

## Paper #34

## Serum Metal Levels for the Diagnosis of Adverse Local Tissue Reaction Secondary to Corrosion in Metal-on-Polyethylene Bearing Total Hip Arthroplasty

**Notes** 

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Introduction: Recently, corrosion at the head-neck junction in metal-on-polyethylene bearing total hip arthroplasty (THA) has been recognized as a cause of adverse local tissue reactions (ALTR). Serum metal levels have been advocated as a tool for the diagnosis of ALTR, however no prior studies have specifically examined their utility. The purpose of this study was to determine the optimal cutoff values for serum cobalt and chromium in diagnosing ALTR after metal-on-polyethylene bearing THA.

**Methods:** We reviewed 447 consecutive patients with serum metal levels tested at our institution and identified 62 with a metal-on-polyethylene bearing who had axial imaging or underwent reoperation to confirm the presence or absence of ALTR. Receiver operating characteristic curves were produced to identify cutoff thresholds to optimize sensitivity and diagnostic test performance was characterized.

**Results:** 42 of the 62 patients (66%) were positive for an ALTR. The best test for the diagnosis of ALTR was the serum cobalt level (area under the curve [AUC]=99%). A threshold cutoff of ≥1.0 ng/ml had a sensitivity of 100%, specificity of 90%, positive predictive value (PPV) of 96%, and negative predictive value (NPV) of 100%. Serum chromium levels were also diagnostic (AUC=87%). A threshold cutoff of ≥ 0.15 ng/ml had a sensitivity of 100%, specificity of 50%, PPV of 81%, and NPV of 100%. Finally, serum cobalt to chromium ratio was also helpful for diagnosis (AUC=90%). A threshold cutoff of 1.4 for the cobalt to chromium ratio offered a sensitivity of 93%, specificity of 70%, PPV of 87%, and NPV of 82%.

**Conclusions:** Measurement of serum cobalt with a threshold value of 1.0 ng/ml in our experience is the best test for identifying the presence of ALTR in patients with a metal-on-polyethylene THA. Measurement of chromium and the ratio of cobalt to chromium are also of value.