatment of chronic plantar fasciitis

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Objective: To evaluate the effect of local platelet-rich plasma (PRP) in the treatment of plantar fasciitis.

Methodology: This study was conducted at Dr. Ruth K. M. Pfau Civil Hospital, Karachi, Pakistan, from September 2018 to March 2019 and included 41 patients. Pain was assessed by using a visual analog scale (VAS) and the overall clinical and functional outcome was assessed by American Orthopedic Foot and Ankle Society (AOFAS) Ankle and Hindfoot score before and after PRP administration.

Results: The mean VAS score after PRP administration decreased from 7.24±2.01 to 2.78±0.61 at the final follow-up. The mean AOFAS score improved from 53.56±7.11 to 86.24±11.21 at the final follow-up.

Conclusion: PRP was effective in reversing pain and improving functionality. However, because of this being a single center study, with a limited number of patients, a large-scale study is needed to further authenticate the use of PRP in plantar fasciitis. (Rawal Med J 202;45:123-126).

Keywords: Platelet-rich plasma, plantar fasciitis, American orthopedic foot and ankle society scale.

INTRODUCTION

Chronic heel pain is amongst the commonest problems of the foot,[1] of which Plantar fasciitis is the commonest cause. Diagnosis is mainly clinical where the patient complains of pain that is worse in the morning and decreases with activity. Tenderness is appreciated on the inferomedial side of the calcaneus. This is most common between the fourth and sixth decades and is more common among athletes.[2–4] Other risk factors include obesity, decreased ankle dorsiflexion, and extensive work-related weight-bearing.[3]

Although there is no approved primary medical treatment, traditional treatments like nonsteroidal anti-inflammatory drugs (NSAIDs), physiotherapy, and splints are successful in the majority of cases. Plantar fasciitis can be considered a self-limiting disease in which these conservative treatments account for considerable relief for as much as 80% of patients. However, despite their common use, there have been very few clinical trials assessing their efficacy.[5–7] Steroid injection into the plantar fascia is also an effective treatment, however, many studies have just pointed out the short-term efficacy with no favorable long-term results.[8,9]

Newer techniques that stimulate a regenerative or a healing response, instead of suppressing the inflammatory process involved in plantar fascitis, could be effective treatment options. This prompted the use of platelet-rich plasma (PRP), a conditioned component of blood that is believed to induce cellular growth and tissue healing. Its safety and efficacy has been proved in various studies along with a comparison to both placebo and corticosteroids.[10–16] Very limited local data is available regarding the efficacy of the use of PRP in plantar fasciitis. This study was carried out to evaluate the effect of local PRP in the treatment of plantar fasciitis.

METHODOLOGY

This prospective single-arm study was conducted at Dr. Ruth K. M. Pfau Civil Hospital, Karachi, Pakistan, from September 2018 to March 2019, after obtaining permission from the ethical review board. A total of 49 patients with chronic plantar fasciitis who failed to respond to conservative treatment (NSAIDs, physiotherapy, splints, and steroids) for more than three months were enrolled after informed consent. Patients with acute plantar fasciitis, a prior PRP injection, peripheral neuropathy, diabetes, or those aged <18 years were excluded.

They were examined utilizing the visual analog scales (VAS)[17] and overall functional and clinical outcome was assessed by the American Orthopedic

Foot and Ankle Society (AOFAS) Ankle-Hindfoot Scale. AOFAS scale comprises nine major items categorized into three, i.e. pain, function, and alignment. The pain section has one item with a maximal score of 40 points, with 40 showing no pain. The function sub-section has seven items and the maximum score is 50, with 50 meaning full function, and the final section is alignment, with a maximum of 10 points, with 10 representing good alignment. An aggregate of 100 points means no symptoms or impairment.[18]

PRP preparation was done utilizing a standard double centrifugation protocol. Blood was drawn from the patient (about 50 ml) into a 60-ml syringe that contained 5 mL sodium citrate. It was placed in a centrifugation machine for 15 minutes and centrifuged using a soft spin (250 g). Plasma was then transferred with platelets into a sterile tube without anticoagulant and then again centrifuged, but now at a higher speed (hard spin-300 g) to obtain a platelet concentrate. The blood was then separated into two components; platelet-poor plasma and platelet-rich plasma. The former was discarded and the process was repeated one more time.[19] The resulting concentrate was six to eight times more concentrated with platelets as compared to whole blood. The 5 mL platelets concentrate was injected using a 22 needle in the tender most area of the plantar fascia by the peppering technique. The patient was then looked at for any complications or side effects for 15 minutes and then discharged.

A home exercise program for self-plantar myofascial release including stretching and strengthening exercises for extrinsic (gastrocnemius and soleus) and intrinsic musculature of the foot and ankle was taught to the patient and they were advised to work on it after two weeks of injection. During their follow-up at three weeks, they were allowed to start recreational activities at 4th-week post-injection. The second follow-up was at 6 months. Both the VAS and AOFAS were again checked on follow-up visits.

Statistical Analysis: One patient was lost to follow-up in three weeks and seven were lost to follow-up by six months. A total of 41 patients data were compiled and analyzed using SPSS Version 22.0. The frequency was calculated for gender and the mean score was calculated for VAS and AOFAS. The mean was compared using the dependent t-test and the $p<0.05$ was considered statistically significant.

RESULTS

Of the 41 patients who completed the study, 24(58.53%) were males and 17(41.47%) were females with a mean age of 30±10 years. In 28 patients (68.29%), the right foot was involved while in 13(31.70%) had left foot affected. The mean VAS score in the platelet-rich plasma decreased from 7.24 to 2.78 at the final follow-up. The mean AOFAS score in the platelet-rich plasma improved from 53.56 to 86.24 at the final follow-up (Table).

Table. Visual analog scale and American Orthopedic Foot and Ankle Society score before and after platelet-rich plasma treatment.

Parameter	Pre-injection	Three weeks follow-up	Six months follow-up	P-value (pre-injection vs six months)
Visual analog scale	7.24 ± 2.01	5.17 ± 1.22	2.78± 0.61	< 0.001
The American Orthopedic Foot and Ankle Score	53.56 ± 7.11	62.19 ± 9.81	86.24± 11.21	< 0.001

DISCUSSION

Our study shows that PRP was effective for reducing pain and improving the outcome in patients with chronic plantar fasciitis who failed the conservative management. In our study, the VAS score decreased showing improvement in pain and AOFAS improved showing good recovery.

This result was consistent with another local study conducted in Islamabad that showed similar improvement in the VAS score and AOFAS score.[20] Ragab et al in their study reported that after using PRP in plantar fasciitis, the average pain decreased in the VAS scale from 9.1 to 1.6. In the same study, 78% of patients had a severe limitation before injection and none had a severe limitation after the PRP injection.[14] Monto et al compared PRP and corticosteroids using the AOFAS score in their study and noticed that even though the cortisone group showed initial improvement at three months in the AOFAS score (52 vs. 81), it kept on reducing, eventually becoming 56 at 24 months. In

comparison, PRP remained elevated to an AOFAS score of 92 even after 24 months.[21]

The mechanism of action for PRP injection is that it increases the tendon ability to regenerate because of its high content of cytokines and cells. In hyper-physiologic dose, PRP stimulates cellular chemotaxis, synthesis of the matrix, and cellular proliferation. The purpose of centrifugation is to concentrate the levels of plasma mechanically to increase the concentration of plasma to levels many times more than the baseline of whole blood.[22] There are studies that have shown that maximal clinical effectiveness is expected when there is a minimal four- to six-fold increase in platelet concentration in PRP as compared to whole blood baseline platelet.[23] Another factor that might affect the effectiveness of PRP is the technique of injection. In comparing the two techniques, peppering or direct single injection, Kalaci et al found that the peppering technique was superior.[13]

Plantar fasciitis is a common occurrence in patients presenting with foot complaints, and it is due to the degeneration of plantar fascia. Treatment that stimulates and promotes tissue regeneration should be given priority in the management of plantar fasciitis. All studies, including ours, showed a significant improvement, with no evidence of complications.

While our study adds to limited local data available regarding the efficacy of PRP in the treatment of chronic plantar fasciitis, it has limitations too. One limitation was the small sample size and single center study. The absence of a placebo group and the short duration of follow-up might also have introduced bias in our study. Lastly, other methods for management of plantar fasciitis, like physiotherapy, were not taken into consideration.

CONCLUSION

In conclusion, the mean VAS score in the PRP decreased more than 4.5 points and the mean AOFAS improved by more than 20 points, suggesting that PRP was effective in relieving pain and improving functionality. However, because of this being a single center study, with a limited number of patients, a large-scale study is needed to further authenticate the use of PRP in plantar fasciitis.

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