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# Realignment and Extended Fusion with Use of a Medial Column Screw for Midfoot Deformities Secondary to Diabetic Neuropathy

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Article by M Assal and R Stern. J Bone Joint Surg Am. 2009;91:812-820.

Commentary by **John F. Grady, DPM**

## CONDENSATION

### Purpose of Study

*To evaluate realignment and extended fusion using a medial column screw in patients with severe neuropathic midfoot deformity secondary to diabetic Charcot arthropathy*

### Approach

Fifteen patients with diabetes mellitus and severe neuropathic midfoot deformities, including a collapsed plantar arch with rocker-bottom foot deformity, were treated with reconstructive surgery from July 2001 through July 2005. The mean age of the patients was 55 years (range, 34 to 70), all had failed a course of conservative management with a Charcot restraint orthotic walker, and 9 were male. Prior to surgery, 4 of the patients were treated for deep soft-tissue infection or osteomyelitis. Thirteen of the patients had a nonhealing midfoot plantar ulcer, the mean size of the ulcers was 2.8 x 2.9 cm and the mean duration was 9.7 months (range, 5 to 23). The other 2 patients had progressive radiographic changes and an instability that could not be controlled by an orthosis.

At surgery, the medial column was reduced and realigned and a medial column fusion of the talonavicular, navicular-medial cuneiform, and medial cuneiform-first metatarsal joints was performed. The joints to be fused were debrided of cartilage and sclerotic bone and an appropriate wedge osteotomy was performed. Four of the patients required the use of a small external fixator to aid reduction. Internal fixation was performed with a cannulated intramedullary screw (8 x 150 mm). A drill hole was made in a retrograde fashion parallel to the subtalar joint through the head of the talus, the navicular, the medial cuneiform, and into the medullary canal of the first metatarsal. The mean length of the metatarsal in these patients was 60.4 mm and the average length of the 150-mm screw engaged in the first metatarsal was

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30.5 mm (longer screws were not available). Bone graft was used in all patients, either morselized pieces from the foot or cancellous bone from the proximal part of the tibia. Additional procedures included an Achilles tendon lengthening in 8 patients and a gastrocnemius recession in 5. All patients were placed in a non-weightbearing below-the-knee splint for 4 months. A removable cast with progressive weightbearing was then used. When the patients were fully weightbearing without difficulty, they were fitted with extra-depth wide-toed shoes. The mean duration of follow-up was 42 months (range, 2 to 72).

### **What Investigators Accomplished**

- At follow-up, 13 of the 15 patients were able to walk with the special shoes.
- The mean time for ulcer healing was 3 months (range, 1 to 4) and there were no recurrences.
- Complications included 4 patients with nonunion and 1 patient with septic osteomyelitis.
- The mean talus-first metatarsal angle for all patients improved from 31.1° preoperatively to 7.2° at final follow-up.
- The mean pre-operative calcaneus-fifth metatarsal angle for all patients was 4.1° and it improved to a mean of 28.1° in those with union and to a mean of 13° in those with nonunion.
- The nonunions were at the tarsometatarsal joint in 3 feet and at the talonavicular joint in 1 foot; all 4 had breakage of the 8-mm screw.
- Only 1 of the patients with nonunion had substantial loss of correction and he was treated with a second reconstruction procedure.
- One patient developed a significant claw-toe deformity of the first ray and was successfully treated with a second procedure.

**Investigators' Observations** Although surgical reconstruction is technically demanding, patients with midfoot collapse of a neuropathic foot can be treated and a stable plantigrade foot that remains free of ulceration can be created.

### **REFERENCES**

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### **COMMENTARY**

Without question, one of the most currently understudied areas in foot and ankle surgery is Charcot reconstruction. We all know the need for looking at corrective procedures for various types of Charcot deformity, at different levels, with different degrees of severity, for a successful formula for

addressing reconstruction that would give more predictable results than are currently available.

This article uses a small number of patients, focused on medial column deformities, but not limited to the Lisfranc joint. Because of the small numbers and the large number of complications (33% – 5 of 15, with 1 patient ending up with a septic foot and 4 with nonunions) within this population, one would be likely to dismiss the technique quickly as either unproven or unsuccessful. Nevertheless, in reviewing the article, it is unstated whether the resulting complications that had to do with infection were in the patients with previously known infection and ulcerations who had the surgery performed with the open ulceration. It is possible that if these patients had been excluded, complication rates would have been less. In addition, while only one technique was studied, concurrent procedures were done in some patients but not in others. It is unknown what the effect of the concurrent procedures was on the success or failure rate of these cases (was it the more complicated deformity that necessitated additional procedures and were those patients the ones who went on to subsequent complications as a result?). Other issues not addressed in this article were why so much adjunctive fixation was used (such as external fixation in four patients). Nevertheless, the impressive result here is not just the changes in radiographic measurements but the mean time for ulcer healing being three months with no recurrences. Certainly, more studies need to be done on specific constructs for the correction of Charcot deformity as well as on the success rates of a Charcot reconstructed patient compared to the amputated patient related to overall outcome and quality of life.