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"ROLE OF AUTOLOGOUS PLATELET RICH PLASMA THERAPY IN TREATMENT OF PLANTAR FASCIITIS, A PROSPECTIVE STUDY."

Orthopaedics

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ABSTRACT

Plantar fasciitis is fairly common in orthopaedics out-patient department. Although, majority of the patients do well with conservative treatment, some patients continue to have painful feet despite a course of conservative management. These patients of plantar fasciitis are provided with other treatment modalities such as local corticosteroid but the chronic condition requires multiple dosages and are associated with adverse reaction. Autologous platelet rich plasma therapy is another modality for treatment of such cases and are not associated with adverse effects when compared with corticosteroid injection therapy. This prospective case series analyses the improvement of pain using visual analogue scale of plantar fasciitis patients treated with autologous platelet rich plasma over the course of 3 months. 30 patients were enrolled in the study. The mean VAS score at pre injection was 7.13 which significantly reduced to 3.3 at 6 weeks post injection and 2.36 at 6 weeks post injection. There was significant improvement in pain. This study is limited with small sample size and short follow up.

KEYWORDS

Autologous Platelet Rich Plasma, Plantar Fasciitis, Visual Analogue Scale

INTRODUCTION:

Plantar fasciitis is one of the most common cause of painful feet limiting its function. Approximately 15% of all foot complaints coming to out-patient department of a hospital can be attributed to this cause.[1] This condition also accounts for 8% of all injuries in athletes in running-related sports.[2] The plantar fascia is a thickened fibrous aponeurosis that originates from the medial tubercle of the calcaneus, runs forward to insert into the deep, short transverse ligaments of the metatarsal heads, dividing into 5 digital bands at the metatarsophalangeal joints [3] and continuing forward to form the fibrous flexor sheathes on the plantar aspect of the toes. The plantar fascia acts like a windlass mechanism to provide tension and support through the arch. [4] The aetiology is multifactorial and poorly understood. Probably, biomechanical dysfunction of the foot is the most common aetiology of plantar fasciitis; however, infectious, neoplastic, arthritic, neurologic, traumatic, and other systemic conditions can prove causative. The pathology is traditionally believed to be secondary to the development of microtrauma (microtears), with resulting damage at the calcaneal-fascial interface secondary to repetitive stressing of the arch with weight bearing.[5,6,7]

Various therapies have been reported for treatment of plantar fasciitis, but there is inadequate available evidence for a single modality of management and there is no gold standard treatment. The corticosteroid injections have shown satisfactory short-term results, but were associated with various local and systemic adverse effects [8,9] and hence, led to search for other options for the treatment of plantar fasciitis.

Autologous platelet rich plasma (PRP), created by centrifugation of whole blood and addition of calcium chloride for platelet activation has various growth factors that may induce local factors to accelerate healing process and has been recently proposed as a treatment for plantar fasciitis.[10] This prospective case series makes use of the VAS score for heel pain as an outcome measure to study the role of single local injection of PRP in the management of plantar fasciitis.

MATERIAL AND METHODS:

This prospective study was conducted after ethics committee approval from July 2019 to April 2020. 30 patients were included in the study after clinical evaluation and diagnosis with unilateral plantar fasciitis in age group of 20-70 years. Patients with bilateral painful feet, local infection, known malignancy, nerve related pathologies, Achilles' tendinitis or tendinosis, Rheumatoid arthritis, ankylosing spondylitis, Gout, pregnant or breastfeeding, complex regional pain syndrome, bony spur on plain radiograph, Previous foot surgery and those not willing for consent or follow-up were excluded from the study.

All patients were assessed using visual analogue scale for pain before injection and at 6weeks and 12weeks follow-up. Under all aseptic precautions, 1.5cc of autologous PRP were injected into the origin of plantar fascia. Patients were observed for 20 minutes for any adverse reaction, were advised for oral analgesics and case specific precautions. Patients were advised for weight bearing as tolerated and stretching exercises were stared after 2 weeks. Patients were followed up at 6 weeks and 12 weeks.

The Visual Analogue Scale is the subjective psychometric response scale marked on a 10cm line with numbers from "0" to "10". Patients were explained "0" as no pain, "5" as moderate pain and "10" as unbearable pain and were asked to mark appropriate score on the line describing their own pain.

RESULTS:

Total of 30 patients were enrolled in the study and final results were analysed based on the Visual Analogue Scale of the 30 enrolled patients. 07 patients were male and 23 patients were female. Majority patients affected with plantar fasciitis were female (76.66%) as compared to male (23.33%). 19 patients had involved of right foot (63.33%) as compared to left foot (36.66%). The mean age was 51.866 with patients in the age group of 28 years to 70 years. Table 01 shows the demographic profile of the patients enrolled in the study.

TABLE 01: DEMOGRAPHIC PROFILE

AGE	MEAN	51.866 (28-70)
	STANDARD DEVIATION	12.577
GENDER	FEMALE	23(76.66%)
	MALE	07(23.33%)
SIDE INVOLVED	RIGHT	19(63.33%)
	LEFT	11(36.66%)

Outcome analysis for improvement in pain of the patients were done using Visual Analogue Scale at pre injection and at 6 weeks post injection and 12 weeks post injection. The mean VAS score at pre injection was 7.13 which significantly reduced to 3.3 at 6 weeks post injection and 2.36 at 6 weeks post injection. Table 02 shows the descriptive statistics of VAS score at pre-injection, 6 weeks and 12 weeks post injection.

TABLE 02: DISCRIPTIVE STATISTICS OF VAS SCORE

	BEFORE INJECTION	6 WEEKS POST INJECTION	12 WEEKS POST INJECTION
Mean	7.133333333	3.3	2.366666667
Standard Error	0.298399306	0.180357244	0.169402828

Median	7	3	2
Mode	9	4	2
Standard Deviation	1.634400308	0.987857312	0.9278575
Range	6	3	3
Minimum	4	2	1
Maximum	10	5	4
Sum	214	99	71
Count	30	30	30
Confidence Level (95.0%)	0.610295105	0.368871983	0.346467685

Repeated measures of ANOVA test were applied and it showed statistically significant improvement in pain assessed using VAS score at pre injection time and at 6 weeks and 12 weeks follow up with P value $2.17174E^{-06}$ which is less than 0.05. Table 03 shows ANOVA test.

TABLE 03: ANOVA TEST

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Male, Female, Right side, Left side	42.333 33333	29	1.4597 70115	3.8719 5122	0.0002 41896	1.8608 11435
Before injection, 6 weeks, 12 weeks post injection	13.066 66667	1	13.066 66667	34.658 53659	2.1717 4E-06	4.1829 64289

Inference of ANOVA test (table 03): For columns (Before injection, 6 weeks, 12 weeks): Since F (34.65853659) is greater than F critical (4.182964289) and p-value (2.17174E-06) is less than α=0.05 Hence rejecting the null hypothesis, and we are mathematical confident to say there is significant difference among all the variables (Before injection, 6 weeks, 12 weeks). For rows (Male, Female, Right, Left): Since F (3.87195) is greater than F critical (1.860811435) and p-value (0. 000241896) is less than α=0.05 Hence rejecting the null hypothesis, and we are mathematical confident to say there is significant difference among all the variables (Male, Female, Right and Left).

DISCUSSION

Plantar fasciitis is caused by degenerative irritation at the insertion of the plantar fascia on the medial process of the calcaneal tuberosity which leads to substantial pain and affects quality of life. Plantar fasciitis is typically a self-limited condition, and studies have reported a resolution incidence of up to 90% with nonsurgical measures. [11,12,13,14,15,16]. About 80% of plantar fasciitis cases resolve spontaneously by 12 months.

Traditional management includes NSAID therapy, stretching exercises and orthoses. Counselling for activity modification, as well as choice of shoe gear, is important. After 6 weeks, recalcitrant cases should be treated additionally with a night splint and, possibly, an injection, along with the initial regimen for another 6 weeks.

Currently local corticosteroid injections are the mainstay in the treatment of chronic plantar fasciitis. The anti-inflammatory property of corticosteroids are effective in reducing the heel pain [17,18]. They also inhibit the proliferation of fibroblasts and ground substance proteins [19]. Multiple injections are associated with rupture or tear of plantar fascia, local infection, depigmentation of skin, post-injection flare, and heel fat pad atrophy [20,21].

Local autologous PRP injection is a recently introduced treatment of plantar fasciitis which is rich in growth factors (TGF, VEGF, PDGF), cytokines and interleukins. In plantar fasciitis, the growth factors and anti-inflammatory cytokines in the PRP initiate the healing process at the site of degeneration of plantar fascia and alleviates the symptoms.

Several case series and RCT's were published in the literature reporting the effectiveness of PRP injection in plantar fasciitis. Martinelli et al. [22] reported a case series of 14 patients of plantar fasciitis treated with three doses of PRP injection, in their study the VAS scores had reduced from 7.1 pre-treatment to 1.9 at the 12-month follow-up. Another case series by Ragab and Othman [23] reported a complete alleviation of pain with a single dose PRP injection in 88% of their patients (n=25) at 12 months follow-up. Kumar et al.[24] in their cases series of 44 patients (50heels) treated with single PRP injection reported that at 6 month post-injection, baseline RM score, VAS score and AOFAS improved from mean 4 to 2 (p<0.001), 7.7 to 4.2 (p< 0.001) and 60.6 to 81.9 (p<0.001) respectively. All the three studies concluded that PRP injection is very much effective in the treatment of plantar fasciitis.

The results obtained in this study shown that PRP injection definitely reduces pain and improves the VAS score for heel pain in patients with plantar fasciitis. The difference from the baseline was statistically significant at both 6 and 12-week follow-up (p<0.001).

All patients in the study tolerated the local PRP injection without any significant local or systemic adverse events. Limitations of this study were small study population, a short duration of follow-up and lack of a control group. To overcome the shortcomings of this study, RCT with a larger study population and a longer follow-up will be helpful in better understanding of the long-term benefits and efficacy of the PRP injection in the management of plantar fasciitis.

CONCLUSIONS:

The outcomes of this study suggest that the short-term results of single dose PRP injection in plantar fasciitis showed clinically and statistically significant improvements in VAS for heel pain. The study concludes that local PRP injection is a viable and safe treatment option for chronic plantar fasciitis. This study is limited by small sample size, shorter duration of follow up. Further studies with larger sample size and longer follow-up are needed for better understanding of the long term benefits and efficacy of the PRP therapy in management of plantar fasciitis.

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