

Case report

Obturator dislocation of total hip arthroplasty with disassembly of the prosthesis components and periprosthetic fracture in morbid obese patient

Luxación obturatriz de una prótesis total de cadera con desensamblaje de los componentes y fractura periprotésica en un paciente obeso

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ABSTRACT. Introduction: Anterior dislocation is a rare complication of total hip arthroplasty (THA). There exist only three cases in the literature. None of them report disassembly of the prosthesis components. We present a morbidly obese woman who suffered an irreducible obturator dislocation of an infected total hip arthroplasty (THA), due to uncontrolled adduction during an early debridement surgery. Following unsuccessful closed reduction attempts, a Vancouver B2 periprosthetic fracture and disassembly of the prosthetic components were observed. Two-stage revision THA was necessary to resolve the infection and restore hip functionality. In obturator dislocation, the femoral head prosthetic can be trapped in the obturator foramen, and this may disassemble the prosthesis components during reduction maneuvers; there's also risk of periprosthetic fracture. This mandate an open reduction of the joint. Patient obesity could be a determining factor for this rare type of hip arthroplasty dislocation. Obturator dislocation is an extremely rare complication of the total hip arthroplasty, whose reductions should be handled with caution given the risks of periprosthetic fractures. In most cases, an open reduction of the joint is required. **Clinical importance:** Our work is likely to be of great interest because it offers

RESUMEN. Introducción: La luxación anterior es una complicación poco frecuente de la artroplastia total de cadera (ATC). Sólo existen tres casos en la literatura. Ninguno de ellos informa del desmontaje de los componentes de la prótesis. Presentamos el caso una mujer obesa que sufrió una luxación irreducible de una artroplastia total de cadera (THA), la cual estaba infectada, debido a la aducción no controlada durante una cirugía de desbridamiento temprano. Después de los intentos fallidos de reducción cerrada, se presentó una fractura periprotésica clasificada como Vancouver B2 y el desmontaje de los componentes protésicos. Ameritó cirugía de revisión en dos etapas, lo cual se realizó para resolver la infección y restaurar la funcionalidad de la cadera. En la luxación obturatriz, la cabeza femoral puede quedar atrapada en el agujero obturador y, como consecuencia, favorecer la disociación de los componentes protésicos al intentar la reducción, asimismo puede favorecer un brazo de palanca que produzca una fractura periprotésica. La obesidad puede ser un factor determinante para la producción de esta rara complicación. Por todo lo anterior, se recomienda considerar de entrada la reducción abierta. La luxación obturatriz es una complicación rara en la artroplastia total de cadera; su tratamiento puede ser difícil y asociarse a

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tips for the management of this rare complication based on our experience.

Keywords: Dislocation, components, complication, hip, fracture, obesity.

fracturas. La relevancia de este caso es que permite mostrar algunas estrategias de manejo para prevenir complicaciones catastróficas.

Palabras clave: Luxación, componentes, complicación, cadera, fractura, obesidad.

Introduction

75% of THAs dislocations are posterior. Anterior dislocation is a rare complication that has been associated with posterior osteophytes of the joint and anterior approach to the hip. It's produced by extension, adduction, and external rotation of the lower extremity.¹ Epstein described four types of anterior dislocations in native hip, classified into two groups:² type 1 (superior dislocations), which includes pubic and subspinal dislocations and type 2 (inferior dislocations), including obturator and perineal dislocations. Obturator dislocation is an extremely rare complication among patients with THA; only three cases have previously been described in the literature,^{3,4,5} but this is the only one in which a disassembly of the prosthesis components occurred. We think that the patient morbid obesity could have contributed to this unique dislocation.

Case report

A 58-year-old woman with morbid obesity (BMI of 55) and a history of schizophrenia and arterial hypertension, was taken to the emergency room after a fall from standing height a week before, she was diagnosed with an intracapsular fracture of left hip and an ipsilateral Monteggia fracture-dislocation. Five years earlier, she'd suffered an intracapsular fracture of the right hip, treated with a THA.

Surgery was performed three days later; the hip was replaced through a posterolateral approach using a non-cemented THA with a ceramic polyethylene pairing (H-MAX stem, head number 36 and delta TT acetabular cup with polyethylene liner (Lima®, Italy)) (Figure 1).

On postoperative day 4, she developed a low-grade fever and purulent discharge through the surgical wound of the left hip. Laboratory analysis showed a CRP of 8.73 mg/dl, ESR of 83 mm and $8.80 \times 1,000/\mu\text{l}$ leukocytes. With the presumed diagnosis of an early deep infection of the arthroplasty, it was decided to carry out a debridement and irrigation of the hip under general anesthesia and in the lateral decubitus position. The modular components (the polyethylene liner and ceramic femoral head) were exchanged and were tested carefully for stability. The remaining components were tested for loosening and left in situ. Several samples of joint and subfascial fluid collections, along with tissue from the femoral and acetabular regions were taken for culture.

While awakening from the general anesthesia, and as a consequence of a coughing reflex, the patient suffered a sudden uncontrolled adduction and external rotation of the left thigh while in lateral decubitus, which was difficult to control due to the difficulty in handling her large weight. Once the breathing tube was removed, she was placed in supine position and an intra-operative fluoroscopy showed an anterior dislocation of the THA. Under sedoanalgesia, closed reduction was initially attempted by longitudinal traction and internal rotation, to no success. Finally, it was decided to carry out an open reduction using the previous approach, in supine position. Through palpation, we realized that the femoral head was trapped in the obturator foramen and a periprosthetic fracture of the proximal femur was noticed too. Fluoroscopy confirmed a Vancouver B2 fracture (Figure 2). On account of these findings, it was decided to perform a CT scan of the joint in order to study the dislocation and establish an appropriated action plan before handling the hip again. Empirical treatment with

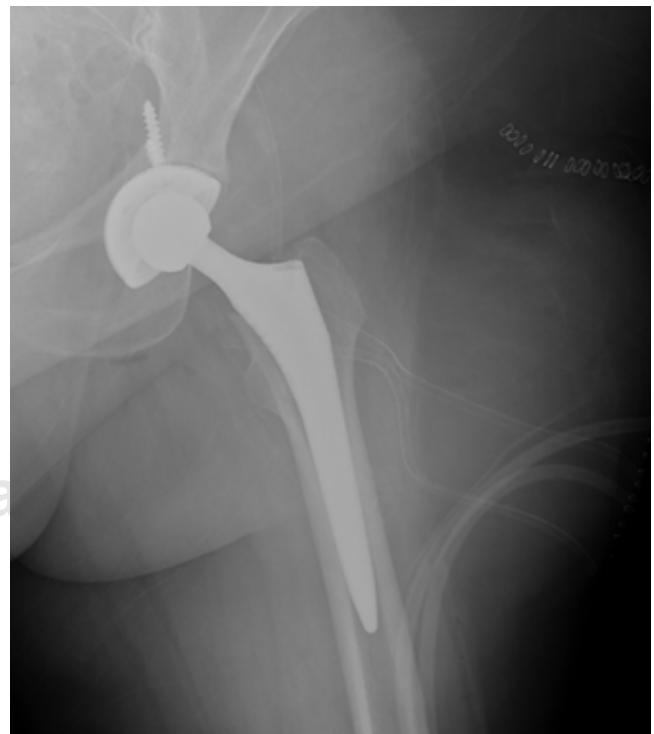


Figure 1: Post-operative X-ray of the THA. It shows lack of periprosthetic fracture or prosthesis luxation.



Figure 2: Vancouver B2 type periprosthetic fracture and anterior dislocation of the total hip arthroplasty.

Vancomycin and Cefepime was initiated, and a skin traction of 3 kg was applied.

CT imaging confirmed a Vancouver B2 periprosthetic fracture, with varus displacement of the stem; it involved the anterior cortex and the lesser trochanter of the femur. In addition, CT confirmed an intrapelvic obturator dislocation of the prosthetic femoral head (*Figure 3*). The acetabular cup showed a correct position (45° of abduction and 15° of anteversion). Intraoperative cultures were positive for *Enterococcus faecalis*, *Granulicatella adiacens* and *Bacteroides fragilis* and empiric therapy was substituted by Ampicillin and Metronidazole according to the antibiogram.

We decided to perform a two-stage revision THA. The first stage was performed four days later, under general anesthesia and through the prior approach. The femoral prosthetic head was found disassembled from the stem and was located intrapelvically adjacent to the obturator foramen. The loose femoral stem was removed. We performed a careful dissection through the greater sciatic notch and through the obturator foramen. In order to avoid further intrapelvic migration of the prosthetic head, we placed a Hohmann retractor through the greater sciatic notch to buttress the femoral head, with attention not to injure the sciatic nerve. Using a finger through the obturator foramen, the femoral head was carefully guided through the foramen. Afterwards, we removed the acetabular cup and carried out an extensive lavage and debridement of the surgical site. Finally, a gentamycin-loaded polymethyl methacrylate cement spacer was inserted and the fracture was reduced and stabilized using a cable cerclage (*Figure 4*).

A seven-week course of antibiotic treatment was completed, and negative-pressure wound therapy was applied until full cessation of wound discharge (VAC®, KCI Clinic). During this time, the patient placed in isolation due to a nosocomial catheter-associated infection caused

by extended spectrum beta-lactamase producing *Klebsiella pneumoniae*. Further cultures of the wound exudate revealed coinfection by *Pseudomonas aeruginosa*, which responded favorably to amoxicillin and metronidazole. The second stage was performed nine weeks later, after confirming normalized laboratory markers of infection such as CRP, ESR and white blood cell count. We implanted a non-cemented modular revision stem (MP stem, Link®, Germany) and a dual mobility cup (Delta One TT, Lima®, Italy) (*Figure 5*).

The patient didn't present any postoperative complications following the second stage surgery and was discharged to a Rehabilitation Facility for two months. Two years later, she's currently asymptomatic: she walks with a crutch, without restrictions of her daily activities; there aren't clinical, laboratory or radiological data suggesting recurrence of infection (*Figure 6*).

Discussion

Instability of the THA has been linked to several risk factors, some of which are patient-dependent: female gender, weakness of the abductors, infection, and comorbidities like alcoholism and obesity. A history of intracapsular hip fracture and femoral head necrosis has also been associated with an increased risk of dislocation of the implant, as well as revision surgery.¹ Obesity is related to greater risk of dislocation, and it also increases the risk of developing both short-term and long-term complications after THA.^{6,7} Among patients with morbid obesity (BMI > 40 kg/m²), the incidence of complications



Figure 3: 3D-CT showing a Vancouver B2 type periprosthetic fracture and varus mobilization of the femoral component. The fracture affects the anterior cortex and the lesser trochanter of the femur. There is an intrapelvic obturator dislocation of the prosthetic femoral head. Antero-posterior view.

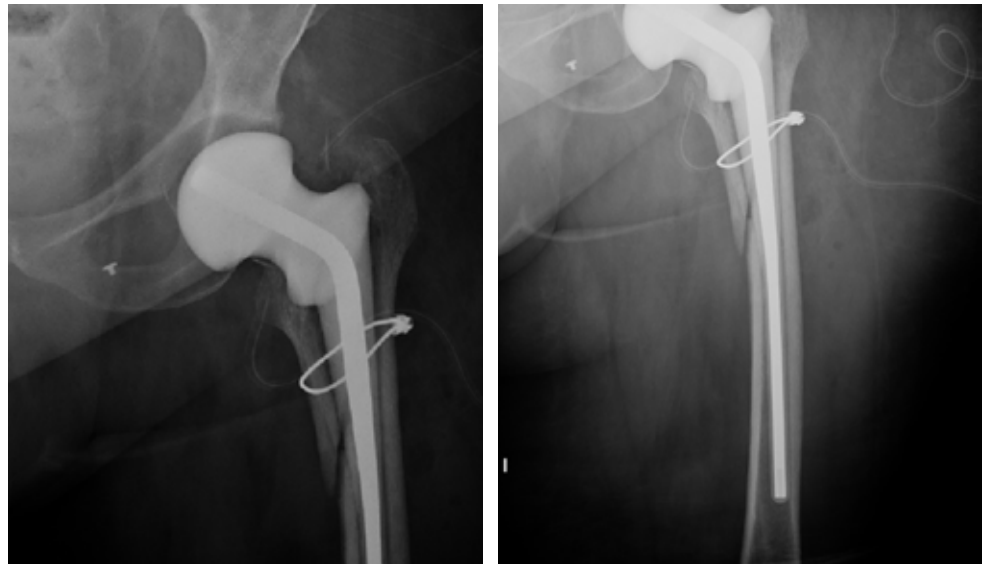


Figure 4:

Post-surgery control after the first step revision surgery. Spacer of cement and a subtrochanteric cerclage.

increases, and it becomes higher with increasing BMI values.⁸

This case report highlights the difficulties encountered in the management of a morbidly obese patient who was treated for a femoral neck fracture with a delayed cementless total hip. She developed an early infection, and after early debridement with exchanged of head and liner, she sustained an anterior dislocation. Patient size hindered her peri-operative management, so an uncontrolled adduction and external rotation happened in lateral decubitus position; we think that the adduction together with the fact that her thighs had a considerable diameter, triggered an obturator dislocation of the prosthesis and supporting this suspicion, Elkins and cols observed that tight to tight contact can predispose to instability in obese patients with THA, and such instability was directly related to thigh girth.⁹

The obturator foramen is located anteroinferior and obliquely to the acetabulum and is covered over by muscles and a ligamentous membrane. Its dimensions are more triangular and smaller in females than in males,¹⁰ with a mean area of $12.2 \pm 2.1 \text{ cm}^2$ compared to a 10.18 cm^2 circle area for a spherical 36-mm femoral head.¹¹ In this type of dislocation, the prosthetic femoral head is in close relation to the obturator foramen and it may go through this foramen, because of its size. In this context, the obturator membrane acts like a buttonhole, and prosthetic femoral head can get caught in the obturator foramen. Repeated attempts of reduction might have disassembled the prosthetic head from the trunnion, because it was trapped in obturator foramen, despite being a fresh taper. Disassembly of the inner head from the stem is a rare complication because a force of more than 427 kg is necessary to pull the head from the taper,¹² some authors related the failure of the taper locking

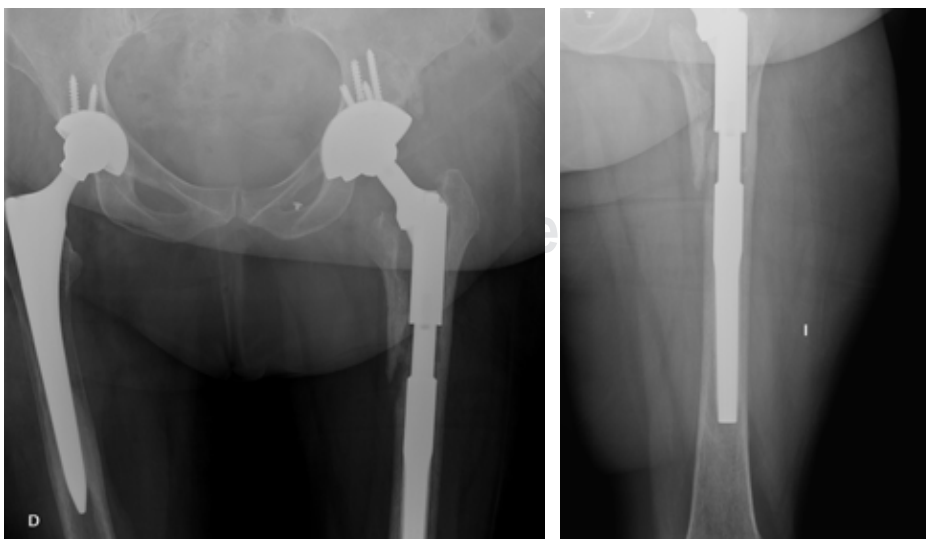


Figure 5:

Post-surgery control after the second step of revision surgery. Final total hip arthroplasty.

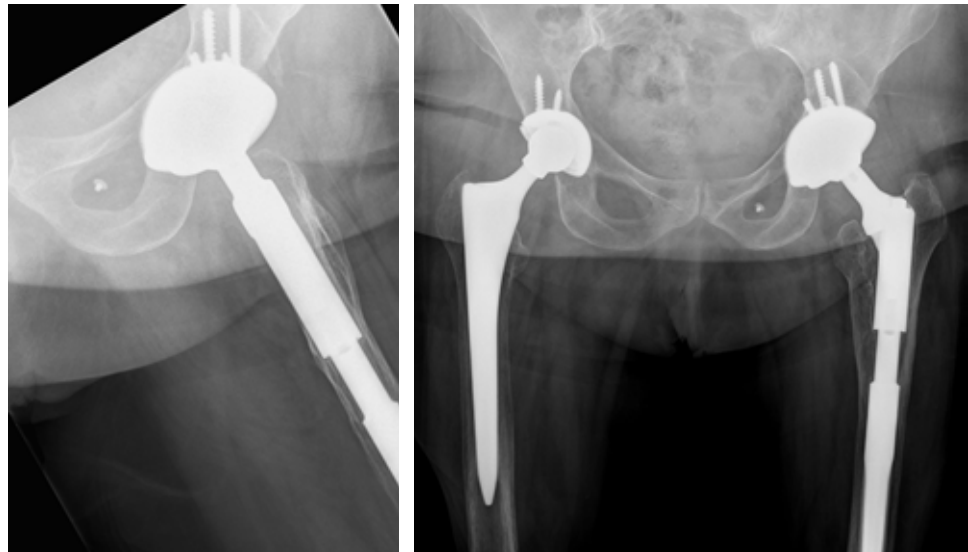


Figure 6:

Two-year post-surgery control.
Fracture is consolidated and
there are no signs of mechanical
loosening.

mechanism with the impingement of the head within the acetabulum after a hip dislocation,^{13,14} in our case obturator foramen and its membrane caused the impingement. This's an obstacle to achieve a safely closed reduction, so a periprosthetic fracture is possible too. In any case, reduction maneuvers should be done with caution.¹⁵

Closed reduction has been described for obturator dislocations of native hips but published cases show that it's difficult to achieve it in prosthetic hips.^{3,5} The impossibility of reduction may lead to untimely manoeuvres that increases the risk of producing a periprosthetic fracture, as in that case. However, we cannot exclude that the fracture was produced by the trauma that led to the dislocation or even it might has occurred intraoperatively during primary arthroplasty; we dismissed this possibility with postoperative X-ray control (*Figure 1*), neither signs of fracture were detected during early debridement surgery. We noticed the periprosthetic fracture with loose stem performing an open reduction after the dislocation.

Obturator dislocation has been described as case reports in native hips; in prosthetic hips it is an extremely rare complication. Glassner et al.³ published the case of a 29-year-old male, which suffered an obturator dislocation of THA following a high-energy motor-vehicle accident; in this case, closed reduction attempts failed, so they performed an open reduction by posterior approach. By contrast, Day et al.⁴ released a similar case, treated successfully by closed reduction. Niciejewski et al.⁵ described a 55-year-old woman who presented an obturator dislocation 16 day following a THA and they treated her directly by open reduction. None of them described a component disassembly of the prosthesis, besides us.

Conclusion

Therefore, in case of an anterior dislocation of THA, we must consider the possibility of an obturator dislocation

which makes difficult a safe closed reduction, so reduction maneuvers should be done with caution in order to minimizing the risk of complications, such as peri-prosthetic fractures or prosthetic disassembly. If close reduction of the arthroplasty isn't possible, it is mandatory to carry out an open reduction.

References

1. Zahar A, Rastogi A, Kendoff D. Dislocation after total hip arthroplasty. *Curr Rev Musculoskelet Med.* 2013; 6(4): 350-6.
2. Epstein HC. Traumatic dislocations of the hip. *Clin Orthop Relat Res.* 1973; (92): 116-42.
3. Glassner PJ, Adler EM, Jaffe WL. Obturator dislocation of total hip arthroplasty: a case report. *Bull NYU Hosp Jt Dis.* 2009; 67(4): 381-3.
4. Day A, Duchman KR, Noiseux NO. Traumatic obturator dislocation following total hip arthroplasty managed with closed reduction: a case report and review of the literature. *JBJS Case Connect.* 2017; 7(3): e66.
5. Niciejewski K, Banachowski W, Kowalczyk A. Obturator dislocation- a rare complication of the total hip prosthesis. Case study. *Chir Narzadow Ruchu Ortop Pol.* 2011; 76(5): 295-7.
6. Springer BD, Parvizi J, Austin M, Backe H, Della VC, Kolessar DJ, Kreuzer S, et al. Obesity and total joint arthroplasty. A literature-based review. *J Arthroplasty.* 2013; 28(5): 714-21.
7. Liu W, Wahafu T, Cheng M, Cheng T, Zhang Y, Zhang X. The influence of obesity on primary total hip arthroplasty outcomes: A meta-analysis of prospective cohort studies. *Orthop Traumatol Surg Res.* 2015; 101(3): 289-96.
8. Schwarzkopf R, Thompson SL, Adwar SJ, Liublińska V, Slover JD. Postoperative complication rates in the "Super-Obese" hip and knee arthroplasty population. *J Arthroplasty.* 2012; 27(3): 397-401.
9. Elkins JM, Daniel M, Pedersen DR, Singh B, Yack HJ, Callaghan JJ, Brown TD. Morbid obesity may increase dislocation in total hip patients: a biomechanical analysis hip. *Clin Orthop Relat Res.* 2013; 471(3): 971-80.
10. Bierry G, Le Minor JM, Schmittbuhl M. Oval in males and triangular in females? A quantitative evaluation of sexual dimorphism in the human obturator foramen. *Am J Phys Anthropol.* 2010; 141(4): 626-31.
11. Ridgeway BM, Arias BE, Barber MD. Variation of the obturator foramen and pubic arch of the female bony pelvis. *Am J Obstet Gynecol.* 2008; 198(5): 546.e1-4.

12. Asgian C, Gilbertson L, Hori R. Fatigue of tapered joints. En: Anderson JM (editor). *Transactions of 2nd World Congress on Biomaterials, 10th Annual Meeting of Society for Biomaterials*. Washington DC: Hyatt Regency-Capitol Hill; 1984.
13. Woolson ST, Pottorff GT. Disassembly of a Modular femoral prosthesis after dislocation of the femoral component. *J Bone Joint Surg Am*. 1990; 72(4): 624-5.
14. Pellicci PM, Haas SB. Disassembly of a modular femoral component during closed reduction of the dislocated femoral component. *J Bone Joint Surg Am*. 1990; 72(4): 619-20.
15. Fillingham YA, Erickson BJ, Cvetanovich GL, Della Valle CJ. Dislocation of a total hip arthroplasty: Acute management in the ED. *Am J Emerg Med*. 2014; 32(12): 1554.e1-3.