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# Retention of a Well-Fixed Acetabular Component in the Setting of Massive Acetabular Osteolysis and Pelvic Discontinuity

## A Case Report

By Murat Pekmezci, MD, James Keeney, MD, Amanda Schutz, PhD, and John C. Clohisy, MD

*Investigation performed at the Department of Orthopaedic Surgery, Washington University School of Medicine, St. Louis, Missouri*

The management of massive pelvic osteolysis can pose a substantial challenge when a revision total hip arthroplasty is performed. For patients with well-fixed, well-positioned acetabular components and with contained osteolytic defects, retention of the prosthesis with bone-grafting of the osteolytic lesions is an accepted surgical strategy<sup>1-4</sup>. In contrast, in the setting of massive osteolysis with pelvic discontinuity, the acetabular component is usually loose and must be revised. To our knowledge, the uncommon clinical scenario in which pelvic discontinuity and massive osteolysis are associated with a well-fixed acetabular component has not been discussed in the literature. In the following case report, we describe the surgical treatment and clinical results of a patient with this challenging combination of problems. The patient was managed with acetabular component retention, open reduction and internal fixation of the discontinuity, and morselized bone-grafting of the osteolytic bone defects. The patient was informed that data concerning the case would be submitted for publication, and she consented.

### Case Report

A sixty-one-year-old woman presented to us with right-sided groin pain nine years after a right primary total hip arthroplasty. The postoperative course had been uncomplicated, and she had remained asymptomatic until eight months prior to the time of presentation. She had no history of trauma. The pain was worse with activity and improved with rest. She had no fever or other constitutional symptoms. The medical history was notable for obesity, coronary artery disease that required coronary artery bypass grafting six months prior to presentation, and a previous episode of diverticulitis, which required a partial colectomy to manage acute intestinal obstruction. She also had a history of cholecystectomy, multiple hernia repairs, and left hip and right knee replacements. She

was retired, divorced, and living alone. The cardiovascular disease limited her to walking inside her home.

On physical examination, she had a well-healed posterolateral hip incision, a moderate limp, a positive Trendelenburg sign on the right side, and relative shortening of the affected extremity of 10 mm. The range of motion of the affected hip was 90° of flexion, 30° of abduction, 10° of adduction, 10° of internal rotation in extension, and 20° of external rotation in extension. Log-rolling of the right lower extremity elicited mild groin pain. The Harris hip score was 69 points at the time of presentation.

Radiographic evaluation, including both anteroposterior and Judet radiographs, demonstrated massive periacetabular osteolysis and pelvic discontinuity (Figs. 1-A and 1-B). The osteolysis was diffuse and involved the superolateral, posterior, medial, and inferior periacetabular regions. The superomedial aspect of the acetabular shell appeared to be integrated with the ilium. There was eccentricity of the articulation of the femoral head, indicating substantial polyethylene wear. There was resorption of the proximal-medial aspect of the femoral neck, but the femoral component appeared to be stable without evidence of osteolysis. Computed tomographic scans confirmed the findings of extensive osteolysis and pelvic discontinuity. Consistent with the plain radiographs, the acetabular component appeared to be well fixed to the ilium along the superior, posteromedial surface (Figs. 2-A and 2-B).

Because of the symptoms of progressive hip pain with activity, and the findings of massive pelvic osteolysis and pelvic discontinuity, we anticipated potential catastrophic failure of the construct and thus recommended surgical intervention. A spectrum of potential treatment options was discussed. Given the low functional demands of the patient and the extent of the medical comorbidities, the surgeon and patient agreed to a

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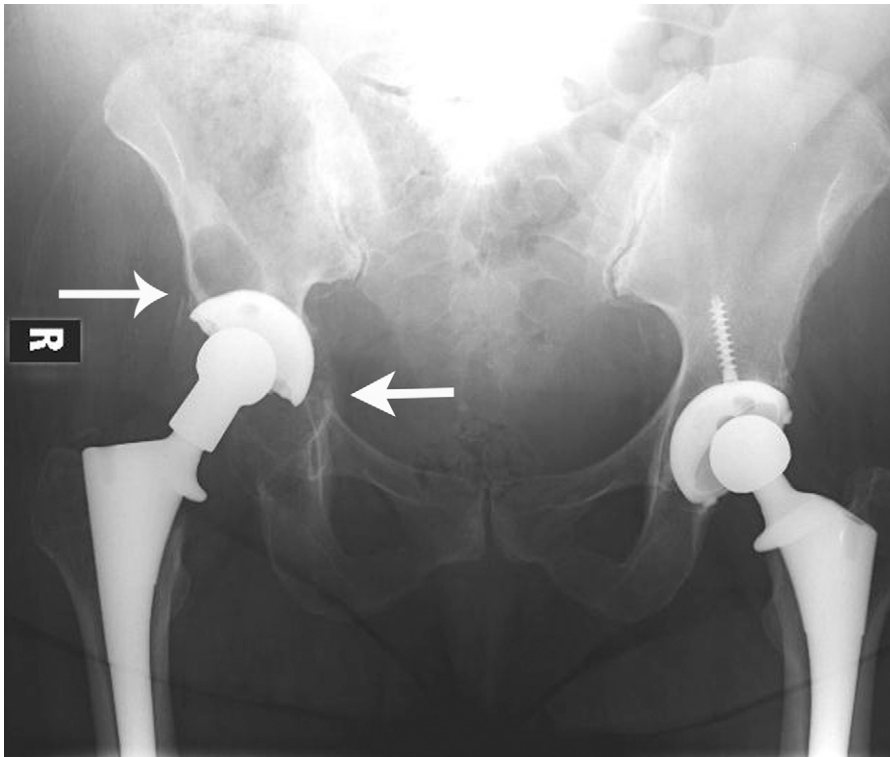


Fig. 1-A

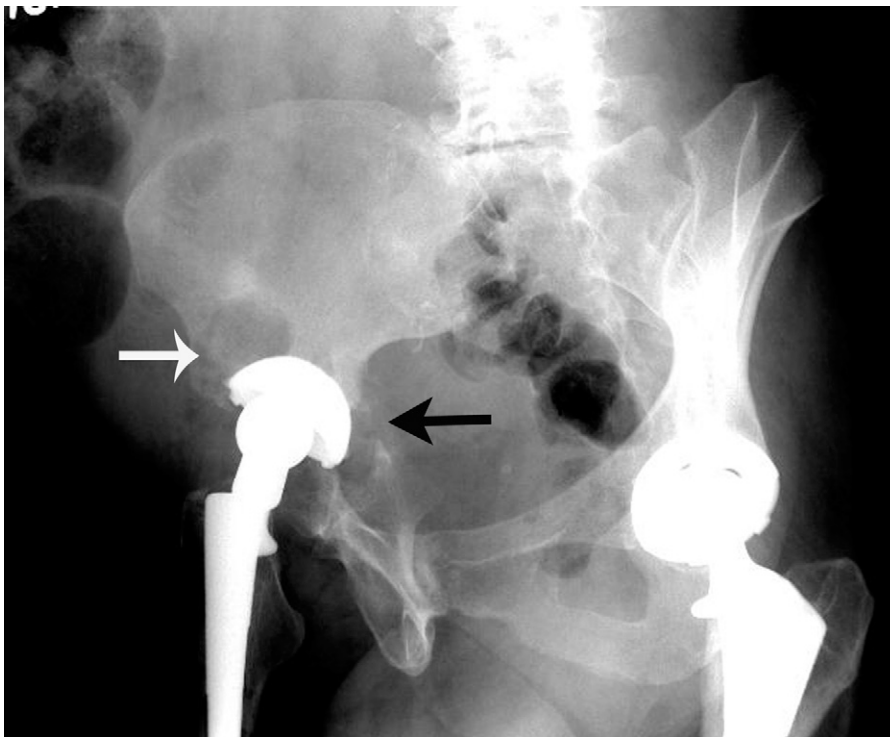


Fig. 1-B

Anteroposterior pelvic (Fig. 1-A) and iliac oblique (Fig. 1-B) radiographs demonstrate massive peri-acetabular osteolysis (white arrows) and pelvic discontinuity (black arrow).

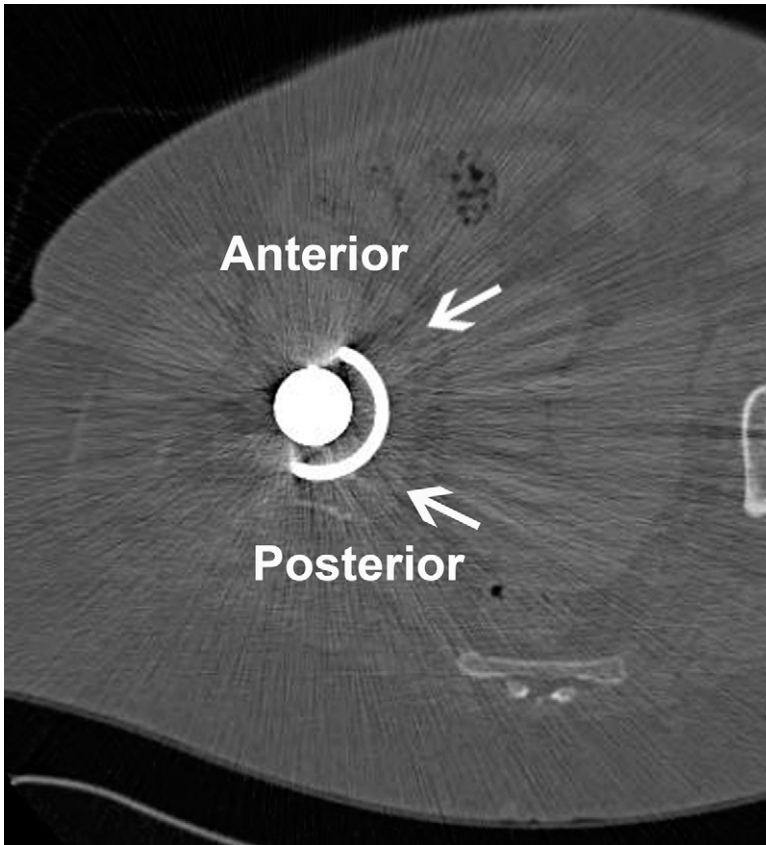


Fig. 2-A

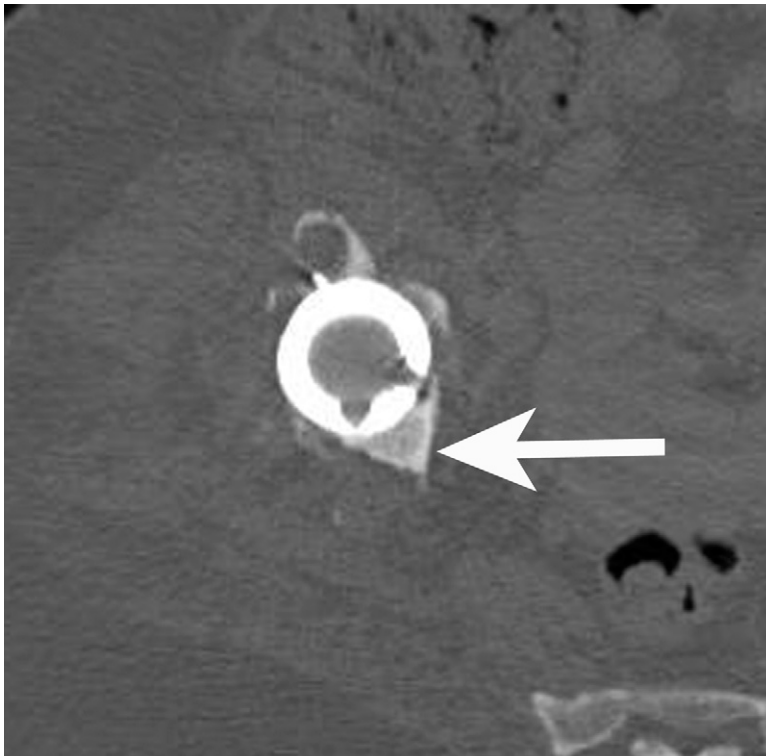


Fig. 2-B

Computed tomographic scan demonstrating massive periacetabular bone destruction at the level of the hip joint center. There is almost complete loss of all periacetabular bone at this level (white arrows) (Fig. 2-A). The superior posteromedial aspect of the acetabulum with osseous ingrowth supporting the component is well visualized (white arrow) (Fig. 2-B).

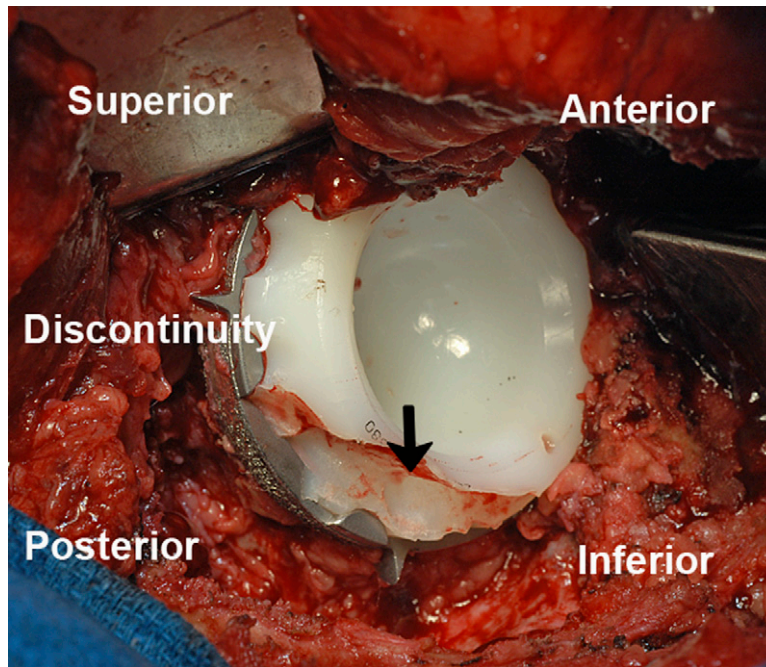


Fig. 3  
Nonarticular polyethylene wear due to osseous abrasion (arrow) from the freely mobile ischium is demonstrated. The metallic shell appears to be well fixed and undamaged.

plan of reconstruction that minimized the magnitude of the procedure, to the extent possible.

The hip revision was performed with the patient in the lateral decubitus position under general anesthesia, and the hip was exposed through a Kocher-Langenbeck approach. The femoral component was well fixed and adequately positioned. The acetabular component was well positioned and well fixed to the superior, posteromedial pillar of the ilium as suggested by the imaging studies, but there was massive bone loss in the superolateral aspect of the acetabulum, the posterior column, the medial wall, the anterior column, and the ischium. The superolateral osteolytic lesion was contained, while the remaining lesions were uncontained. Frank discontinuity of the hemipelvis was present as demonstrated by free motion between the superior and inferior portions of the hemipelvis. The inferior, nonarticulating margin of the polyethylene liner showed major wear that was attributed to abrasion from the adjacent mobile ischium (Fig. 3). The metallic shell was not damaged.

These intraoperative observations indicated to us that acetabular component removal would result in a massive uncontained acetabular defect that would require a major structural allograft and reconstructive cage. Since the acetabular component was well fixed and the patient had low functional demands, we decided to retain the acetabular component, perform open reduction and internal fixation of the posterior column, and place morselized allografts in the osteolytic lesions.

The deficient posterior column was packed with morselized graft, and the discontinuity was reduced and fixed with double plating with use of eight and twelve-hole 4.5-mm re-

construction plates (Figs. 4-A and 4-B). The remaining peri-prosthetic osteolytic areas were packed with morselized allograft. The reconstruction was completed with cementation of a 32-mm inner diameter, 10° lipped acetabular liner (Longevity; Zimmer, Warsaw, Indiana) and placement of a 32-mm-diameter femoral head with a 12-mm neck length (DePuy, Warsaw, Indiana). A cemented liner was used because of the suboptimal liner locking mechanism of the retained acetabular component.

The postoperative course was uneventful. The patient walked using a touch-down weight-bearing gait for three months postoperatively. She was then advanced to 50% partial weight-bearing for one month and to full weight-bearing four months after surgery. The patient was last seen twenty-eight months after surgery, and the hip was asymptomatic. The Harris hip score was 87 points. Radiographs made at that time demonstrated apparent healing of the discontinuity and incorporation of the morselized bone graft (Fig. 5). The acetabular component was well fixed with no sign of loosening or migration.

### Discussion

Periacetabular osteolysis can range in severity from small contained lesions to massive uncontained defects with pelvic discontinuity. The primary treatment goal is to achieve bone stock restoration and stable acetabular fixation<sup>4</sup>. When patients with massive pelvic osteolysis present with a loose cup, the decision to proceed with acetabular component revision is straightforward. However, in the setting of a well-positioned and osseointegrated cup, the optimal approach has not been conclusively established. Some authors have recommended



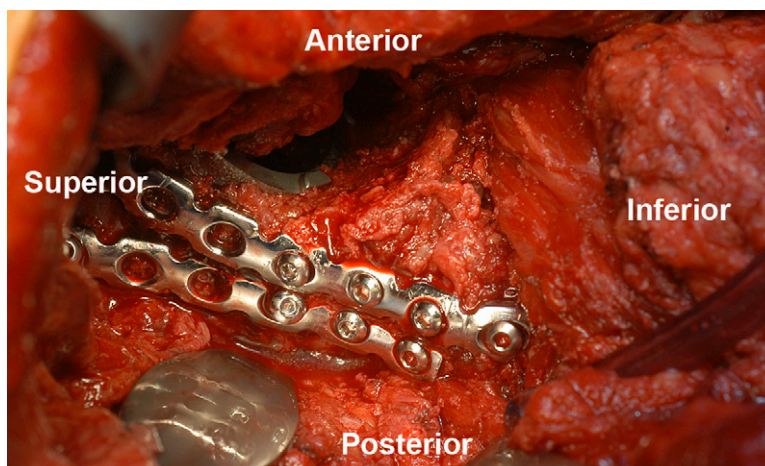


Fig. 4-A

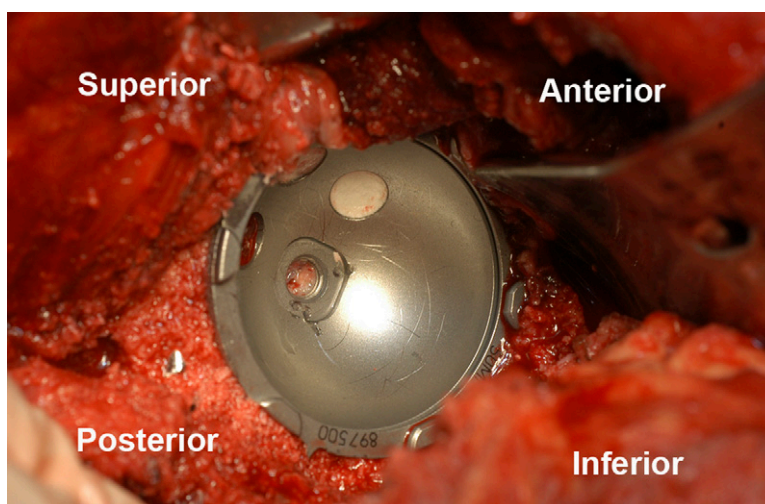


Fig. 4-B

The pelvic discontinuity has been reduced and stabilized with double plating of the posterior column with use of two reconstruction plates (Fig. 4-A), and morselized bone graft has been placed in the periacetabular osteolytic defects (Fig. 4-B).

preservation of a well-fixed cup and grafting of the defect if the cup is modular and well fixed, has an intact locking mechanism, and is in acceptable position and if an appropriate polyethylene liner is available<sup>1,2,5,6</sup>. Other authors have recommended the removal of a well-fixed cup at the time of revision, noting that this will enhance identification of the extent of osteolysis and facilitate grafting of the defects<sup>7-9</sup>.

The management of pelvic discontinuity has classically involved two options<sup>10</sup>. For acute pelvic discontinuity, primary apposition of the osseous surfaces and fixation with a pelvic reconstruction plate has been recommended<sup>11</sup>. For pelvic discontinuity associated with massive osteolysis where a fracture gap is typically present, the use of structural allograft or metal augments<sup>12</sup> may be considered, often supported by a reconstruction plate or a reinforcement cage. In our patient, although there was pelvic discontinuity, the cup was well-fixed into the cephalad portion of the posteromedial aspect of the acetabulum. The cup was in satisfactory position, and the liner

could be exchanged<sup>1</sup>. Since the locking mechanism was sub-optimal, a cross-linked polyethylene liner was cemented into the acetabular shell to achieve stability at the interface<sup>13</sup>. While retaining an acetabular shell in the presence of pelvic discontinuity and massive osteolysis is controversial, component retention in the setting of an acute pelvic discontinuity has been reported in one small series<sup>11</sup>.

The management of a hip with concomitant massive periacetabular osteolysis, pelvic discontinuity, and a well-fixed acetabular component is challenging. The case of our patient suggests that retention of the acetabular component with grafting and plate fixation of the surrounding pelvis is a treatment option for some patients. We emphasize that our patient had extremely low functional demands and had substantial comorbidities. Thus, one of our surgical goals was to avoid implant removal and major structural grafting (or metallic augments), if possible. Given this clinical situation, the surgical strategy of component retention, repair of the discontinuity,

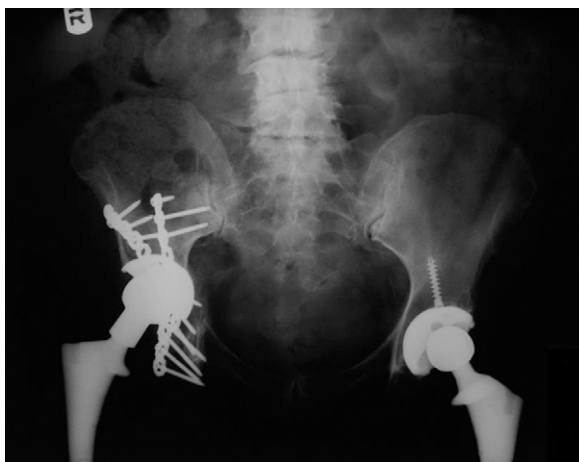


Fig. 5

The anteroposterior pelvic radiograph made at the time of the latest follow-up demonstrates a stable acetabular cup, bone graft incorporation, and healing of the pelvic discontinuity.

and bone-grafting of the osteolytic defects seemed appropriate. While this procedure has been associated with a good clinical result at a relatively short follow-up interval of twenty-eight months, the long-term durability of this construct is unknown.

Therefore, we cannot advocate this surgical technique for all patients with a similar implant failure pattern, but we present this approach as one option to be considered. We believe that for these complex reconstructions, the surgical decision-making process must be individualized and the surgeon must consider both the specific characteristics of the implant failure and the patient-specific factors. ■

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