Management of Severe Bone Loss in Acetabular Revision Using a Trabecular Metal Shell

Xavier Flecher, MD,*§ Scott Sporer, MD,†‡ and Wayne Paprosky, MD†‡

Abstract: We investigated the early results of trabecular metal components in 23 acetabular revisions associated with major bone loss. The mean age was 58.2 years. According to Paprosky's classification, there were 17 type IIIA and 6 type IIIB acetabular defects. Eight chronic pelvic discontinuities were intraoperatively assessed. No additional plating or bone grafting was necessary. The mean postoperative modified Postel-Merle d'Aubigne score was 10.6 points (8-12 points). The mean postoperative position of the center of rotation was 26.3 mm vertically (15-47 mm). The mean inclination was 45.1° (20°-63°). No mechanical failure occurred at a mean follow-up of 35 months (24-50 months). Trabecular metal components appear suitable to achieve primary stability in type III acetabular defect as an alternative to bone graft and cages. **Key words:** total hip arthroplasty, acetabular revision, bone defect, trabecular metal, results.

Acetabular revision is a challenging procedure, and one of the most challenging aspects of this surgery relates to the management of a major bone loss.

With adequate biologic and mechanical conditions, cementless acetabular components have shown improved medium- and long-term survival over cemented components [1-7]. However, preoperative understanding and determination of acetabular bone loss are essential to achieve a successful reconstruction. Based on the remaining host bone, the surgeon has to evaluate if the required biologic conditions are available and if primary mechanical stability will allow bone ingrowth for the cementless hemispheric component. The intraoperative decision is made both on the stability of the trial component and the mechanical stability provided by the remaining host bone to the construct.

The senior author previously described a systematic approach based on the severity of bone loss and analyzed the ability of the use of hemispheric cementless porous component in face of failed acetabulum [8]. A type I defect has an undistorted rim with no osteolysis or migration of the component, a type II defect has a distorted intact rim with adequate remaining bone to support a hemispheric cementless implant, and a type III defect has a nonsupportive rim. In type I and II defects, cancellous bone and porous hemispheric acetabula may be used. A cementless acetabular implant is usually suitable in types I and II, and satisfactory outcomes have been shown [1,3,9].

A cementless component may not be adequate in type III defects. Radiographs show superior migration of greater than 2 cm with or without ischial and medial osteolysis. The acetabular rim does not provide sufficient initial stability and

*From the *Department of Orthopedic Surgery, Aix-Marseille University, Marseille, France; †Department of Orthopedic Surgery, Central Dupage Hospital, Winfield, Illinois; ‡Department of Orthopaedic Surgery, RUSH, University Medical Center, Chicago, Illinois; and §Department of Orthopedic Surgery, Sainte-Marguerite Hospital, Marseille, France.*
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Reprint requests: Xavier Flecher, MD, Department of Orthopedic Surgery, Sainte-Marguerite Hospital, 270 Bd Sainte-Marguerite, BP 29, 13274 Marseille cedex 09, France.

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requires structural allograft to achieve the reconstruction in the proper location. Type III is subdivided in 2 categories.

In type IIIA, durable biologic conditions for bone ingrowth are present with a contact of the component with the remaining host bone more than 40% to 60%. Implantation of a cementless component is possible but requires the use of a structural buttress to provide initial stability, allowing secondary bone growth to occur.

In type IIIB, the migration is superior and medial. Less than 40% host bone is in contact with the component, and the bone ingrowth required for the durable stability of a cementless component is compromised. Therefore, type IIIB defects require the use of a massive allograft fused to the ilium, protected with an acetabular cage, and a cemented polyethylene liner. Other current options include placement of an acetabular component associated with structural bone graft, placement of a large acetabular component, and placement of an acetabular component on host bone in a superior position (a high hip center). Moreover, patients with type IIIB defect are at high risk for occult pelvic discontinuity that may need an additionally posterior reconstruction plate.

The poor clinical outcomes observed with these techniques to face the major acetabular bone loss and the controversial results of structural bone grafting have incited the senior author to explore the use of a trabecular metal acetabular component with augments most of his current type III cases.

Materials and Methods

Material

A group of 23 hips (22 patients) underwent an acetabular revision with the use of tantalum cups and augments for type III defect and was included in a retrospective clinical and radiographic study. Preoperatively, 17 hips were classified as type IIIA and 6 were classified as type IIIB. The mean age at the time of surgery was 58.2 years (range, 34-84 years). There were 16 females and 7 males. Acetabular revision was performed as an isolated procedure in 15 cases (65.2%). The preoperative diagnosis was mainly aseptic loosening (17 hips, 73.9%). On these, 11 acetabular components were cemented (5 metal-backed, 5 whole polyethylene, and 1 cage) and 6 were cementless, including 2 jumbo cups and 1 high hip center. The mean number of previous surgery on the hip was 2.3. The patients were followed up for a mean period of 35 months (range, 24-50 months) (Figs. 1 and 2).

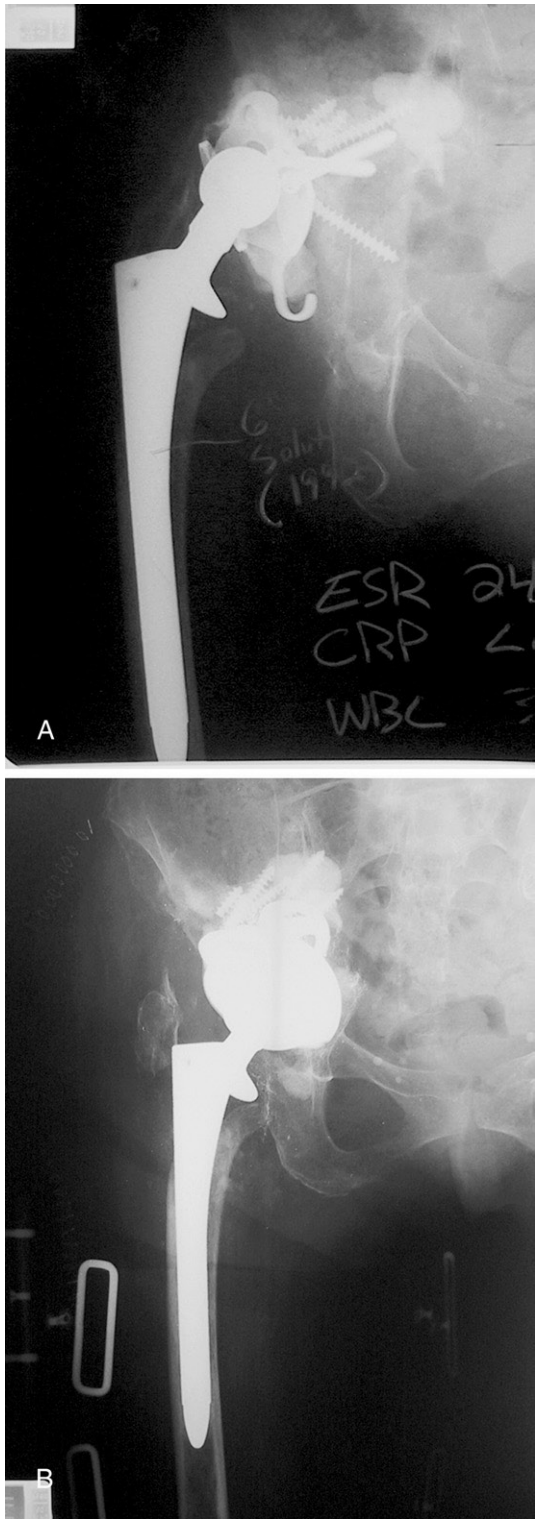

Fig. 1. Anteroposterior view of a 79-year-old woman's right hip with an aseptic cup loosening anteriorly 4 times revised. A, On the preoperative x-ray, the acetabular osteolysis is type IIIA according to Paprosky's classification. The presence of a pelvic discontinuity was not assessed preoperatively. B, Postoperative x-ray at 34 months of follow-up with osseointegration of both tantalum-made cup and superomedial augment.