Introduction: Metal-on-metal hip resurfacing arthroplasty (MoMHRA) has undergone a recent resurgence as an alternative treatment option for young and active patients with significant hip osteoarthritis. A series of symptomatic ‘pseudotumours’ or soft-tissue masses relating to the hip joint have been reported in patients following this procedure [1]. The soft-tissue mass was found to be locally destructive, requiring revision surgery in a high percentage of patients. The incidence of symptomatic pseudotumours has been reported to be 1% and they were associated with elevated serum metal levels. Asymptomatic pseudo-tumours have not been previously investigated. The aims of this study were two-fold: (1) to determine the incidence; and (2) to measure serum metal ion levels in MoMHRA patients with asymptomatic pseudotumours.

Materials and Methods: A total of 115 MoMHRA implanted hips (80 patients; 48 male, 32 female, mean age 56 years, range 33-73) were evaluated in this Institutional Review Board approved study. Patients were identified from a prospective MoMHRA database at the authors’ institution. Those patients who had MoMHRA performed at least one year previously were invited on an all-comer basis to participate in the study. The mean follow-up was 61 months (range 13-88). Radiographs and Oxford Hip scores (OHS) were assessed. Any cystic or solid masses detected on the screening ultrasound (US) scan were confirmed using magnetic resonance imaging (MRI). Patients with a soft-tissue mass had an aspiration or biopsy performed. The core needle biopsy samples were fixed in formalin and stained with haematoxylin and eosin and other standard stains (gram, Ziehl-Neelsen, PAS, Grocott or Giemsa staining). Serum cobalt and chromium levels were analysed in a blinded fashion using Inductively-Coupled Plasma Spectrometer. The serum levels and OHS were compared (Mann-Whitney tests) between those cases found to have pseudotumours with those without pseudotumours.

Results: The preliminary results of this on-going study indicated the incidence of asymptomatic pseudotumours was 8%. Pseudo-tumours were found in 6 patients (5 female: 1 male) with solid (n=2) and cystic (n=7) masses. Pseudotumours were found in both hips in three out of four bilateral patients. Histological examinations of solid mass obtained in two cases showed extensive necrosis and diffuse lymphocyte infiltration with B cells, T lymphocytes and plasma cells. The presence of pseudotumour was associated with: (1) higher median serum cobalt levels, 5.6 μg/L (range 8-22.5) vs. 1.7μg/L (range 0.5-33.3), p<0.01, Mann-Whitney test, (Figure 1); and (2) higher median serum chromium levels, 7.2μg/L (range 1-22.8) vs. 1.8μg/L (range 0.5-21.2) p=0.01 (Figure 2); and (3) inferior OHS, 18.9 (range 13.0-24.8) vs. 13.9 (range 12.9-14.9) p=0.08. Three out of four patients in the non-pseudo-tumour group, who had either extreme or outlier values, reported the presence of other orthopaedic metal implants in situ (e.g. spinal fusion and fracture metal implants).

Discussion: The incidence of asymptomatic pseudo-tumours during the first six post-operative years is significantly higher than the reported incidence of symptomatic pseudotumours. The current study also shows a very high (15%) incidence of asymptomatic abnormal soft tissue reaction in females. Further research is needed to determine if these will develop into symptomatic pseudo-tumours.

The histological features of the solid mass were similar to those previously described as ALVAL (aseptic lymphocyte dominated vasculitis associated lesion), suggesting a T lymphocyte-mediated hypersensitivity reaction of type IV (delayed type hypersensitivity) [2]. However, the incidence of pseudotumour far exceeds the metal hypersensitivity reactions leading to adverse clinical outcome, which are currently estimated to affect < 1% of the patients with implants [3]. Thus, the results of this study demonstrate that an asymptomatic pseudo-tumour in patients with MoMHRA is associated with elevated serum cobalt and chromium ion levels, suggesting that abnormal wear may be the cause of pseudotumour. The precise mechanism is unclear and may be due to metal hypersensitivity reaction or toxic effects.


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