

Failed Metal-on-Metal Total Hip Arthroplasty Presenting as Painful Groin Mass With Associated Weight Loss and Night Sweats

Håvard Molvik, MRCS, Sammy A. Hanna, MRCS, and Nicholas J. de Roeck, FRCS (Orth)

Abstract

We report an unusual case of a failed metal-on-metal total hip arthroplasty presenting as a groin mass with associated weight loss, night sweats, and raised inflammatory markers. After a malignant process was ruled out, the patient was found to have a loose acetabular component. Histopathologic results revealed features of an aseptic lymphocytic vasculitic associated lesion. All symptoms resolved completely after the metal-on-metal bearing was revised to metal-on-polyethylene.

Metal-on-metal (MOM) bearing surfaces in total hip arthroplasty (THA) are being implanted in increasing numbers into ever younger patients. The wide interest in these articulations as an alternative to metal-on-polyethylene (MOP) bearings is a result of the increasing recognition of the phenomenon of osteolysis associated with the accumulation of polyethylene wear debris. Furthermore, use of large metallic articulations is believed to result in good hip range of motion (ROM) and function, in addition to a low dislocation rate.^{1,2} Both factors are especially important in relatively young patients. However, these implants have been shown to produce approximately 13,500 times the number of particles produced by MOP bearings, though these are lower-volume (nano-scale) particles.³

Current-generation MOM implants are made of cobalt-chromium alloys. A few authors⁴⁻⁹ have reported on an unusual mode of failure of these implants that is associated with a localized hypersensitivity reaction

Mr. Molvik is Core Trainee in Orthopaedics, Mr. Hanna is Specialist Orthopaedic Registrar, and Mr. de Roeck is Consultant Orthopaedic Surgeon, Department of Orthopaedic Surgery, Lister Hospital, East and North Hertfordshire NHS Trust, Stevenage, United Kingdom.

Address correspondence to: Mr. S. A. Hanna, MRCS, Department of Orthopaedic Surgery, Lister Hospital, Coreys Mill Lane, Stevenage, SG1 4AB, United Kingdom (tel, 44-7905-227888; e-mail, sammyhanna@hotmail.com).

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and immunologic response to metal wear debris: aseptic lymphocytic vasculitic associated lesion (ALVAL). The reported presenting features of ALVAL include early postoperative groin pain, radiographic loosening and osteolysis, recurrent dislocations, and periprosthetic fractures.

In this article, we report an unusual case of early failure of a MOM-THA presenting as a painful groin mass with associated raised inflammatory markers and substantial weight loss. After a malignant process was ruled out, the ALVAL diagnosis was confirmed histologically.

Our patient provided written informed consent for print and electronic publication of this article.

CASE REPORT

A white Caucasian woman in her early 60s underwent a left cementless MOM-THA for hip osteoarthritis. The cobalt-chromium-molybdenum system that was used (Biomet, Warsaw, Ind) consisted of a 54-mm porous-coated cup, a 38-mm modular head component, and a Bi-Metric femoral stem. Recovery was uneventful, and all the preoperative “arthritis” groin pain resolved completely. Four months after surgery, however, the patient started complaining of a new, occasional pain in the groin. She was mobilizing well, with a slight limp, and had a healthy scar without any signs of infection. Trendelenburg test-



Figure 1. Anteroposterior pelvic radiograph before revision.



Figure 2. Left groin fullness at mass site (arrow).

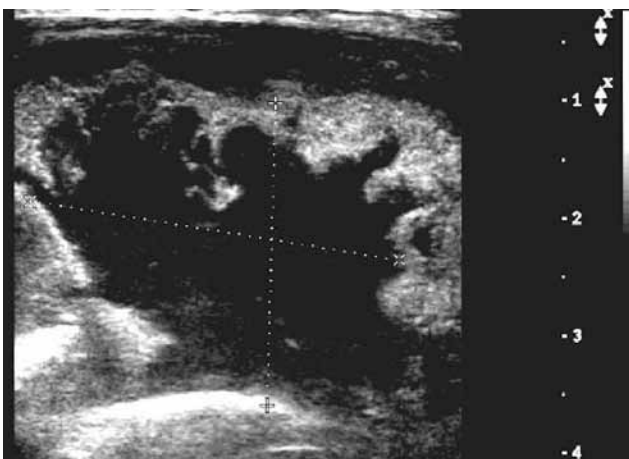


Figure 3. Ultrasound shows fluid-filled mass in left groin region.

ing showed her abductors working well against gravity. Check radiographs showed good component positioning without radiolucent lines or any signs of osteolysis. Cup inclination was approximately 37° (Figure 1).

Nine months after surgery, she was walking unaided with a normal gait, but she still experienced an occasional sharp pain in her left groin. Her hip was stable with a very good range of movement on clinical examination. A repeat radiograph revealed no change in implant position and no signs of loosening or osteolysis.

The patient's groin pain worsened significantly over the next few months and was associated with weight loss of nearly 10 kg and frequent night sweats. Inflammatory markers were elevated: erythrocyte sedimentation rate (ESR), 58 mm/h; C-reactive protein (CRP), 26 nmol/L. Clinical examination by the patient's general practitioner revealed a 4×5-cm painful groin mass (Figure 2) with associated regional lymphadenopathy. Suspicion of a malignant process/lymphoma was raised, and the patient was urgently referred for hematology and oncology opinions.

Computed tomography (CT) of abdomen and pelvis did not show any other masses. Subsequent ultrasound



Figure 4. Purulent fluid (200 mL) found around hip joint in inflammatory capsule during surgery.

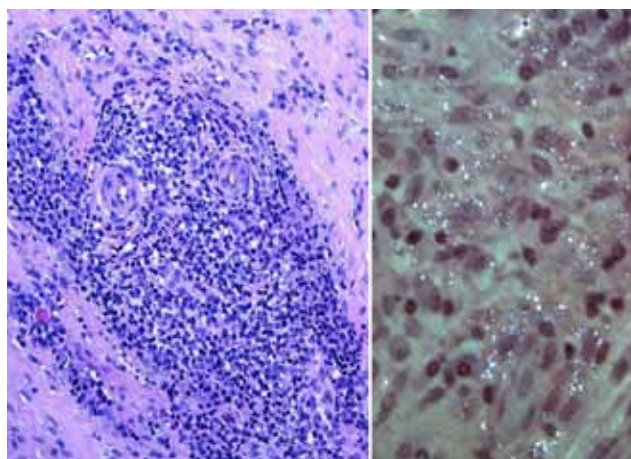


Figure 5. High-power photomicrographs show (A) prominent perivascular lymphocytic infiltration of deep vascular layer of failed hip arthroplasty site (hematoxylin-eosin, original magnification $\times 200$) and (B) cluster of plasma cells interspersed with macrophages laden with black metal dust (hematoxylin-eosin, original magnification $\times 600$).

revealed a left groin fluid collection (5×4 cm) that was suggestive of an abscess communicating with the left hip prosthesis (Figure 3).

Eventually, the patient was referred back to us for further management. More than 2 years after surgery, she once again had well-preserved ROM in the left hip and a fully healed scar without any evidence of infection or discharging sinuses. Radiographs again showed well-fixed hip components with no signs of loosening.

We aspirated the left hip joint and the groin lump separately under general anesthesia to rule out deep infection of the metal work. Straw-colored fluid was aspirated from the joint (15 mL) and the lump (15 mL). Direct microscopy, culture and sensitivity testing, and *Mycobacterium* screening were used to analyze the aspirates. All these investigations were unequivocal.

A few weeks after aspiration, the left groin swelling was reformed, and the patient started to experience extensive clicking in the hip. CT and magnetic reso-

nance imaging of the left hip were carried out as per the London Implant Retrieval Centre (LIRC)¹⁰ failed-MOM hip protocol. They showed marked expansion of the iliopsoas muscle belly and a slightly heterogeneous density within the swelling, reported as an inflammatory and reactive response to metal debris.

We decided to explore the hip and revise any loose components in a single session in the absence of features of an infective process. Intraoperative findings included purulent fluid (200 mL) in an inflammatory capsule, normal soft tissues, and marked superior and anterior acetabular osteolysis with a defect in the anterior wall communicating with the groin mass (Figure 4). As there were no signs of an infection, we performed single-stage revision of the loose acetabular component. A porous trabecular metal shell (Zimmer; Warsaw, Ind), a 40-mm M2a-Magnum modular head (Biomet; Warsaw, Ind), and a polyethylene liner were used. The femoral stem was not revised, as it was well fixed.

Postoperative microbiological analysis of fluid and tissue specimens did not reveal any organisms. Histopathologic results revealed prominent perivascular infiltration of lymphocytes and plasma cells interspersed with macrophages laden with black metal dust (Figure 5).

By 6 months after surgery, the patient's symptoms had resolved completely.

DISCUSSION

To our knowledge, this is the first report of a failed MOM-THA presenting as a painful groin mass with associated weight loss and raised inflammatory markers. As a lymphoma was thought to be a possibility, hematology and oncology specialists were initially consulted.

Systemic clinical and biochemical features are not well described in the few reports of ALVAL, as this is thought to be a "localized" delayed type IV hypersensitivity or a foreign-body reaction to metal debris.⁴⁻⁹ Our patient's presenting features (weight loss, night sweats, elevated inflammatory markers) suggest an associated generalized reaction to elevated blood metal ion levels as well. Recently, Hart and colleagues¹¹ analyzed the histologic and immunohistochemical features of failed MOM hips in 18 patients, concluded that not all ALVAL features could be attributed to delayed type IV hypersensitivity or granulomatous foreign-body reactions, and recommended more studies to elucidate the pathophysiology of this reaction.

Numerous studies of MOM bearings in THA have found significantly elevated blood levels of cobalt and chromium.¹²⁻¹⁴ Our patient was not known to have any history of allergic reactions or intolerance to any metals, though formal testing was not performed. Mikhael and colleagues¹⁵ recently described 2 failed MOM hip arthroplasties presenting as deep infections with associated elevated ESR and CRP. That finding is similar to ours, though weight loss had not been reported before.

The worrisome weight loss and groin mass delayed orthopedic referral.

Our patient's radiographs showed cup inclination of approximately 37°. A few authors have reported a linear relationship between cup inclination and blood metal ion levels.^{16,17} Although the optimal acetabular component position is universally accepted to be 45°, a more closed position has not been reported to result in any increase in incidence of loosening and/or abnormal metal ion levels.

Another factor thought to be associated with ALVAL is a mismatch or inappropriate pairing of the acetabular and femoral components.¹⁵ Such a factor was not found in our patient's case, as was confirmed by the operative records and the manufacturers' implant stickers.

In the United Kingdom, all failed MOM-THA cases are referred to the LIRC for further analysis of clinical and radiologic data alongside tissues and retrieved implants. Findings may provide clues to the biological effects of metal wear particles, the effect of component position on wear rates, and the usefulness of new biomarkers (blood levels of cobalt and chromium; immune cells).

The systemic effects of metal ions in patients with failed MOM hip bearings are being extensively investigated at many centers. A few authors have already reported immune function disturbances and chromosomal aberrations in patients with MOM bearings.¹⁸⁻²⁰ Interestingly, in the first of these studies,¹⁸ metal ion levels and chromosomal changes all normalized after the bearings were revised from MOM to MOP.

CONCLUSIONS

MOM hip bearing surfaces are being used in increasing numbers in ever younger patients. These patients are likely to be exposed to metal wear debris and elevated blood metal ion levels for many decades, resulting in a probable increase in incidence of hypersensitivity reactions and hip implant failures. Therefore, more studies are required to fully investigate the pathophysiology of ALVAL. Our patient's symptoms resolved completely after revision to a MOP bearing. As other authors have done, we also recommend such revision as the treatment of choice.

AUTHORS' DISCLOSURE STATEMENT

The authors report no actual or potential conflict of interest in relation to this article.

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This paper will be judged for the Resident Writer's Award.
