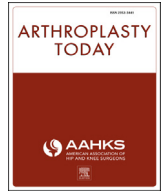




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## Surgical technique

## Antibiotic impregnated total femur spacers: a technical tip

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## ABSTRACT

Simultaneous prosthetic joint infection of ipsilateral hip and knee arthroplasties is often accompanied by significant bone loss and presents a challenging reconstructive problem. Two-stage reconstruction is favored and requires the placement of a total femur spacer, which is not a commercially available device. We describe a surgical technique, reporting on 2 cases in which a customized total femur antibiotic impregnated spacer was created by combining an articulating knee spacer and an articulating hip spacer with a reinforced cement dowel construct connecting the 2 spacers. Custom total femoral spacers are useful in the management of infected femoral megaprotheses and cases with ipsilateral injected hip and knee arthroplasties and severe femoral bone loss.

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## Introduction

Articulating spacers are routinely used in the management of prosthetic joint infection [1]. Techniques have evolved from simple spacers to more complex implants with intramedullary stem extensions to assist in the management of cases with substantial bone loss [2,3]. On rare occasions, a concomitant infection of an ipsilateral total knee arthroplasty and total hip replacement can occur, and this presents a complex management problem. Infected femoral megaprotheses offer similar challenges. This report describes a surgical technique in 2 such cases, in which a customized total femur antibiotic impregnated spacer was created by combining an articulating knee spacer and an articulating hip spacer with a reinforced cement dowel construct connecting the 2 spacers.

## Surgical technique

The patient is secured in the lateral decubitus position. We prefer a posterolateral approach to the hip because of its extensile

nature. The distal extension of the incision is curved laterally to incorporate a lateral parapatellar approach to the knee joint. The pseudocapsule around the hip is excised and the hip components are removed. Attention is then turned to the knee. The previous incision is utilized as much as possible. Knee components are removed and a complete synovectomy is performed. Thorough irrigation and debridement of both joint cavities is performed. Spacers are then fabricated.

## Spacer fabrication

Each spacer is fabricated independently using Simplex polymethyl methacrylate cement (Stryker Orthopaedics, Mahwah, NJ). For each bag of cement, 3 vials (1.2 g each) of tobramycin powder and 3 vials (1 g each) of vancomycin powder are added, as well as a few drops of methylene blue to facilitate identification of small pieces of cement at subsequent surgery. The articular portion of the knee spacer is made from preformed gentamicin-impregnated poly(methyl methacrylate) spacers (InterSpace Knee, Exactech Inc., Gainesville, FL; or The Remedy, OsteoRemedies, Memphis, TN), which contain 1.2 g of gentamicin in each of the femoral and tibial components. Antibiotic cement rods are then created by coating stainless steel Harrington rods with cement and placing them in a mold designed to uniformly coat the rod with antibiotic-impregnated cement (Nimbic Systems, Sugarland, TX) to produce a 13-mm diameter rod (Fig. 1). Various lengths are available up to 400 mm. Each rod is then connected to the articulating femoral and tibial knee components with cerclage wires and coated with

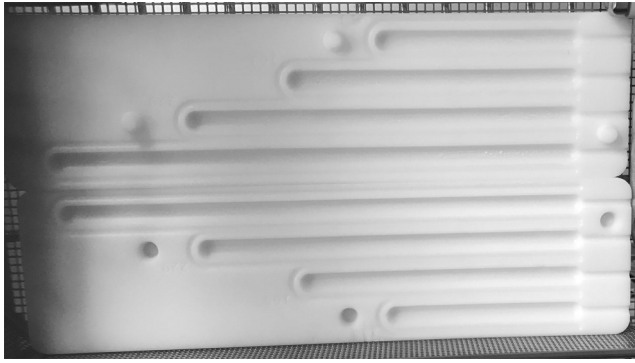
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**Figure 1.** Plastic mold used to create antibiotic cement dowels in total femur spacer fabrication.

additional cement. The femoral spacer is created using a commercially available mold system (DePuy PROSTALAC, Warsaw, IN), which has a constrained acetabular polyethylene component, which is important in these cases. The longest available femoral component (240 mm) is used.

#### Spacer insertion

The acetabulum is gently reamed and thoroughly irrigated. The acetabular component is cemented in place. The femoral component is then articulated with the acetabulum. The tibial canal is reamed to a size 14, and the tibial component with its stem extension is cemented in a stable position. The degree of overlap between the femoral stem of the knee component and the femoral PROSTALAC spacer is adjusted to achieve appropriate limb length and the 2 are then secured together with 2 cerclage wires (Fig. 2). Finally, additional cement is placed at the junction of the 2 femoral

components to unitize them. The wound is thoroughly irrigated and then closed in layers.

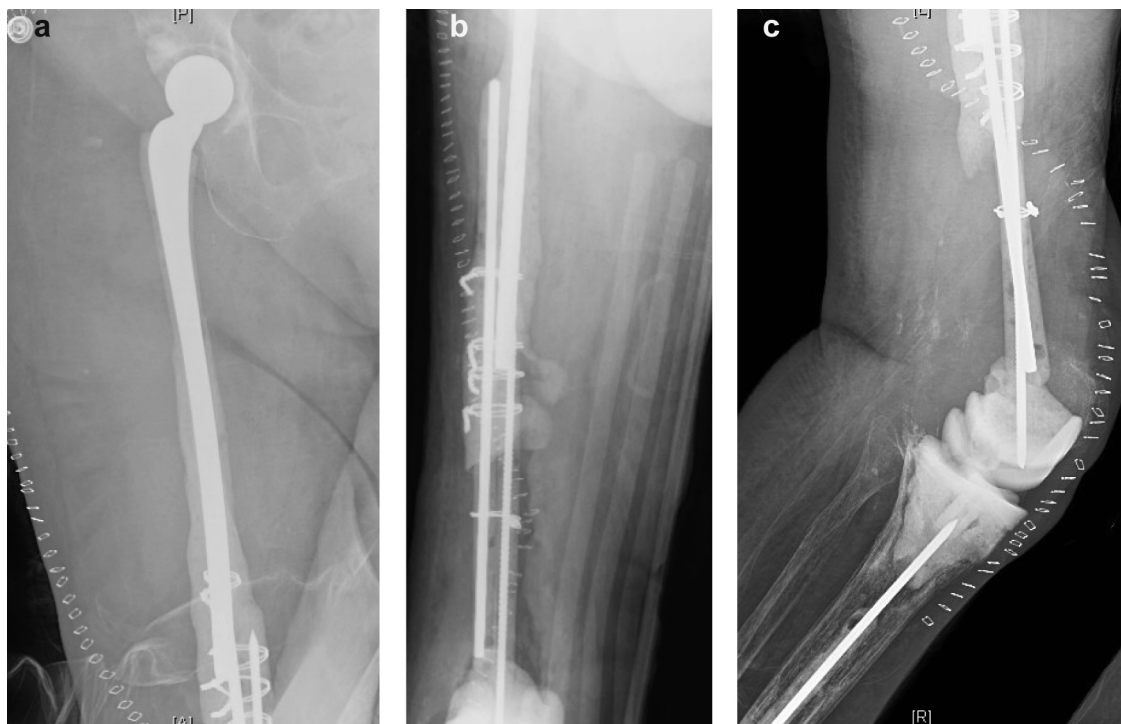
#### Postoperative course

Postoperatively, patients are allowed toe-touch weight bearing on the affected limb and are placed on subcutaneous low-molecular-weight heparin for venous thromboembolism prophylaxis. A knee immobilizer is used because minimal stability is present at the knee joint. Limited weight bearing is allowed after 4 weeks if the patient can comply.

We place these patients on a minimum of 6 weeks of targeted parenteral antibiotic therapy, which is directed by an infectious disease specialist. Because of the complicated nature of these infections, we delay reimplantation for 3 months. Although there is no evidence to guide us in determining the optimal time to proceed with reimplantation in these patients, we believe delaying it provides more time to eradicate the infection. This must be balanced with the risk of catastrophic mechanical failure of the spacer, which becomes more likely the longer it is left in place. Therefore, we arbitrarily choose to proceed with reimplantation 3 months following the explant.

#### Reimplantation of total femur arthroplasty

The work-up prior to reimplantation includes checking erythrocyte sedimentation rates, C-reactive protein, and white blood cell for normalization or persistent downward trend following a minimum 2-week antibiotic holiday. Synovial fluid analysis including cell count, gram stain, and culture is also performed. In these patients, we believe there is essentially one compartment around the prosthesis and choose to sample the knee joint as opposed to the hip joint because it is readily done in clinic without the need for image guidance. We have used a synovial fluid nucleated cell count threshold of 3500 as a sign of persistent infection based on the work



**Figure 2.** Postoperative anteroposterior (AP) (a and b) and lateral (c) radiographs of a dual-articulating total femur spacer implanted in patient 1. AP, anteroposterior.

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