

Dissociation of a Bipolar Prosthesis after Right Hip Hemiarthroplasty

Luke J. Grauke, Michael L. Richardson

We report the case of an 84-year-old woman with a dissociated bipolar component of her right hip hemiarthroplasty. Dissociation of components is a rare but increasingly recognized consequence of modular componentry. Radiologists should be aware of the distinction between dislocation of a prosthesis and dissociation of its bipolar components, and be able to describe these complications accurately in their interpretations.

Case Report

We report the case of an 84-year-old woman who fell, resulting in a fracture of her right femoral neck. This fracture was treated with placement of a bipolar hemiarthroplasty. Two weeks later, a routine post-operative radiograph demonstrated an abnormal appearance of her arthroplasty, despite no history of hip pain, leg numbness, or weakness.

Initial right hip radiographs demonstrated dissociation of the components of the bipolar hemiarthroplasty, with inferomedial displacement of the acetabular cup component, and with the prosthetic femoral head abutting the roof of the acetabulum (Figure 1). There was no evidence of fracture or loosening of the femoral component of the prosthesis. The patient underwent successful conversion to total hip replacement and had an uneventful postoperative course.

Discussion

Although interpositional hip arthroplasty was first performed in the 1800's (1), it did not become commonplace,



Figure 1. Anteroposterior radiograph of the pelvis demonstrates a bipolar hip arthroplasty, with a cemented femoral stem. The acetabular cup component of the arthroplasty has dissociated from the femoral component and is dislocated inferomedially. The head of the femoral component now lies directly within the native acetabulum.

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Abbreviations: THA, total hip arthroplasty

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or widely successful until the significant refinements by Charley in the 1960's (2, 3). Since then, hip replacement surgery has become a multi-billion dollar industry, with close to 300,000 total hip arthroplasties performed each year in the United States (2). Osteoarthritis and significantly displaced femoral neck fracture represent two of the more common indications for hip replacement surgery (4-7).

Painful loosening and acetabular erosion often occurred after the use of the early unipolar femoral endoprostheses

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(6). In the early 1970's, bipolar femoral prostheses were introduced, with the goal of reducing these complications. These prostheses are designed to allow movement to occur, not only between the patient's native acetabulum and the prosthesis, but also at a joint within the prosthesis itself (8). Their purported advantages over unipolar prostheses include less wear and erosion of the acetabulum, lower risk of dislocation, variable head sizes and neck lengths, and an increased range of motion (5, 7, 9). However, recent studies have shown no significant differences between unipolar and bipolar prostheses regarding complication rates and functional outcome (7, 8, 10).

Complications from hip arthroplasty are rare, but result in significantly increased costs and patient morbidity. Dislocation of the hemiarthroplasty from the native acetabulum is a well-documented, albeit rare, complication and is reported to occur in 1.2% to 3.4% of cases (11, 12).

A related but distinct complication of bipolar arthroplasties is the development of component dissociation. These dissociations are quite uncommon. When they do occur, they frequently co-exist with dislocation of the prosthesis from the native acetabulum. There have been relatively few prior reports of this serious complication. Georgiou et al. recently reported five cases of dissociation involving elderly patients (ages 75 to 86) with a variable postoperative period from two months to ten years (13). Four of these five patients denied significant insult or trauma, similar to the case we describe. Four other case reports have been published describing various dissociations of bipolar components, in a total of eight additional patients (14-17).

The exact mechanisms behind component dissociation are variable. The most commonly identifiable factor is the behavior of the prosthesis during the force of dislocation itself and during subsequent attempts at closed reduction of a dislocated prosthesis. If the femoral head component locks against the acetabular rim during dislocation, and the component sizing is not accurate, simultaneous dissociation can occur (13). This mechanism is plausible in our case, with the prosthetic head locking on the superior acetabular rim during dislocation leading to varus displacement of the acetabular cup. Another possible etiology in our case is an intra-acetabular dislocation/dissociation as a result of a weak or defective polyethylene locking ring (16). A defective locking ring can allow slippage to occur such that dissociation may take place without traditional extra-acetabular dislocation.

Dissociation during attempted closed reduction typically results from a "bottle-opener" effect wherein the cup locks on the posterior acetabular rim while traction is applied to the limb (9, 15). These forces can lead to a valgus displacement of the acetabular cup. During reduction, care should be taken to ensure proper fluoroscopic visualization, patient sedation, and avoidance of twisting forces. Post-reduction radiographs should always confirm placement and any variance in component seating should raise suspicion of potential disassociation.

When component dissociation occurs, the treatment of choice is undoubtedly open reduction. The orthopedist

should entertain possible modification of prosthetic components or, as in our case, convert to total hip arthroplasty (THA). Conversion to THA alleviates future alignment problems, which is often advantageous given the typical age group of these patients.

In conclusion, we report the radiographic appearance of a dissociated bipolar hip arthroplasty, a rare but increasingly recognized consequence of modular componentry. To avoid this complication, orthopaedic surgeons make great efforts to assure proper fit of the arthroplasty components. Additionally, when dislocation of the bipolar arthroplasty does occur, every effort should be made to avoid dissociation of the components during closed reduction. Radiologists should be aware of the distinction between dislocation of a prosthesis and dissociation of its bipolar components, and be able to describe these complications accurately in their interpretations.

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