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A prospective study on use of platelet rich plasma for treatment of plantar fasciitis

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Abstract
Background: Plantar fasciitis which is a common problem but conservative treatment often is not satisfactory, use of platelet rich plasma induces healing in plantar fasciitis.
Aim: Efficacy of injection of intralesional injection of autologous platelet rich plasma for treatment of plantar fasciitis.
Materials and methods: This is a prospective study done at government chengalpattu medical college from august 2015 to january 2017. Two hundred patient with chronic plantar fasciitis with ultrasonogram thickness >4mm were included in our study, Injection of activated autologous platelet rich plasma followed by stretching protocol, and followed up with foot function index, AOFAS SCORE and USG thickness.
Results: 96% of cases shown good clinical outcome with FFI and AOFAS score and 90% 0f patients shown reduction in thickness of plantar fascia measured by ultra-sonogram.
Discussion: This study found a significant relationship between the change in plantar fascia thickness and the pain level using FFI and AOFAS score after treatment. In 190 patients reduction of symptoms strongly correlated with a reduction in plantar fascia thickness. 2 patient has no decrease in thickness and no decrease in pain. 3 patient had no decrease in thickness but pain decreased.
Conclusion: Autologous platelet rich plasma is an cost effective, simple out patient treatment modalities which gives excellent results in chronic plantar fasciitis.

Keywords: platelet rich plasma, plantar fasciitis

Introduction
Plantar fasciitis is the most common cause of foot pain. Most common cause is found to be degeneration that occurs near the site of origin at medial tuberosity [1]. It also results from sustained stress of weight bearing hopping, jumping, running results in micro trauma to plantar fascia which leads to plantar fasciitis.
It constitutes 11% to 15% of all foot symptoms [2, 3]. Its prevalence is 8% to 10% in general population. It commonly affects at the age of 40 to 60 years [4].
Pain is felt over the inner aspect of sole on heel on weight bearing. Tenderness is usually present at the inner part of calcaneum. Pain is relieved as soon as weight bearing is discontinued but persist with low intensity.
In acute cases, plantar fasciitis is characterized by classical signs of inflammation including pain, swelling and loss of function. For more chronic conditions, however, inflammation is not the underlying tissue disruption. In fact, histology of chronic cases has shown no signs of inflammatory cell invasion into the affected area [5]. The tissue instead is characterized histologically by infiltration with macrophages, lymphocytes, and plasma cells; tissue destruction; and repair involving immature vascularization and fibrosis [5]. The normal fascia tissue is replaced by an angiofibroblastic hyperplastic tissue which spreads itself throughout the surrounding tissue creating a self-perpetuating cycle of degeneration [5].
Various modes of treatments have been advocated for treating this condition like rest, nonsteroidal anti inflammatory drugs, night splints, keeping appropriate wedge on shoe, soft heel pad or well padded medial arch support, faradism, exercises in warm water, stretching exercises, splints, ultrasound massage, extracorporeal shock wave therapy, local corticosteroid

injections, sugery [6]. But in most of the treatment recurrence is common.

Recently platelet rich plasma was used in treating in degeneration, muscle and tendon injuries [7-9]. The prp increases regeneration abilities with cytokines which promotes matrix synthesis and proliferation [10]. Degranulation of the alpha granules in platelets releases many different growth factors that play a major role in tissue regeneration process.

Literature review on growth factors of autologous platelet rich plasma *in vivo* and *in vitro* studies suggests it will be useful for tendonitis and ligament healing.

The purpose of this study is to analyse the use of autologous platelet rich plasma as a better alternative for management of chronic plantar fasciitis not to responding to conservative methods.

Aim of the study

To analyse the efficacy of injection of autologous platelet rich plasma in treatment of chronic plantar fasciitis

Materials and methods

This is a prospective study conducted in chengalpattu medical college hospital. Chennai from august 2015 to January 2017. Hundred patients were taken up for the study.

The patients aged above 18 years with Chronic plantar heel pain > 6 months And Tenderness present at the inner part of calcaneum the site of origin of plantar fascia were included. Those patients who had Previous injection or surgery for heel pain, Nerve related complaints, "Regional pain syndrome", Achilles tendinitis, Local infection, Peripheral vascular disease, Coagulopathy, Rheumatoid arthritis, Pregnancy, Spondyloarthropathy were excluded.

All the patients were informed and obtained consent, and undergone assessment for plantar fascia thickness with ultrasound, foot function index, AAFOS.

Autologous platelet rich plasma preparation

About 12 ml of whole blood was collected in vacutainer tube with sodium citrate. The blood was centrifuged for 10 minutes at 2100 rpm using a table top centrifuge. Blood is separated in to three layers lower red coloured layer containing RBC, middle white coloured buffy coat, top straw coloured plasma. In the straw coloured plasma layer the lower third contains more platelets which are lifted in the syringe. Approximately 2ml of platelet rich plasma was obtained for each patient. 8.4% of sodium bicarbonate added at the ratio of 0.05cc sodium bicarbonate to 1 cc of platelet concentrate to increase Ph which reduced due to addition of sodium citrate during withdrawal. The resulting platelet rich plasma has 6-8 times concentration of platelets compared to baseline whole blood. The resultant platelet rich plasma is activated with 0.05cc of 10% calcium chloride per ml of platelet rich plasma. This is done as an out patient procedure.

Injection technique

After preparing the foot with betadine solution. 2ml of activated autologous platelet rich plasma was injected using a 22 gauge needle at the origin of plantar fascia in medial calcaneal region using a peppering technique. The autologous platelet rich plasma was injected in to it in different direction through single skin insertion.

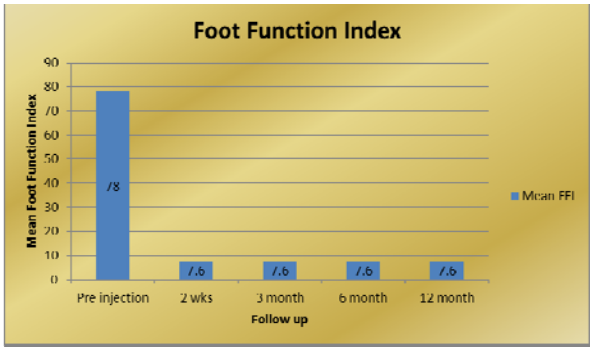
After injection of autologous platelet rich plasma the patient was adviced to sit for 15 minutes without moving the foot. Patients were adviced to minimize the their use of feet for next 48 hours. Patient was not allowed to take NSAIDS. Patients were given a standardised stretching exercises for four weeks. And allowed for routine activities after four weeks of injection.

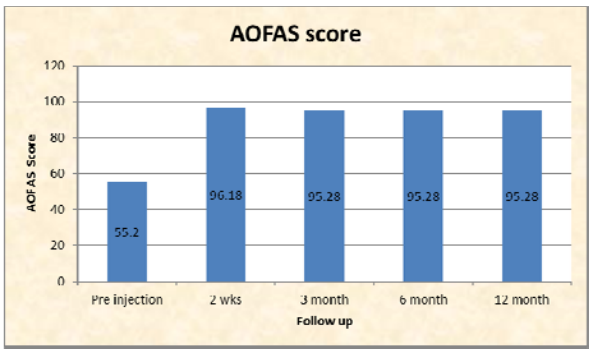
A visual analog score of foot function index, AOFAS score, ultrasonogram thickness of plantar fascia were used for outcome analysis at 2 weeks, 3 months, 6 months, 12 months, and compared with pre injection values.

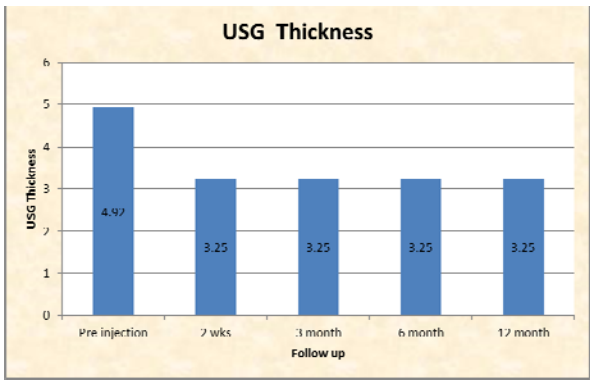
Results

In our study, Out of 200 patients 115 were female, with right side more commonly involved. We lost follow up for 4 patients. No complications like infections, neurovascular changes or reoccurrence occurred.

At six-month follow up, Foot function index on an average improved from 78 to 7.6, Aofas score improved from 55.92 to 95.28, usg plantar fascia thickness decresed from 4.92 mm to 3.25 mm.







Discussion

Chronic plantar fasciitis is a common foot problem. Immediate relief of symptoms is necessary for patients. Patients day to day activities are affected and work output reduced due to pain. Rest or simple exercises does not provides satisfactory relief of pain in chronic plantar fasciitis. The most common recommended treatment is exercise therapy. But it does not give relief of symptoms for long time. Corticosteroids injections is extensively used for this problem, but recurrence and complications are common like sub cutaneous fat atrophy, rupture etc. But still corticosteroid is being commonly used. Surgical option for plantar fasciitis leads to collapse of arch of foot leading to flat foot. The high concentration of growth factors in autologous platelet rich plasma. Initiates healing and complete repair of the damaged tendon. This study is supported by *in vitro* data from klein *et al* [11]. This study reported increased type 1 collagen production by transforming growth factor beta in tendon sheath fibroblasts. Autologous Platelet rich plasma also helps in recruitment of bone marrow derived stem cells to the site of affected tendon. Which moderates the microvascular environment to complete the repair process.

Only patients with severe chronic plantar fasciitis were taken up others who had improved with time or non operative treatment was excluded. In our study patients improvement clinically with visual analog scale of foot function index & AOFAS score. Reduction in pain is maintained in most of the cases till 1 year without relapse. Of importance none of the PRP treated patient become worse after treatment and there was no complications in this study. Patients acceptance of this procedure was excellent. Procedure are done as out patient procedure and patient back to work place was good.

This study found a significant relationship between the change in plantar fascia thickness and the pain level using FFI and AOFAS score after treatment. In 195 patients reduction of symptoms strongly correlated with a reduction in plantar fascia thickness. 2 patient has no decrease in thickness and no decrease in pain. 3 patient had no decrease in thickness but pain decreased.

Ragab and Othman [12] looked at 25 patients who received PRP for chronic plantar fasciitis In their prospective study, they had a mean follow-up of 10.3 months with patients' pain decreasing from an average of 9.1 to 1.6 on the visual analogue scale post-PRP injection. They reported that 88 percent of patients were completely satisfied.

Barrett and Erredge investigated the use of PRP for plantar fasciitis in nine patients [13]. The authors used ultrasound of the fascia before and after treatment with the patients' pain scale determining the efficacy. They found that six of the nine patients achieved complete resolution of symptoms after two months. It took a second injection for one patient to have complete resolution. The authors noted that 77.9 percent of their patients had no symptoms after one year of treatment. They also concluded that ultrasound measurements of the thickness of the plantar fascia post-injection showed reduced thickness.

Aksahin and colleagues compared 30 patients treated with PRP versus 30 patients treated with corticosteroid injection [14]. Over a six-month period, they found both groups of patients to have significant improvement in symptoms but there were no statistical differences between the groups. The authors felt PRP to be safer than corticosteroid injection with the same effectiveness.

Mishra and Pavelko evaluated 20 patients with chronic severe elbow tendinosis who had persistent pain for a mean of 15 months despite nonoperative treatments and were considering surgical intervention [7]. The patients received either a single percutaneous injection of PRP or bupivacaine. After eight weeks of treatment, their results showed 60 percent improvement in the visual analog scale pain scores for the PRP patients versus 16 percent improvement for the bupivacaine patients. They concluded treatment with PRP reduced pain significantly in patients with chronic elbow tendinosis and one should consider PRP before surgical intervention.

There has been extensive research, both animal and human studies, with widespread applications revealing the efficacy and safety of PRP. Recently, there has been a focus in the literature on the beneficial effects of PRP for chronic non-healing tendon injuries such as plantar fasciitis and lateral epicondylitis.

The results suggest autologous platelet rich plasma may be an good alternative for treating patients with chronic plantar fasciitis. single injection of autologous platelet rich plasma provides long term relief of pain without any complications.

Advantages of this procedure was it is cost effective, simple, no complications, since patients own blood was used patients acceptance was good.

Conclusion

Autologous platelet rich plasma is an cost effective, simple out patient treatment modalities which gives excellent results in chronic plantar fasciitis.

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