The Utility of MRI with Metal Artifact Reduction Sequencing in Diagnosing Periprosthetic Joint Infection after Total Hip Arthroplasty

Kaitlin M. Carroll, BS, Erik Schnaser, MD, Hollis Potter, Michael B. Cross.
Hospital for Special Surgery, New York, NY, USA.


Introduction: The current recommendation by the AAOS in the 2010 clinical practice guidelines for the use of MRI to diagnose a periprosthetic joint infection (PJI) is “inconclusive” given the lack of evidence to support its use. The purpose of this study was to determine the utility of MRI with metal reduction artifact sequencing in diagnosing a periprosthetic joint infection (PJI) after total hip arthroplasty (THA).

Methods: 176 patients who underwent MRI with multi-acquisition variable resonance image combination (MAVRIC) to reduce metal artifact for a painful THA between the years of 2009-2013 were retrospectively evaluated. All MRIs were read by one of four radiologists with extensive experience in interpreting MRIs after THA. All MRIs were performed using a 1.5 Tesla magnet. Of the 176 patients examined, 16 patients were found to have a deep periprosthetic joint infection using Musculoskeletal Infection Society (MSIS) criteria after the MRI was performed. MRI reads were classified as either positive (read as “evidence of active infection” or “suspicious for infection”) or negative (read as no evidence of infection). Only one patient who had a positive MRI read was excluded because of loss to followup after the MRI was performed.

Results: Of the 160 aseptic patients, only one patient was read as suspicious for infection (false positive rate = 0.6%, specificity=99.4%, negative predictive value (NPV)=98.8%). Of the 16 patients with an infected THA, 14 patients were read as positive for infection (false negative rate=12.5%, sensitivity = 87.5%, positive predictive value (PPV)=93%).

Discussion: MRI with metal reduction artifact sequence is a highly specific test to diagnose or rule out a PJI with a low false positive rate and excellent PPV and NPV however, given its lower sensitivity than published for the serum C-reactive protein, is not recommended as a general “screening” test for all patients with pain after THA to rule out infection.

Significance: Traditionally, magnetic resonance imaging (MRI) has not been routinely used after TJA, given the historical limitations in visualization secondary to metal artifact. Multi-acquisition variable resonance image combination (MAVRIC) sequencing MRI has greatly improved the images obtained with MRI, now allowing its use in evaluating a painful prosthetic joint.

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