Case report

Catastrophic failure of an acetabular total hip arthroplasty component mimicking a posterior dislocation

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ABSTRACT

In our case study, we examine a case of catastrophic failure of a total hip arthroplasty acetabular component leading to complete central wear by the ceramic femoral head, requiring revision total hip arthroplasty. Despite subtle clinical findings, initial orthopaedic evaluation and treatment yielded a diagnosis of total hip arthroplasty dislocation. While a much more common phenomenon, the diagnosis led to futile initial attempts at closed reduction. Our index of suspicion must remain high to pick up on subtle, less common diagnoses we will encounter.

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Introduction

Hip dislocation after total hip arthroplasty offers several challenges to the total joint surgeon. When using a posterior approach to the hip, the vast majority of postoperative dislocations occur posteriorly with an overall rate ranging from 1.1% to 4.76% in the literature [1-5]. Most dislocations warrant an attempted closed reduction in the emergency room. However, in this case, a thoughtful analysis of the presenting radiographs should have lead one to conclude that such an attempt would be futile.

Detailed surgical planning is a necessary component to any revision case. Bone loss must be assessed for both the acetabular and femoral components, as this will affect what tools need to be available and what options exist for reconstruction. A full set of plain films must be obtained. Sometimes, a computed tomography scan is useful in evaluating the extent of osteolysis. Laboratory workup should include complete blood count, erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP) with an aspiration if results are consistent with infection. When all these details are obtained, things do not always unfold as expected. The following is one such case we encountered. The patient was advised that details of the case would be submitted for publication and provided informed consent.

Case history

A 50-year-old man initially presented to our emergency department in November 2012 complaining of right hip pain with a 1-month inability to ambulate without crutches on the right lower extremity. The patient denied any trauma but did have multiple sclerosis with periodic falls from standing. The patient had undergone staged bilateral total hip arthroplasties at an outside institution for steroid-induced avascular necrosis. The patient had been on disability since 2005 secondary to his hip complaints and back issues that had also been addressed with surgery. His left total hip arthroplasty was performed in 2008 and the right in 2009. Both procedures were reportedly uncomplicated with satisfactory postoperative recovery. The patient had been on disability since 2005 secondary to his hip complaints and back issues that had also been addressed with surgery.

The patient complained of persistent pain in the right hip associated with decreased range of motion and noise from the hip
that had been gradually increasing. Plain radiographs taken in the emergency department demonstrated findings that were interpreted as a dislocation of the femoral head component as seen in Figure 1. There was concern for anterior dislocation of the femoral component. Orthopaedics was consulted, and the patient was seen and evaluated by a junior resident after hours. The patient subsequently underwent 2 unsuccessful attempts at closed reduction under intravenous sedation in the emergency department. In addition, the patient's ESR and CRP were elevated, so preparations were made for hip aspiration and open reduction in the operating room. However, the patient left the hospital against medical advice before the procedures. He had undergone a recent aspiration at an outside hospital that was reportedly negative.

One month later, the patient presented to our outpatient clinic with persistent right hip pain radiating to the right foot. He was evaluated by the senior author. Radiographs taken in the office were interpreted as persistent right hip dislocation and stable periprosthetic lucency. It was recognized that the patient had central wear-through of the acetabular shell, as this was the only possible explanation for the femoral neck being superimposed on the socket in both AP and lateral views. Concern for infection was high due to elevated ESR and CRP, so the patient was advised to undergo hip aspiration. The aspiration showed no growth, and the decision to proceed with operative treatment was made. In the time between the patient’s initial evaluation and surgery, he sustained a fall from standing resulting in a right hip intertrochanteric periprosthetic fracture as seen in Figure 2.

The patient underwent operative revision of the right total hip arthroplasty roughly 10 months after the initial emergency room visit via posterolateral approach. Intraoperatively, we encountered...
the polyethylene liner immediately deep to the fascia and completely displaced from the acetabular cup. The polyethylene showed significant wear. There were copious amounts of black metallosis-stained tissue within the joint and in surrounding tissue with concomitant soft tissue reaction. After extensive debridement of the black tissue, the intertrochanteric fracture was found to be malunited. At this point, the approach was converted to a sliding trochanteric osteotomy for adequate exposure. On exposing the hip joint, it was discovered that the ceramic head of the femoral component had worn completely through the central dome of the acetabular component, leaving a hole in the acetabular component as demonstrated in Figure 3.

The ceramic femoral head, polyethylene acetabular liner, and acetabular components were removed (Fig. 4). The patient’s bony acetabulum was significantly expanded and demonstrated a large central defect, most consistent with Paprosky type 2A bone stock damage. This was filled with fresh crushed cancellous bone. The acetabulum was reamed and fitted with a new acetabular component fixed with adjunctive dome screws. A new polyethylene liner was placed in the acetabular shell, and a cobalt–chromium head was press fitted onto the trunnion of the retained, original femoral component (Fig. 5). The patient had excellent stability with the new implants, although he still had roughly 10°-15° of residual flexion contracture.

The patient recovered well postoperatively in the hospital. He worked with physical therapy daily and was able to ambulate with a walker for 100 feet, and comfortably sit in a chair. He was discharged to an extended care facility on the third postoperative day.

Discussion

Femoral component dislocation is a common complication of total hip arthroplasty, especially in the early postoperative period. The overall dislocation rate after primary total hip arthroplasty has been cited at 1.1%-4.76% with the majority occurring in the early postoperative period [1-5]. A study by Phillips et al. [2] looked at complications in the first 6 months postoperatively and found an overall dislocation rate of 3.9% with 3% occurring in the first 8 weeks after surgery. In addition, a long-term analysis of Medicare patients from 1998 to 2007 by Malkani et al. [4] found a dislocation rate of 3.84% in the first 2 years postoperative and 0.92% from years 2 to 10.

While dislocation continues to be a major concern in total hip arthroplasties, the incidence of chronic dislocated prosthesis is rare. A comprehensive review of the literature was performed, and 7 reports of chronic hip prosthetic dislocations were discovered [6-12]. In 2 cases, the patients had no associated pain and were treated without intervention [8,11]. One patient underwent successful open reduction with soft tissue closure [12], and another with a revision total hip replacement [9]. In 1 case, the femoral component eroded through skin, and the component was removed and the patient followed [7]. One patient was successfully treated with an adjustable external fixator [6]. There was 1 case in the literature that described a dislodged polyethylene liner leading to erosion of the acetabular component by a cobalt–chromium femoral head and extensive metallosis of the surrounding tissue, which was treated with total hip revision [10]. To our knowledge, the case we described is the first case reported of a ceramic head completely wearing through the acetabular cup with resulting central dislocation.

In this particular case, the likely precipitating event for central dislocation was failure of the locking mechanism of the polyethylene liner, resulting in direct contact between the ceramic head and metal acetabular cup. There are several case reports in the literature describing failure of the polyethylene liner requiring revision surgery. Binda et al. [13] presented a case of a polyethylene liner dislodging in an S-ROM Oblong Cup System (DePuy, Warsaw, IN). On evaluation of the components, irregular wear at the locking slot sites was noticed. A similar case was described by Mesko with dissociation of the polyethylene liner from a Pinnacle (DePuy, Warsaw, IN) acetabular cup. Evaluation of the liner intraoperatively revealed shearing of 3 of the 6 peripheral locking tabs [14]. As this is a rare occurrence, there is
frequency by many orthopaedic surgeons; catastrophic failure is common, it is a diagnosis that will be encountered with some protocols. While total hip arthroplasty dislocation is relatively uncommon, it is a diagnosis that will be encountered with some frequency by many orthopaedic surgeons; catastrophic failure is rare and requires a high index of suspicion. In retrospect, it is clear that our patient’s hip was not dislocated anteriorly as suspected, seen most clearly on the lateral radiographs. Radiographic recognition of a central wear through the acetabular component could have prevented futile closed reduction maneuvers and confirmed the need to proceed with operative revision total hip arthroplasty. By discussing total hip arthroplasty dislocation in the setting of our patient’s catastrophic failure, we hope that readers will be more adept at evaluating and treating both.

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