

# Successful Closure of Midfoot Plantar Ulcerations Complicated by Charcot Arthropathy: A case series reporting combined surgical technique with advanced wound care modalities.

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## Abstract

The diabetic patient is at significant risk for developing foot ulceration due to complications of diabetes including muscular atrophy, arthropathy, neuropathy, and arterial insufficiency. The management of a diabetic foot wound is often plagued with the pitfalls and impediments to successful healing. These patients often have recurrence, infection, and deterioration and are at high risk for amputation and limb loss. Patients presenting with Charcot arthropathy and midfoot plantar ulceration provide an exceptional challenge to wound care providers. A series of cases where surgical midfoot reconstruction was combined with an aggressive wound care regimen utilizing negative pressure wound therapy and adjunctive hyperbaric oxygen therapy is presented. We describe an algorithm for the management of these patients and a photographic representation of the typical case. This novel combined approach has resulted in the successful closure of the majority of these patients presenting to our institution with challenging midfoot plantar ulcerations complicated with Charcot arthropathy.

## Discussion

Diabetic midfoot plantar ulcerations complicated by Charcot arthropathy are particularly challenging wounds to heal. These patients oftentimes will deteriorate due to continued pressure secondary to imperfect offloading, new trauma, recurrent infection, and poor control of their diabetic disease. For these patients, wound healing is compromised due to small vessel arterial insufficiency and peripheral arterial occlusive disease and they are at high risk for limb loss. These tissues are hypoxic and thus surgical intervention for correction of the midfoot deformity is rarely successful and seldom attempted.

At our institution, we have developed a strategy to overcome these difficulties and successfully manage these patients with a combined approach that maximizes tissue perfusion and oxygenation, allowing for surgical correction of the plantar deformity. Our treatment algorithm begins with surgical reconstruction with the goal of correcting the deformity to decrease midfoot forces. In the immediate postoperative period, hyperbaric oxygen therapy is initiated. This is followed by aggressive wound care utilizing negative pressure therapy. Hyperbaric oxygen provides for supersaturation of the plasma with oxygen, allowing a several fold increase in the oxygen diffuse gradient. Negative pressure therapy has been shown to decrease tissue edema and enhance tissue perfusion.

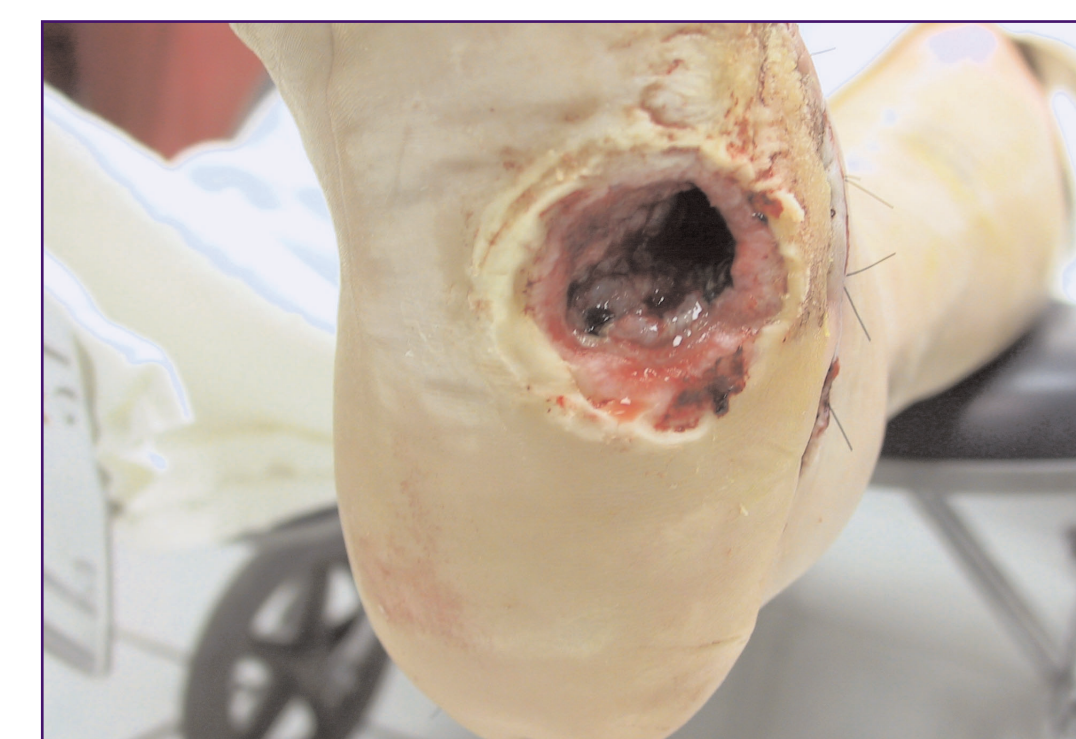
Combination of the modalities allows preservation of marginal tissue, prevention of ischemic and hypoxic advancement, and ultimately wound healing. We have utilized this approach in a recent series of 6 patients, achieving successful wound closure of these complicated wounds as well as return of ambulation for our patients.

## Summary

Diabetic patients with midfoot plantar ulcerations complicated by Charcot arthropathy present the wound care expert with an extreme problem that usually results in limb loss despite dedicated and aggressive efforts. We have found that our novel combined approach including surgical midfoot reconstruction, aggressive wound care including negative pressure therapy and adjunctive hyperbaric oxygen therapy has led to successful management of these challenging patients.

## Case Summary

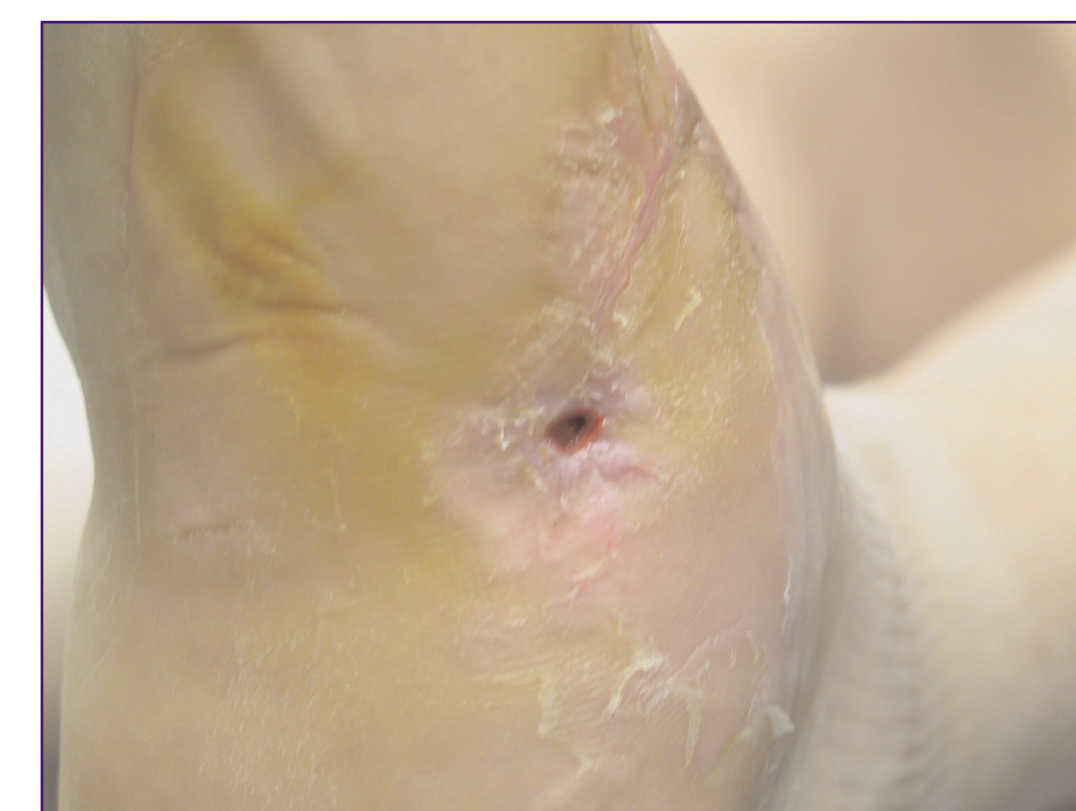
SB is a 39 year old female with a long history of insulin dependent diabetes mellitus and left foot Charcot arthropathy, complicated by ulceration and osteomyelitis who was referred to The Center for Comprehensive Wound Care and Hyperbaric Medicine. She has had numerous prior surgical débridements and reconstruction attempts as well as multiple courses of IV antibiotics for treatment of her left foot disease. She was seen in wound care consultation and expressed a strong desire for limb salvage. On 8/6/03 she underwent a midfoot reconstruction that included subtalar fusion with posterior iliac crest bone graft, fifth metatarsal resection and peroneal tendon transfer procedure. Postoperative management included adjunctive hyperbaric oxygen therapy and negative pressure wound therapy. Hyperbaric oxygen was started immediately postoperative, initially twice daily for 3 days then daily for a total of 20 treatments. The surgical dressing was removed post-op day 2 and vacuum-assisted closure therapy used for management of the residual plantar tissue defect. On 9/22/03, the wound was healed. Prescription orthotic shoe inserts were ordered and a brief period of rehabilitation returned the patient to full ambulatory status.



8/8 Post Operative



9/10



9/17



9/22