

Pseudotumor complicating a well-fixed ceramic-on-polyethylene total hip arthroplasty

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Key Clinical Message

A suspicious area surrounding hardware components, usually following arthroplasty, should raise awareness to a possible particle related disease. Even in the presence of confusing or less typical symptoms, clinicians and surgeons must join efforts to diagnose and treat the patient effectively and in the appropriate time.

KEYWORDS

critical care medicine, orthopedics

1 | INTRODUCTION

Pseudotumor is a rare complication after total hip arthroplasty, more frequent in metal-on-metal combinations. We present a case, with severe systemic repercussion, after total hip arthroplasty revision with ceramic-on-polyethylene combination. It was a diagnostic challenge that, although not treated at an early stage, had good clinical and functional outcomes.

Periprosthetic inflammatory masses found after hip arthroplasties (THA) have been designated as pseudotumors. Soft tissue reactions related to metal-on-metal THA couples are the most common; however, this complication has also been described with other material combinations. In this study, the authors review the literature on this topic and present a rare case of a pseudotumor associated with severe systemic repercussion after a ceramic-on-polyethylene THA.

2 | PATIENT INFORMATION AND CLINICAL FINDINGS

An 82-year-old woman was admitted to the Internal Medicine Department with fever, asthenia, weight loss, nocturnal hypersudoresis.

After investigating the orthopedic history, we found that the patient had a femoral neck fracture that underwent closed reduction and internal fixation, 20 years before. This surgery failed, and a cemented total hip arthroplasty was performed in Germany. Few years after, still in Germany, the patient was submitted to a hip revision for aseptic loosening, and a ceramic-on-polyethylene prosthesis was used.

On examination, she presented a large soft tissue mass on the left thigh, that had been growing for the past 2 years, anterior and proximal to the greater trochanter (Figure 1), associated with important edema of this region. No skin or temperature changes were detected.

Serologic tests revealed an increase in C-reactive protein (115.3 mg/L) values as well as in erythrocyte sedimentation rate (102 mm/h). A mildly elevated white blood cell count ($12.73 \times 10^9/L$) was also detected, with low lymphocyte count (12.2%). The patient also presented severe anemia, with need of several blood transfusions.

No other acute or chronic situations were found that could justify the signs and symptoms, namely no endocarditis, urinary or pulmonary tract infection, tumors, among others.

She had no important comorbidities, no known allergies or metal sensitivities and no autoimmune disorders.



Figure 1. Soft tissue mass was noted just proximal and anterior to the greater trochanter

3 | DIAGNOSTIC ASSESSMENT

Radiographs of the affected hip were performed (Figure 2). These confirmed a well-positioned cup, without signs of migration or significant wear. Decreased bone density at the proximal femur was noted at this time.

Further investigation of the tumor was performed, with a pelvic computerized tomography (CT) (Figure 3).

A biopsy was performed to rule out a malignant process, and histology confirmed the presence of muscular tissue with fibrosis, focal areas of necrosis with hemorrhagic and polymorphic inflammatory infiltrate, and slight brownish pigment were observed at the end of one of the fragments (compatible with metallosis).

These findings combined with aspirations from the pseudotumor site confirmed an inflammatory pseudotumor and excluded preoperative infection suspicion (that would probably lead to a two-stage arthroplasty revision surgery).

4 | THERAPEUTIC INTERVENTION

Due to the chronic anemia, with repercussion in the patient's clinical status, a one stage revision surgery was proposed.

The surgical approach followed the previous THA incision. Large amounts of necrotic tissue and bone, as well as

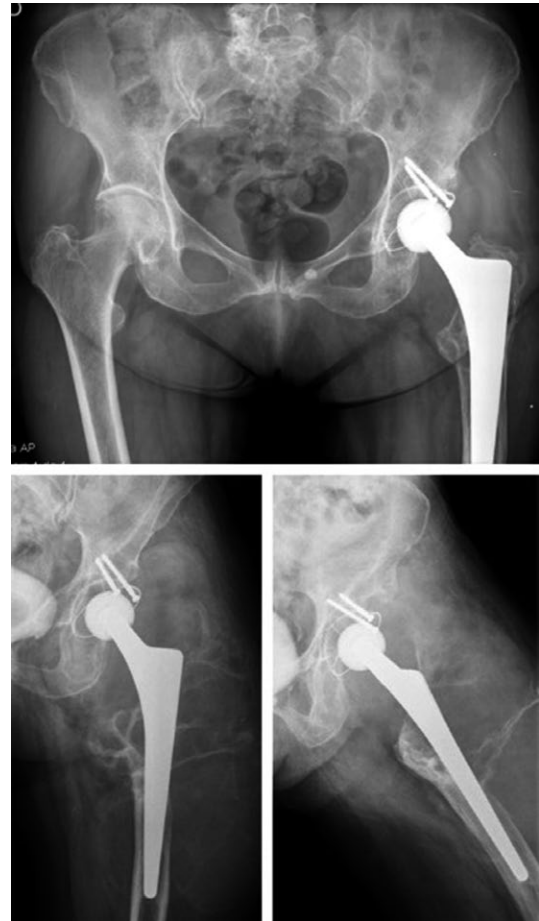


Figure 2. Radiographs of the pelvis and left hip, showing osteolysis of the greater trochanter

cavitary lesions were found, in the greater trochanter and acetabular region. The macroscopic appearance of the surgical specimen is shown (Figure 4). The polyethylene liner did not present signs of wear, nor did the ceramic head. The femoral stem and acetabular cup were partially fixed.

Extensive soft tissue and bone debridement was performed. The femoral stem was changed to a noncemented straight stem (Reef; Depuy Synthes) with a 32-mm ceramic head (Stryker); and the acetabular cup was revised with a Tritanium Jumbo Multiholes component.

5 | FOLLOW-UP AND OUTCOMES

Surprisingly, the immediate postoperative radiograph showed a vertical position of the acetabular component that was not noticed intraoperatively (Figure 5).

One week later, the patient had a hip dislocation, and as seen in the radiography (Figure 6), associated with a total loosening of the acetabular component. In face to these findings, we proposed another revision surgery.

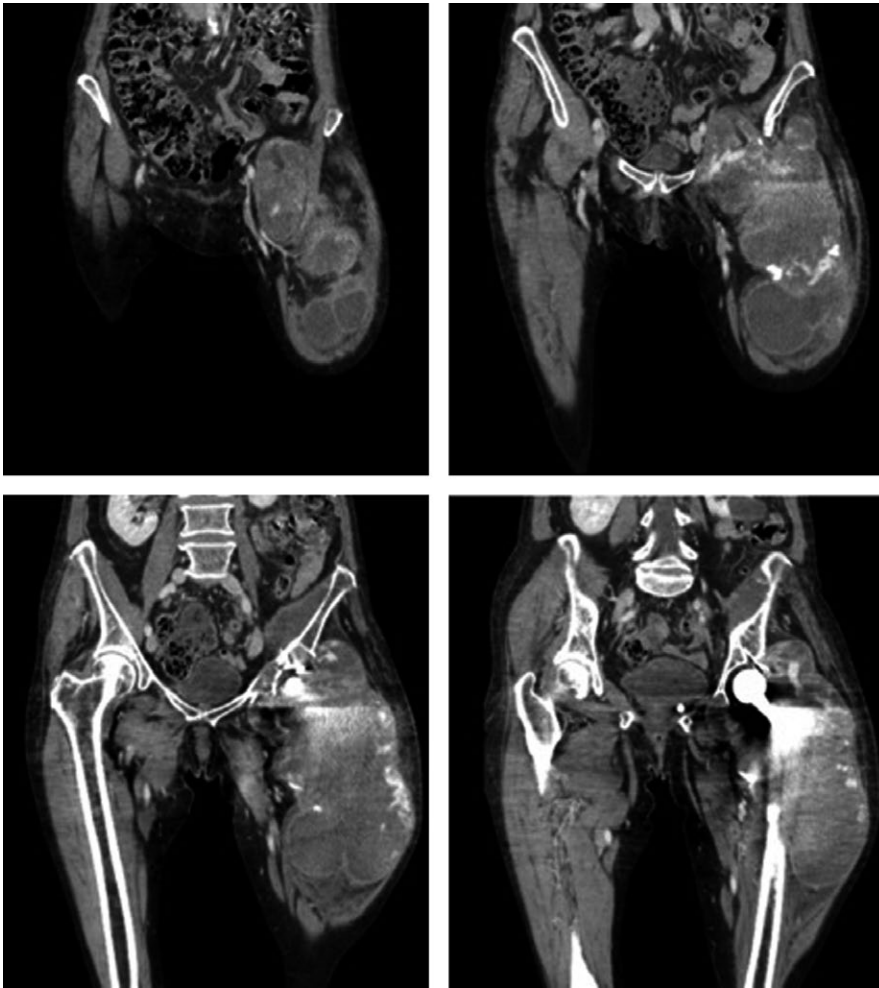


Figure 3. A coronal TC image of the pelvis showing a well-defined soft tissue mass anterolateral to the greater trochanter, with intra-pelvic extension. Intraoperative findings



Figure 4. Intraoperative findings

Intraoperatively we detected a total loosening of the acetabular component, associated with a pelvic discontinuity. Acetabular reconstruction with plate, allograft, and a Burch-Schneider ring was performed (Figure 7).

At 1-year follow-up, the patient was asymptomatic, able to walk with external support, with no neurologic deficits, and apparently all components remained stable on repeated radiographs.

No clinical or analytic signs of infection were present.

6 | DISCUSSION

Several publications have emerged regarding adverse local tissue reactions (ALTR) as well as bone reactions following THA and resurfacing implants.¹⁻⁵ Pseudotumor is the



Figure 5. Postoperative radiography, showing a vertical position of the acetabular component

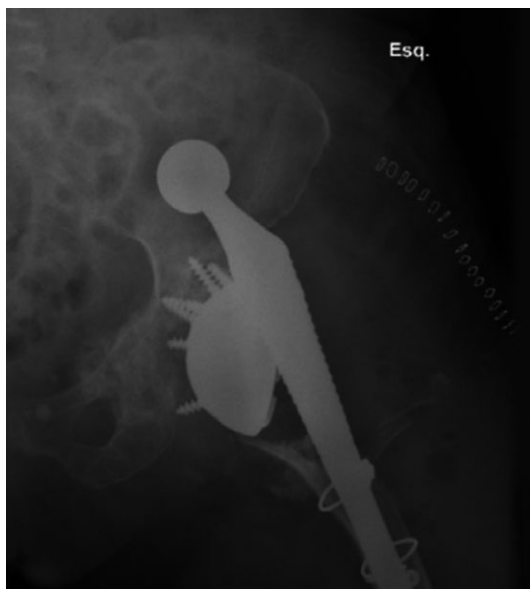


Figure 6. THA dislocation, 1 wk after revision

commonly used designation to describe a granulomatous and extremely destructive cystic or solid lesion, presenting itself like an actual tumor. It appears adjacent to hip implants and is neither of infectious or neoplastic origin.⁶ The pathophysiology of these lesions is unclear, but they are thought to be local chronic inflammatory reactions to metal debris causing cellular cytotoxicity and necrosis.⁷⁻⁹

Adverse local tissue reactions to metal debris are multifactorial and can result from a number of different causes,

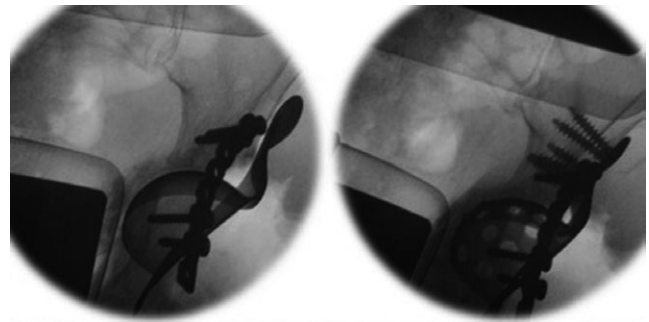


Figure 7. Peri- and postoperative radiographs of acetabular reconstruction

including edge loading from malpositioned components, metal hypersensitivity, and corrosion at modular junctions. Individual patient susceptibility to metal wear debris may also play a significant role in the formation of ALTRs.^{1,2,10}

Our case is rare and potentially misleading because the ALTR could only have origin in metal ions released at the head-neck junction, as no other metal-on-metal surface was present. ALTR could also be related to polyethylene wear.¹¹ However, in this case, intraoperatively, the polyethylene showed no signs of wear, and no polyethylene debris was found in the surrounding tissues.

The literature regarding systemic repercussion in this type of particle diseases is little to none. After a challenging diagnosis and treatment, that took over 1 month, and excluded all other possible causes for this presentation, we understood that the systemic symptoms did, in fact, correlate to the pseudotumor, or a consumptive syndrome that this tumor originated. There was an extraordinary recovery after removal of the tumor and revision arthroplasty that also confirmed this preoperative assessment.

Overall, pseudotumors remain a rare complication from fretting and crevice corrosion but should be in the differential diagnosis of any symptomatic patient with a well-fixed

THA, regardless of component design or bearing surface. Surgeons should be conscious and aware of this rare, but possible complication, whenever facing a case of swelling or pain around an otherwise well-positioned and stable THA.

CONFLICT OF INTEREST

None declared.

AUTHORSHIP

PMS: performed study conception and design and drafting of manuscript. CR: performed drafting of manuscript and acquisition of data. MSS: performed acquisition of data. VO, RC and PC: performed analysis and interpretation of data and critical revision.

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REFERENCES

- Walsh AJ, Nikolaou VS, Antoniou J. Inflammatory pseudotumor complicating metal-on-highly cross-linked polyethylene total hip arthroplasty. *J Arthroplasty*. 2012;27(2):324.e5-8.
- Hsu AR, Gross CE, Levine BR. Pseudotumor from modular neck corrosion after ceramic-on-polyethylene total hip arthroplasty. *Am J Orthop (Belle Mead NJ)*. 2012;41(9):422-426.
- Mao X, Tay GH, Godbolt DB, Crawford RW. Pseudotumor in a well-fixed metal-on-polyethylene uncemented hip arthroplasty. *J Arthroplasty*. 2012;27(3):493.e13-7.
- Messana J, Adelani M, Goodman SB. Case report: pseudotumor associated with corrosion of a femoral component with a modular neck and a ceramic-on-polyethylene bearing. *J Long Term Eff Med Implants*. 2014;24(1):1-5.
- Scully WF, Teeny SM. Pseudotumor associated with metal-on-polyethylene total hip arthroplasty. *Orthopedics*. 2013;36(5):e666-e670.
- Daniel J, Holland J, Quigley L, Sprague S, Bhandari M. Pseudotumors associated with total hip arthroplasty. *J Bone Joint Surg Am*. 2012;94(1):86-93.
- Pandit H, Glyn-Jones S, McLardy-Smith P, et al. Pseudotumours associated with metal-on-metal hip resurfacings. *J Bone Joint Surg Br*. 2008;90(7):847-851.
- Mahendra G, Pandit H, Kliskey K, Murray D, Gill HS, Athanasou N. Necrotic and inflammatory changes in metal-on-metal resurfacing hip arthroplasties. *Acta Orthop*. 2009;80(6):653-659.
- Campbell P, Ebramzadeh E, Nelson S, Takamura K, De Smet K, Amstutz HC. Histological features of pseudotumor-like tissues from metal-on-metal hips. *Clin Orthop Relat Res*. 2010;468(9):2321-2327.
- Bisseling P, Tan T, Lu Z, Campbell PA, Susante JL. The absence of a metal-on-metal bearing does not preclude the formation of a destructive pseudotumor in the hip—a case report. *Acta Orthop*. 2013;84(4):437-441.
- Leigh W, O'Grady P, Lawson EM, Hung NA, Theis JC, Matheson J. Pelvic pseudotumor: an unusual presentation of an extra-articular granuloma in a well-fixed total hip arthroplasty. *J Arthroplasty*. 2008;23(6):934-938.

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