



## Management of Chronic Plantar Fasciitis using Hyperosmolar Dextrose Injection

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### Abstract

*Plantar fasciitis is most common cause of heel pain. More than 90% of patients are managed by conservative treatment. Chronic recalcitrant cases of plantar fasciitis not responding to other treatment modalities can be managed by Hyperosmolar dextrose injections with no or minimal complications. Hyperosmolar dextrose injection has been shown to increase Beta-1 platelet derived growth factor expression and upregulation of multiple mitogenic factors that may act as signaling mechanisms in tissue repair. We recommend Hyperosmolar dextrose solution for the management of chronic plantar fasciitis in place of local corticosteroid injection, so as to avoid the complications like rupture of plantar fascia and fat pad atrophy which are associated with local corticosteroid injections.*

**Keywords:** *Plantar Fasciitis, Hyperosmolar dextrose solution, Heel pain*

### Introduction

Planter fasciitis (PF) is a common cause of heel pain in adults of both sexes all over the world.

Plantar fasciitis is thought to be caused by

biomechanical overuse from prolonged standing or running that creates microtears at origin of plantar fascia. The exact aetiology of entity is not known<sup>[1]</sup>. Woolnough<sup>[2]</sup> called the entity “tennis

heel”, and postulated that repeated traction with aging and repeated trauma produces microscopic tears and cystic degeneration in the origin of the plantar fascia and the flexor digitorum brevis immediately beneath the plantar fascia. The diagnosis is usually clinical and rarely needs to be investigated further <sup>[1,3]</sup>. Ultrasonography can be used to confirm recalcitrant PF or to exclude other pathology based on findings of proximal plantar fascia thickness greater than 4 mm and areas of hypoechogenicity <sup>[3]</sup>. Most patients with PF are between 40 and 70 years of age <sup>[4,5]</sup>. Obesity is a well known predisposing factor, and symptoms are even more difficult to control when patient is overweight <sup>[1,4]</sup>. PF patients usually present with heel pain that is worse on rising in the morning or after sitting for a while, after few steps, the pain diminishes, and patient is reasonably comfortable during the day, towards the end of the day, the discomfort becomes more of an aching that is relieved by absence of weight bearing <sup>[1,4,5]</sup>. Numerous treatment options are available for the treatment of PF; these include, rest, nonsteroidal anti-inflammatory agents, deep massage, stretching techniques, shoe-inserts, local corticosteroid injections, ultrasound and extracorporeal shock wave therapy <sup>[1,3,4,5,6]</sup>. The above mentioned treatment regimes are effective in 90 % of plantar fasciitis patients; However, approximately 10% of patients remain recalcitrant to conservative therapies <sup>[3]</sup>. Local steroid injections can provide good short-term relief of symptoms, but are associated with complications such as the rupture of plantar fascia and fat pad atrophy, therefore multiple corticosteroid

injections are avoided in these patients <sup>[6,7,8]</sup>. Prolotherapy is a technique in which a small volume of an irritant solution like Hyperosmolar dextrose solution is injected at multiple sites around a ligament or tendon insertion, this solution initiates a localized inflammatory response at the site of injection, which induces fibroblast proliferation and subsequent collagen synthesis from the resultant upregulation and migration of various growth factors responsible for tissue repair <sup>[5,9,10]</sup>. Hyperosmolar dextrose has been shown to increase Beta-1 platelet derived growth factor expression and upregulation of multiple mitogenic factors that may act as signaling mechanisms in tissue repair <sup>[3,5,11]</sup>. In a study of 23 patients with chronic refractory plantar fasciitis who have failed with conservative management Ryan et al <sup>[5]</sup> obtained good to excellent results in 14 patients with local Hyperosmolar dextrose injections; with 12 of them reporting complete resolution of symptoms and return to function.

### Methods and Materials

The present study titled “Management of Chronic Plantar Fasciitis using Hyperosmolar Dextrose injection” was conducted in Postgraduate Department of Orthopaedic, Bone and Joint Hospital Barzulla Srinagar from June 2011 to November 2012. 40 patients with chronic plantar fasciitis of either sex were included in the study. Ethical clearance was taken from the Ethical Committee of Govt. Medical College Srinagar. All the patients with symptoms of chronic heel pain of more than 6 months duration with failure

of conservative treatment including rest, nonsteroidal anti-inflammatory agents, deep massage, stretching techniques, shoe-inserts, local corticosteroid injections were included in the study. All the patients with symptoms of less than 6 months duration; patients with local skin infection and patients with bilateral involvement were excluded from the study. A record of the patient's pain using a visual analogue scale (VAS) was obtained at the start of study using a range of 0 to 10, with 0 representing no pain and 10 the worst pain ever experienced. After taking written informed consent, the part was prepared under all aseptic precautions; 23 G needle was inserted at most tender point. We injected 1 ml of 25% dextrose solution and 1 ml of 2% lignocaine at the site of maximum pain. Patients were advised not to take nonsteroidal anti-inflammatory medication after procedure and refrain from heavy loading activities for about one week after procedure. Patients were followed at six weekly interval; repeat injections were given at the site of maximum tenderness at 6 weeks interval if patients persisted with symptoms. Final follow-up was done at 12 months.

### Results and Observations

The patients in our study ranged in age from 33 to 74 years with mean age of 53.33 years. 26 (65%) patients were females and 14 (35%) were males. Left side was involved in 23 (58%) patients and right side was involved in 17 (42%) patients, left side was involved more than right side. The mean period of symptoms was 10 months (range 6 to 27 months). In our patients, the median VAS pain

score at the start of study was 7 (range 4-10) which decreased to a mean score of 2 (range 0 – 8) at final follow up 12 months. Statistical analysis revealed a significant decrease in the score ( $p < .001$ ).

Visual analogue scale (VAS)	At the start of study	At 12 months
0-3	0	29 (72.5%)
4-7	13 (32.5%)	6 (15%)
8-10	27 (67.5%)	5 (12.5%)

Out of 40 patients 20 (50%) patients improved with 4 injections of Hyperosmolar Dextrose solution given at an interval of 6 weeks, 9 (22.5%) patients improved with 3 injections, 6 (15%) patients improved initially with 4 injections but had a recurrence of symptoms with minimal or no change in VAS scores at 12 months and 5(12.5%) patients failed to respond to the treatment even after receiving 4 injections. Out of 40 cases, 6 (15%) patients showed an initial improvement but had a recurrence of symptoms with minimal or no change in VAS scores at 12 months. Five (12.5%) of the cases failed to respond to the treatment. Statistically significant improvement was seen in rest of the 29 (72.5%) cases at 12 months final follow-up.

### Discussion

Plantar fasciitis is a common cause of heel pain. It is estimated that more than 1 million patients seek treatment annually for this conditions <sup>[1]</sup>. Conservative treatment is used for this condition in majority of the cases and surgery being used in

cases with failed conservative treatment [6]. Surgery carries the risk of nerve injury, infection, rupture of the plantar fascia, and failure to improve the pain [12]. Corticosteroid injections have been shown to be effective in improving symptoms however it has been associated with various complications such as rupture of plantar fascia, and fat pad atrophy [7,8]. Muzamil et al [6] in a study of 50 patients with chronic heel pain obtained 82 % excellent results at final follow up of 6 months using autologous blood injection at the site of maximum tenderness. Prolotherapy with Hyperosmolar dextrose has been reported to decrease pain and improve function in a variety of tendinopathies [3,13,14]. Ryan et al [5] in a study involving 23 patients of chronic plantar fasciitis who had failed with conservative treatment; obtained 70-80% good to excellent results using Hyperosmolar dextrose injections under ultrasound guidance, the patients in his study received an average of five injections 6 weeks apart, for average treatment duration of 33 weeks. At the end of the treatment period, 14 patients reported good to excellent results, with 12 of them reporting complete resolution of symptoms and return to function. Kim E (2013) [3] compared outcome of Hyperosmolar dextrose injection with autologous platelet rich plasma injection for the treatment of chronic recalcitrant plantar fasciitis, and obtained comparable results at final follow-up, although initial pain relief was better in patients who received platelet rich plasma than the patients who received Hyperosmolar dextrose solution.

## Conclusion

Hyperosmolar dextrose injection is a safe and effective mode of treatment for patients with chronic recalcitrant plantar fasciitis who have not responded to other treatment modalities with no or minimal complications.

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