Diagnosis of Periprosthetic Joint Infection In Revision Hip Arthroplasty With A Metal-On-Metal Bearing Or Corrosion

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Introduction: Failed metal on metal (MOM) bearings and corrosion reactions are being increasingly encountered with little to guide evaluation for periprosthetic joint infection (PJI). Our purpose was to determine the utility of the erythrocyte sedimentation rate (ESR), C-Reactive Protein (CRP), synovial fluid white blood cell count (WBC) and differential (%PMN) in diagnosing PJI in failed hips with a MOM bearing or corrosion.

Methods: We identified 150 revision THA that included a MOM bearing (92, 61%), hip resurfacing (19, 13%) a metal-on-polyethylene bearing with corrosion (30, 20%) or full thickness polyethylene wear with metallosis (9, 6%). 19 Patients (13%) were diagnosed as infected using MSIS criteria. Mean laboratory values were compared between groups and receiver operating curves (ROC) generated with an area under the curve (AUC) to determine test performance and optimal cutoffs. Only synovial fluid samples with both a WBC and differential were included to ensure accuracy of the samples.

Results: The synovial fluid WBC was deemed inaccurate secondary to cellular debris in 47 patients (31.3%); 41 of these were not infected and initially reported with a mean synovial WBC of 16,157 cells/μL before being deemed inaccurate. Infected patients had significantly higher mean serum ESR (50 vs.18 mm/hr), CRP (65 vs. 13 mg/L), synovial fluid WBC (25,547 vs. 1720 cells/μL) and differential (89% vs. 52% PMN) [p < 0.0001, all]. The best tests for diagnosis of PJI were the synovial fluid WBC (AUC=98%, optimal cutoff 4,350 WBC/μL), and differential (AUC = 90%, optimal cutoff 85%PMN). The ESR and CRP both had good sensitivity.

Discussion: The diagnosis of PJI is extremely difficult in patients with metallic bearings or corrosion and the synovial fluid WBC can frequently be falsely positive. It should only be relied upon if a manual count is done or if a differential can be performed on the sample.

Significance: This study is the first to determine optimal cutoff values for commonly used laboratory values in the diagnosis of PJI, as well as the impact of cellular or metal debris on the utility of synovial fluid analysis in the diagnosis of PJI in failed hip arthroplasties with a MOM bearing or corrosion. As the clinical presentation and laboratory values of failed hips with a MOM bearing or corrosion due to aseptic reasons can mimic those of PJI, this study will help guide the diagnosis and appropriate treatment for such patients.

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References: 

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