Alumina ceramic-on-ceramic total hip arthroplasty is a widely-adopted option, especially for younger patients, due to low wear, scratch resistance, the wettable characteristics of alumina ceramics, and because of the relatively low biological reactivities of ceramic wear particles. However, fracture remains a significant problem because ceramics are inherently brittle, and few reports have been issued on short head fractures. In the described case, a ceramic head fracture occurred only 8 months after replacing the original head and with a new 28 mm head and liner. Both of these incidents may have been caused by head-to-liner impingement due to excessive anteversion of the metal shell. During the second revision surgery, this situation was managed successfully using a conventional elevated-polyethylene liner and a CoCr metal head, while retaining all metal implants.

Key Words: Total hip arthroplasty, Ceramic-ceramic total hip arthroplasty, Ceramic head fracture

Introduction

Early generation ceramic articulations were problematic in terms of ceramic implant fracture and wear. Although the mechanical properties of ceramic material have improved during the last three decades, ceramic component fracture remains an issue. Many authors have reported fractures of the ceramic head, and a few have described ceramic acetabular insert fracture. However, these complications are only encountered rarely, and all cases reported to date involve a history of minor trauma. Here, we describe a case that required 2nd-revision with a CoCr metal head and conventional polyethylene liner due to a recurrent fracture of the ceramic head.

Case report

In August 2006, a 44-year-old man (height 180 cm and weight 70 kg) visited our emergency room due to a pain in his left hip. He had not experienced unusual impact or trauma. Previously, he had undergone bilateral primary THA due to avascular necrosis at other university hospital during 2001. The implant used was composed of a hemispherical titanium metal shell and the femoral component was a slightly tapered, rectangular, collarless titanium stem. The proximal one-third of the stem was coated with plasmapor (BiContact, Aesculap, Tuttingen, Germany), and the articulating component was composed of a ceramic liner and a 28 mm short ceramic head (Biolox Forte, Ceramtec, Plochingen, Germany). Although the femoral stem and acetabular cup were well fixed by bony ingrowths, a ceramic...
fracture was observed on the left side of the ceramic head (Fig. 1). Computed tomography showed an intact liner and broken femoral head in the liner (Fig. 2). Intraoperatively, we observed that the trunion of the femoral stem was not grossly damaged at revision surgery and had a near normal contour. We removed ceramic particular debris carefully and exchanged the head and liner with a new liner and 28 mm medium neck because of provide stability to the surrounding muscles. The patient followed an uneventful postoperative course (Fig. 3).

However, eight months later, he revisited our emergency room because he felt a ‘crunching’ sensation in the left hip while walking. Again, he had not experienced any unusual impact or trauma. In the emergency room, we took radiographs of both hips (Fig. 4A). The stem and acetabular cup were still well fixed, but the left side of the ceramic head was fractured and dislocated. Computerized tomographic (CT) scans of both hips revealed metal shells with a normal abduction angle range of 46.14°, but anteversion of the left metal shell was found to be 36.09° (Fig. 4B).

The patient underwent a second revision surgery. Multifragmentary fractured particles of the ceramic head (one on the apical segment and four on the lateral segment) and dark metallic stains were observed on the medial surface of the fractured head. This stain was revealed Ti particles on EDAX study. At the peripheral rim of the ceramic liner, a similar metallic stain and chip fractures were found (Fig. 5A). Interestingly, a groove was observed around the lateral and posterior neck base of the femoral stem (Fig. 5B), indicating impingement between the stem neck and the ceramic liner. During second revision surgery, the fractured ceramic head and the ceramic liner were replaced with 28 mm CoCr medium neck and an elevated-polyethylene liner, which were both replaced anterosuperiorly instead of posteriorly, to overcome excessive anteversion (Fig. 6). The trunion of the femoral stem was retained, although a portion of it was scratched and grooved, because the femoral stem showed bony ingrowth stabilization. Two years after second revision, no postoperative complication or dislocation had occurred, and he was working...