The Journal of Foot & Ankle Surgery 54 (2015) 490–493

Contents lists available at ScienceDirect

The Journal of Foot & Ankle Surgery

journal homepage: www.jfas.org

Ankle Fusion With a Trabecular Metal Spacer and an Anterior Fusion Plate

Martin Wiewiorski, MD [1], Thomas Schlemmer, MD [1], Monika Horisberger, MD [1], Krit Prugsawan, MD [2], Victor Valderrabano, MD, PhD [1], Alexej Barg, MD [1]

[1] Orthopaedic Department, University Hospital Basel, Basel, Switzerland
[2] Orthopaedic Department, Vejthani Hospital, Bangkok, Thailand

ARTICLE INFO

Level of Clinical Evidence: 4

Keywords:
angular stable plate
ankle joint
arthrodesis
bone loss
trabecular metal

ABSTRACT

We present a novel operative technique for ankle joint fusion in a case of severe talar bone loss. Fusion was achieved with a trabecular metal spacer combined with a single anterior, anatomically preshaped, angular, stable plate. Excellent postoperative results with good bone consolidation and preservation of lower leg length were present shown at 1 year of follow-up.

Severe bone loss at the level of the ankle joint is frequently associated with failed total ankle replacement, large avascular talar necrosis, fractures, and end-stage Charcot arthropathy (1–3). Ankle joint fusion in the presence of a large osseous defect is a technically challenging procedure. Any surgical procedure that does not reestablish the bone stock will result in substantial leg shortening, which can be a debilitating condition for the patient. We present the case of a patient with a large bony defect of the talus, who underwent ankle fusion. An interpositional tantalum spacer was inserted to preserve the lower leg length. The fusion site was secured with an anatomically preshaped, anterior locking plate.

Case Report

Preoperative Management

A 19-year-old female patient sustained a displaced fracture of the right talar neck with dislocation of the talar body in November 2010. Open reduction and internal fixation was performed, and the implants were removed subsequently 9 months after the index surgery. The patient developed subsequent talar necrosis. In an attempt to preserve the joint, a vascularized autograft bone block was transplanted from the medial femoral condyle to the lateral talar edge in November 2011 (4). In July 2012, the patient presented to our outpatient clinic complaining about recurrent load bearing-dependent pain in her right hindfoot. The clinical examination showed distinct swelling around the ankle joint and painful tenderness at the anterior joint line. The range of motion of the ankle joint was reduced compared with the healthy side, with dorsiflexion and plantar flexion of 10° and 15°, respectively. Her pain score measured using the visual analog scale (0 points, no pain; 10 points, maximal pain) during normal walking was 8. The American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Scale (composed of pain, function, and alignment; minimum score, 0 points; maximum score, 100 points) score was poor at 55 points. Initial conventional weight-bearing radiographs showed a translucency of the upper talar facet (Fig. 1*A*). Computed tomography revealed a large bony defect of the complete upper part of the talar body (Fig. 1*B* and *C*) and failure of ingrowth of the vascularized allograft transplant. Operative treatment was chosen in agreement with the patient.

Surgical Technique

The patient was positioned supine, and a modified anterior approach to the ankle joint between the tibialis anterior and extensor hallucis longus tendons was performed. A laminar spreader was inserted in the ankle joint, and all necrotic tissue was debrided. The ankle joint was positioned 90° in the sagittal plane, with 5° valgus and 10° external rotation. A saw guide was used to prepare the distal tibia and talus for the trabecular metal insertion. The width of the defect gap after resection was 15 mm (Fig. 2*A*). One 7.5-mm-thick, small spacer and one medium-size perforated porous metal spacer

Financial Disclosure: None reported.
Conflict of Interest: None reported.

Address correspondence to: Martin Wiewiorski, MD, Orthopaedic Department, University Hospital of Basel, Spitalstrasse 21, Basel 4031 Switzerland.
E-mail address: wiewiorskim@gmail.com (M. Wiewiorski).

Video online only at http://www.jfas.org

1067-2516/$ - see front matter
http://dx.doi.org/10.1053/j.jfas.2014.09.033

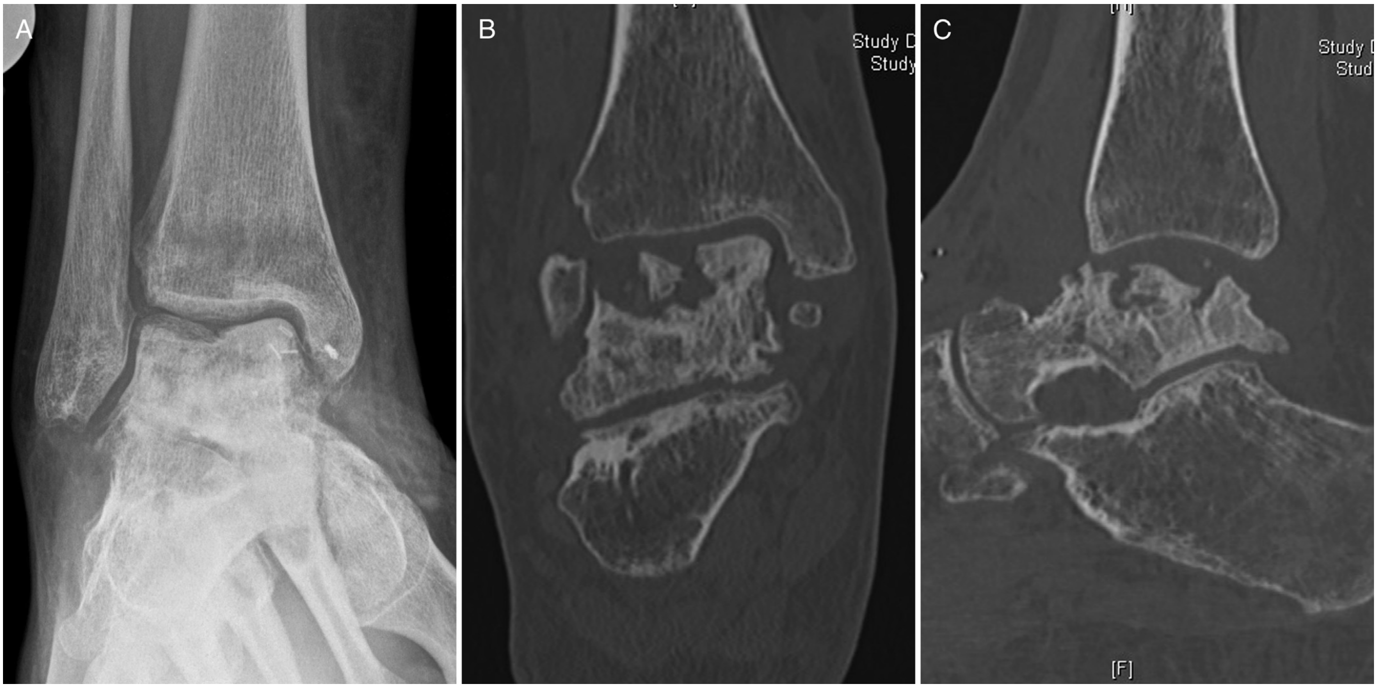

Fig. 1. Preoperative imaging showing talar necrosis due to a talar neck fracture. Previous vascular bone grafting had failed, leaving a vast bony defect of the talus seen on conventional radiographs (*A*) and computed tomography scans (*B* and *C*).

(Trabecular Metal Ankle Fusion Spacer, Zimmer, Warsaw, IN) were cemented together using conventional bone cement to create a 15-mm spacer. The spacer was inserted into the prepared defect (Fig. 2*B*). An anatomically preshaped locking compression plate (Synthes, Solothurn, Switzerland) was inserted over the anterior surface of the tibia and the talar neck. The appropriate plate position was checked using fluoroscopy, and the plate was fixed with locking screws proximally and distally (Fig. 2*C*).

Aftercare

The initial dressing and splint were removed and changed on the second postoperative day. When the wound conditions were appropriate (dry wound, no secretions), the foot and ankle were immobilized using a functional orthosis (VACOped, OPED, Schweiz, Switzerland) with partial weightbearing (15 kg) for 6 weeks. A gradual progression to full weightbearing during the next 6 weeks was allowed after radiographic follow-up at 6 weeks postoperatively.

Follow-Up

Osseous fusion was achieved at 6 months of follow-up by observing trabecular bridging at the arthrodesis site using weightbearing radiographs. At 2 years after the surgery, the patient was pain free (VAS score 0) during daily activities. The American Orthopaedic Foot and Ankle Society hindfoot score increased to 76 points. Conventional weightbearing radiographs at 2 years showed complete fusion of the ankle joint and no implant dislocation or failure. The position of the arthrodesis had remained unchanged during the postoperative course. Owing to discomfort at the anterior ankle, removal of the anterior plate was performed 25 months after the initial fusion surgery (Fig. 3*A*). After plate removal, stress radiographs were taken intraoperatively, which showed a stable fusion site (Fig. 3*B*, Supplemental Video S1).

Discussion

In the present case report, we have demonstrated successful isolated ankle joint fusion in the presence of a large osseous talar defect using a porous trabecular metal insert and an anatomically preshaped anterior locking plate. To our knowledge, the present case report is the first description of this novel approach.

Some of the techniques that aim to restore the bone stock and restore or preserve the leg length after fusion have included large structural iliac crest autografts (5), distal fibula autografts (palisade technique) (6), femoral head allografts (7), and bone cement (8). Those techniques have several challenges. Autograft and allograft bone transplants lack vascularity and carry the risk of nonunion and secondary collapse (9,10). Iliac crest grafting will result in a symptomatic donor site in ≤48% of the patients. Also, in extensive bone loss, the amount of the autograft needed might exceed the availability at the donor site. Allograft transplantation involves the risk of disease transmission and immunogenic issues (11). Bone cement as an artificial spacer is an inert foreign body that cannot integrate with the surrounding bone and should be considered a temporary solution. Trabecular metal interpositional spacers have been described recently as an alternative to structural bone grafts (12–15). Trabecular metal implants offer several advantages, including unlimited off-the-shelf availability, good stability similar to bone, a low implant cost, and no donor site morbidity. Horisberger et al (14) described successful tibiotalocalcaneal arthrodesis using a trabecular metal spacer at the ankle fusion site. A retrograde arthrodesis nail was inserted through an integrated hole in the trabecular metal spacer. Frigg et al (12) described the use of a porous metal spacer in their mixed case series of 9 ankle and subtalar joint fusions. At 2 years of follow-up, all 9 arthrodeses had fused. Successful union had been achieved in all cases after a mean follow-up period of 1.4 years. Wiewiorski et al (15) described a method for revision of subtalar nonunion after failed subtalar joint fusion. The nonunion was excised, a trabecular metal