OsteoSponge® | *Case Study*

BACTERIN

CASE STUDY FOOT ANKLE

Revision Arthrodesis for Treatment of Symptomatic Intramedullary Nail in a Charcot Foot

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History

A 66 year old diabetic male presented to clinic with complaint of symptomatic hardware in the left ankle. The patient had previously undergone a pan-talar arthrodesis with intramedullary nail for surgical correction of charcot deformity of the left foot. The patient had pain at the plantar central aspect of the foot with collapse and difficulty ambulating. The left foot was noted to have severe talar collapse with hindfoot valgus deformity (Figure 1).

The patient relayed a recent period of erratic blood sugar levels as well as increased activity to the affected extremity. X-rays revealed spacing between the subtalar joint, collapse of the talus, and distal displacement of the intramedullary rod (Figure 2). The treatment plan was removal of the intramedullary rod, calcaneal osteotomy, arthrodesis of the talonavicular joint, and application of external fixator with refusion of the left ankle and subtalar joints using Bacterin's OsteoSponge®.

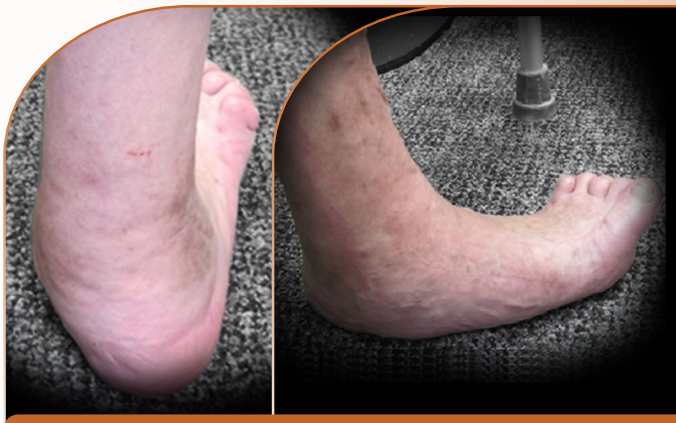

Figure 1
Severe talar collapse with hindfoot valgus deformity

Surgical Procedure

Due to the symptomatic hardware, difficulty with ambulation, and severe collapse of the left foot, removal of the intramedullary rod was performed followed by application of external fixator with refusion of the left ankle and subtalar joints, calcaneal osteotomy, and arthrodesis of the talonavicular joint. The patient was placed in supine position and received spinal anesthesia. A thigh tourniquet was used for hemostasis during the procedure. Fluroscopy was used to identify the location of all screws and the intramedullary nail. The screws and nail were removed through small incisions.

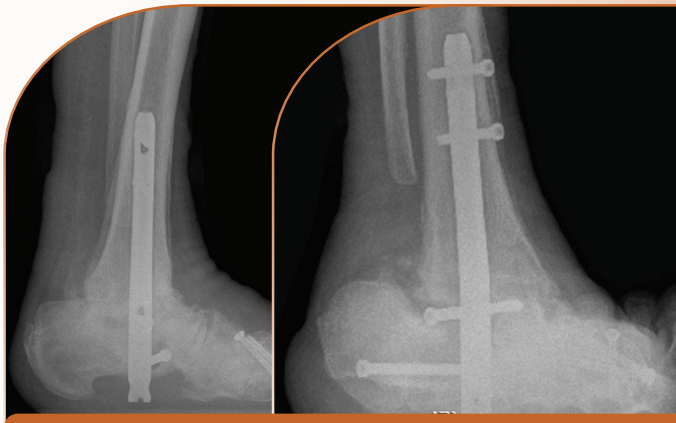

Figure 2
Pre-operative x-rays

Examination revealed motion was occurring at both the left ankle and subtalar joints. An 8 cm curvilinear incision was made over the lateral aspect of the left foot for ankle and subtalar joint exposure. Partial fusion of the ankle and subtalar joint with fibrous tissue was present. All fibrous tissue was removed and a curette and osteotome were used to prepare joint surfaces for fusion. A medial incision was made over the distal medial malleolus extending to the medial cuneifrom to gain better exposure to the ankle joint. Bacterin's OsteoSponge® was then prepped with normal saline and pressed into the large defects within the ankle and subtalar joints (Figure 3).

To reduce the abduction deformity, a medial wedge of bone was resected from the talonavicular joint. A 6.5 mm cannulated screw was placed across the talonavicular joint following standard AO technique (Figure 4).

A linear incision was placed over the posterior lateral aspect of the calcaneus and posterior calcaneal displacement osteotomy

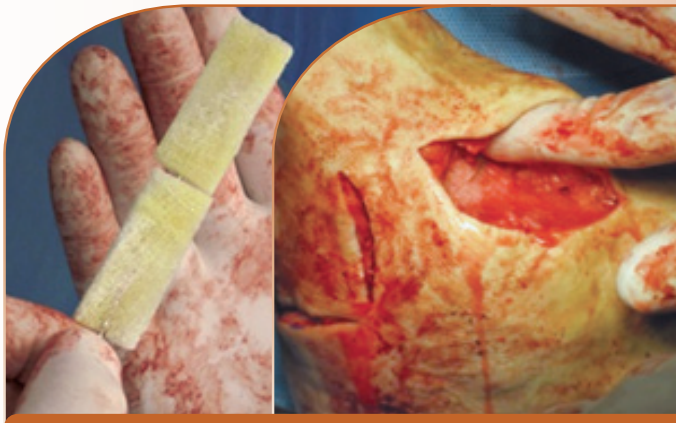

Figure 3 Placement of Bacterin OsteoSponge® within the ankle and subtalar joints

was performed with a sagittal saw. The osteotomy was translated approximately 1.5 cm medially and fixated with two 6.5 mm cannulated screws placed across the subtalar and ankle joints (Figure 4). Proper screw placement and anatomic alignment of all joints was confirmed under fluoroscopy. An external ring fixator was placed on the left lower extremity using fine wire technique. Two transosseous wires were placed in both the proximal and distal aspect of the tibia and two transosseous wires were placed in both the calcaneus and through the midfoot. Deep structures were re-approximated utilizing 2-0 vicryl. Subcutaneous structures were closed with 3-0 vicryl and skin was closed with 4-0 nylon in a simple interrupted and horizontal mattress fashion. A sterile dressing was applied.

Post-Operative Course

The post-operative course was uneventful and without complication. The patient was non-weightbearing for a period of 8 weeks. Both radiographic and clinical evidence of arthrodesis were noted. The external fixator was removed at 14 weeks. The patient was then transitioned to a CAM boot for a period of 4 weeks and was full weight bearing at 18 weeks post-operatively. Post-operative X-rays revealed successful hindfoot and ankle arthrodesis with restoration of a plantar grade foot (Figure 5). The patient was last evaluated at 1 year follow-up. He was ambulatory, without pain or ulceration to the lower extremity.

Discussion

The patient in this case had significant osseous voids which required the use of a bone void filler. Potential autograft sources from the foot and ankle were scarce due to the patient's history of prior surgeries and Charcot arthropathy.

The Bacterin OsteoSponge® allograft was selected for this revision arthrodesis for the following reasons: The graft possesses unique, compressible handling characteristics so one can obtain precise placement of the graft via press-fit into any osseous void in the foot and ankle. Upon placement into the arthrodesis site, the graft will stay in place and will not migrate, even under irrigation or upon release of the tourniquet.

The OsteoSponge® allograft is an ideal bioscaffold suited for cellular infiltration and new bone formation. Since OsteoSponge® is comprised of 100% demineralized bone matrix, it contains the natural spectrum of native growth factors known to be essential for the signaling of new bone formation. It should be noted that the graft is non-structural and therefore structure must be maintained by internal and/or external fixation.

Conclusion

Use of bone graft is common in reconstructive foot and ankle surgery. Autograft remains the gold standard, however there are reports in the literature suggesting that union rates of allograft and autograft are equal in foot surgery[1-3]. Currently there are several bone allograft products available. Bacterin's OsteoSponge® is both osteoinductive and osteoconductive and has a unique compressible property for filling osseous voids[4]. These properties proved helpful in the case presented and make this allograft well suited for reconstructive foot and ankle surgery. Further research exploring this product's application and role in the allograft realm is warranted.

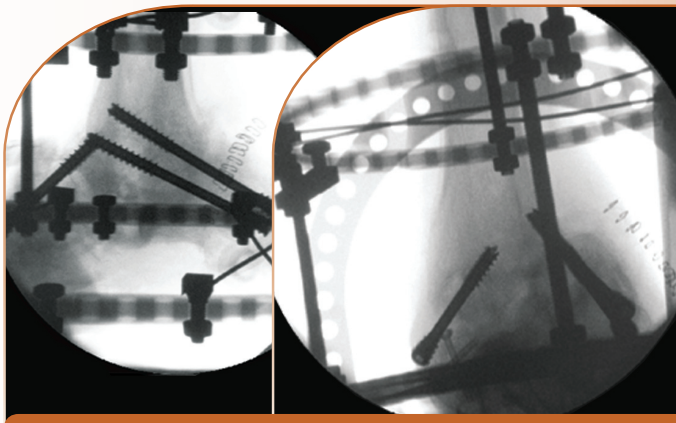

Figure 4
Intra-operative fluoroscopic views

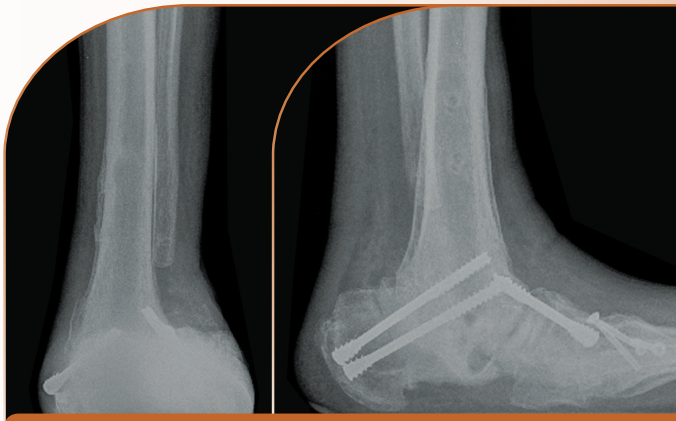

Figure 5
Post-operative x-rays at 26 weeks

References

1. Dolan CM, Henning JA, Anderson JG, et al: Randomized prospective study comparing tri-cortical iliac crest autograft to allograft in the lateral column lengthening component for operative correction of adult acquired flatfoot deformity. *Foot Ankle Intl.* 2007 Jan;28(1):8-12.
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3. Lee MS, Tallerico V: Distraction arthrodesis of the subtalar joint using allogeneic bone graft: a review of 15 cases. *J Foot Ankle Surg.* 2010 Jul-Aug;49(4):369-74.
4. http://www.bacterin.com/index.asp?p=OsteoSponge&n=healthcare-professionals