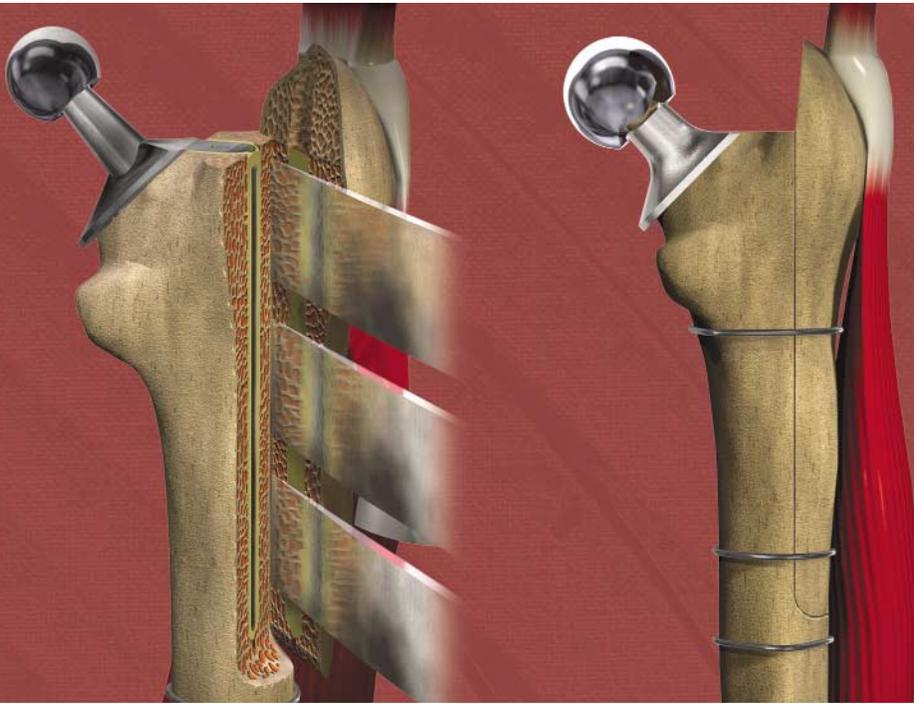


EXTENDED TROCHANTERIC
OSTEOTOMY
SURGICAL TECHNIQUE

THE
SOLUTION
SYSTEM®
REVISION SURGERY



EXTENSIVELY
COATED FIXATION

SINCE 1983

► EXPLANTATION OPTIONS

► The Issues

In femoral revision arthroplasty, removal of well-bonded cement can be extremely difficult, time consuming and damaging to the remaining bone.¹ Improved cementing techniques and removal of implants for reasons other than loosening also have added to the problem of femoral revision. This is especially true if cement is located beyond the anterior bow of the femur. Removal of cementless, proximally fixed or extensively coated femoral implants may also be an extreme challenge.

► Traditional Technique for Cemented Stem Removal

Removing cement from the femur involves three areas: the metaphyseal portion of the cement mantle, the cement canal in the lower metaphysis and the upper diaphysis and the diaphyseal cement plug.

The cement in the upper metaphyseal region can be easily accessed. Identify the bone/cement interface and use Moreland® hand tools to separate the cement from the bone interface. If the bone/cement interface cannot be delineated or easily separated using hand removal instruments, use high-speed, low-torque burrs.

The diaphyseal canal cement can be extracted in several ways. First, identify the interface between the upper portion of the cement mantle and bone using a lighted suction irrigation device. Advance a series of Moreland hand tools with increasingly larger diameters as far distally in the cement canal as possible. Once the tap has been advanced and is securely fixed within the canal, use a slap hammer to attempt to remove the cement. If this is successful, proceed to the removal of the cement plug. If using the slap hammer is unsuccessful, place hand instruments such as an offset or T-splitting instrument between the bone/cement interface. Remove cement until the cement plug is reached. Remove

the cement from inside the cement canal until the bone/cement bond is broken.

Other methods and instruments used to facilitate cement and implant removal are limited by poor visibility and inadequate ability to remove distal cement from a curved femur.

► Extended Trochanteric Osteotomy

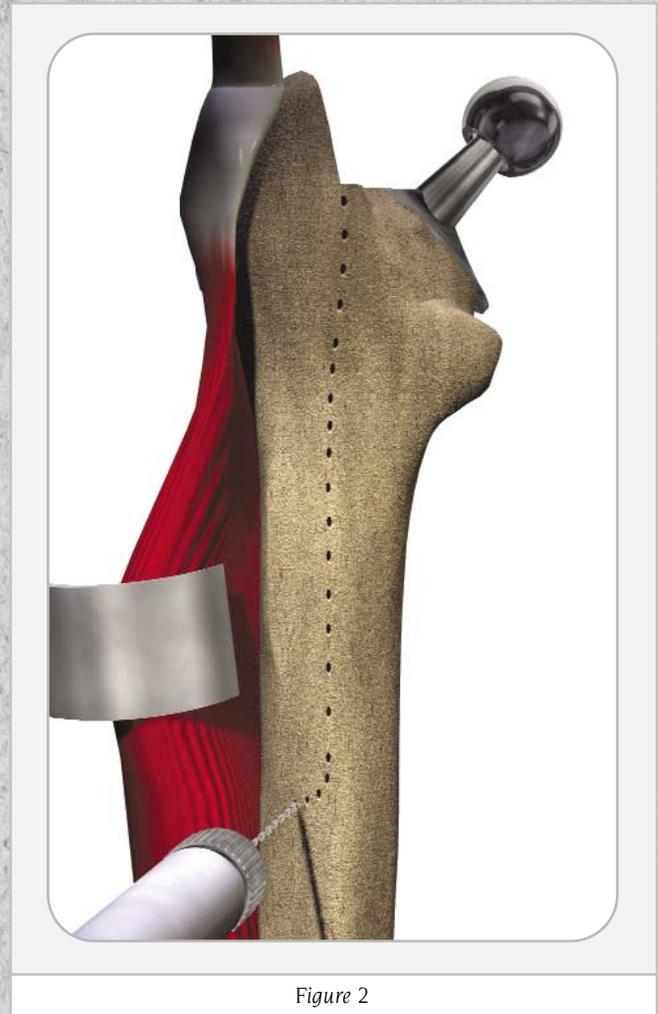
The advances made in revision hip arthroplasty have not only been in the field of biomaterial and implant design, but also in the area of surgical techniques used to remove implants.² Notable among them is the technique of the extended trochanteric osteotomy (ETO). The long bone incision of the ETO facilitates the removal of cement from the femur as well as improving access to the acetabulum.³ In addition, this technique may be used to extract loose cemented implants and ingrown proximally coated or extensively coated implants. The osteotomy results in the anterolateral third of the femur being opened in the form of a book. Therefore, an extensively coated implant will be the implant of choice, being able to provide stable, rigid fixation in the intact diaphyseal portion of the femoral canal.

► EXPOSURE

A variety of exposures can be utilized for revision hip surgery. Based on experience, anatomic assessment and previous surgeries, an anterolateral or posterior approach can be utilized in conjunction with a trochanteric osteotomy to provide necessary exposure while considering what implant choice is optimal for the patient.

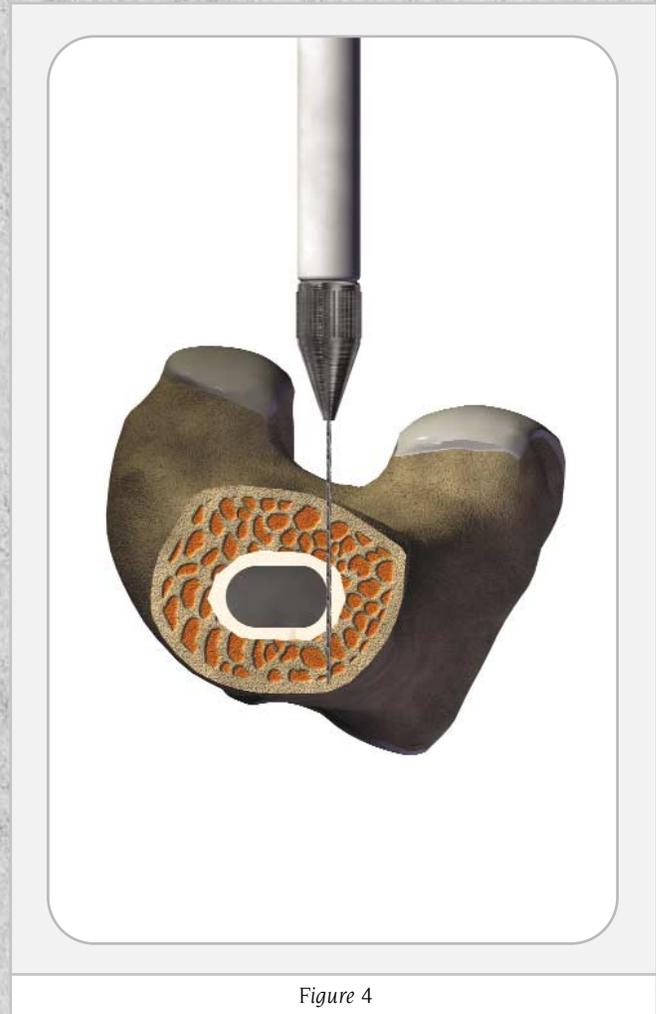
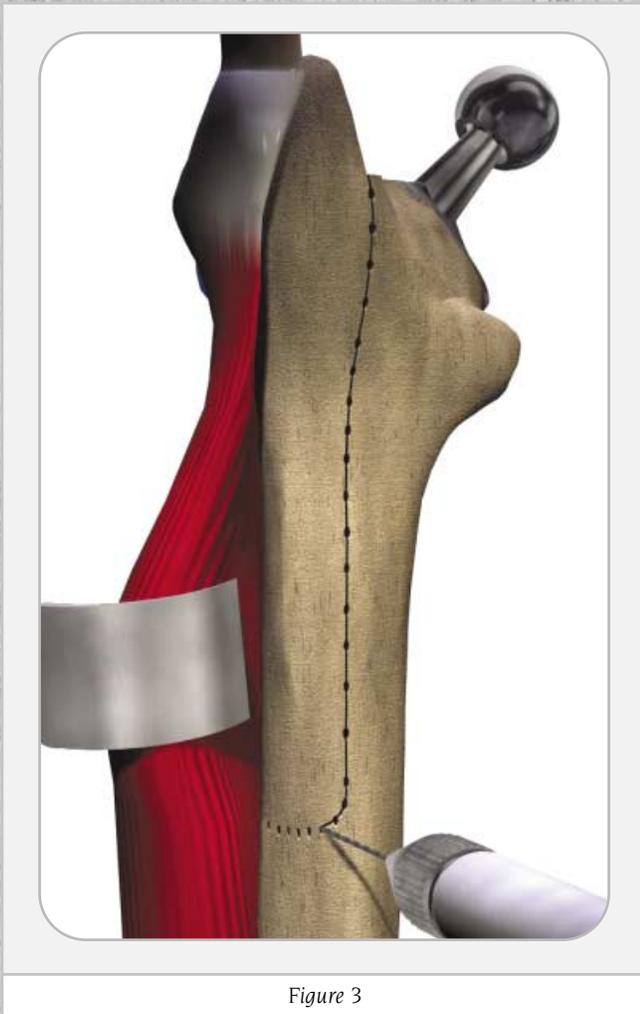
► **1** Release the gluteus maximus through an extensile posterior lateral approach. Elevate the vastus lateralis subperiosteally. Strip as little as possible, and retract anteriorly, maintaining its origin on the vastus ridge (Figure 1).

► **2** Outline the osteotomy using multiple drill holes with a narrow, high-speed pencil burr or oscillating saw. Begin at the base of the greater trochanter in the sagittal plane and extend distally, staying just anterior to the linea aspera (Figure 2).



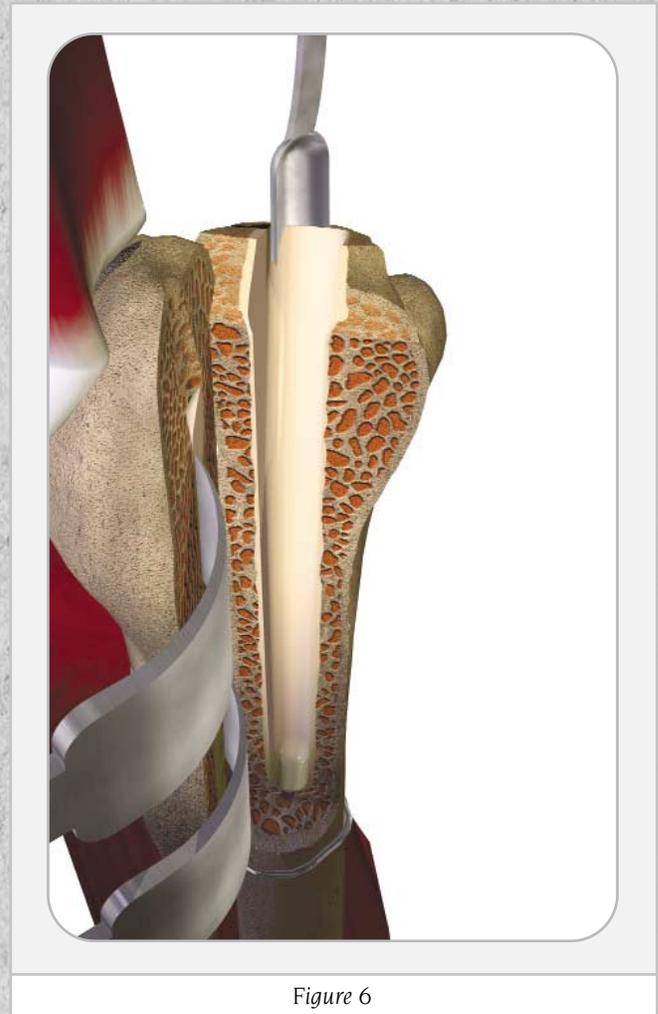
▶ **3** Carry the osteotomy distally to a point determined by preoperative templating to allow for easy removal of distal cement and/or uncemented implants and to achieve 4-6 cm of scratch-fit distally. When this point is reached, carry the osteotomy anterolaterally for a distance of one-third the femoral circumference. Connect the drill holes using a high-speed, narrow pencil burr or oscillating saw, penetrating the proximal cortex and cement mantle, if present (*Figure 3*).

▶ **4** The osteotomy segment will consist of one-third the femoral circumference. If the prosthesis has remained in the canal, the pencil burr or saw blade will just skirt the edge of the prosthesis. The osteotomy can be performed before or after removal of the implant (*Figure 4*).



- **5** Hinge open the osteotomy based on an anterolateral hinge of periosteum and muscle. Use multiple, wide osteotomes to create a controlled fracture through the anterolateral cortex and lever the osteotomy open. During canal preparation and component reinsertion, apply cable or wire distal to the transverse osteotomy site to help prevent femoral fracture (Figure 5).

- **6** Retract the osteotomy for excellent visualization of the fixation surfaces of the proximal femur and femoral canal. This permits removal of the cement and/or cementless implants under direct vision using hand or power instruments (Figure 6).



► **7** Release the anterior scar tissue to avoid tension. Retract the greater trochanter and proximal anterolateral femur out of the way to provide direct access to the distal cement plug or bony pedestal. Retract the greater trochanter with care to avoid fracture. Perform cement removal under direct vision, minimizing the possibility of perforation. Complete cement removal and begin diaphyseal reaming (*Figure 7*).

► **8** Machine the diaphyseal canal. Excellent visualization minimizes the chance of eccentric reaming, component undersizing or malpositioning. Over-ream 1-2 mm of isthmus at the osteotomy site to help prevent splitting bone. Prepare the inner surface of the osteotomized segment with a small reamer or sculpt with a high-speed burr to create a concave surface to match the lateral aspect of the revision prosthesis. Under-ream .5 mm for Solution System® straight stems, line-to-line for bowed stems (*Figure 8*).

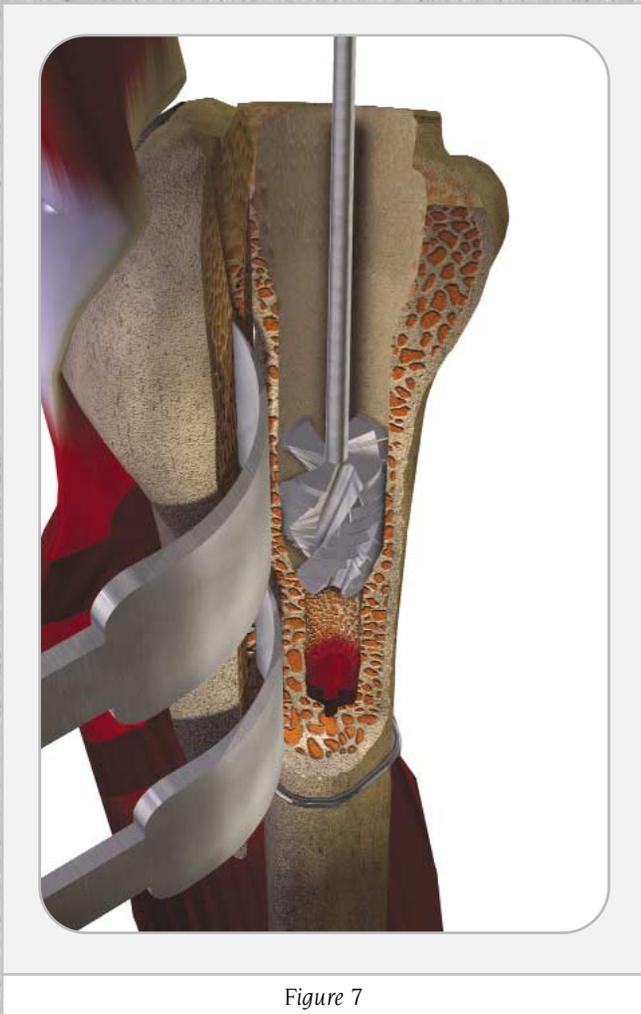


Figure 7

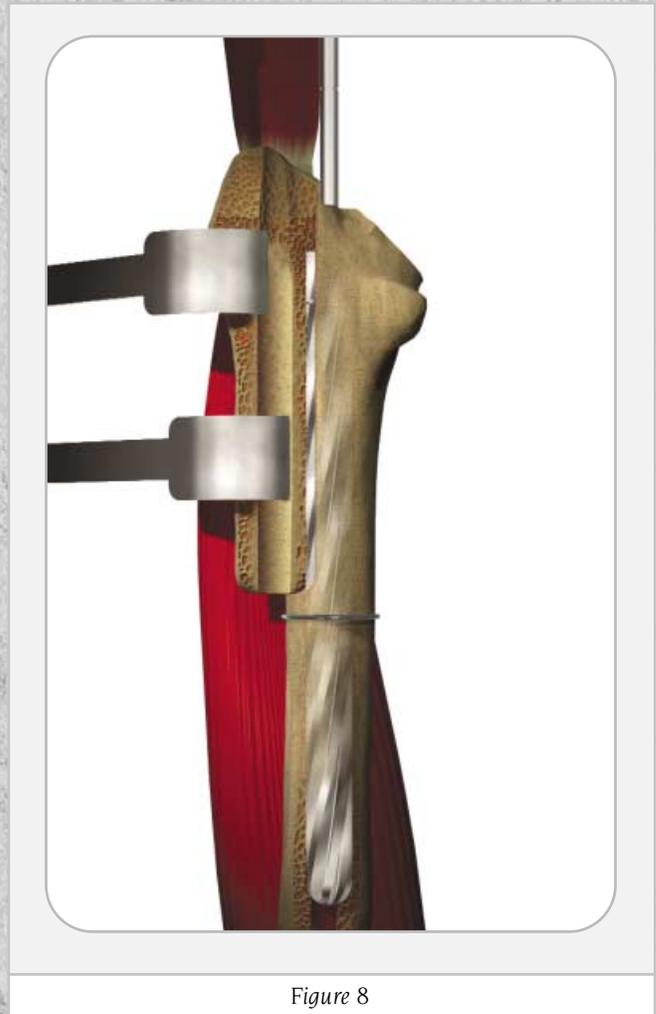


Figure 8

ADVANTAGES OF EXTENDED OSTEOTOMY

- Extensive exposure of fixation surfaces is achieved without opening the entire femur or compromising revision component stability.
- A long osteotomy segment with extensive soft tissue attachments allows for multiple rigid cerclage cable fixation points, providing a broad, well-vascularized surface area for rapid healing.
- Impedance from the greater trochanter or proximal anterolateral femur is eliminated, effectively straightening the femur to provide direct visualization of the distal cement while preventing damage to the greater trochanter and proximal shaft.

► **9** Distal rotatory stability is essential with this type of reconstructive procedure. Therefore, an extensively porous-coated, canal-filling revision prosthesis is preferred for femoral reconstruction. Alternatively, a revision stem with distal flutes may be used to provide the necessary rotatory stability. The revision stem should be long enough to allow a minimum of 4-6 cm of porous coating scratch-fit (*Figure 9*).

► **10** Following acetabular reconstruction and insertion of a femoral implant with distal fixation, internally rotate the femur and repair the osteotomy with multiple cerclage cables or wires (*Figure 10*).

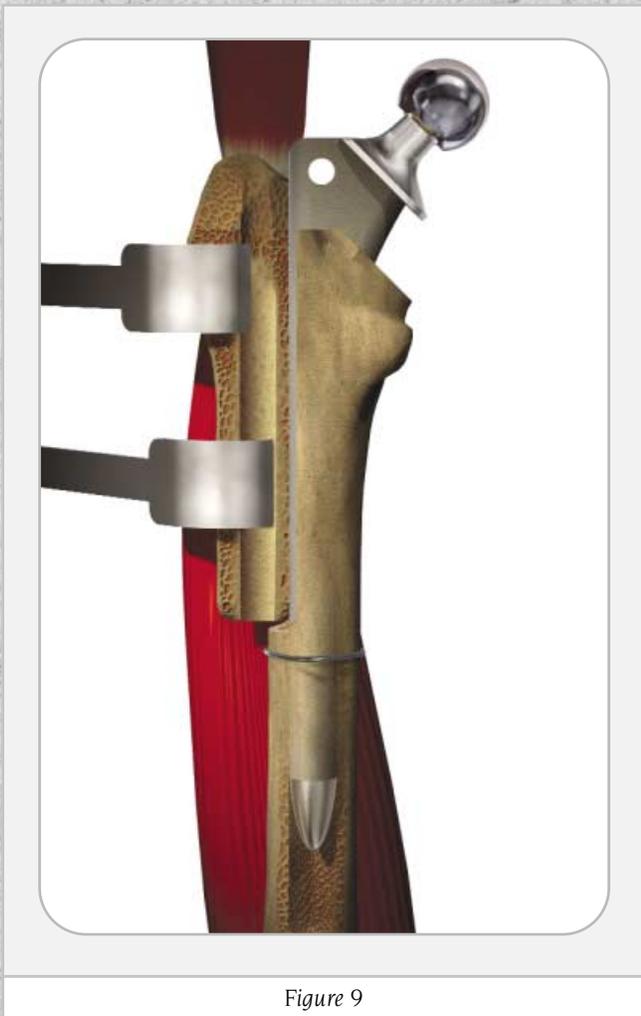


Figure 9



Figure 10

- Distal cement and/or implant removal is accomplished rapidly and safely under direct vision.
- Abductor tension can be adjusted after alteration in limb length to optimize hip biomechanics and stability.
- Machining of the diaphyseal canal is performed with excellent visualization with the proximal anterolateral femur and greater trochanter retracted, minimizing the chance of component undersizing or malpositioning.



REFERENCES

1. Magnus, R.E., et al. "Before you put it in ... can you get it out?" Annual Meeting of the American Academy of Orthopaedic Surgeons. Feb. 18-23, 1993.
2. Paprosky, W.G. and A.B. Krishnamurthy. "Revision of the femoral component: extensive coatings." *The Adult Hip*. Ed. J.J. Callghan, A.G. Rosenberg and H.E. Rubash. Philadelphia: Lippincott-Raven, 1998.
3. Peters, P., W. Head and R. Emerson. "An Extended Trochanteric Osteotomy for Revision Total Hip Replacement." *The Journal of Bone and Joint Surgery* Jan. 1993: 158-159.

CAUTION: Federal Law (USA) restricts these devices to sale by or on the order of a physician.

For more information about the Solution System Hip, visit our web site at www.jnjgateway.com/revisionhip.



DePuy Orthopaedics, Inc.
 700 Orthopaedic Drive
 Warsaw, IN 46580
 USA
 Tel: +1 (800) 366 8143
 Fax: +1 (219) 267 7196

DePuy International Ltd
 St Anthony's Road
 Leeds LS11 8DT
 England
 Tel: +44 (113) 270 0461
 Fax: +44 (113) 272 4101