

The Use of Subchondroplasty® for Treatment of Chronic Plantar Fasciitis with Underlying Calcaneal Bone Marrow Lesions

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Abstract

Plantar Fasciitis is one of the most common diagnoses seen by foot and ankle specialists. It has been reported that up to 90% of cases are self-limiting or responsive to conservative treatment¹. However, those cases that do not respond well to conservative treatment go on to more invasive treatment options including possible surgical intervention. With limited existing literature, there is currently no standard of care for treatment of recalcitrant plantar fasciitis following plantar fasciotomy surgery. Our goal with this case vignette is to support previous literature for successful treatment of recalcitrant plantar fasciitis with underlying bone marrow lesions using Subchondroplasty technique and revisional fasciotomy. We present a case of a 52-year-old female with right foot plantar fasciitis who failed previous plantar fasciotomy surgery with right foot recalcitrant plantar fascia pain who successfully was treated using subchondroplasty. In conclusion, we support Subchondroplasty with revisional fasciotomy as an option for treatment of recalcitrant plantar fasciitis in patients with bone marrow lesions noted on magnetic resonance imaging.

Background:

Plantar fasciitis is one of the most common pathologies seen in the foot and ankle clinic. It typically affects patients in fourth and fifth decades and it is the most common injury affecting runners⁷⁻¹³. With most cases resolving with conservative treatment it has been estimated that approximately 10% go on to chronic plantar fasciitis or rather a degenerative plantar fasciopathy¹⁰⁻¹³. Conservative treatment consists of one or more of the following: taping/strapping, custom orthotics, stretching/strengthening exercises of the posterior muscle group, night splints, physical therapy, corticosteroid injections, platelet rich plasma injections, dry needling, ESWT therapy^{4-6, 10-12, 13}.

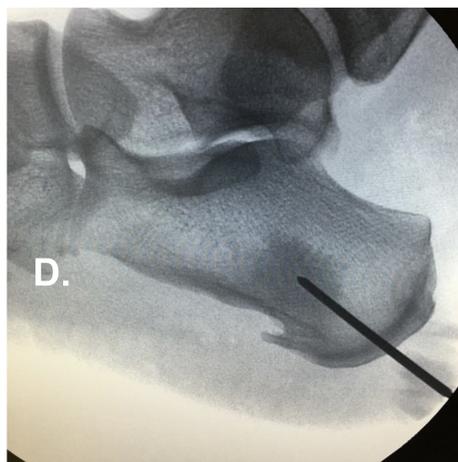
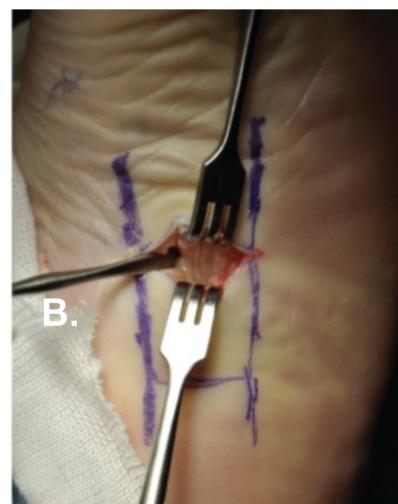
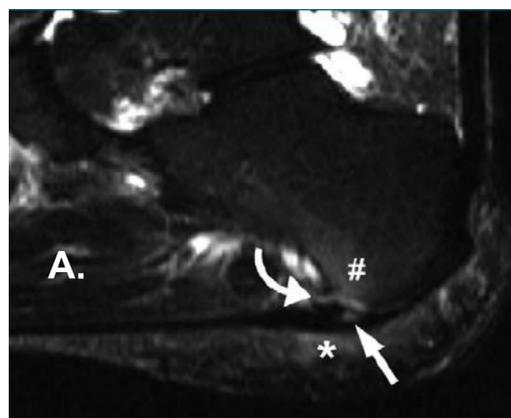
Plantar fasciitis is mostly a clinical diagnosis but when conservative treatment fails to resolve plantar heel pain, diagnostic imaging such as ultrasound or MRI is performed to rule out other differential diagnoses of plantar heel pain. Following diagnostic imaging, surgical intervention is an option pending results with either endoscopic plantar fasciotomy, open plantar fasciotomy of medial and central bands, and/or if there is concern for nerve entrapment then nerve decompression is also an option. Recently, there has been literature describing bone marrow lesions at the plantar fascia insertion of the calcaneus and possible correlation to heel pain.

We present a case where our patient failed conservative treatment, underwent surgical intervention and had recalcitrant plantar fasciitis following surgery. The purpose of this case report is to support the use of Subchondroplasty for treatment of chronic plantar fasciitis with underlying bone marrow lesion.

Case Report:

52 year old female presented to the clinic initially complaining of recurring right heel pain, with post static dyskinesia. Patient underwent plantar fasciotomy at an outside facility a year and a half prior to initial presentation with recalcitrant right heel pain. On clinical examination patient had pain with palpation of plantar right medial calcaneal tubercle. She was treated conservatively with custom orthotics and advised to decrease activity, which failed to resolve right plantar heel pain. Following failure of conservative treatment, magnetic resonance imaging of the right foot was performed to rule out nerve entrapment versus plantar fasciitis. MRI of right foot visualized intact medial band of the right plantar fascia measuring 9.0mm, and T2 hyperintensity involving the plantar fascial attachment to the calcaneus, consistent with bone marrow lesion. Patient also complained of left ankle instability which, also failed conservative treatment. During surgical discussion, patient decided to undergo surgical treatment of right plantar fasciitis and internal fixation of bone marrow lesion prior to left ankle stabilization.

Images:



Images: **A:** T2 MRI of bone marrow edema at site of plantar fascial attachment⁶ **B:** Transverse incision plantar fasciotomy²; **C:** Subchondroplasty 0.3cc foot kit ZimmerBioMet **D:** Intraoperative fluoroscopic post injection with visualization of subchondroplasty into pre-operative site of bone marrow edema

Surgical Technique and Results:

Surgical plan consisted of revisional partial plantar fasciotomy with subchondroplasty as internal fixation repair for bone marrow lesion. A linear incision parallel to the relaxed skin tension lines through skin was then made in the plantar aspect of the right foot overlying the central and medial plantar fascial bands. There was noted to be apparent regrowth of the medial plantar fascial band to the medial tubercle of the calcaneus as demonstrated in the pre-operative MRI. The medial and central plantar fascial bands were then partially resected with the lateral plantar fascia left intact. Next, attention was then directed to the right foot calcaneal bone marrow lesion. Under intraoperatively fluoroscopy, a triangulation approach via both anteroposterior and calcaneal axial views were used to properly guide, place and insert the cannula to the site of the subchondral bone marrow lesion as visualized on preoperative imaging. The biomaterial was mixed with approximately 1cc of radiopaque contrast medium prior to insertion to allow for visualization during implantation. After insertion, Subchondroplasty was performed by injecting 0.3 cc of flowable biomaterial calcium phosphate implant into the affected area and allowed 8 minutes for the implant to cure. Using intra-op fluoroscopy, injected biomaterial was noted to reflect size of bone marrow lesion. Patient was non-weight bearing for two weeks and then transitioned into CAM walker at second post operative appointment. She was transitioned to normal shoe gear at four weeks. She reported minimal to no right heel pain compared to preoperative right heel pain at two and four week post-operative appointments. She underwent contralateral lateral ankle stabilization and at 3 month post-operative appointment patient was pain free to right heel.

Discussion:

In an article by Sanders they noted the presence of calcaneal bone marrow edema on MRI in 83 percent of patients diagnosed with recalcitrant plantar fasciitis⁹. This finding points to a correlation of chronic plantar fasciitis with underlying bone marrow lesions. Bicer et al in 2018 described successful treatment of chronic plantar fasciitis with Extracorporeal Shockwave Therapy (ESWT) with significant decrease in plantar fascia thickness, soft tissue edema, and bone marrow edema, but did not mention previous history of plantar fasciotomy².

Cooperman et al. did a literature review over Subchondroplasty in the lower extremity in 2018 and found promising outcomes with minimal adverse effects⁵. They noted that the most common adverse effect was overfilling of biomaterial injection which usually subsided after 72 hours post-operatively.

This technique for subchondroplasty of bone marrow lesions in patients with recalcitrant plantar fasciitis was first described by Bernhardt et al in 2018 with favorable outcomes similar to those presented in this case report¹. We obtained similar results, which supports subchondroplasty as a favorable option in recalcitrant plantar fasciitis with underlying bone marrow lesion after failed plantar fasciotomy.

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