Rev Esp Cir Ortop Traumatol. 2014;58(1):57–59

Revista Española de Cirugía Ortopédica y Traumatología

www.elsevier.es/rot

CASE REPORT

Aseptic, simultaneous and bilateral mobilization due to an acetabular shell fracture in a 43 year-old patient☆

M. Ceretti*, **M. Fanelli**, **S. Pappalardo**

Department of Orthopaedic Surgery, ''Sapienza'' University of Rome, Rome, Italy

Received 8 July 2013; accepted 25 July 2013

KEYWORDS
Total hip replacement;
Shell;
Rupture

Abstract The acetabular shell mobilization is the main long-term complication in total hip replacement. Metal-back fracture has also to be considered among the possible causes of shell mobilization. A case is presented of bilateral acetabular shell mobilization due to the trabecular covering de-soldering from the metal-back in a 43 year-old patient, 13–14 years after the first surgery.

PALABRAS CLAVE
Prótesis total de cadera;
Cotilo;
Rotura

Movilización aséptica, simultánea y bilateral por rotura de la copa acetabular en una paciente de 43 años

Resumen La movilización del componente acetabular en una prótesis total de cadera (PTC) es la principal complicación en este tipo de cirugía. Además, los casos de rotura del cótilo llevan casi siempre a su movilización. Presentamos el caso de una mujer de 43 años con movilización aséptica por separación de la malla reticular bilateral del cotilo después de 13 y 14 años de la intervención.

Introduction

In uncemented total hip arthroplasties (THA), the acetabular component is the most frequent cause of failure, especially among young patients.[1] The wear on the polyethylene insert and loosening, together with recurrent dislocations, are the most common reason leading to salvage surgery.[2] The survival of the shell is between 87 and 100% of cases after 10 years since implantation, according to a range of published series,[3] but survival falls below 80% by 20 years after placement.[4,5]

Failures in the fixation of the acetabular component through breakage are infrequent.[6] We present here the case of a young women fitted with THA who had aseptic simultaneous bilateral loosening of the acetabular components due to de-soldering of the trabecular mesh on both shells.

☆ Please cite this article as: Ceretti M, Fanelli M, Pappalardo S. Movilización aséptica, simultánea y bilateral por rotura de la copa acetabular en una paciente de 43 años. Rev Esp Cir Ortop Traumatol. 2014;58:57–59.

* Corresponding author.
E-mail address: dr.ceretti@gmail.com (M. Ceretti).

1988-8856/$ - see front matter

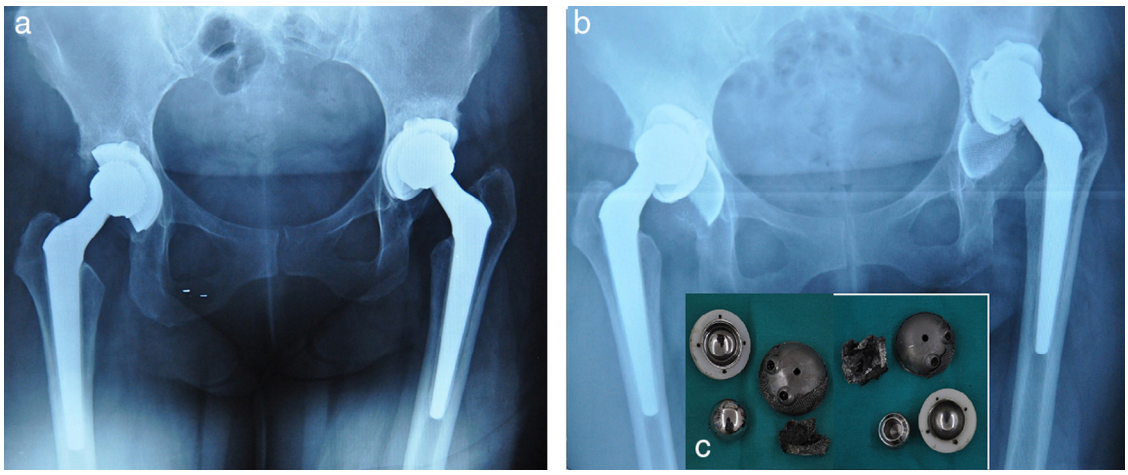

Figure 1 (a) Follow-up X-ray (from 2005) with separation of the reticular component of both cups and radiolucence lines on acetabular zones I and II, without clinical symptoms. (b) Follow-up X-ray (from 2012) showing bilateral mobilization of the acetabular cup without dislocation but with displacement. Please note the separation of the acetabular porous component. (c) Components mobilized and removed.

Case report

Female, 43 years of age, 162 cm in height and 80 kg in weight, without any pathological prior history except for congenital dysplasia of both hips treated at 7 months of age through progressive traction, reduction and a long leg cast. The patient did not report any significant symptoms until age 35 (1998) when she underwent total uncemented bilateral hip arthroplasty due to presenting painful secondary coxarthrosis. Fitmore® acetabular components were implanted with Conus Wagner® rods (Sulzer Orthopaedics, Winterthur, Switzerland); this cup comprised a bi-radial shell in titanium–aluminum–vanadium alloy welded to a porous reticular mesh of pure titanium.

Seven years later, she was subjected at another center to a routine X-ray check-up that revealed early separation of the reticular mesh from both shells, revealing radiolucence lines in the Lee I and II acetabular areas, without presenting any clinical symptoms (Fig. 1). In January, 2012, the patient came to our department complaining of spontaneously arising bilateral pain in the groin region with limitation of mobility; although painful, movement was possible throughout the arc. In the acute phase, she reported pain while walking and lameness, and she was only able to walk a maximum distance of 50 m. The range of mobility in the left hip was 20° abduction, 25° flexion, 5° extension, 0° external rotation and 5° internal rotation. On the right side, the mobility reached 15° abduction, 10° flexion, 0° extension, 5° external rotation and 10° internal rotation. Her pre-operative score on the Harris scale (HHS) was 45 points.

During radiographic examination, bilateral mobilization of the acetabular shell was observed, without dislocation, with more than 3 cm displacement with respect to the transverse obturator line (Paprosky 3A).[7] We also found evidence, in the location of the primary bilateral implant, a dense image corresponding to the trabecular component of the acetabular shell. The Gruen zones on the femur were unharmed (Fig. 1).

Septic mobilization was ruled out pre-operatively through a blood test (sedimentation velocity [SV] and protein C reagent [PCR]), as well as bacteriological analysis of aspirated joint fluid. For this reason, considering the severity and simultaneity of mobilization and in view of the patient's age, it was decided to operate in 2 stages, first on the left side, and later on the right, separated by a one-month recovery period.

We used Hardinge's approach following the pre-existing incision. Following dislocation of the joint, we proceeded first of all to verify that the femoral rod's stability was satisfactory and then we removed the metal dome, which had become separated from the titanium trabecular mesh that was three-quarters integrated into the bone of the shell. Metallosis was striking and was eliminated by means of a chisel together with the reticular osteointegrated part at the bottom of the cup. Once bleeding bone was uncovered, we proceeded with the milling of the area and the placement of a new 58 mm acetabular implant in trabecular titanium using three 6.5 mm screws and a titanium trabecular booster with interlodged cement (Trabecular Metal Revision Shell® Zimmer, Warsaw, Inc., USA, and Multihole®, Zimmer, Warsaw, Inc., USA). The bone defect was completed by infilling with bone bank chips following the ''impaction grafting'' technique. The metallic head with the polyethylene insert was replaced by an analogous component (Longevity®, Zimmer, Warsaw, Inc., USA).

The post-operative follow-up X-ray showed the correct positioning of the implant. Drainage was removed the day after surgery. Partial support was allowed after 2 months, during which physiotherapy was applied. Crutches were removed 6 months after the second implant.

Clinical check-ups and follow-up X-rays were conducted after 3, 6 y and 2 months (Fig. 2). The bilateral Harris score after one year was 92 and the bilateral mobility arc only revealed a limitation of 20° in abduction with a reduction in Trendelenburg's sign.

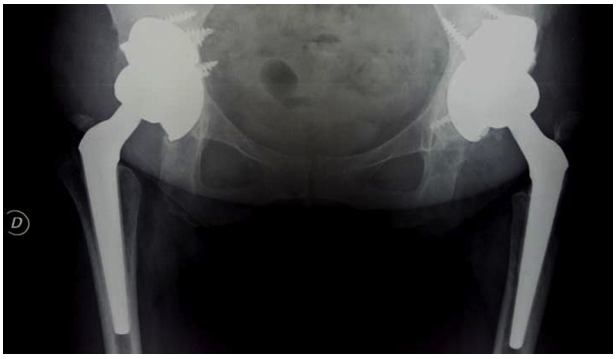

Figure 2 Annual follow-up X-ray showing the correct positioning of the implants with restoration of the rotation centers.

Discussion

The breakage of metallic acetabular cups is infrequent, and the most common cause is usually the implantation of defectively designed components[7] although cases have also been reported as secondary to a breakage of the polyethylene and excessive wear of the metal.[6] The in vitro studies published have shown that the rigidity parameters and the design of the metal prostheses have an influence on corrosion and cause an implant to fail.[8,9] The dorso-cranial area of the acetabulum is the location with the highest frequency of breakages in the components; this area corresponds to the point at which the stresses due to transmission of hip loads concentrate and, where there is a sufficient amount of bone in this region, it is possible to see bone growth in the base of the cup. However, insufficient support when there are bone defects present or when the bone grafts used during the integration phase cannot support these stresses entails a higher risk of acetabular metal breakage. We have found only 3 articles in the literature discussing this problem,[6,10,11] but no articles document any case of bilateral breakage of both cups due to failure and separation of the porous layer. Despite the wear on the medial wall, the ilion and the anterior and posterior columns were intact, which allowed the defect to be infilled with allogenic bone grafts and, subsequently, to screw a review cup into place with screws to guarantee the component's stability.

There is no generally accepted protocol for monitoring hip arthroplasties, but after the first year follow-ups once a year or every two years are considered reasonable to detect asymptomatic problems that might end up leading to catastrophic failure if not resolved.[12]

In the case reported here, we observed a long-standing bilateral rupture of the acetabular components in a single patient and we feel it must be the consequence of an intrinsic weakness due to the failure of the welded join between the acetabular component and the porous coating.

Evidence level

Evidence level iv.

Ethical responsibilities

Protection of people and animals. The authors declare that no experiments have been conducted on humans or animals in the course of the present research.

Data confidentiality. The authors declare that this article contains no patient data.

Right to privacy and informed consent. The authors declare that this article contains no patient data.

Conflict of interests

The authors have no conflicts of interest to declare.

References

1. Eskelinen A, Remes V, Helenius I, Pulkkinen P, Nevalainen J, Paavolainen P. Uncemented total hip arthroplasty for primary osteoarthritis in young patients: a mid- to long-term follow-up study from the Finnish Arthroplasty Register. Acta Orthop. 2006;77:57–70.
2. Kim YH, Kim JS, Park JW, Joo JH. Periacetabular osteolysis is the problem in contemporary total hip arthroplasty in young patients. J Arthroplasty. 2012;27:74–81.
3. Hallan G, Dybvik E, Furnes O, Havelin LI. Metal-backed acetabular components with conventional polyethylene: a review of 9113 primary components with a follow-up of 20 years. J Bone Joint Surg Br. 2010;92:196–201.
4. Sadoghi P, Janda W, Agreiter M, Rauf R, Leithner A, Gerold Labek G. Pooled outcome of total hip arthroplasty with the Cement-Less Spotorno (CLS) system: a comparative analysis of clinical studies and worldwide arthroplasty register data. Int Orthop. 2013;37:995–9.
5. Emms NW, Stockley I, Hamer AJ, Wilkinson JM. Long-term outcome of a cementless, hemispherical, press-fit acetabular component: survivorship analysis and dose–response relationship to linear polyethylene wear. J Bone Joint Surg Br. 2010;92:856–61.
6. Papaliodis DN, Uhl RL, Fuchs MD. Catastrophic fracture of a stable metal acetabular component. Orthopedics. 2012;35:1260–3.
7. Kircher J, Bader R, Schroeder B, Mittelmeier W. Extremely high fracture rate of a modular acetabular component with a sandwich polyethylene ceramic insertion for THA: a preliminary report. Arch Orthop Trauma Surg. 2009;129:1145–50.
8. Teoh SH, Chan WH, Thampuran R. An elasto-plastic finite element model for polyethylene wear in total hip arthroplasty. J Biomechanics. 2002;35:323–30.
9. Liu F, Jin ZM, Grigoris P, Hirt F, Rieker C. Contact mechanics of metal-on-metal hip implants employing a metallic cup with a UHMWPE backing. Proc Inst Mech Eng H. 2003;217:207–13.
10. Bacciocchi G. Rupture of the acetabular cup in total arthroprosthesis of the hip. Ital J Orthop Traumatol. 1984;10:143–4.
11. Chotai PN, Siddaraju VKM, Shon WY, Han SB, Yoon YCh, Park YH. Catastrophic rupture of a CLS Spotorno acetabular expansion cup in a metal–polyethylene total hip arthroplasty: a case report and review of literature. J Orthopaedics. 2011;8:3.
12. Veysi VT, Jones S, Stone MH, Limb D. Outpatient follow-up after total hip replacement in one health region. J R Coll Surg Edinb. 1998;43:95–6.