Groin pain after metal-on-metal hip resurfacing prosthesis

Daniel Hernández-Vaquero1, Ramon Delgado-Sevillano2 and Maria Rodríguez de la Flor-García2

Abstract
Total hip replacement continues to be a widely successful operation, but persistent groin pain following a metal-on-metal hip resurfacing remains a problem for some patients. The concern regarding the safety and efficacy of metal-on-metal total hip replacements has been rising. We present the case of a 47-year-old man with groin pain after metal-on-metal hip resurfacing. We observed high metal ion levels detected in blood analytical studies and a pseudotumor in magnetic resonance imaging. Our patient was treated with a revision surgery. The progressive elevation of blood and urine metal levels in the presence of periarticular cysts and/or groin pain is a complication of metal-on-metal hip arthroplasty and needs revision surgery.

Keywords
Hip, arthroplasty, metal–metal, pseudotumor, metallosis

Date received: 26 March 2014; accepted: 4 July 2014

Introduction
Hip resurfacing with metal–metal friction seemed an attractive option in the young patient group due to its bone-conserving nature, with possible simple revision and the large head contributing to greater stability. It was also conceptually sound as it dealt with arthritis as a disease of the joint and not of the whole head and neck. We present a case report of pseudotumor associated with metal-on-metal (M-M) hip resurfacing.

Case report
A 47-year-old man with ankylosing spondylitis underwent surgery 7 years ago to implant an M-M hip resurfacing ASRTM (DePuy, Warsaw, IN, USA) in the right hip. The patient attended the clinic complaining of progressive pain in the right groin exacerbated by stair climbing, getting into or out of bed and rising from seated position, but does not affect his ability to walk. A plain radiograph showed the arthroplasty in good position with no signs of failure (Figure 1). High levels of metal ions appeared in blood analytical studies (56.7 ppb chromium, 63.2 ppb cobalt) and urine (163.7 ppb chromium, 628.6 ppb cobalt). A magnetic resonance imaging (MRI) study was performed (Figure 2). The patient was revised to remove the arthroplasty and reimplant a conventional metal-on-polyethylene model. In this revision surgery, we found a pseudotumor and profuse metallosis area with inflammatory reaction and partial destruction of the femoral neck (Figure 3). After 3 months, analytical studies showed 22.9 ppb of chromium and 2.9 ppb of cobalt in blood and 33 ppb of chromium and 8.9 ppb cobalt in urine. The patient is asymptomatic after 2 years of revision surgery.

Discussion
With the introduction of resurfacing arthroplasty and the increasing use of various M-M articulations, groin pain has once more been reported as a complication.1 M-M articulation in total hip replacement (THR) has a higher prevalence of groin pain. This is well known to orthopedic surgeons. The aim of this case study is to report this event to other physicians: rheumatologists, general practitioners or internal medicine.

Bartelt et al.2 reported groin pain in 7% of metal-on-polyethylene or ceramic-on-ceramic THRs, 15% of M-M and 18% of M-M resurfacings. The articular surface replacement

1Department of Surgery, School of Medicine, University of Oviedo, Oviedo, Spain
2Hospital St Agustin, Aviles, Spain

Corresponding author:
Daniel Hernández-Vaquero, Calle Luis Treillard, 23, escl, 10º Izda, 33405 Salinas, Oviedo, Asturias, Spain.
Email: danielhvaquero@gmail.com
X-ray: the implant position is correct with no signs of failure.

(ASR) prosthesis has recently been recalled for unacceptably high revision rates. Langton et al. reported that in a series of 660 M-M hip resurfacings, 3.4% of ASR components required revision. Metal hypersensitivity, synovitis due to elevated metal ion levels or adverse local tissue reactions (formerly aseptic lymphocytic vasculitis–associated lesions (ALVAL)) should be considered in persistent groin pain and no evidence of infection, loosening, fracture or iliopsoas tendinitis. Many articles have been published recently on the subject of pseudotumors surrounding M-M hip resurfacing and replacement prostheses. These pseudotumors are sterile, inflammatory lesions within the periprosthetic tissues and have been variously termed masses, cysts, bursae, collections or ALVAL. The prevalence of pseudotumors in patients with a well-functioning M-M hip prosthesis is not well known. A periprosthetic cystic pseudotumor was diagnosed commonly in 60% of patients with the use of metal artifact reduction sequence MRI. The prevalence of pseudotumors was similar in patients with a well-functioning hip prosthesis, patients with a painful hip, patients with a well-positioned acetabular component, both men and women and symptomatic and asymptomatic hips.

Although MRI is useful for surgical planning, the presence of a cystic pseudotumor may not necessarily indicate the need for revision arthroplasty. Previous studies suggest that there are two kinds of lesions: fluid collections and soft-tissue masses; these lesions may be asymptomatic and are associated with reactions to metal wear particles on histology. Therefore, according to the current evidence base, a lesion on MRI is not synonymous with the need for intervention.

The US Food and Drug Administration (FDA) recommends orthopedic surgeons to consider performing special imaging tests, joint aspiration and blood tests, including ion levels on symptomatic patients with an M-M THR. Blood tests include an erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP), which can be elevated with either infection or adverse local tissue reaction. When the blood or serum ion levels are <2 ppb, there is a low risk of this complication. When the levels are >7 ppb, the risk is increased. For other authors, preoperative testing of serum ion levels was not helpful in identifying patients with or without soft-tissue damage related to a failed M-M THR. Both Co and Cr levels had poor sensitivity and specificity for tissue damage found at revision. Furthermore, some authors found that the arbitrary cutoff value of 7 ppb was not a predictor of tissue damage. Any patient with even minimal symptoms in the presence of M-M total hip arthroplasty should be counseled with regard to management of symptoms.

**Conclusion**

We presented a patient with groin pain in an M-M hip prosthesis with normal X-ray and without other symptoms. Neither the symptoms nor the presence of cysts in MRI and high levels of Cr and Co in blood have enough predictive value taken one by one. Only the confirmation of a progressive elevation of metal levels in the presence of periarticular cysts and/or groin pain would force a revision surgery.

**Consent**

We have obtained the consent for publication from the patient and the ethics board (Research Committee, Hospital St Agustin, Spain).

**Declaration of conflicting interests**

The authors of this article have nothing to disclose.

**Funding**

This work was partially supported by a research grant from the Spanish Society of Orthopaedic Surgery and Traumatology (SECOT).

**References**

1. Henderson RA and Lachiewicz PF. Groin pain after replacement of the hip. Aetiology, evaluation and treatment. *J Bone Joint Surg Br* 2012; 94: 145–151.
2. Bartelt RB, Yuan BJ, Trousdale RT, et al. The prevalence of groin pain after metal-on-metal total hip arthroplasty and total hip resurfacing. *Clin Orthop Relat Res* 2010; 468: 2346–2356.
3. Langton DJ, Jameson SS and Joyce TJ. Early failure of metal-on-metal bearings in hip resurfacing and large-diameter total hip replacement: a consequence of excess wear. *J Bone Joint Surg Br* 2010; 92: 38–46.
Figure 2. MRI: STIR-weighted and T1 images showed a bulky periprosthetic fluid collection above and below acetabular (arrows) component, with areas of low signal within it (arrowheads) due to metal debris. MRI: magnetic resonance imaging; STIR: short time inversion-recovery.

Figure 3. Metallosis tissue and metal debris in revision surgery. Osteolysis in femoral neck.

4. Hart AJ, Satchithananda K, Liddle AD, et al. Pseudotumors in association with well-functioning metal-on-metal hip prostheses: a case-control study using three-dimensional computed tomography and magnetic resonance imaging. *J Bone Joint Surg Am* 2012; 94: 317–325.

5. Sabah SA, Mitchell AWM, Henckel J, et al. Magnetic resonance imaging findings in painful metal-on-metal hips. A prospective study. *J Arthroplasty* 2011; 26: 71–76.

6. US Food and Drug Administration. http://www.fda.gov/MedicalDevices/Safety/AlertsandNotices/ucm335775.htm (accessed 29 July 2014).

7. Smolders JM, Bisseling P, Hol A, et al. Metal ion interpretation in resurfacing versus conventional hip arthroplasty and in whole blood versus serum. How should we interpret metal ion data? *Hip Int* 2011; 21: 587–595.

8. Hart AJ, Sabah SA, Bandi AS, et al. Sensitivity and specificity of blood cobalt and chromium metal ions for predicting failure of metal-on-metal hip replacement. *J Bone Joint Surg Br* 2011; 93: 1308–1313.