Management of Femoral Neck Fracture and Metallosis after Failed Hip Resurfacing in Developmental Dysplasia of the Hip. A Case Report

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Case report

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Summary

Background: Hip resurfacing arthroplasty has been presented as an alternative for management of symptomatic hip osteoarthritis in young patients with developmental dysplasia of the hip. However, complications such as femoral neck fractures may occur, especially in patient with certain risk factors.

Clinical case: We present the case of a 44 year-old women with developmental dysplasia of the left hip treated with hip resurfacing. Four years after surgery, the patient consulted at our trauma center with a femoral neck fracture and radiologic signs of mal positioning of the acetabular component. A type-B postnecrotic periprosthetic fracture associated to metallosis due to mal positioning of the acetabular cup was evidenced. We decided to perform a conversion to total hip arthroplasty.

Conclusions: The indication of hip resurfacing in patients with DDH has risks of major complications in the short term, such as periprosthetic femoral neck fractures and metallosis. The conversion to THA is not an easy surgical procedure, requiring a careful preoperative plan and an experienced surgical team.

Key words: Developmental dysplasia, hip resurfacing, periprosthetic fracture, metallosis, total hip arthroplasty

INTRODUCTION

In recent years hip resurfacing arthroplasty as emerged as a therapeutical alternative for young patients with symptomatic hip osteoarthritis, including patients with developmental dysplasia oh the hip (DDH). We present the case of a 44 year-old women with a DDH treated with hip resurfacing, who suffered a femoral neck fracture 4 years after surgery. The objective is to report an example of a new type of hip periprosthetic fracture, review the literature and describe our surgical decisions.

CLINICAL CASE

A 44 year-old woman with Crowe type I DDH and subsequent Tönnis grade 2 symptomatic osteoarthritis of the left hip (Figure 1) underwent hip resurfacing of (ReCap ™, Biomet) in 2005, which was performed through a posterior approach. At the moment of surgery, her body mass index was 29,5 k/m^2. Postoperative X-rays showed a theta angle of 75° and a well positioned femoral component (Figure 2).

The patient evolved adequately, recovering a normal gait pattern without any assistance, and two years after surgery we estimated a Harris hip score of 78 points. Since the beginning of rehabilitation, the patient occasionally presented an audible "click" sound when flexing her hip.

In June 2009 our patient began with moderate hip pain for about 3 weeks. While walking at a normal pace, she suddenly presented intense pain and fell. At the emergency department of our institution, an objective loss of function, external rotation of the left hip and shortening of the limb was found. The radiograph confirmed left femoral neck fracture just distal to the prosthetic component, and the orientation of the acetabular component showed a theta angle of 75°, without radiological signs of loosening (Figure 3).

A convertion to non cemented total hip arthroplasty (THA) with acetabular cup revision was performed because of malpositioning. Surgery was performed through posterior approach. After incision in the fascia lata, a large amount of material consistent with metallosis was evidenced and extracted without incidents (Figure 4). The ion serum levels were not measured.

The femoral neck fragment with the femoral component was withdrawn without incidents. A fully stable, well integrated "verticalization" of the acetabular cup was evidenced. The removal was difficult because the cup and its 4 pairs of fins were well incorporated. Extraction was performed by adapting the Explant™ Acetabular cup Removal System (Zimmer) with a 40mm test head, which did not fit well with the 44mm cup, but allowed the extraction of this double-radius cup, smoothly and without excessive removal of periacetabular bone (Figure 5).

A titanium trabecular metal acetabular cup (Tritanium™, Stryker) was placed with a 36mm ceramic head, theta angle of 45°, and an intraoperative anteversion of 25° was evidenced. A primary uncemented stem (Secure Fit™, Stryker) with an offset of 127° was inserted, achieving correct intraoperative stability. Figure 6 shows the postoperative radiological control.

Fig. 1. Anteroposterior (AP) pelvis X-ray demonstrating developmental dysplasia of the left hip and secondary osteoarthritis

In the postoperative period, the patient progressed without any incidents. Drainage was removed after 24 hrs of surgery and the patient was discharged on the fourth day with crutches and partial weight-bearing. Eights months after surgery, the patient was satisfied with the outcome, carrying out a normal life, with a Harris hip score of 86 points.

Fig. 2. Postoperative AP pelvis X-ray after hip resurfacing arthroplasty of the left hip

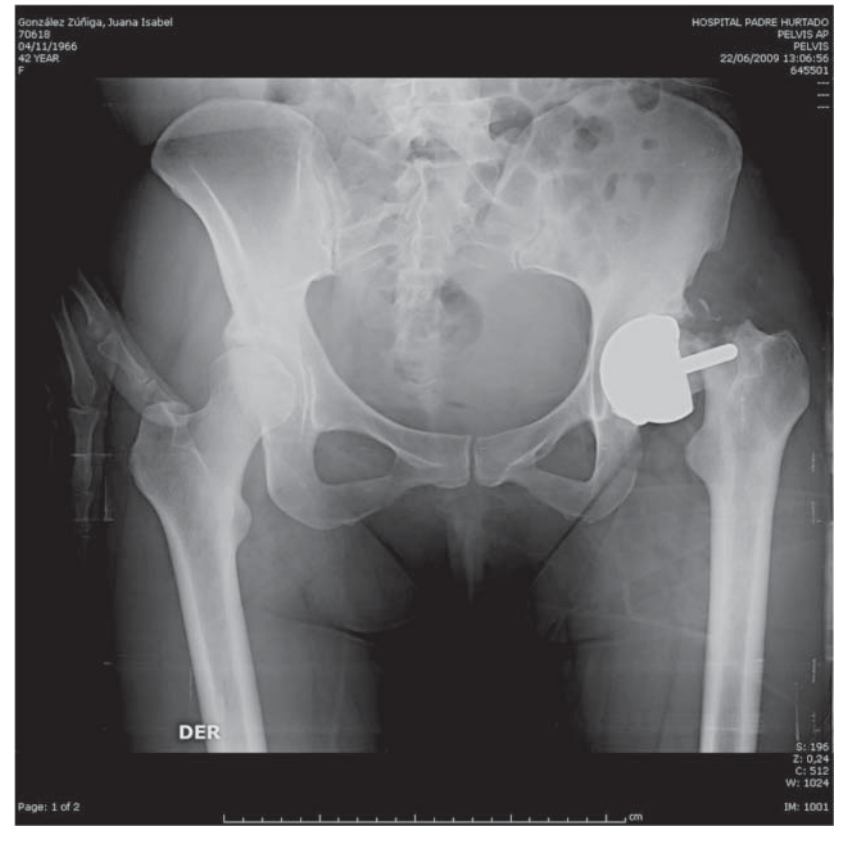

Fig. 3. AP pelvis X-ray showing left femoral neck fracture, occurred 4 years after hip resurfacing arthroplasy

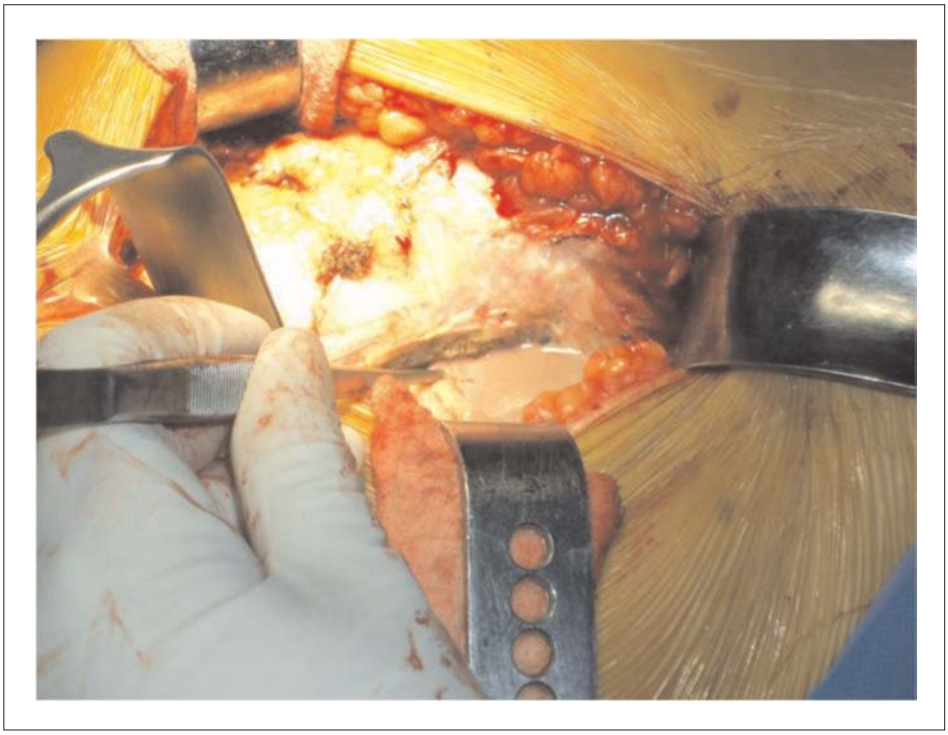

Fig. 4. Intraoperative photograph showing liquid content, exposed after opening of the fascia lata, compatible with metallosis

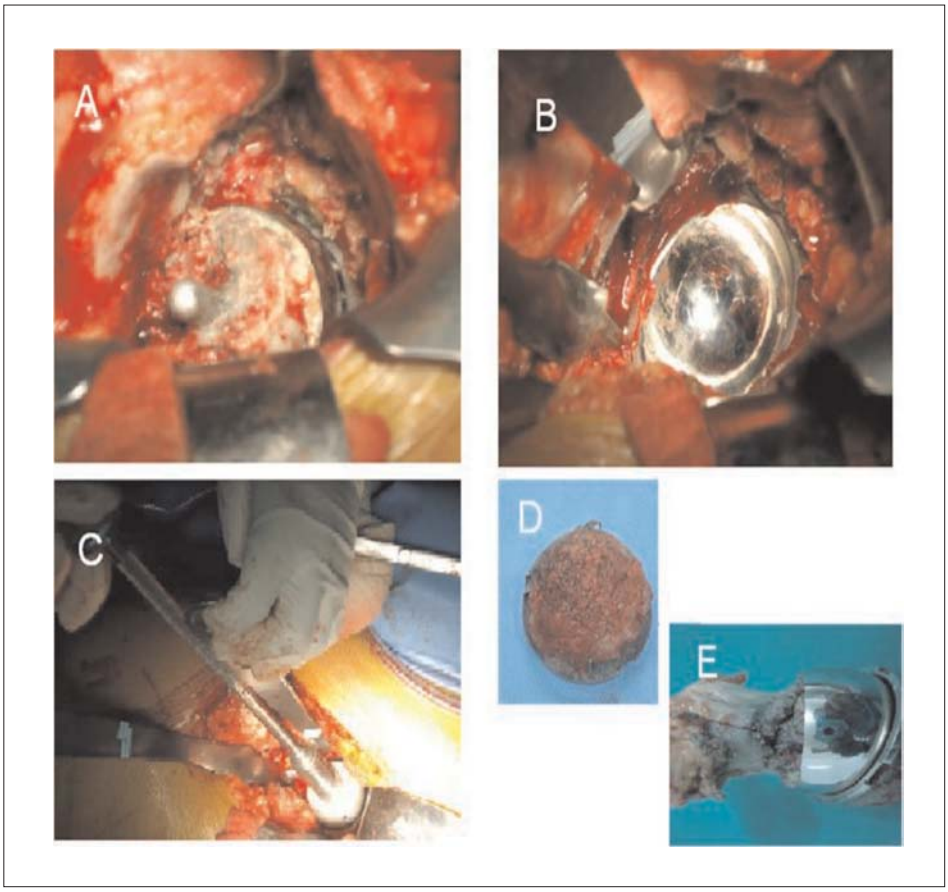

Fig. 5. Intraoperative photographs: A. In situ observation of femoral neck fracture and the prosthesic component. B. Bone-integrated acetabular component. C. Image showing the innovative cup extraction technique. D. Bone-integrated acetabulum removed. E. Image of both components removed showing line of femoral neck fracture

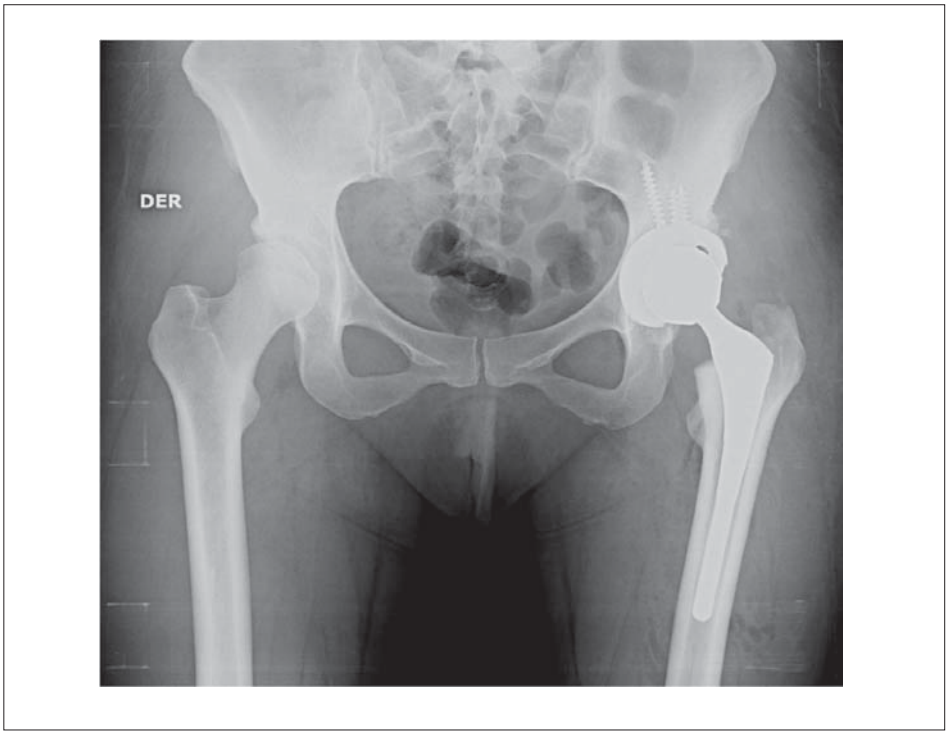

Fig. 6. Postoperative pelvis X-ray after conversion to total hip arthroplasty of left hip

DISCUSSION

The most frequently reported complications of hip resurfacing in patients with DDH that lead to THA are femoral hip fractures. Marker [1] described a 2.5% global risk of suffering femoral neck fractures in patient submitted to hip resurfacing arthroplasty. Among the risk factors, varus positioning of the femoral component, obesity, female gender and alteration of bone densitometry are mentioned. After hip resurfacing surgery, the femoral component position is anatomic in the coronal plane and without a notch in the superior aspect of the femoral neck [2], condition that affects strain and fracture resistance in the femoral neck.

Technically, a poor orientation of the acetabular component, female gender and an increased abduction angle are closely related to metallosis in hip resurfacing [3, 4], all conditions found in our patient. Futhermore, computer models have estimated that the maximum tolerated flexion without impingement is lower in patients that underwent hip resurfacing compared to traditional 32mm head stems in THA. This difference increases with larger theta angles, which theoretically could cause a larger amount of debris products [5]. Eventually, these two factors could explain the metallosis found in this case report.

Zustin [6] described a macroscopic and histopathologic classification of the femoral neck fracture in hip resurfacing. In the presented case, the fracture macroscopically corresponds to an outside femoral neck fracture. The fracture line was completely outside of the bone encompassed by the resurfacing cup. Histopathologically, the fracture was compatible with Type B-acute postnecrotic fracture, which can occur as late as 2-3 years after implantation.

The indication of hip resurfacing in patients with DDH is not strongly supported by the literature. The findings described by Amstutz [7] and Naal [8] have "disappointing" mid-term results, owing to the rate of failure of the femoral neck. Mc Bryde [9] reported inferior results when compared a group with DDH with a group treated for osteoarthritis and McMinn [10] described a cumulative 95% survival to 9 years. However, Amstutz [11] reported that newer surgical techniques can improve results. There are no type I evidence comparing hip resurfacing arthroplasty versus THA, therefore no definitive conclusions can be drawn. Mont [12] reported that the optimization of the indications and surgical techniques decrease the rate of fractures from 7.2% to 0.8%.

CONCLUSION

Hip resurfacing arthroplasty for patients with DDH has risks of major complications in a short-term period, such as periprosthetic fractures and metallosis. Conversion to THA is not an easy surgical procedure, and requires a careful preoperative plan and an experienced surgical team.

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