Neck Narrowing Of Resurfaced Hips Is Associated With Increased Wear

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Introduction
Femoral neck narrowing (NN) following Metal-on-Metal Hip Resurfacing Arthroplasty (MoMHRA) is a well-recognised clinical phenomenon. The incidence of resurfaced hips with NN > 10% is reported to be up to 27% in literature. Its pathogenesis is thought to be multi-factorial secondary to stress shielding, impingement, osteolysis secondary to wear/ion particles and as a result of reduced vascularity and pressure effect on cancellous bone secondary to the presence of a soft-tissue mass around the resurfaced hip. Recognised risk factors for its development in literature include: female gender and the presence of a pseudotumour. Serum Chromium (Cr) and Cobalt (Co) are recognised surrogate markers of in-vivo wear of MoMHRA. The aims of this study were to establish whether NN is associated with increased wear and whether progressive NN after the second year can be a radiographic sign of increased wear.

Methods
A cohort of 214 patients with unilateral MoMHRA (139M: 75F) was included in this study. Primary osteoarthritis was the diagnosis leading to surgery for the majority of patients (208), followed by dysplasia (3) and AVN (3). The average age at surgery was 54.1 years old (range: 13.34-73). Six different implants were used; BHR (116 hips), Conserve plus (92 hips), Recap (2 hips), ASR (2hips), Adept (1hip) and Cormet (1 hip). The average femoral component size was 49.2mm (range: 38-59). The average follow up was 4.3 years (range: 2-10). Patients were subdivided into 3 groups as per implant size. Small size component group had implants <45mm, average size group had components 45-51mm and large component size group had components >51mm.

All patients had Prosthesis-Junction-Ratio (PJR) measured from postoperative (PJR post) and at latest follow up (PJR follow) radiographs. Measurements were made using the method described by Lilikakis1, measuring however the true diameter of the implant.

Metal ion levels (Cr/Co) were measured at last follow-up for all patients. Cr level>5.1 μg/ml and Co levels>4.4 μg/ml were considered high2 and patients with such levels formed the high ion group.

The power of %NN for predicting high ion levels were examined by Receiver Operating Characteristic (ROC) analysis. The area under the curve (AUC) is an indication of predictive power.

Results
For the whole cohort, mean NN was 3.2% (range: 0-32%, SD:4.3).

Females (4.7%, range: 0-32%, SD: 5.8) had significantly greater NN than males (2.4%, range: 0-23%, SD: 2.9) (p=0.001).

Patients in the large component group had less NN (2.1%, SD: 2.3) in comparison to the average (3.2%, SD: 3.7%) (p=0.046) and the small (5.9%, SD: 7.9) (p=0.007) component size groups. There was no difference in NN between small and average sized components (p=0.1). Patients in the high ion group (25 patients) had significantly greater NN than patients with low ions (10.1%, range: 1%-32%, SD: 8.3 Vs 2.3%, range: 0-11, SD: 2.3) (p=0.0001). NN>10% was seen in 16 hips (7.5%). The odds ratio of having high ions if NN>10% was 125 (p<0.001).

Discussion
The findings of this study showed that greater NN occurs in females and patients with small components and in patients with high ions. In addition, the ROC analysis showed that NN can be used as a diagnostic radiological tool in resurfaced hips, indicating the presence of increased wear. Furthermore, hips with NN> 10% should be investigated further as they are more likely to have increased wear.

References:

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