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Autologus Platelet Rich Plasma a Biological Therapeutic Option for Planter Fascitis

Khajotia B. L.[1], Singh Chandan[2], Tanwar Sanjay[3], Grover Kheman[4]

[1]Director Trauma Center, Senior Professor & HOD, Department of Orthopaedics, SPMC Bikaner

[2]Post Graduate Student, SPMC Bikaner

[3]Assistant Professor, Department of Orthopaedics, SPMC Bikaner

[4]Post Graduate Student, SPMC Bikaner (Corresponding Author)

Abstract: ***Introduction: Plantar fasciitis (PF) is a common lesion that occurs in the heel, and approximately 11% to 15% of adult foot symptoms require professional care. In terms of treatment, various methods have also been used in the treatment of PF, including nonsteroidal anti - inflammatory drugs (NSAIDs), corticosteroid injections, and nondrug approaches, such as ice packs, shoe inserts, plantar fascia stretching exercises, extracorporeal shock wave therapy, and even surgical treatment. Over the last few years, the use of autologous platelet - rich plasma (PRP) has emerged in the forefront of biologic tools for foot and ankle specialists. Platelet - rich plasma (PRP) has been used as an alternative therapy for plantar fasciitis (PF) to reduce heel pain and improve functional restoration. Methodology: A hospital - based prospective case study of 30 unilateral plantar fasciitis patients with symptom duration of 6 months or more was done. All patients included in the study were assessed clinically, by visual analogue score for heel pain and by Foot and Ankle Disability Index (FADI) score for functional outcome at 2, 4, 12 and 24 weeks follow - up. All patients were observed for 24 weeks. Results: The mean age was 42.3 years (range 28 - 65 years). The pre - injection mean VAS score for heel pain was 5.67 ± 1.49 which improved upto 3.6±1.42 at 2 weeks, 2.0±0.10 at 4 weeks, 0.6±0.9 at 12 weeks and.06±.03 at 24 week respectively. The baseline mean FADI scores were 60.58±5.57 which improved to 65.05±5.74 at 2 weeks, 68.27±5.90 at 4 weeks, 71.11±6.92 at 12 weeks and 73.54±6.56 at 24 weeks respectively. Conclusion: The short - term results of single dose PRP injection have shown clinical improvements in VAS for heel pain and functional outcome scores. This study concludes that local PRP injection is a viable management option for chronic plantar fasciitis.***

Keywords: Foot and Ankle Disability Index, Plantar Fasciitis, Platelet Rich Plasma, Non Steroidal Anti - Inflammatory Drugs, Visual Analogue Scale.

1. Introduction

Plantar fasciitis (PF) is a common lesion that occurs in the heel, and approximately 11% to 15% of adult foot symptoms require professional care. [1, 2] Pain is intensified by prolonged standing, weight bearing and obesity. It is estimated that approximately 1 in 10 people experience heel pain at some point. Although PF occurs at all ages, the highest risk of occurrence of PF is 40 to 60 years of age, with no significant sex bias. [3] The diagnosis of PF is mainly based on the patient's history and clinical examination, and further investigation is rarely needed. In terms of treatment, various methods have also been used in the treatment of PF, including nonsteroidal anti - inflammatory drugs (NSAIDs), corticosteroid injections, and nondrug approaches, such as ice packs, shoe inserts, plantar fascia stretching exercises, extracorporeal shock wave therapy, and even surgical treatment. [4 - 6] It is reported that the symptoms will disappear after nonsurgical treatment in more than 80% of patients. [7] In 10% of patients, symptoms do not improve with conservative measures and further develop into chronic diseases. [8] In general, when these conservative treatments fail, injecting steroids is considered an option. However, steroid injections are often not successful after 1 injection and can thus require multiple injections, which may be associated with potential complications, including plantar fascia rupture and fat pad atrophy. [9, 10] Therefore, the study of alternative therapies is important.

Platelet - rich plasma has become more popular over the last several years as an orthobiologic option for foot and ankle injuries. The use of orthobiologics in the treatment of foot and ankle injuries, both in the clinical and surgical venues, is significantly increasing. Clinicians and surgeons continue to seek better ways to accelerate and mediate the healing of bone and soft tissue while incorporating less invasive techniques. Over the last few years, the use of autologous platelet - rich plasma (PRP) has emerged in the forefront of biologic tools for foot and ankle specialists. Researchers have investigated the use of PRP in the treatment of tendon injuries, chronic wounds, ligamentous injuries, cartilage injuries, muscle injuries and for bone augmentation (intraoperative fusions and fracture repair). Platelet - rich plasma has been in use over the last four decades. Theoretically, PRP offers increased concentrations of autologous platelets, which yield high concentrations of growth factors and other proteins that will subsequently lead to enhanced healing of bone and soft tissue on a cellular level. A local injection of platelet - rich plasma (PRP) is an emerging therapy for ligament pathologies and recalcitrant tendons, including PF.

This platelet - rich solution can be an adjunct to healing as with a fresh surgical fusion or it can reinstate healing as with chronic tendon injuries. Platelet - rich plasma and related products have different labels throughout the literature including platelet - rich concentrate, platelet gel, preparation rich in growth factors (PRGF), platelet releasate and platelet - leukocyte - rich gel (PLRG). Platelet - rich plasma may or

may not become activated by another product.

The PRP without activation is usually reserved for the treatment of tendon, muscle and other soft tissue. In the clinic, PRP has been widely applied to various tissue injuries, such as osteoarthritis, muscle strain, bone healing, and tendon injury. [11 - 12] PRP has also been used as an effective treatment modality in sports medicine to rehabilitate disabled muscles. [13]

2. Material and Methods

This prospective study was carried out on a total number of 30 patients, who were registered in OPD of Department of Orthopaedics. with the chief complaints of a sharp pain in heel or the area of the sole near the heel after awakening, long period of standing and worse pain after exercise. The patients were selected by O. P. D. basis and followed up to 6 months, between the age groups of 18 - 70 years of both male and female gender on the basis of following inclusion and exclusion criteria -

Inclusion Criteria

1) Patient between the age groups of 18 - 70 years.
2) Patient who is registered in OPD of Department of Orthopaedics with the complaint of a sharp pain in heel or the area of the sole near the heel after awakening, long period of standing and worse pain after exercise.
3) Patients who give consent for treatment with autologous PRP injection as per our protocol.
4) Regular visits in the OPD.

Exclusion criteria

1) Patient who is <18 years and >70 years of age groups.
2) Patient with active superficial/deep infection, Tumor or Fracture of Foot/Ankle.
3) Patients with diabetes mellitus, rheumatoid arthritis, gout, hypothyroidism or other painful orfunction limiting disorders of the foot and ankle, presence of severe anemia, platelet count <100, 000 per microliter of blood, significant cardiovascular, renal or hepatic disease were also excluded from the study.
4) The patients were excluded if they received local steroid injection within 1 month, physical therapy within 6 weeks, non - steroidal anti - inflammatory drugs or acetylsalicylate within 1 week, and hadundergone previous surgery for plantar fasciitis, or had history of foot fracture.
5) Patient who is not agree to give the consent for treatment as per our protocol.
6) Irregular visit in the OPD in the Department of Orthopaedics.

Detailed history was taken. Patients were asked for the duration of the disease and the nature of management taken prior to autologous platelet rich plasma treatment i. e. for the usage of NSAIDS 72 hour's prior and local steroid infiltration 4 weeks prior to autologous PRP injection. The baseline investigation (CBC, FBS, HIV, HBsAg, HCV, LFT, RFT, ESR, S. Uric acid) done and informed written consent was taken.

Method of preparation of platelet rich plasma: -

PRP is prepared by a process known as differential centrifugation. In differential centrifugation, acceleration force is adjusted to sediment certain cellular constituents based on different specific gravity. In our institute we prepared the PRP by following method: -

40cc of venous blood was collected from anti - cubital vein under aseptic conditions into four, 10cc ACD (acid citrate dextrose) containing vacutainer tubes; All tubes were placed in centrifuge machine in such a way that each of them is counter balanced by another.

FIRST SPIN: After placing the tubes in centrifuge machine they centrifuged at 1800 rpm for 5 minutes.

Blood in the all four tubes separated into 3 layers after first spin.

a) Upper layer - that contains mostly platelets and WBC,
b) Intermediate thin layer - that is known as the buffy coat and that is rich in WBC
c) Bottom layer - that consists mostly of RBCs.

With the help of Micropipette the serum and the buffy coat (leucocytes and platelets) drawn from the each tubes into another 10 cc tube. Thus, total 20 cc of plasma is obtained, which is divided into two tubes of 10cc each. These two tubes were modified and capped to fit into the centrifuge machine.

SECOND SPIN: After placing the tubes in centrifuge machine, centrifuged again at 4500 rpm for 10 minutes.

After second spin the tubes contains platelet poor plasma on top and platelets and leucocytes at bottom. The supernatant drawned and discarded leaving about 3.5 cc at the bottom as platelet rich fraction of plasma. Similarly, 3.5 cc of platelet rich plasma is obtained from second tube. In total 7 cc of platelet rich plasma is available, of which 5 cc injected at the point of maximum tenderness at heel under aseptic conditions and 2cc sent for cell counts.

Procedure of Injection: Patient in supine position with the leg externally rotated. After thorough scrubbing and painting with Betadine followed by Surgical Spirit and draping, A 18G needle inserted at the point of maximum tenderness in the heel and an empty syringe used to check any blood or serous aspirate after that the empty syringe replaced with PRP filled syringe and 5 ml PRP injected. The sterile dressing and compression bandage applied at the injection site. Remaining 2 ml PRP sent for cell count.

Follow up and Assessment: Patient advised for protected weight bearing for minimum of 2 weeks and to combat the pain with ice pack application. Patients were followed up for 6 months. A telephonic follow up was done at second day after injection to find out any adverse reactions. The functional status and severity of pain was charted according to VAS and FADI score both pre - procedurally on day 0 and post - procedurally at the end of 2nd, 4th, 12th and 24th week. Final outcome was measured based on pain and activity at the end of 6th month.

3. Discussion

The present study "Autologus Platelet Rich Plasma a Biological Therapeutic Option for Planter Fascitis", was conducted in Department of Orthopaedics, Trauma center of Medical College and associated group of hospitals, Bikaner Rajasthan. This study was conducted on 30 cases who were registered in OPD of orthopaedics Department with the complaint of a sharp pain in heel or the area of the sole near the heel after awakening, long period of standing and pain getting worse after exercise. All patients completed the follow - ups. The average follow up duration was about 6 months.

Age:
In our study, the age distribution predominant 13 (43.33%) cases were from 41–50 years of age group, 11 (36.66%) cases found in the age group of 31–40 years, 3 (10%) cases in 51–60 years of age group and 2 (6.66%) cases were in the age group of ≤30 years of age group which is close correlate with following studies -

Study	Mean age of the patients	Mean follow up	Range
Our study	42.3 years	24 weeks	28 - 65 years
Ragab EM et al [14]	44 years	10.3 months	–
Upadhyay S et al [15]	45.95 years	24 weeks	40–50
Anand Kumar et al [16]	36 years	24 weeks	20–50

Sex:
There was a male preponderance. 19 (63.33%) patients were male and 11(36.67%) patients were female.

Platelet count:
In our study, pre injection CBC Platelet count (Mean ± SD) were 2.11 ±.3 lack per $mm^3$and PRP platelet counts were 12.17 ± 1.14

VAS score:
In our study, Mean±SD of VAS score of patients before PRP injection was 5.67±1.49 which improved upto 0.06±0.03 at the end of 24 weeks. Maximum improvement was seen between 12th to 24th weeks which was close correlate with following studies: -

Visits		VAS Score			
		Our study	Upadhyay S et al [15]	Sachdeva T [17]	Anand Kumar et al [16]
0 visit	Mean	5.67	7.10	7.9	7.2
	SD	1.49	0.750	0.72	–
1 week	Mean	–	–	5.45	–
	SD	–	–	0.6	–
2 weeks	Mean	3.6	–	–	–
	SD	1.42	–	–	–
3 weeks	Mean	–	–	–	–
	SD	–	–	–	–
4 weeks	Mean	2.00	4.52	4.2	4.7
	SD	0.10	0.779	0.77	–
6 weeks	Mean	–	–	–	–
	SD	–	–	–	–
12 weeks	Mean	0.6	3.06	1.85	5.53
	SD	0.09	0.856	0.75	–
24 weeks	Mean	0.06	1.41	–	4.57
	SD	0.03	0.495	–	–

FADI Score:
In our study, Mean FADI score was 60.58 ± 5.57 which improved up to 73 ± 6.56 at the end of 24 weeks. Maximum improvement was seen at first follow up visit (at 2 weeks) which correlate with following studies: -

Clinical assessment of Foot with FADI Score

Visits		FADI Score		
		Our study	Sachdeva T [17]	Anand Kumar et al [16]
0 visit	Mean	60.58	25	36.33
	SD	5.57	7.23	–
1 week	Mean	–	48.55	–
	SD	–	4.88	–
2 weeks	Mean	65.05	–	–
	SD	5.74	–	–
3 weeks	Mean	–	–	–
	SD	–	–	–
4 weeks	Mean	68.27	62.6	76.33
	SD	5.90	5.56	–
6 weeks	Mean		–	–
	SD		–	–
12 weeks	Mean	71.11	84.05	80
	SD	6.92	6.05	–
24 weeks	Mean	73.54	–	71.2
	SD	6.56	–	–

Results:
The initial and 2, 4, 12, 24 week's VAS pain score was recorded and analyzed. It was found that65 percent of patients had significant relief of pain at 2 weeks which continued till the end of study.

The initial and 2, 4, 12, 24 week's functional outcome was recorded and analyzed. It was found that 70 percent of patients had significant improvement in functional activities at 4 weeks which continued till the end of study.

4. Conclusions

Autologous PRP injection is a safe and useful modality of treatment in the treatment of chronic plantar fasciitis. Maximum benefit after PRP injection was observed at 1 month and sustained for at least 6 months.

Finally it was concluded that intralesional autologous platelet rich plasma injection is safe and useful in the treatment of chronic plantar fasciitis.

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