Bone loss management is an important consideration in revision total knee arthroplasty (TKA) (Figures 1-3). Large structural allograft use is an option that offers two significant advantages.

First, allograft bone is readily available. As a graft material, this bone is sterilized and preserved by freezing. Second, allograft bone provides support for the adjacent implant by maintaining its structural integrity during revision TKA. A biologic bond forms with bone on-growth and bone in-growth between the host bone and allograft.

Over the past 15 years at the Anderson Orthopaedic Institute, structural allografts have been used to repair most large bone deficiency encountered with revision surgery. We use femoral heads to reconstruct most deficiencies, as the defect can be shaped with hemispherical reamers to the same dimensions as the allograft. In an early report from a series of 116 revision TKAs performed between 1985 and 1992, 26 (22%) cases were managed with structural allografts. In the interval from 1993-1996, 30 (46%) of 65 knees undergoing revision TKA were managed with structural allografts.

The technique used to repair bone defects with structural femoral heads is simple. During preoperative planning for revision, defect size is estimated and a femoral head with a diameter large enough to fill the bone deficiency is ordered through an accredited tissue bank. At revision, the femoral head is thawed for 15-20 minutes in warm saline or sterile water. Once thawed, the femoral head is mounted in an Allogrip (DePuy, Warsaw, Ind) bone holding device. A female-type, cheese-grater reamer larger than the femoral head is used with power equipment to remove retained cartilage and bone. After the cartilage is removed, progressively smaller reamers are used to remove the dense bone of the subchondral plate from the full hemisphere of the graft. The graft is then flushed with sterile water or saline to remove marrow elements.

The technique for preparing the host bone is the same whether the defect is located in the femur or the tibia. The bone defect must be delineated and denuded of all non-viable tissue. A male-type, cheese grater reamer no larger than the prepared allograft is used to prepare the host bone. If dense, sclerotic bone is encountered or if the defect is not a concavity, the reamer may wander In such instances, it may be necessary to remove dense bone at the base of the defect with a high speed burr before initiat-
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ing the reaming process (Figure 4). All cement and fibrous tissue should be removed from the area that will be grafted. To facilitate union with the graft, the defect in the host bone must be prepared to a bed of healthy, bleeding cancellous bone.

The allograft is impacted into the defect and secured temporarily with Kirschner wires (Figure 5). The K-wires should be placed in a location that will not interfere with a stemmed revision component.

A rough cut is performed to remove the protruding allograft bone and allow revision instrument positioning. Cutting guides are used to trim the graft for femoral or tibial component implantation (Figure 6). Bone cement is applied to all surfaces that will aid in stabilizing the component to the reconstructed bone segment. In most instances, the component stem is not cemented.

After the cement cures, the K-wires should be removed.

Thus, the allograft is captured between the host bone and implant. A diaphyseal-filling, long-stemmed component protects the allograft. A non-cemented canal-filling stem allows axial loads that encourage graft union to pass through the bone, yet off-loads some of these stresses from the allograft.\(^2,5,6\)

**MANAGING BONE DEFICIENCY**

To successfully manage bone deficiency using large structural allografts, one must adhere strictly to surgical bone grafting principles. The advantage of using allograft bone is the ability to restore lost bone. The advantage of femoral head allografting is that bulk femoral head allografts provide rigid support for the components. The results to date support the continued use of large structural allografts with revision TKA.\(^4,7,8\)

**REFERENCES**