



# Pseudotumor in Large Diameter Head Metal-on-metal Total Hip Replacement\*

## *Pseudotumor em artroplastia total do quadril metal-metal com cabeça de grande diâmetro*

Elmano de Araújo Loures<sup>1</sup> Daniel Naya Loures<sup>2</sup> Armando D’Lucca de Castro e Silva<sup>1</sup>  
Luiz Fernando Ribeiro Monte<sup>1</sup>

<sup>1</sup> Universidade Federal de Juiz de Fora, Hospital Universitário, Juiz de Fora, MG, Brazil

<sup>2</sup> Universidade de São Paulo, Hospital das Clínicas, Ribeirão Preto, SP, Brazil

Address for correspondence Elmano de Araújo Loures, Universidade Federal de Juiz de Fora (UFJF), Hospital Universitário, Juiz de Fora, MG, Brazil (e-mail: loures.elmano@gmail.com).

Rev Bras Ortop 2019;54:87–89.

### Abstract

The authors describe a case of a large diameter head metal-on-metal total hip replacement that evolved with an inflammatory pseudotumor formation. The diagnosis was established by magnetic resonance imaging (MRI) with suppression of the metal artifact. The treatment consisted on the resection of the abnormal tissue and on the revision to a ceramic on cross-linked polyethylene hip replacement. To this date, no similar case has been reported, in Portuguese language, in the PubMed, Scielo, and Lilacs databases.

### Keywords

- ▶ adverse tissue reaction
- ▶ pseudotumor
- ▶ total hip arthroplasty

### Resumo

Os autores descrevem caso de artroplastia total do quadril (ATQ) com par tribológico metal-metal e cabeça de grande diâmetro que evoluiu com formação de pseudotumor inflamatório. O diagnóstico foi estabelecido por ressonância magnética com supressão de artefato metálico. O tratamento consistiu na ressecção do tecido anormal e revisão com par tribológico cerâmica-polietileno reticulado. Nenhum caso semelhante em língua portuguesa encontra-se descrito nas bases de dados PubMed, Scielo e Lilacs até a presente data.

### Palavras-chave

- ▶ reação tecidual adversa
- ▶ pseudotumor
- ▶ artroplastia total do quadril

## Introduction

The search for more durable joint prostheses led to the reintroduction of the metal-on-metal tribological pair, followed by large diameter heads. In 2007, they represented 35% of the total hip replacements performed in the United

States of America.<sup>1</sup> It is estimated that more than one million metal-on-metal implants were sold worldwide, with some thousands in Brazil. Larger heads were associated with implants modularity, favoring tribocorrosion and adverse tissue reactions caused by metallic debris produced on multiple interfaces. These reactions are mediated by lymphocytes and form pseudotumors in some individuals.<sup>2,3</sup> This is a severe complication, and its early recognition is crucial to an adequate resolution. The authors report a case of a large diameter head metal-on-metal total hip replacement which evolved with the formation of an inflammatory pseudotumor.

\* Work developed at the Hospital Universitário, Universidade Federal de Juiz de Fora (UFJF), and at the Hospital Albert Sabin, Juiz de Fora, MG, Brazil.

Elmano de Araújo Loures's ORCID: is <https://orcid.org/0000-0003-3691-013X>.

received

April 11, 2017

accepted

June 6, 2017

published online

November 28, 2017

DOI <https://doi.org/10.1016/j.rbo.2017.06.021>.

ISSN 0102-3616.

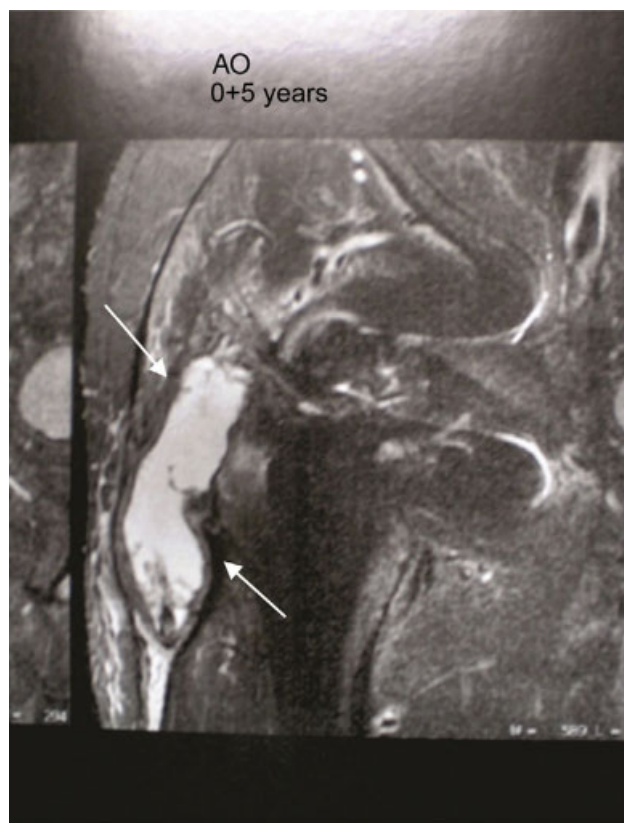
Copyright © 2019 by Sociedade Brasileira de Ortopedia e Traumatologia. Published by Thieme Revnter Publicações Ltda, Rio de Janeiro, Brazil

License terms



## Case Report

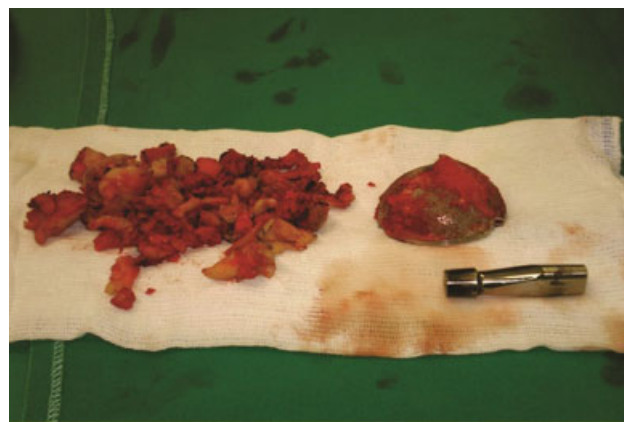
Male, former athlete, 60 years old, primary osteoarthritis of the hip (Tonnis III), submitted to an uncemented total hip replacement with metal-on-metal tribological pair, 50 mm head, and femoral stem with interchangeable neck. The patient presented a normal evolution for 5 years, until the onset of groin pain, sudden limping, and trochanteric region swelling. The patient had no fever, and his motion range was preserved. Radiographs show the implant in normal position, cup inclination at 40°, with no demarcation lines and/or osteolysis (►Fig. 1). Normal C-reactive protein, erythrocyte sedimentation rate = 35/45; chromium = 2.1; cobalt = 4.1 µg/L. Joint puncture fluid with café au lait color and sterile cultures. A magnetic resonance imaging (MRI) exam with suppression of the metal artifact showed a large soft tissue mass involving the peritrochanteric region and communicating with the joint capsule (►Fig. 2). The patient underwent a total hip replacement revision via the lateral route with the resection of the tumor mass involving part of the abductor mechanism and joint capsule (►Fig. 3). The fixed acetabular component, with no wear signs, was removed and replaced with another implant with a cross-linked polyethylene insert and a 32 mm ceramic head (►Fig. 4). The interchangeable neck and its connections showed signs of tribocorrosion and were replaced (►Fig. 5). At the 12-month post revision follow-up, the patient was asymptomatic and presented normal clinical, radiological, and laboratorial parameters.



**Fig. 2** T2-weighted magnetic resonance imaging showing the pseudotumor mass.



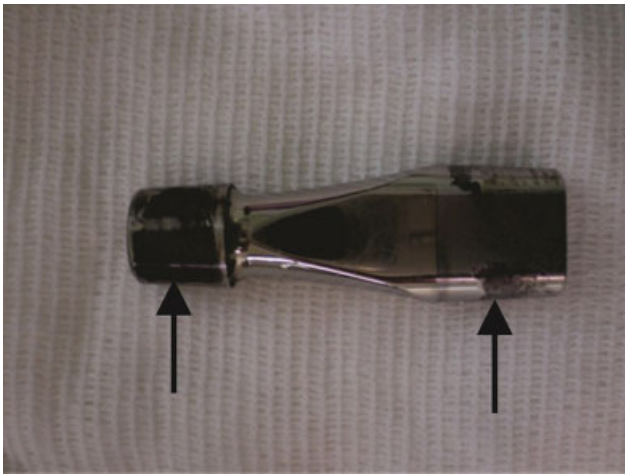
**Fig. 1** Preoperative image, 5-year evolution.



**Fig. 3** Extensive mass of resected tissues.



**Fig. 4** Right-sided revision, 12 months postoperative.



**Fig. 5** Typical tribocorrosion signs.

## Discussion

Pseudotumors are described as a semisolid or cystic mass at the periprosthetic soft tissues with  $> 2$  cm in diameter that are not attributable to infection, malignancy, bursas or healing tissue.<sup>4</sup>

The incidence of pseudotumors and adverse reactions to metallic debris in total hip replacement is high with the metal-on-metal tribological pair if associated with large diameter heads and interchangeable neck. Tissue tribocorrosion phenomenon is recognized in all implant types and tribological pairs.<sup>5-7</sup>

The adverse tissue reactions purportedly result from the inability of the body to eliminate metal microparticles from joint surfaces and junctions and/or from metal allergy. The presence of chromium and of cobalt is an essential element. Cups with an abduction angle  $> 50^\circ$  in metal-on-metal total hip replacements are more prone to adverse reactions.<sup>8</sup>

The frictional torque and the micromovements at the modular connection produce an additional amount of metallic debris caused by damage at the superficial layer of the cone, which is summed up to the particles formed at the joint surface.<sup>9</sup> The diagnostic value of the increased serum levels of chromium and cobalt ions is debatable. The clinical picture and the MRI with metallic artifact suppression are considered the basis for the diagnosis. The recommended treatment is the revision of the total hip replacement with resection of the abnormal tissue and implant exchange to achieve the maximum reduction of metallic interfaces.<sup>10</sup>

The systematic follow-up of individuals with metal-on-metal total hip replacement is mandatory for early diagnosis of complications, allowing revisions before the destruction reaches great proportions and compromises a reconstruction. Any implant with metallic connection interfaces can develop tribocorrosion, tissue adverse reactions, and pseudotumors. Patients with metal-on-metal implants and heads  $> 32$  mm constitute the group with the highest risk.

### Conflicts of interest

The authors have no conflicts of interest to declare.

## References

- 1 Bozic KJ, Kurtz S, Lau E, Ong K, Chiu V, Vail TP, et al. The epidemiology of bearing surface usage in total hip arthroplasty in the United States. *J Bone Joint Surg Am* 2009;91(7):1614-20
- 2 Bosker BH, Ettema HB, van Rossum M, Boomsma MF, Kollen BJ, Maas M, et al. Pseudotumor formation and serum ions after large head metal-on-metal stemmed total hip replacement. Risk factors, time course and revisions in 706 hips. *Arch Orthop Trauma Surg* 2015;135(3):417-25
- 3 Fricka KB, Ho H, Peace WJ, Engh CA Jr. Metal-on-metal local tissue reaction is associated with corrosion of the head taper junction. *J Arthroplasty* 2012;27(8, Suppl)26-31.e1
- 4 Kop AM, Swarts E. Corrosion of a hip stem with a modular neck taper junction: a retrieval study of 16 cases. *J Arthroplasty* 2009; 24(7):1019-23
- 5 Cooper HJ, Della Valle CJ, Berger RA, Tetreault M, Paprosky WG, Sporer SM, et al. Corrosion at the head-neck taper as a cause for adverse local tissue reactions after total hip arthroplasty. *J Bone Joint Surg Am* 2012;94(18):1655-61
- 6 Fagotti L, Vicente JR, Miyahara HS, de Oliveira PV, Bernabé AC, Croci AT. Formation of a pseudotumor in total hip arthroplasty using a tribological metal-polyethylene pair. *Rev Bras Ortop* 2015; 50(6):747-51
- 7 Scully WF, Teeny SM. Pseudotumor associated with metal-on-polyethylene total hip arthroplasty. *Orthopedics* 2013;36(5): e666-70
- 8 Berry DJ, Callaghan JJ, Barrack RL, Bostrom MP, Browne JA, Greenwald AS, et al. Trunions, Tapers, and Corrosion in Total Hip Arthroplasty: What's All the Fuss About? What Every Surgeon Should Know. In: AAOS 2015 Annual Meeting -Instructional Course #301 Lecture Handout 2015
- 9 Langton DJ, Sidaginamale R, Lord JK, Nargol AVF, Joyce TJ. Taper junction failure in large-diameter metal-on-metal bearings. *Bone Joint Res* 2012;1(4):56-63
- 10 Kwon YM, Lombardi AV, Jacobs JJ, Fehring TK, Lewis CG, Cabanela ME. Risk stratification algorithm for management of patients with metal-on-metal hip arthroplasty: consensus statement of the American Association of Hip and Knee Surgeons, the American Academy of Orthopaedic Surgeons, and the Hip Society. *J Bone Joint Surg Am* 2014;96(1):e4