CHAPTER **34**

DISTAL TIBIAL BONE GRAFTS AS AN ALTERNATIVE TO ILIAC CREST GRAFTS

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INTRODUCTION

Every day podiatric surgeons are faced with the need to use bone grafts for reconstructive surgery. In the case of smaller defects in the forefoot or rearfoot, allogenic grafts of crushed cancellous bone are viable. The literature also supports the use of allogenic tricortical iliac crest grafts in situations such as the Evan's calcaneal osteotomy. However, the extensive use of allogenic bone often leads to what appears to be good bone consolidation that is later followed by collapse of the graft with weightbearing. Larger volumes of allogenic grafting often lead to problems with maturity of the graft because there are no live cells in the graft material. Bone putty and artificial bone morphogenic protein products can be added to the allogenic matrix, but problems still remain with long-term collapse of the graft or long delays in the postoperative period due to slow bone healing. It should come as no surprise that if the joint to be fused is already destroyed that applying a dead bone matrix is not the best possible solution.

Foot and ankle reconstructive surgeons have regularly obtained grafts from the calcaneus, talus, proximal tibia, and the hip with good results. In the case of the calcaneus, the graft is often compressed if taken with a trephine and is of insufficient volume for rearfoot fusions, bone cyst grafting, or Charcot foot reconstructions. State laws often limit the podiatric physician's ability to obtain proximal tibial grafts. The distal tibia is a great source of cancellous bone graft or unicortical bone strut with cancellous grafting. The distal tibial graft has all of the same handling properties as cancellous bone obtained from the iliac crest.

SURGICAL TECHNIQUE

An incision is made in the distal medial aspect of the tibia and dissection is carried down to the periosteum where a periosteal incision is made. Following the adequate mobilization of the periosteum, an osseus window is created in the tibia in such a fashion as to create a trapezoid window of bone. The oblique tibial wall bone cuts allow the window to fit back into the site without pulling through the space created with the bone cuts. The bone cut is positioned approximately 1- to 2-cm above the joint line.

The cancellous bone is then harvested through the window with the use of a curette. Bone exposed in the window as well as the proximal and the distal area can be harvested. Once the correct amount of material has been harvested, the area is flushed, and back filled with a combination of bone putty and allogenic crushed cancellous bone graft. The cortical window is then reapplied and secured using a single cancellous screw or a plate depending on the size of the window. The soft tissue is closed in a layered fashion (Figures 1-3).

POSTOPERATIVE COURSE

The distal tibial graft site must be treated in the same manner as an ankle fracture. The cortical bone healing is of greater concern than the creation of new medullary bone. Once there is radiographic evidence of cortical bone healing, the patient may begin weightbearing on the tibia. Cast immobilization is appropriate or the use of an Ilizarov fixator if already being used for fixation in the foot.

CASE PRESENTATION

A 29-year-old woman presented with a chief complaint of severe pain in the heel occurring over several months. She had not been treated at the time of presentation. On the review of radiographs a large benign calcaneal cyst was noted (Figure 1). A large source of bone graft material was necessary due to the 2.5-cm x 2.5-cm x 3.5-cm lesion. The patient declined an iliac crest bone graft, therefore a distal tibial bone graft was harvested and mixed with allogenic crushed cancellous bone. A window in the calcaneus was opened and following the graft, a plate was applied due to pathologic fractures in the lateral wall of the calcaneus (Figures 4-12). The patient was managed postoperatively in a cast for 6 weeks followed by partial-weightbearing for several weeks and then full-weightbearing at 8-9 weeks. Postoperative management

was controlled by radiographic evidence of consolidation in the calcaneus and the tibia.

DISCUSSION

The distal tibia is an excellent source of bone graft when a large volume of cancellous bone is needed. The iliac crest graft will remain as the largest source of bone graft, but it also comes with extended pain following its harvest. The distal tibia graft can be considered for grafting in the foot, but should be avoided in patients undergoing an ankle fusion on the same leg. Other contraindications include use in the elderly because the medullary canal may be filled with unusable fatty marrow, or in those with osteoporosis. Use of the tibia in the contralateral limb is an interesting concept and may be used, however it will likely put the patient into a bilateral non-weightbearing status that would be difficult but not impossible to manage.

Figure 1. Osseous window in the distal tibia.

Figure 2. Open window with graft material harvested.

Figure 3. Fixation of the window following back filling of the harvest site.

Figure 4. Preoperative radiograph.

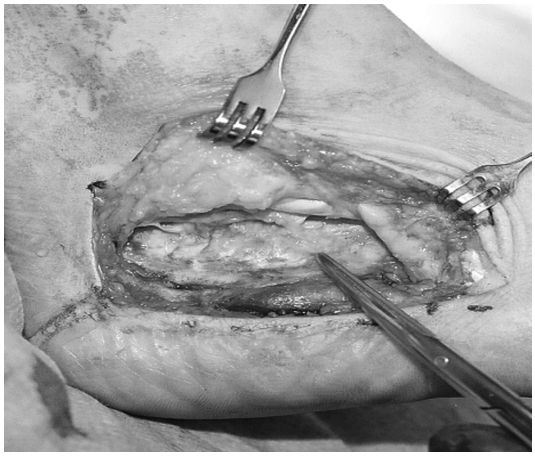

Figure 5. Exposure of the lateral calcaneus prior to window exposure.

Figure 6. Window osteotomy of the lateral calcaueus.

Figure 7. Combination grafting using autogenic and allogenic bone graft materials.

Figure 8. Autogenic tibial bone graft.

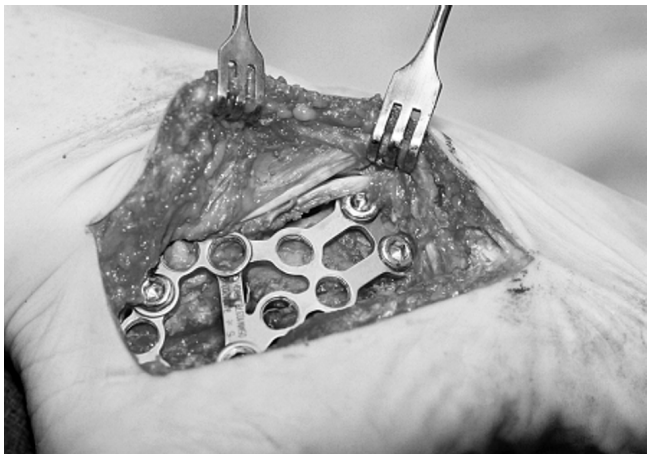

Figure 9. Application of a calcaneal plate due to multiple pathologic fractures.

Figure 10. Intraoperative radiograph showing the bone graft site following harvest.

Figure 11. Radiograph showing postoperative graft site.

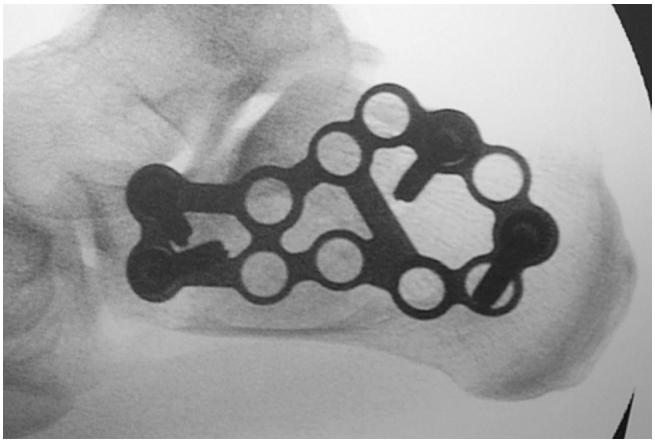

Figure 12. Final lateral radiagraph with full consolidation.