

Serum Metal Ion Levels Following Total Hip Arthroplasty: A Comparison Between Monoblock and Modular Dual Mobility Components

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Introduction: Modular dual mobility (DM) components were introduced to overcome the difficulties controlling orientation during component insertion and inability to confirm full implant seating limitations of monoblock-DM components. Due to the metal-on-metal interface on modular-DM implants (titanium cup and CoCr liner), fretting and corrosion releasing metal ions can be a concern. This study prospectively reviewed metal ions (cobalt, chromium, and titanium) on patients with monoblock-DM and modular-DM implants with a minimum 1-year follow-up.

Methods: All patients with monoblock-DM and modular-DM implants underwent evaluation of metal ions at their one-year follow-up appointment. Radiographic evaluation for acetabular polar gaps was performed. Elevated metal ions were determined using standard laboratory ranges. Differences were assessed using the Mann Whitney-U test and Fisher's exact test.

Results: Fifty consecutive patients (25 monoblock-DM and 25 modular-DM) were included in this study. All patients in the monoblock-DM group were primary THA and all in the modular-DM group were revision THA. Mean age and BMI were 73 and 26, respectively. Mean length of implantation was 1.2 years. We found no difference in metal ion elevations between groups at a minimum of one-year post implantation (cobalt, $p=1.0$; chromium, $p=0.49$; titanium $p=1.0$). Within the modular-DM and monoblock-DM cohorts, there were an equal number of patients with mildly elevated cobalt ($n=6$), as well as mildly elevated titanium ($n=1$). When reviewed as raw values, there was a difference in mean chromium levels between monoblock-DM and modular-DM cohorts (monoblock-DM=1.4 vs. modular-DM=1.2, $p=0.03$). Two monoblock-DM patients had a 1-mm polar gap. One modular-DM liner was malseated.

Conclusions: There were no differences in metal ion elevation minimum one-year post implantation between primary monoblock-DM and revision modular-DM cohorts. This is encouraging based on the titanium/cobalt chrome interface in the modular-DM implant.