Metal ions and Lymphocyte counts in the bedding-in period. An RTC between Resurfacing and ceramic on poly THA

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INTRODUCTION: In Metal on metal articulations high ion levels of chromium (Cr) and cobalt (Co) are indicative of excess wear. Cross sectional studies have found an association between high circulating levels of metal ions and a reduced T-cell count, in particular, CD8+ cells (Fig 1) [1,2]. The present RCT of resurfacing (RHA) and 28 mm ceramic on polyethylene (THA) aims to investigate the development and relationship of Co Cr ions and lymphocyte counts during the bedding in period.

METHODS: The patients were randomized to either RHA (ASRTM, DePuy) or THA. Whole blood (wb) and serum (s) samples were collected prior to surgery, at 8 weeks, 6 months and 12 months.

The samples were analyzed for Co and Cr ions using a Finnigan ELEMENT ICP-SFMS. The total lymphocyte count was measured using an automated hematology instrument (Model XH-1800, Sysmex Co. Ltd., Kobe Hyogo, Japan) and the subsets CD3+, CD4+, CD8+, CD19+ and CD16+/CD56+ were analyzed on a Becton DickinsonFacsCalibur/FacsCanto II flow cytometer. Standardized AP and lateral oblique view radiographs provided cup inclination and anteverision angles.

Statistical methods: Using STATA 10.0 Delta values for mean metal ions and lymphocyte subpopulations were analyzed, using ANCOVA adjusted for sex and baseline values and robust standard error estimation. A Spearman correlation analysis was used to evaluate links between lymphocytes and metal ion levels. Repeated measurement regression analysis, using STATAS cluster option was used to evaluate effect of head size.

RESULTS: Demographics are listed in table 1. We could not demonstrate any change in the total or lymphocyte subsets during the bedding in period and no difference was noted between the RHA and THA groups (Fig 2). Nor did we demonstrate any correlation between the lymphocyte counts and the metal ion levels.

DISCUSSION: In contrary to cross sectional studies suggesting a depressive metal ion influence, in particular the CD8+ subgroup, [2] this RCT does not support the association. Our study did not demonstrate the same 6-9 months ion peak found in other running-in studies [3,4], but rather a slow continuous rise with lower median ion concentrations. It could indicate lower wear or perhaps a longer bedding in period. Contrary to our expectations we found the inclination including and just above 45 deg. to display the highest metal ion levels. However our steepest cups also had very large heads so may have compensated for the position. A study using the same component found a protective effect of large heads and suggested a “safe” zone below 45 deg. [5] Our results support those conclusions.

REFERENCES: