OUTCOMES OF ULTRASOUND GUIDED PLASMA RICH PROTEIN INJECTION IN CHRONIC PLANTAR FASCIITIS

Shaukat Hayat Khan, Muhammad Shahbaz Raza, Iffat Ara, Rehan Wani, Khalid Mehmood, Anam Altaf*

Sheikh Khalifa Bin Zayed Al Nahyan, Muzaffarabad Pakistan, *Al-Shifa Trust Eye Hospital, Rawalpindi Pakistan

ABSTRACT

Objective: To compare outcomes (plantar fascia thickness, Visual analogue scale scores, role and maudsley scores of satisfaction and complication) of ultrasound guided plasma rich protein injection and steroid injection in chronic plantar fasciitis.

Study Design: Quasi experimental study.

Place and Duration of Study: Department of orthopedics, Sheikh Khalifa Bin Zayed Al Nahyan/Combined Military Hospital (CMH), Muzaffarabad, from Jun 2018 to Jun 2019.

Methodology: Plantar fasciitis patients were selected through non probability consecutive sampling. Patients were randomly divided into two groups, group A received ultrasound guided PRP injection while group B received steroid injection. Both groups were followed for outcomes for 6 months.

Results: Total 42 patients were included in study. There were 20 (47.6%) male and 22 (52.4%) female. Mean age of patients was 42.6 years ± 9.5 SD. Plasma rich protein group showed significantly low visual analogue scores (p<0.01), American Orthopedic foot and ankle scores (p<0.01), reduced plantar fasciitis thickness (p<0.01), Roles and Maudsley satisfaction scores (p<0.01). Age and gender showed insignificant association with outcomes (p=0.538 & p=0.653 respectively).

Conclusion: Ultrasound guided Plasma rich protein injection is a safe, well tolerated and effective method of plantar fasciitis management with long lasting accuracy as compared to steroid injection. Early diagnosis and management of plantar fasciitis leads to better health outcomes

Keyword: Platelet fasciitis, Platelet rich plasma injection, Ultrasound.

INTRODUCTION

Plantar fasciitis (PF) is common chronic heal pain affecting more than 2 million individual in United States every year[1]. Plantar fasciitis is referred as heel spur syndrome, painful heel syndrome, calcaneal periostitis, chronic plantar heel pain and runner's heel[2]. Plantar fasciitis is common among middle age obese female, sports man and athlete males. Literature reported that 1/10 individual is affected with plantar fasciitis[3].

Risk factors for PF include obesity, calcaneal spur, reduction in ankle dorsiflexion, prolonged standing, older age, metatarsophalangeal (MTP) joint extension reduction, intense muscle contraction of plantar flexor muscles, deficit in plantar flexor muscles flexibility, excessive pro-nation and foot posture[4]. PF diagnosis is based on clinical finding with rare need of further investigation. Pain in medial side of heel (worsening at the end of day) is most common symptom of PF with bilateral presentation in 30% patients and 80% patients with tightness of Achilles[5]. Imaging studies for PF include lateral radiograph of ankle (quality of fat pad, assessment of heel spur and thickness of plantar fascia), ultrasound examination (plantar fascia thickness >4.0mm) and MRI (for diagnosis of other causes like stress fractures, soft tissue and bone tumors, osteomyelitis, tarsal tunnel syndrome and subtalar arthritis). Differential diagnosis of PF include plantar fascia rupture, fat pad syndrome, calcaneal stress fractures, tumor, calcaneal bursitis, boxter's nerve entrapment, medial calcaneal nerve compression, seronegative arthopathies and spinal stenosis[6].

Treatment modalities of PF include rest, ice pack, heat, night splints, non steroid anti inflammatory drugs, magnetic insole, walking

Correspondence: Dr Anam Altaf, Eye Department, Al-Shifa Trust Eye Hospital, Rawalpindi Pakistan

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cast taping, extra corporeal shock wave therapy, steroid injections, platelet rich plasma injection, electromagnetic field therapy, plantar and Achilles stretching, pulsed radiofrequency and surgery[7]. Platelet rich plasma (PRP) local injection is an emerging therapy for PF. Autologous whole blood is used for preparation of PRP (containing a high concentration of autologous platelets). Literature reported PRP as effective treatment modality for disable muscle rehabilitation[8]. Acosta-Olivo reported that PRP is effective treatment as compared to conservative treatment, however efficacy of PRP is approximately equal to steroids. PRP treatment disadvantage include cost and time of preparation[9]. Soraganvi *et al*, reported that visual analogue scores (VAS) and American Orthopedic foot and ankle scores (AOFAS) were significantly improved after treatment in PRP group as compared to steroid injection in chronic plantar fasciitis with long lasting beneficial effects[10]. Data available on efficacy of PF is limited to make any conclusion in Pakistan setting. Present study aims to compare outcomes (plantar fascia thickness, VAS scores, Role and Maudsley scores of satisfaction and complication) of ultrasound guided Plasma rich protein injection and steroid injection in chronic plantar fasciitis.

METHODOLOGY

A quasi experimental study was conducted at department of Orthopedics, Combined Military Hospital, Muzaffarabad, from June 2018, June 2019. A sample size of 42 (21 patients in each group) patients was calculated with 95% confidence interval, 80% power of study, μ1=90.03, μ2=74.67, SD=3.3 using WHO calculator[11]. Ethics permit was taken from CMH ethics board (IRB no=7891). All participating patients signed consent form before participation into study. Patients of plantar fasciitis were selected through non probability consecutive sampling. Inclusion criteria was based upon 20-70 years, both genders, patients diagnosed with plantar fasciitis (>6 months duration of disease), patients not responding to non steroid anti-inflammatory drugs (NSAIDS) and VAS >5. Patients with surgery (endoscopic plantar fascia release/open plantar fascia release, history of severe anemia, neuropathy related heel pain, rupture of plantar fascia (proved image on MRI or US), impalpable pedal pulse (vascular insufficiency) and thrombocytopenia were excluded from study. A random division of patients was done using lottery method. group A patients were undergone PRP (3ml injection) while group B was given steroid injection [2ml depamedrol (80mg) and 0.5ml oxylocaine (2%)]. PRP preparation was done with cubital vein blood drawn into 6 vacutainer tubes (containing 0.35ml of 3.2% sodium citrate). Centrifugation was done at 1200 rpm (10 minutes) making three layers (red blood cells in bottom, white blood cells in intermediate and plasma platelets with some white blood cells in upper layer). 10cc syringe of upper layer was taken, 1ml of upper layer was undergone 1st spin step and trans-ferred to tube of 6ml. In the end tube was centrifuged (24000 rpm for 10min) again, upper half of plasma volume was removed and rest of PRP volume was used for injection. Ultrasound imaging technique was used for PRP insertion. Patients were followed for 6 months outcome measurement before and after treatment. SPSS version 24 was used for data analysis. Descriptive and inferential statistics were calculated. Fissure exact and t-test was applied. *p*-value ≤0.05 was considered significant in our study.

RESLUTS

Total 42 patients were included in study. There were 20 (47.6%) male and 22 (52.4%) female. Mean age of patients was 42.6 ± 9.5 SD. There were 19 (45.2%) patients in age group 20-42 years age group and 23 (54.8%) patients in age group 43-70 years age group. There were 19 (45.2%) patients with BMI ≤25 kg/m2 and 23 (54.8%) patients with BMI >25 kg/m2.

Mean VAS pre injection was 7.66 ± 0.79 in group A and 7.95 ± 0.97 in group B (p=0.816). Mean visual analogue scores after injection in group A were 4.57 ± 1.36 and in group B 6.85 ± 0.47 (p<0.01). In group A AOFAS pre injection scores were 53.76 ± 1.33 and in group B 54.76 ±

1.51 (p=0.276). Mean AOFAS post injection scores after injection were 90.19 ± 1.8 in PRP group and 73.85 ± 1.87 (p<0.01). Mean thickness of plantar fascia pre injection in group A was 5.42 ± 0.50 and in group B 5.71 ± 0.46 (p=0.06). In PRP group, mean thickness of plantar fascia after treatment was 2.71 ± 0.71 and in group B 4.33 ± 0.48 (p<0.01) as shown in table-I.

Among all the patients in group A (PRP) 21 (50%), satisfaction scores were poor 12 (28.6%), acceptable in 9 (21.4% while in group B 21 (50%), 9 (21.4%) had poor, 9 (21.4%) acceptable and 3 (7.1%) had good scores before treatment (p=0.180). After treatment among all the patients in group A 21 (50%), satisfaction scores were good in 12 (21.4%) and excellent in 12 (28.6%) while in group B 21 (50%), satisfaction scores were acceptable in 9 (21.4%) and good in 12 (28.6%) (p<0.01) as shown in table-II.

Table-I: Comparison of outcomes in both interventional groups (n=21).

Outcomes	Interventional Groups		*p*-value
	Group A (Plasma rich protein)	Group B (Steroid Injection)	
Visual Analogue Scores			
Pre-injection	7.66 ± 0.79	7.95 ± 0.97	0.816
Visual Analogue Scores			
Post-Injection	4.57 ± 1.36	6.85 ± 0.47	<0.01
American Orthopaedic Foot & Ankle Society Scores			
Pre-Injection	53.76 ± 1.33	54.76 ± 1.51	0.276
American Orthopaedic Foot & Ankle Society Scores			
Post-Injection	90.19 ± 1.88	73.85 ± 1.87	<0.01
Thickness of Plantar Fascia			
Pre-injection	5.42 ± 0.5	5.71 ± 0.46	0.06
Thickness of Plantar Fascia			
Post-Injection	2.71 ± 0.71	4.33 ± 0.48	<0.01

Table-II: Comparison of satisfaction scores in both interventional groups.

Roles and Maudsley score of satisfaction	Interventional Groups		*p*-value
	Group A (Plasma rich protein)	Group B (steroid injection)	
Pre-Injections			
Poor	12 (28.6%)	9 (21.4%)	0.180
Acceptable	9 (21.4%)	9 (21.4%)	
Good	-	3 (7.1%)	
Excellent	-	-	
Satisfaction Scores Post Injection			
Poor	-	-	0.01
Acceptable	-	9 (21.4%)	
Good	12 (21.4%)	12 (28.6%)	
Excellent	12 (28.6%)	-	

DISCUSSION

Plantar fasciitis is main cause of foot complaints and adult foot symptoms accounting 11% to 15% that require medical treatment. PRP local injections are getting acceptance in treatment of soft tissue musculoskeletal injuries and gained promising results[12]. PRP injections are associated with high tendon regenerative capacity due to hyperphysiological growth factor doses, chemotaxis process promotion, synthesis of matrix and cellular proliferation[13].

In present study, total mean visual analogue scores were significantly lower in PRP group as compared to steroid injection (p<0.01) after intervention. Aksahin *et al*, reported that mean VAS were significantly lower after treatment in PRP group as compared to Corticosteroid injection group (3.92 ± 1.2 SD vs 5.43 ± 2.3 SD, p=0.01)[14]. Omar *et al*, reported that significant difference in VAS was found in PRP group (8.2 ± 1.3 SD before and after 2.6 ± 2.1 SD, p=0.02) while no difference in pain scores was found in corticosteroid group (8.8 ± 0.9 SD before and after 7.7 ± 2.6 SD, p=0.167)[15].

In present study, high AOFAS post injection in PRP group represent high efficacy of PRP as compared to steroid injection. Monto *et al* reported that mean AOFAS were 92 (ranging 77-100) in PRP group while in corticosteroid group mean AOFAS scores were 56 (ranging 30-75) indicating better treatment efficacy in PRP group[16]. Kumar *et al*, reported patients undergone PRP showed significant increase in AOFAS before and after treatment (60.6 ± 13.1 SD vs 81.9 ± 16.6 SD, p=0.05)[17].

In present study, R & M scores of patients satisfaction showed majority of patients with excellent satisfaction in PRP group as compared to steroid group (p<0.01). A similar study reported that R & M scores were excellent in 20%, good

in 13.3%, acceptable in 53.3% and poor in 13.3% patients in PRP while majority of patients in corticosteroids groups showed poor and acceptable scores of R&M (p<0.05)[18]. Kim *et al*, reported that PRP group patients reported satisfaction in terms of activity limitation. Patients in steroid injection group were more prone to face activity limitation as compared to PRP group (O.R:1.2, 95% C.I, p=0.01)[19].

In present study, plantar fascia thickness was significantly lower after treatment in PRP group as compared to steroid group (p<0.01). Mahindra *et al*, reported that ultrasound reported thickness was lower after PRP therapy in plantar fasciitis patients (medial band 4.8mm, central band, 5.4mm and lateral band 4.6mm)[20].

LIMITATION OF STUDY

Short duration of study, small sample size and conduction of study at single center limits generalisability of study.

CONCLUSION

Ultrasound guided PRP injection is a safe, well tolerated and effective method of plantar fasciitis management with long lasting accuracy as compared to steroid injection. Early diagnosis and management of plantar fasciitis leads to better health outcomes.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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