



P15:103

## Serum metal ion concentrations following total knee arthroplasty using megaprotheses for tumour indications: Is there a matter of concern?

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**Background:** Metallic wear following endoprosthetic reconstruction is a continuing matter of concern in the literature. The aim of the study was to determine the values of cobalt (Co), chromium (Cr), and molybdenum (Mo) in the serum of paediatric patients following reconstruction of the knee using fixed hinge megaprotheses after tumour resection. Further, these metal ion levels were compared with pre-operative controls as well as metal ion levels following metal on metal (MoM) total hip arthroplasty (THA) and rotating hinge total knee arthroplasty with standard devices and megaprotheses.

**Methods:**

**Fixed hinge group:** There were ten patients with a distal femoral or proximal tibial device (Howmedica Modular Resection System/HMRS®). The mean follow-up was 109 months (range, 67 to 163).

**Rotating Hinge Knee groups (RHK):** There were 17 megaprotheses (Limb Preservation System; LPS/M.B.T.) and eight standard rotating hinge devices (S-ROM Noiles). The mean follow-up was 35 months (range, 9-67 months).

**Total Hip Arthroplasty group (THA):** Thirty-two patients underwent metal-on-metal large diameter total hip arthroplasty (ASR XL Head). For this study, the preoperative, the 12-months, and the 24-months data were regarded as controls.

**Metal ion analysis:** The concentrations of Co, Cr, and Mo were determined using electrothermal graphite furnace atomic absorption spectrometry (ET ASS).

**Results:** In the fixed hinge megaprotheses group the mean concentration for Co, Cr and Mo were 0,51 µg/dl (range, 0,04-1,28 µg/dl), 0,420 µg/dl (range, 0,148-0,891 µg/dl), and 0,06 µg/dl (range, 0,01-0,09 µg/dl). The values for Co and Cr were tenfold and twofold, respectively, increased compared to the upper values from the reference laboratory, while Mo was within the limits.

The serum concentrations of Co and Cr were significantly higher compared to the rotating hinge group with the standard device ( $p < 0.001$ ), and the preoperative controls ( $p < 0.001$ ), while the serum concentrations of patients following MoM THA were higher at one and two years of follow-up.

**Conclusion:** Determining the concentrations of metal ions following fixed hinge and rotating hinge total knee arthroplasty revealed significant increments for Co and Cr. Thus, periodic long-term follow-ups are recommended. Upon the occurrence of adverse reactions to metal debris or intoxications, the revision of the hinge implant to a rotating hinge device or another reconstruction method should be considered.

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