

Abstract for resident research day 2020:

Prognostic Value of Rating Systems for Osteonecrosis of the Femoral Head (ONFH)

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Background:

Osteonecrosis of the femoral head (ONFH) remains a challenging problem in young patients. Many risk factors have been elucidated but an individual's clinical course is difficult to predict based on exam and imaging. Arthroplasty has become an increasingly viable option for end stage ONFH and has good outcomes, but is ideally avoided in young patients. If ONFH is diagnosed at an early enough stage, various treatment options may preserve the native femoral head and delay arthroplasty.

Current classification systems are complicated, have low inter-observer reliability, and no clear correlation to clinical outcomes.

This study aims to review the currently used rating system and compare to a case series with clinical outcomes. Additionally, we introduce a new rating system which is based on CT scan and may provide a more objective quantification of the extent of ONFH and better predict clinical progression.

Methods: 40 sets of de-identified images were randomized and provided to 8 evaluators (ARCO panel, ONFH experts, and residents). We provided instructions for each scoring system (modified Kerboul, JOA, Steinberg, novel rating system). All measurements were performed using NIH ImageJ software. After the first round of scoring the images were again randomized and sent back to each rater for a second round of scoring several weeks later. Analysis was performed to calculate inter-observer and intra-observer reliability for each rating system. Clinical outcomes for each patient were reported in terms of progression to arthroplasty.

Results: inter-observer reliability reported as Kappa (Kerboul 0.2778; JOA 0.298; Steinberg 0.092; novel rating system 0.545). Novel rating system correlated to the following clinical outcomes for progression to THA within follow-up period (stage 1: 0%, Stage 2: 12.5%, Stage 3: 50 %)

Discussion: All of the currently accepted rating systems we evaluated had low to very low inter- and intra-observer reliability. Additionally, there was not a clear relationship between any of these rating systems and clinical progression to femoral head collapse or hip arthroplasty. The poor reproducibility and lack of correlation to patient outcomes greatly limits the utility of these systems in evaluating individual cases of ONFH. Our novel system (to be named shortly) was significantly more reproducible which was likely related to the relative simplicity and division into only 3 stages. There was a very clear clinical correlation between stage at time of imaging and likelihood of progression to hip arthroplasty. We recommend further validation of this rating system and adoption into clinical practice for evaluation and counseling of patients with ONFH.