

## Case Report

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## Platelet Rich Plasma Injection in the Treatment of a Recalcitrant Plantar Fasciitis: A Case Study

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### ABSTRACT

Plantar fasciitis (PF) is a common musculoskeletal problem that causes so much disability in the foot. Recently, platelet-rich plasma (PRP) injection has been recommended for the treatment of patients with chronic plantar fasciitis (PF), particularly where physiotherapy or other conservative treatments have failed or pain is limiting exercise, in order to reduce heel pain and improve functional restoration. In this case study, a patient who PF for 16 years and had failed all conservative treatments including cortisone injection was treated with platelet-rich plasma injections twice and made significant improvements with 100% reduction in pain intensity measured using numeric pain scale (NPS) from 10 to 0 and improvement in her lower limb functional by 56% from 68 to 24/80, which was assessed using lower extremity functional scale (LEFS) score. There were no safety issues recorded. Conclusion: Injection of autologous PRP for chronic plantar fasciitis was found to be beneficial in terms of pain relief (reduced NPS score) and functional outcome (improvement in LEFS score). However, a large scale and a properly randomised controlled study is needed to prove further efficacy of PRP injection.

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### Introduction

Plantar fasciitis (PF) is a common musculoskeletal condition of the foot that affects people of all ages, and it increases with age with peak occurrence at 40 to 60 years [1,2]. One in ten people will experience PF at some point in life and it is estimated that 11% to 15% of adult foot symptoms will require medical attention including orthopaedic consultations.<sup>3,4</sup> In the United States of America, one in six persons, regardless of age or activity level, will experience PF, resulting in over 1 million primary care visits annually (Haley and Cook, 2021). It is a major cause of disability and work productivity loss and causes significant physical challenges, with associated costs.<sup>3,4,5,6</sup> PF affects functional daily activities such as standing and walking and hinders participation in sports involving a lot of jumping or running such as dancers, long-distance runners and basketball players [3,4].

The exact aetiology of plantar fasciitis is still debatable, however, researchers attribute repetitive microtrauma to plantar fascia as the main cause of plantar fasciitis.<sup>7</sup> Research evidence suggests that obesity, prolonged weight bearing, heel pad atrophy, aging, leg-length discrepancy, gradually increased activity are risk factors associated with PF [5,6]. Clinical presentation of PF includes

sharp shooting heel pain which is worse during initial steps. The pain is usually located on the plantar surface of the foot and may radiate proximally with prolonged standing. In worsening cases the pain may be so severe, causing patients having to walk on toes in order to avoid severe pain caused by normal walking [7]. The diagnosis of PF is mainly based on the patient's history and clinical examination, and further investigation such as radiographic or other expensive diagnostic procedures is rarely recommended, except there are concerns that a more serious injury to the heel may have occurred such as a NPScular necrosis of calcaneum [1,8,9].

In general, most patients with PF are diagnosed and treated in primary and community health settings including both public and private settings by health care practitioners such as physiatry, primary care physicians, podiatrists and physiotherapists. There are a range of conservative treatments including nonsteroidal anti-inflammatory drugs (NSAIDs), and non-drug approaches, such as ice packs, shoe inserts, plantar fascia stretching exercises, dry needling, acupuncture and extracorporeal shock wave therapy [1,8-11]. Usually, when these conservative treatments fail, cortisone injection is considered as an alternative, however, its benefit is usually temporary and may require repeated injections of steroid, which may be associated with potential complications, including plantar fascia rupture and fat pad atrophy [12-14]. Therefore, the study of alternative therapies is important.

Recently, platelet-rich plasma (PRP) injection has been recommended for the treatment of patients with chronic plantar fasciitis (PF), in order to reduce heel pain and improve functional restoration [1,15,16]. Particularly where physiotherapy or other conservative treatments have failed or pain is limiting exercise. The mechanism by which platelet rich plasma injection cause tissue repair is thought to be due to the presence of growth factors including platelet-derived growth factor (PDGF) and transforming growth factor-beta (TGF-beta) [17,18]. In this case study, we used PRP injection in the management of a patient with a long-standing chronic PF where previous non-surgical interventions including hydrocortisone injection have failed to improve her symptoms. Therefore, the aim of this study was to investigate the efficacy of PRP injection in chronic PF. The research question is: “will PRP injection provide better pain relief and heel and foot function in a patient with chronic bilateral PF?”

**Case Presentation**

A 53-year-old female patient who presented to the Sport and Regenerative Medicine Clinic/Orthopedic department with chronic, severe constant bilateral heel pain, localized over the medial borders of both calcaneal tubercles. Her symptoms initially began insidiously about 16 years ago and previous conservative treatments including wearing of insoles, shortwave therapy and cortisone injection have failed to improve her symptoms and with the passage of time they got worse. Therefore, she was referred to the Physiatry Consultant in the orthopedic department KFSHRC (MA) for further assessment and intervention. Her symptoms are aggravated with weight bearing activities and worse first thing in the morning. She could barely stand for up to 2 minutes and walk for 5-10 minutes. She had difficulty sleeping at night. The intensity of pain on the numeric pain scale (NPS) was 10/10 in the morning and 8-10/10 throughout the day. Patient was a full-time house-wife and her symptoms interfered with her normal daily activities. She was not taking any pain medication. Her previous blood results and x-ray for both feet were unremarkable. However, previous x-ray of both knees revealed early osteoarthritic changes. Her system reviews, previous hospital visits and medical histories were unremarkable. Patient was in good health, a non-smoker and not over weight.

Physical examination revealed generally normal alignment of the lumbropelvic region and no reported lumbrosacral pain. There was no obvious abnormal gait pattern or leg length discrepancies. Overall, active lumbar spine and hip ranges of movements were within normal limits, including muscle power. Active knee ranges of movements were within normal limits, with no obvious muscle atrophy or weakness. One-leg standing functional genu valgus testing was negative bilaterally, but performed with pain on each of the heels. Heel and toe walking were also painful. Palpation of both medial borders of the calcanei and heel of the plantar fascia, revealed severe acute tenderness. However, there was no warmth or hotness or redness or discoloration. Both of her ankle mortise movements were within functional limits and no obvious loss of muscle power with manual resistance. Joint play revealed restrictions in the subtalar and ankle mortise joints bilaterally. The following orthopedic tests were negative: anterior and posterior drawer, talar tilt, Kleiger’s, Thompson’s, Homan’s, Noble’s compression and Hibb’s. No abnormal neurovascular compromise. Bilateral pedal pulses were present. She was not flat footed (absence of pes panii) and there was no other foot or ankle deformity. The clinical impression was chronic bilateral plantar fasciitis with biomechanical activities such as prolonged standing aggravating the patient’s symptoms of pain and disability.

This was a prospective case study conducted at the clinic of Sport and Regenerative Medicine Clinic/Orthopedic department of a tertiary hospital located in an urban area in Riyadh between August 2021 and May 2022. The patient included in this study had a diagnosis of chronic PF and met the selection criteria below (See Table 1):

**Table 1: Selection Criteria for PRP Injection for a Plantar Fascia Patient**

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> <li>• Patients aged 19 and above</li> <li>• Have heel pain due to plantar fasciitis.</li> <li>• Patient gave informed consent</li> </ul>	<ul style="list-style-type: none"> <li>• Patients below 19 years of age</li> <li>• Patient with history of pain due to fractures, arthropathies, rheumatoid arthritis or osteomyelitis etc.</li> <li>• Patient with any local intervention in last 6 months such as local steroid injection or surgery.</li> <li>• Patient having uncorrected congenital anomalies of foot and ankle</li> <li>• Patient with history of peripheral neuropathy</li> <li>• Patient failure to consent</li> </ul>

Informed consent was obtained from the patient including explanation of the risks and benefits of the injection. Patient also gave fully informed written consent for publication of this study. The patient also knew to contact the Emergency and Accident Department in case of any adverse reactions as instructed. Under aseptic conditions, PRP was prepared from autologous 20 ml whole blood that contains an increased concentration of autologous platelets. The blood was centrifuged at a rate of 3000 rpm and 12 ml of serum was extracted. On palpation the most tender aspect of the foot - medial lateral aspect of the mid foot on the plantar surface was injected with four injections each containing 3 ml of PRP (See Figures I and 2 below). Patient was provided with aftercare and instruction to limit strenuous and prolonged weight bearing activities on both feet for about one week.



**Figure 1:** Plate-rich plasma Injection      **Figure 2:** Repeat Plate-rich plasma Injection

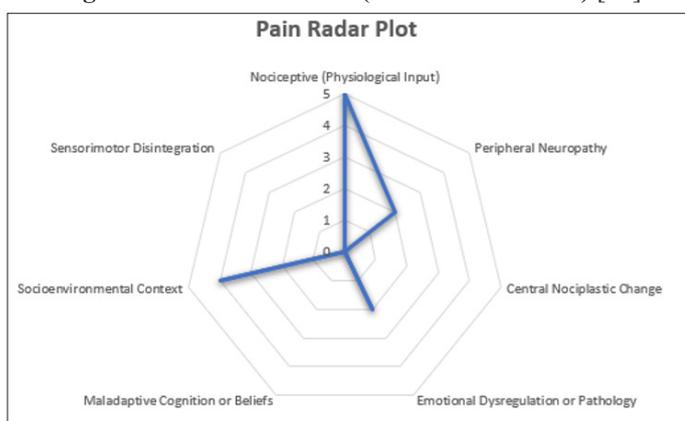
This case study was conducted to assess the clinical and functional outcome of a patient with chronic plantar fasciitis that was treated by autologous platelet rich plasma injection. This study was conducted between August, 2021 (initial appointment) and May 2022 (follow-up). It involved a 53-year female with PF, who was seen twice, first at baseline and then followed up 9 months later. At 9 months’ follow-up a significant reduction in pain by 100% was recorded, with baseline NPS score reduced from 10 to 0 (zero). Functional outcome was measured using LEFS. The initial LEFS was 68/80 and at 9 months’ follow-up it was 24/80. The result demonstrated a significant improvement in LEFS score by 65%. At baseline, patient

could only stand for 2 minutes and walk for 5-10 minutes, but at follow-up, she was able to stand for over 60 minutes and walk for over 45 minutes without pain. See Table 2 below for details. She also demonstrated better psychosocial factors at follow-up, with improvement in her mood and motivation, which enhanced her daily activities such as walking and cooking compared to their initial presentation. There were no safety issues or adverse effects recorded, and this was likely to be attributable to the injection technique, experience and skills of the injecting clinician [19].

**Table 2: Baseline and Outcome Measures at week 0- and 9-months' follow-up**

	Baseline data – week 0	Follow-up – 9 months
NPS	10/10	0/10
LEFS	68/80	24/80
Standing time before experiencing pain	2 minutes	60 minutes
Walking time before experiencing pain	5-10 minutes	45 minutes

**Figure 3: Pain Radar Plot (Walton and Elliott) [20]**



**Legend:** 0-Very Minor, 1-Minor, 2-Minor to Moderate, 3-Moderate, 4-Moderate to Strong Driver, 5-Strong Driver

### Discussion

This case study has demonstrated that injection of autologous platelet rich plasma for chronic plantar fasciitis is beneficial in terms of pain relief (reduced NPS score) and functional outcome (improvement in LEFS score). NPS is a single 11-point numeric scale (with 0 as “no pain” and 10 as the “worst imaginable pain”) that allows patients to measure their level of pain accordingly using a whole number (0-10 integers) [21,22]. The scale is easy to use and it is considered reliable, responsive and valid [21]. To obtain a minimal clinically important difference over the NPS for plantar fascia pathology, the patient must show a reduction of at least 2 points, or 30% over the total score [23,24].

We detailed the patient’s pain within the seven domains in Figure 3 adopted from Walton and Elliott [20]. This proposed framework is a complementary tool, with 7 sub-classifications to identify the magnitude of the primary driver of one’s pain experience, without labelling the condition. The most predominant driver of pain in this case study is nociceptive pain, which is supported by the biomechanical weight bearing pressure on the plantar fascia and well localized tenderness. Emotional dysregulation was demonstrated by patient being unable to efficiently achieve her normal daily activities and work. For socioenvironmental

factors, she is living with her family with support but she tried to stay active. We did not find the domains of peripheral neuropathy, maladaptive beliefs, sensorimotor and central nociceptive change to be associated drivers of her pain experience. We classified her pain as severe using Figure 3, which further classifies each pain domain into the degree of representation, from very minor to strong driver in the radar plot adopted from Walton and Elliott [20]. Subgrouping patients who present with musculoskeletal pain has enabled both clinicians and researchers to estimate risk of chronicity and to provide match treatments [25].

Case studies are generally considered weak sources of evidence, however, they can add a wealth of knowledge into an area of promising research and where there are few RCTs [26]. Aveyard also argued that relevant information may be missed if papers such as case studies are not included in a review, as such information could add context and insight, providing depth to the arguments that already exist [27]. A case study can also serve as a motivation for further robust studies such as randomised controlled trial. Furthermore, in some circumstances a RCT may not only be unethical but also not practicable, due to difficulties with recruitment, in such instances a case study or case series might be useful, particularly if the result is significant [28].

A systematic review and meta-analysis of randomised controlled trials (n = 513), focusing on PRP injection compared with steroid injection for treatment of PF29, found that PRP was more beneficial than steroid injection at improving NPS scores (standard mean difference [SMD], -0.66; 95% CI, -1.3 to -0.02; p = 0.04) and AOFAS scores (SMD, 1.87; 95% CI, 0.16–3.58; p = 0.03) at 3 months’ follow-up. However, at 3 months and 6 months’ follow-up, no statistically significant difference was found between the groups. In contrast, Yang et al, in a meta-analysis of randomised controlled trials (n = 430), found a statistically significant difference in favour of PRP injection compared to steroid treatment at reducing pain after 24 weeks (WMD = -0.95, 95% CI: -1.80 to -0.11, P = 0.03, I = 85%). A recent prospective study of 60 cohorts conducted to investigate the functional and clinical outcome in patients with plantar fasciitis treated by autologous PRP injection, found statistically significant improvements in pain reduction and lower limb function at 12 weeks’ follow-up.7 Similarly, other authors, have reported improvements in NPS and American orthopedic foot and ankle society (AOFAS) scores following local injection of platelet rich plasma. The findings of these studies are consistent with this case study [1,30,31].

This implication of this study is that PRP injections should be recommended for patients with chronic PF particularly where physiotherapy or other conservative treatments such as cortisone injection have failed to improve patient’s symptoms. There is also cost saving benefit of treating patients with PRP when compared to surgical intervention. Therefore, more clinicians should be trained and encouraged to adopt this intervention as part of the treatment protocol for long standing PF [32].

### Conclusion

This single case study has shown that injection of autologous PRP for chronic plantar fasciitis is beneficial in terms of pain relief (reduced NPS score) and functional outcome (improvement in LEFS score). However, a large scale and a properly randomised controlled study is needed to further prove its efficacy.

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### References

1. Yang WY, Han YH, Cao XW, Pan JK, Zeng LF, et al. (2017) Platelet-rich plasma as a treatment for plantar fasciitis: A meta-analysis of randomized controlled trials. *Medicine* 96: 8475.
2. Taunton JE, Ryan MB, Clement DB, D C McKenzie, D R Lloyd-Smith, et al. (2002) A retrospective case-control analysis of 2002 running injuries. *British Journal of Sports Medicine* 36: 95-101.
3. Cole C, Seto C, Gazewood J (2005) Plantar fasciitis: evidence-based review of diagnosis and therapy. *American Family Physician* 72: 2237-2242.
4. Schwartz EN, Su J (2014) Plantar fasciitis: a concise review. *Permenente Journal* 18: 105-107.
5. Irving DB, Cook JL, Menz HB (2006) Factors associated with chronic plantar heel pain: a systematic review. *Journal of Science & Medicine in Sport* 9: 11-22.
6. Buchbinder R (2004) Clinical practice. Plantar fasciitis. *New England Journal of Medicine* 350: 2159-2166.
7. Phadke I S, Vaibhav Vinayak Antrolikar, VV, Allamwar AR (2021) Injection of platelet rich Plasma in plantar fasciitis. *Asian Journal of Medical Sciences* 12: 3.
8. Haley G J, Coke S (2021) Plantar Fasciitis: Low-Cost Treatment Interventions in Primary Care, *The Journal for Nurse Practitioners* 17: 192-196.
9. Dastgir N (2014) Extracorporeal shock wave therapy for treatment of plantar fasciitis. *Journal of Pakistani Medical Association* 64: 675-678.
10. Salvi AE (2015) Targeting the plantar fascia for corticosteroid injection. *Journal of Foot Ankle Surgery* 54: 683-685.
11. Johnson RE, Haas K, Lindow K, Robert Shields (2014) Plantar fasciitis: what is the diagnosis and treatment? *Orthopaedic Nursing* 33: 198-204.
12. Tatli YZ, Kapasi S (2009) The real risks of steroid injection for plantar fasciitis, with a review of conservative therapies. *Current Reviews in Musculoskeletal Medicine* 2: 3-9.
13. Neufeld SK, Cerrato R (2008) Plantar fasciitis: evaluation and treatment. *J Am Acad Orthop Surg* 16: 338-346.
14. Ogden JA, Alvarez RG, Marlow M (2002) Shockwave therapy for chronic proximal plantar fasciitis: a meta-analysis. *Foot Ankle Int* 23: 301-308.
15. Dragoo JL, Wasterlain AS, Braun HJ, Kevin T Nead (2014) Platelet-rich plasma as a treatment for patellar tendinopathy: a double-blind, randomized controlled trial. *American Journal of Sports Medicine* 42: 610-618.
16. Goff JD, Crawford R (2011) Diagnosis and treatment of plantar fasciitis. *American Family Physician* 84: 676-682.
17. Okuda K, Kawase T, Momose M, Murata M, Saito Y, et al. (2003) Platelet-rich plasma contains high levels of platelet-derived growth factor and transforming growth factor-beta and modulates the proliferation of periodontally related cells in vitro. *Journal of Periodontology* 74: 849-857.
18. Middleton KK, Barro V, Muller B, Terada S, Fu FH (2012) Evaluation of the effects of platelet-rich plasma (PRP) therapy involved in the healing of sports-related soft tissue injuries. *Iowa Orthop J* 32: 150-163.
19. McInerney JJ, Dias J, Durham S, Evans A (2003) Randomised controlled trial of single, subacromial injection of methylprednisolone in patients with persistent, posttraumatic impingement of the shoulder. *Journal of Emergency Medicine* 20: 218-221.
20. Walton DM, Elliott JM (2018) A new clinical model for facilitating the development of pattern recognition skills in clinical pain assessment. *Musculoskelet Sci Pract* 36: 17-24.
21. Hawker GA, Mian S, Kendzerska T, French M (2011) Measures of Adult Pain Visual Analog Scale for Pain (VAS Pain), Numeric Rating Scale for Pain (NRS Pain), McGill Pain Questionnaire (MPQ), Short-Form McGill Pain Questionnaire (SF-MPQ), Chronic Pain Grade Scale (CPGS), Short Form-36 Bodily Pain Scale (SF-36 BPS), and Measure of Intermittent and Constant Osteoarthritis Pain (ICOAP), *Arthritis Care & Research* 63: 240-252.
22. Rodriguez CS (2001) Pain measurement in the elderly: a review *Pain Management Nursing* 2: 38-46.
23. Childs JD, Piva SR, Fritz JM (2005) Responsiveness of the numeric pain rating scale in patients with low back pain. *Spine* 30: 1331-1334.
24. Farrar JT, Young JP Jr, LaMoreaux L, Werth JL, Poole RM (2001) Clinical importance of changes in chronic pain intensity measured on an 11-point numerical pain rating scale. *Pain* 94: 149-158.
25. Ogbeivor C, Elsabbagh L (2021) Management approach combining prognostic screening and targeted treatment for patients with low back pain compared with standard physiotherapy: A systematic review & meta-analysis. *Musculoskeletal care* 19: 436-456.
26. Hek G, Langton H, Blunden G (2000) Systematically searching and reviewing literature". *Nurse Researcher* 7.
27. Aveyard H (2007) *Doing a Literature Review in Health and Social Care. A Practical Guide*. Maidenhead; New York: Open University Press.
28. Sibbald B & Roland M (1998) "Understanding controlled trials: Why are randomized controlled trials important?" *BMJ* 316: 201.
29. Singh P, Madanipour S, Bhamra, JS. et al. (2017) A systematic review and meta-analysis of platelet-rich plasma versus corticosteroid injections for plantar fasciopathy. *International Orthopaedics (SICOT)* 41: 1169-1181.
30. Kalia RB, Singh V, Chowdhury N, Jain A, Singh SK, et al. (2020) Role of Platelet Rich Plasma in Chronic Plantar Fasciitis: A Prospective Study. *Indian journal of orthopaedics* 55: 142-148.
31. Ling Y, Wang S (2018) Effects of platelet-rich plasma in the treatment of plantar fasciitis: A meta-analysis of randomized controlled trials. *Medicine* 97: 12110.
32. Walton DM, Elliott JM (2018) A new clinical model for facilitating the development of pattern recognition skills in clinical pain assessment. *Musculoskelet Sci Pract* 36: 17-24.

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