Extended Trochanteric Osteotomy for 2-Stage Revision of Infected Total Hip Arthroplasty

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Abstract: We evaluate the rate of osteotomy healing, implant stability, and eradication of infection when an extended trochanteric osteotomy, with interval placement of an antibiotic-impregnated cement spacer and delayed osteotomy fixation, is used to treat the chronically infected total hip arthroplasty. Thirteen cases were followed for a minimum of 2 years. All patients had complete healing of the extended trochanteric osteotomy within 6 months. At an average follow-up of 39 months, recurrent infection occurred in 3 (23%) patients. Femoral component subsidence of 5 mm occurred in 2 patients, both of which had recurrent infection. Extended trochanteric osteotomy with interval placement of an articulating antibiotic-impregnated cement spacer and delayed osteotomy fixation permits reliable healing of the osteotomy. **Key words:** extended trochanteric osteotomy, total hip arthroplasty, infection, revision hip, femoral revision.

Treatment of a chronically infected total hip arthroplasty requires 2-stage debridement with component removal, intravenous antimicrobial therapy, and delayed revision total hip arthroplasty to maintain hip function in most cases [1-3]. Removal of the well-fixed femoral stem in this setting can be challenging and risk damage to remaining bone stock. Usually, this requires the use of specialized manual instruments, power instruments, and ultrasonic devices. Trochanteric osteotomies and cortical windows have been described as useful means of gaining exposure for femoral component and cement removal. A standard trochanteric osteotomy may provide adequate exposure, and a sliding trochanteric osteotomy prevents proximal migration should a nonunion occur [4]. However, removal of a well-fixed infected cemented or cementless femoral component may not be feasible without wide exposure of the femoral canal through an extended trochanteric osteotomy [5-9]. Use of an antibiotic-impregnated cement spacer may also be helpful to deliver local antibiotics to the hip, maintain soft tissue tension and leg length, and permit patient mobility [10,11]. Once adequate control of infection is achieved, revision total hip arthroplasty may then be performed. Success rates of 80% to 95% have been reported with 2-stage debridement and delayed revision total hip arthroplasty [1-3,12-14].

The use of an extended trochanteric osteotomy in the setting of infection allows wide exposure for complete removal, debridement, and direct preparation of the femoral canal. It can be used to remove cemented and cementless femoral implants and bypasses proximal bone deformities and protects weakened proximal bone from inadvertent injury. Moreover, proximal migration of the osteotomy is prevented by the vastus lateralis tether distally. Complications associated with the extended trochanteric osteotomy include nonunion, migration, and intraoperative or postoperative fracture. The

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use of this technique for the removal of the infected femoral stem has not been widely published.

After the antibiotic-impregnated cement spacer is inserted, the surgeon is faced with a decision regarding fixation of the extended trochanteric osteotomy in the setting of infection. Fixation options include repair of the extended trochanteric osteotomy with cerclage cables, plating, or soft tissue closure without osteotomy fixation. Internal fixation of the osteotomy with metallic cables or plates may increase the risk of developing persistent infection by leaving a foreign body in a hip joint with bacterial contamination. However, leaving the osteotomy unfixed may compromise later osteotomy repair and healing after the second stage revision procedure. To minimize the risk of persistent infection, we have chosen to avoid fixation of the osteotomy at the time of initial debridement and antibiotic-impregnated cement spacer insertion and delay osteotomy fixation until the time of reimplantation. The purpose of this study is to determine the rate of osteotomy healing, femoral component stability, and eradication of infection in patients with chronically infected total hip arthroplasties who are treated with this technique.

Materials and Methods

We analyzed data from the total hip registry at our institution on patients undergoing 2-stage reconstruction for infected total hip arthroplasty over a 5-year period. Institutional review board approval for review of patient records was obtained. All patients undergoing 2-stage reconstruction with the use of an extended trochanteric osteotomy, an articulating antibiotic cement spacer, and delayed osteotomy repair at the time of revision total hip arthroplasty were included in the present study. Patient characteristics including age, sex, number of prior ipsilateral hip surgeries, and history of infection are noted. Host factors impairing patient's immunity are reported by dividing them into intrinsic systemic compromise and substance use, based on the Cierny-Mader classification system described by Calhoun et al [15]. Host factors are meaningful given recent evidence suggesting altered healing and immunity in patients who use intravenous drugs [16] and increased risk of dislocation and/or failure in patients on immunosuppressive drugs or who have excessive alcohol intake [17].

Of the 255 hip revisions performed at our institution by a single surgeon over the study period, 33 were performed for infection. Thirteen hips (12 patients) underwent a 2-stage reconstruction using an extended trochanteric osteotomy for resection and debridement with a minimum 2-year follow-up. Eight of the initial femoral components were cemented. The remaining 20 infections were treated with staged reimplantation, but extended trochanteric osteotomy was not required because the implant and cement mantle were loose or bone loss was so extensive so that extended trochanteric osteotomy was not necessary for implant removal. Patient characteristic and outcomes are shown in Table 1. The average patient age was 52.6 (range, 40-82.2) years. There were 8 men and 5 women. Eight (62%) of 13 patients had some form of systemic or local immune compromise (Cierny-Mader B–type host).

Surgical Technique

All 13 hips in this series were treated with resection arthroplasty using an extended trochanteric osteotomy [7,18] to remove a solidly fixed cemented or cementless femoral component or cement mantle. The hip was dislocated posteriorly, and an attempt was made to extract the stem manually. If either the stem or cement mantle remained well fixed, an extended trochanteric osteotomy was performed. The vastus lateralis was dissected from the intramuscular septum, and its attachment to the osteotomized bone fragment was preserved. The distal cut of the osteotomy was made with an oscillating saw approximately 4 to 5 cm proximal to the distal extent of the cement mantle or 1 to 2 cm distal to the porous coating of the uncemented implant. An antibiotic-impregnated cement spacer containing 3.6 g of tobramycin per pack of Palacos cement (Biomet, Warsaw, Ind) was inserted as described by Ries and Jergesen [11]. The tobramycin powder was thoroughly mixed with the cement powder into a fine consistency before the addition of liquid monomer. Four packs of cement containing 14.4 g of antibiotic powder were used. The osteotomy was then reapproximated around the antibiotic cement spacer, and only fascial repair was performed. The posterior border of the vastus lateralis fascia was repaired to the intramuscular septum with absorbable monofilament sutures. Postoperatively, patients were allowed to touch-down weight bear on the operated extremity until reimplantation.

All 13 hips received a minimum of 6 weeks of organism-specific intravenous antibiotics postoperatively and returned for clinical follow-up at the completion of their antibiotic course. Routine laboratory studies were obtained including com-