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A rare case of liner dissociation with ceramic-on-ceramic preassembled acetabular components: a case report

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Liner dissociations are rare but catastrophic complications after THA, requiring revision surgery. Although this complication has been well documented in THA with modular components, it has been rarely described in preassembled designs. In this report we present a rare case of liner dissociation in a ceramic-on-ceramic pre-assembled cup design. A 41-year-old man who received THA seven years ago, presented with sudden pain in the hip. Radiographic examination confirmed a small dissociation of the liner component in the acetabular shell, as well as radiolucency between the acetabular shell and the ceramic liner, and pneumarthrosis. Revision surgery was carried out six weeks following the liner dissociation. To make an accurate diagnosis, orthopaedic surgeons must be aware of the symptoms of liner dissociation.

Keywords: total hip arthroplasty, liner dissociation, ceramic liner.

INTRODUCTION

Total hip arthroplasty (THA) using Ceramic-on-ceramic (CoC) bearings has shown excellent survival rates and offers low wear, which makes it an attractive cup design for young THA patients with an active lifestyle[1]. To improve stability and range of motion, larger femoral heads can be used[2]. To reduce the risk of liner fracture, some manufactures preassemble a thin ceramic liner directly into a metal acetabular shell, which can subsequently be implanted as a monoblock by the surgeon[3].

Liner dissociations (LD) are rare but, nevertheless, serious complications following THA and will often require revision surgery. This mechanical failure is characterized by a shift of the liner component in the acetabular shell. A recent systematic review reported an estimated prevalence of 0.15%[4]. However, this is likely an underestimation since the symptoms are easily misinterpreted and LD often occur atraumatic. This makes the diagnosis challenging. Several cases of LD have been reported in the past. In the majority of these cases a modulated polyethylene liner was used[5-9]. Cases of LD in pre-assembled designs consisting of CoC bearings with large femoral heads have only been described once in a report consisting of five cases[10].

In this report we describe a case of LD following THA with a preassembled large femoral head CoC cup design.

CASE PRESENTATION

A 41-year old male patient had received a bilateral THA for degenerative arthritis due to hip dysplasia. A posterolateral approach was used bilaterally and the following components were implanted: CoC Maxera™ cup with a BIOLOX® OPTION HD/ADPT head and 12/14 GTS Standard Stem size -1 (Zimmer Biomet, Warsaw, IN, USA). The left and right cup had a diameter of 60 mm and 58 mm, respectively. Although post-operative rehabilitation was uncomplicated, groin pain remained, which was possibly related to the m. iliopsoas.

Seven years following THA, the patient reported to the emergency room. He had felt a sudden "snap" in the left groin during walking, which was immediately followed by pain radiating to his left leg making weight bearing impossible. No preceding trauma had occurred which could be associated with these complaints. Given the patient's history of longstanding groin problems related to the iliopsoas, an MRI scan was obtained but no acute muscle tears, periprosthetic fluid collections or other soft tissue abnormalities were visible. The

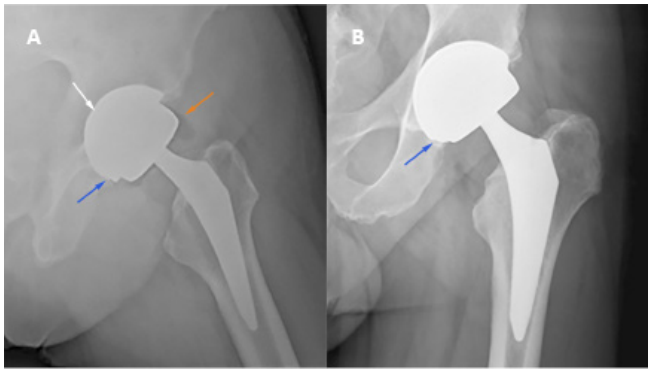

Figure 1. — (A) AP radiograph of the left hip taken three weeks after LD revealing a small dissociation of the liner component (blue arrow), a crescent-shaped radiolucency (white arrow) and pneumarthrosis (yellow arrow); (B) AP radiograph of the left hip taken six weeks after LD demonstrates that the pneumarthrosis has disappeared. The LD is still present (blue arrow).

Figure 2. — Removed cup showing slight dissociation of the ceramic liner.

anteroposterior (AP) radiographic imaging of the hip joint showed a small dissociation of the liner component in the acetabular shell (Fig. 1a). Additionally, there was a clear crescent-shaped radiolucency line visible between the acetabular shell and the ceramic liner as well as pneumarthrosis against the lateral side of the acetabulum. A follow-up radiograph was made six weeks post-LD to assess potential progression of damage to the liner or ceramic head. No evidence of progressive damage was observed; however, pneumarthrosis had disappeared (Fig. 1b).

The patient received revision surgery six weeks following the LD. The removed cup showed a slight dissociation of the ceramic liner (Fig. 2). Because of minimal bone damage of the acetabulum after removal of the cup, a 2 mm larger AneXys multi hole revision cup (Mathys, Bettlach, Switzerland) was implanted with screw fixation, polyethylene insert and a ceramic

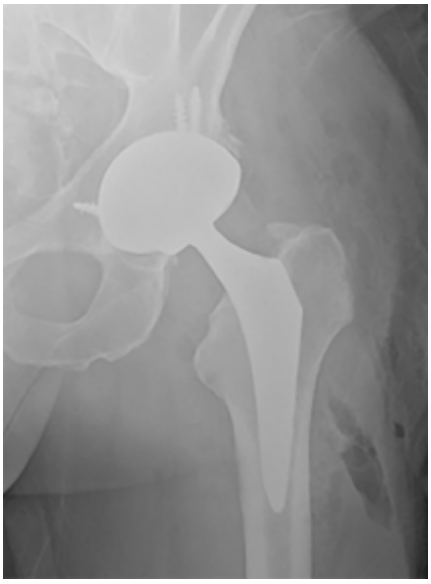

Figure 3. — Post-revision AP radiograph of the left hip showing the correct placement of the revision cup with screw fixation.

revision head (Zimmer Biomet, Warsaw, IN, USA) (Fig. 3). The postoperative recovery and rehabilitation were uneventful.

DISCUSSION

In this report, we present a rare case of LD in a CoC pre-assembled implant (Maxera™, Zimmer Biomet, Warsaw, IN, USA). This is a serious mechanical failure following THA which often requires revision surgery. To our knowledge, only one case report, consisting of five cases, reported on LD in CoC pre-assembled acetabular components. Revision surgery was performed in four of the five patients while one patient was treated conservatively[10].

Our case suffered from an atraumatic LD seven years after the THA. The LD was preceded by a sudden "snap" and followed by immediate pain and discomfort. Although complaints of pain and discomfort decreased, revision surgery was deemed necessary due to the risks of liner fracture. The changed pressures could cause the shifted liner to break into many little pieces of debris which could end up in the surrounding tissues or in the space between the head and the liner and cause additional damage. Alternatively, the liner could shift further, causing more pain and damage. At best, the liner would stay status quo, but in this case the above-mentioned risks were considered too high.

It is unclear what caused the LD in this CoC pre-assembled prosthesis. In hip prostheses with modular systems, LD have been attributed to a malfunction in the locking mechanism[4]. This was the case after

several cases of polyethylene LD with the Pinnacle component (Depuy Synthes, Warsaw, IN, USA) were reported[5,7,11,12]. Early LD within the first two years, on the other hand, has been associated with acetabular malposition[4,13]. Some authors have also proposed that the surgical approach could be linked with the occurrence of LD. Singleton et al. described six cases of LD, all of which received THA through a lateral approach[14]. However, in a recent systematic review similar rates of LD among the surgical approaches were reported, showing no association between LD and surgical approach[4].

Similar to a previous case report[10], we also observed pneumarthrosis in the first weeks following LD. A small space between the acetabular shell and the ceramic liner exists in the pre-assembled prosthesis to allow better taper interference[10]. The air in this space could escape during dissociation, causing pneumarthrosis. Similar to other cases[10], the pneumarthrosis disappeared again in the weeks following the dissociation. When the liner shifts, it does not connect appropriately with the acetabular shell. We assume that this caused the crescent-shaped radiolucency line visible on the radiographs.

CONCLUSION

In this case report, we discussed a case of LD in a CoC pre-assembled prosthesis. This is a mechanical failure of the liner characterized by a shift of the liner in the acetabular shell and pneumarthrosis on X-ray. Due to the risk of further dissociation or fracture of the ceramic liner following LD, revision surgery is required. Although LD is a rare complication, it is important for orthopedic surgeons to be aware of the symptoms of LD.

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