Cemented Long-Stem Femoral Components in Revision Total Hip Arthroplasty

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Indications and Rationale

Although cementless reconstruction is indicated for most femoral revisions, there are exceptions where cemented, long-stem femoral revisions may be preferred. These relative indications include: allograft–prosthetic composites (Fig. 32.1); failed cementless reconstruction (Fig. 32.2A, B); reimplantation for sepsis with antibiotic-impregnated bone cement (Fig. 32.3); elderly patients with poor proximal femoral bone; and medical conditions limiting life expectancy and activity level with pathologic remaining bone (rheumatoid arthritis, dialysis and transplantation patients, systemic lupus erythematosus, and metastatic disease). Relative exclusions include young, active patients with life expectancy greater than 10 years; and femora with fractures, perforations, and/or bone deficiencies requiring internal fixation or biological bone graft reconstruction.

Cemented long-stem femoral components were initially found to be useful in the treatment of certain cases of femoral shaft fractures associated with total hip arthroplasty (THA). With increasing knowledge of the anatomy, physiology, and biomechanics of cemented femoral revision arthroplasty (Fig. 32.4), combined with the poor long-term results reported for revisions utilizing a standard length cemented femoral stem, the potential advantages of using a long-stem femoral prosthesis becomes evident. The longer stem provides a longer cement fixation surface area, reducing the unit load on the prosthesis and cement. It also bypasses bone deficiencies and stress concentrations in the pathologic proximal femur, permitting more rigid bone-cement fixation with distal bony trabeculae and reducing the incidence of cement and femoral shaft fracture. The constraint on the implant imposed by the femoral isthmus allows less potential for motion, which may lead to bone resorption and mechanical loosening. Disadvantages of the long-stem femoral component include the sacrifice of normal distal bone stock, increased technical difficulty with insertion and revision of a long-stem prosthesis, and the potential for stress shielding of an already compromised proximal femur.

Surgical Technique

Most standard revision surgical approaches can be utilized for insertion of a long-stem cemented femoral component. However, extended lateral trochanteric osteotomy windows, or distal osteotomies should be avoided to prevent nonunion from cement interposition and to improve cement pressurization. Trochanteric osteotomy is required in most cases where the previous cement mantle extends distally greater than 180 to 200 mm. All cases should be performed with the patient positioned over a fluoroscopy extension table to permit biplane fluoroscopic visualization when needed.

To minimize the risk of fracture or perforation, it is essential to obtain full length anteroposterior (AP) and lateral radiographs of the femur before surgery to determine the exact position of the femoral stem and distal cement column, the amount of femoral bow, and any areas of cortical thinning. Prophylactic cerclage wires are placed in areas of bony compromise prior to component removal. Trochanteric osteotomy, fiberoptic illumination of the femoral canal, and reflection of the vastus lateralis improve visualization and accurate instrumentation of the medullary canal. Standard techniques are used for cement removal. We attribute our low incidence of fractures and perforations to several techniques that aid in central placement of the distal stem in both the coronal and sagittal planes. We re-
move as much proximal cement as possible and any obstructive endosteal bony projections to prevent impingement and misdirection of the implant. Flexible reamers are used to widen the intramedullary canal to at least 3 mm greater than the femoral stem, to permit easy passage of the stem past the isthmus into the canal, and provide an adequate cement mantle. A stem length is chosen that bypasses the distal most area of cortical weakening by 2 to 2.5 cortical diameters. The trial stem is placed into the distal canal with gentle hand pressure until either the prosthesis is fully seated or resistance is met; the position of the distal stem is then checked with the use of AP and lateral biplane fluoroscopy. Central stem placement in the coronal plane is usually not dif-

Figure 32.2. A. Failed, painful cementless femoral revision. B. Reconstruction of femur with long-stem cemented implant (6 years).