

## Case Report

# Inflammatory Pseudotumor Causing Deep Vein Thrombosis After Metal-On-Metal Hip Resurfacing Arthroplasty

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**Abstract:** Metal-on-metal hip resurfacings have recently been associated with a variety of complications resulting from adverse reaction to metal debris. We report a case of extensive soft tissue necrosis associated with a huge pelvic mass causing extensive deep vein thrombosis of the lower limb secondary to mechanical compression of the iliac vein. This is a rare and unusual cause of deep vein thrombosis after metal-on-metal hip resurfacing arthroplasty. **Keywords:** hip resurfacing arthroplasty, pseudotumors, DVT.

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Metal on metal (MoM) hip resurfacing has been in use for the past number of years. Recently, a number of problems have been reported in the literature relating to the local as well as systemic effects of hip prosthesis. These effects are secondary to local tissue necrosis as well as a systemic type IV hypersensitivity reaction. We present a case of a large pelvic pseudotumor associated with MoM hip resurfacing arthroplasty resulting in deep vein thrombosis (DVT). Such cases have been described in association with polyethylene debris, but to our knowledge, no such case is reported with resurfacing hip arthroplasty. The patient gave consent for publication of this case report.

### Case Report

A 54-year-old woman presented to our hospital in 2010 with left inguinal and groin pain and lower limb swelling for a number of weeks. She also had associated squeaking sensation in the left hip. Her background surgical history consisted of right and left hip resurfacing arthroplasty in 2003 and 2005, respectively. Both hips were resurfaced using Birmingham hip resurfacing arthroplasty (BHRA) system (Smith and Nephew). She had no history of febrile illness, although she generally felt unwell over the

preceding months. She also had undergone varicose veins surgery in the past on both lower limbs.

On examination, she had generalized swelling of left lower limb extending from thigh to the ankle. She had generalized tenderness starting from the groin and the lateral aspect of the thigh radiating down her leg. Her hip arthroplasty wound was well healed, and there were no inflammatory changes around it. Her hip examination revealed flexion of 90° with 30% internal and 40% of external rotation. All hip movements were pain free. She was walking with the aid of a stick (she had been walking independently up to 6 months ago). Her abdominal examination revealed fullness in left lower quadrant with mild tenderness on deep palpation. She also had palpable inguinal lymph nodes in the groin. Her right hip examination was within normal limits.

On her laboratory workup, she had mildly elevated erythrocyte sedimentation rate of 48 mm and C-reactive protein of 37 (normal, <5), whereas her white blood cell count was 7.6 ( $10^5$ ). She had raised D-dimers. She was admitted to the hospital, and further investigations were carried out. A plain radiograph of her pelvis showed bilateral Birmingham hip resurfacing implants in satisfactory alignment (Fig. 1). There were some changes noted in the femoral neck region on left side (Fig. 1). A Doppler ultrasound of the lower limbs revealed thrombosis of the deep veins in the thigh extending into the pelvis. A venogram of left limb was performed, which showed extensive thrombosis of the deep vein of calf and thigh with thrombus extending into left iliac vein. An external compression of the iliac vein was noted on the venogram in the pelvis. There was no thrombus proximal to that

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**Fig. 1.** Anteroposterior pelvis showing bilateral BHR implants.

specific point. An ultrasonogram and a computed tomography were carried out to further evaluate the intrapelvic organs, which revealed a large complex mass in the left hemipelvis with mixed solid and cystic characteristics. The computed tomography showed this mass to be extending from the iliopsoas muscle toward its insertion into the femur (Fig. 2). The dimensions were approximately 7.3 × 5.7 cm. The exact caudal extent was obscured because of the metal artifact from hip implants. The mass was shown to be abutting against the left iliac vein causing external compression of the vessels.

She was initially started on anticoagulant therapy with heparin and warfarin. In view of the extensive DVT and other associated risk factors, a Greenfield filter was also placed in the inferior vena cava. To further evaluate her hip complaints, an aspiration of the left hip was carried out, which revealed a slightly turbid fluid. The Gram stain was negative, and after 5 days of incubation, no organism growth was reported. Subsequently, an image-guided biopsy of the mass lesion within the pelvis was also carried out, which revealed abundance of giant cells and perivascular lymphocytic infiltrate. There was extensive surface fibrin deposition with associated dense lymphohistiocytic reaction. Beneath the fibrin, a focally dense



**Fig. 2.** Computed tomographic image showing large tumor in left hemipelvis compressing the vascular structures.



**Fig. 3.** Anteroposterior pelvis after revision left THA with trabecular metal shell and cemented Exeter stem.

predominantly lymphocytic inflammatory cell infiltrate with scattered polymorphonuclear and plasma cells was noted. Overall, the histology was consistent with aseptic lymphocyte-dominated, vasculitis-associated lesion. She also had significantly raised serum chromium and cobalt levels at 377 and 424 nmol/L, respectively.

Because of the persistence of her hip symptoms, she was offered a conversion to a conventional total hip arthroplasty (THA). Her case was also discussed with colorectal team, and because of the proximity of pseudotumor to the major vessels, it was deemed inoperable and because the histology confirmed an inflammatory mass, a decision was made not to excise it. A revision left THA was finally carried out through posterior approach using ceramic bearings. Intraoperatively, extensive soft tissue fibrosis was identified within the joint. All the short external rotators were replaced with fibrotic tissue. All the fibrotic tissue around the joint was extensively excised and sent for histology and microbiology analysis. The acetabular implant was removed using Explant Acetabular Cup Removal System (Zimmer). There was a segmental defect in the medial wall that was bone grafted using fresh frozen allograft. The acetabulum was reconstructed using trident multihole cup and cemented Exeter stem with ceramic bearings (Stryker) (Fig. 3). Her culture and sensitivity results were negative, and the histology was again consistent with aseptic lymphocyte-dominated, vasculitis-associated lesion. Post-operatively, her chromium and cobalt levels dropped to 105 and 68.2 nmol/L, respectively. Subsequently, she also completed her course of anticoagulants, and a repeat sonogram revealed patent deep venous system of left lower limb. Her symptoms have significantly improved, although she still complains of occasional hip pain, but she is able to carry out most of her daily activities.

### Discussion

Metal-on-metal hip resurfacing arthroplasty is preferred in young active population with high activity levels. More than 5000 resurfacing hip arthroplasties

were performed in England and Wales in 2005. Although there is less wear in MoM bearing compared with metal-on-polyethylene bearings, the particle size in MoM hips is small and induces greater biological reactivity [1]. Some studies have shown satisfactory short-term outcome after MoM hip resurfacing [2,3], but concern is emerging about the abnormal reaction to metal debris in such patients. The presentation varies from a constant pain to intense inflammatory reaction, which, in severe form, may lead to abnormal mass formation commonly referred to as a pseudotumor [4-7]. At 7 years of follow-up, the incidence of pseudotumors after hip resurfacing arthroplasty has been described at 0.3% to 3.4% [8-10]. According to Pandit et al [4], the overall incidence of pseudotumors in MoM resurfacing arthroplasty is 1% at 5 years. Factors associated with higher prevalence of pseudotumors are female sex, bilateral resurfacing arthroplasties, excessive cup anteversion, cup inclination of more than 50°, and higher metal ion levels [9,11].

Pseudotumors can remain asymptomatic or can give rise to a variety of complications. Various complications associated with pseudotumors include persistent pain, femoral nerve palsy, rash, ureteral obstruction, and others [12,13]. Although the DVT from a pseudotumor caused by a metal-on-polyethylene hip arthroplasty has been described in the literature [14,15], it has not been described in relation to the large (>36 mm) MoM resurfacing arthroplasty. The patient in our case had bilateral BHRAs. She has remained asymptomatic from the first hip resurfacing. Her symptoms started 5 years after the second hip resurfacing. She developed a pseudotumor that started to cause the local compression upon the vascular structures within the pelvis. It is a rare cause of a DVT. The tumor was communicating with the hip joint and caused extensive soft tissue damage around it. The femoral neck thinning noted on plain radiograph in our patient has been described by Hing et al [14] and Laffosse et al [16] for up to 6 years after initial BHRAs without any significant clinical consequence. The patient in our case had presented to our service after 5 years of initial surgery with left leg swelling and pain. Although her DVT was being treated, she was investigated for the hip pain, and subsequently, a revision hip arthroplasty was carried out after exclusion of infection.

Few cases of such tumors causing DVT after polyethylene wear debris have been described before. They were managed with revision hip surgery and excision of the mass through abdominal approach [17]. In our case, the tumor was deemed to be inoperable by the surgeons, and thus, only revision arthroplasty with ceramic bearings was carried out. Our patient improved symptomatically after revision THA and anticoagulant therapy.

In the current literature, adverse reaction to metal debris (ARMD) is replacing the term *pseudotumor*. It is

believed to be the result of local tissue necrosis as well as a type IV hypersensitivity reaction to metal particles [18]. Interestingly, Birmingham hip resurfacing (BHR) implants have traditionally been associated with lower incidence of ARMD (1.5%) [19], compared with other implants such as Articular Surface Resurfacing (ASR) (DePuy Orthopaedics, Warsaw, Ind), which are associated with higher rate of ARMD at 12.8% at 5 years [15]. This raises the concerns about the safety of BHR implants and stresses the need for more vigilant follow-up of such patients especially of female sex.

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