

CORR Insights®: High Prevalence of Adverse Reactions to Metal Debris in Small-headed ASR™ Hips

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Where Are We Now?

Reito et al. should be commended for enhancing our knowledge on this controversial topic. Their work reinforces the notion that certain metal-on-metal (MOM) hip arthroplasty implant designs can perform poorly [1, 2]. The study from Reito and colleagues also serves as another example of how MOM THA seem to be associated with worse outcomes compared with their specific MOM hip resurfacing counterparts [3]. It is now clear that MOM should not be the bearing of choice for THA.

Some of the current questions surrounding MOM THA versus MOM hip resurfacing include: 1) does the benefit of femoral bone conservation provided by MOM hip

resurfacing warrant the use of the MOM articulation (in certain designs)? 2) Which MOM hip resurfacing designs and techniques are best, and how should patients be selected? 3) What are the design elements that account for the poor performance of those that have not fared well? 4) If MOM hip resurfacing is warranted in certain circumstances, and survivorship is so tied to minor differences in acetabular component positioning, what surgical training methods and intraoperative acetabular component position optimization methods should be employed? 5) How should hip surgeons manage MOM hip arthroplasty patients?

In the final section of this paper, I offer potential studies that may provide answers to these controversies.

Where Do We Need to Go?

Reito et al. demonstrated that adverse tissue reactions are very common (upwards of 50 % at 7 years) with Depuy ASRs™ that have femoral head sizes less than 50 mm. The authors attribute this to the design flaw of poor cup coverage and a high likelihood of edge loading, resulting in a high-wear metal ion production state. Interestingly, Reito et al. also concluded that predominantly cobalt ion production is the result of corrosion at ASR™ THA taper junctions. Retrieval, metal ion, and histologic studies, along with mining implant registry data, will help unravel the details surrounding the failure mechanisms associated with MOM THA.

How Do We Get There?

Circling back to the major controversies in this area:

This CORR Insights® is a commentary on the article “High Prevalence of Adverse Reactions to Metal Debris in Small-headed ASR™ Hips” by Reito and colleagues available at:
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1. Does the benefit of femoral bone conservation provided by MOM hip resurfacing warrant the use of the MOM articulation (in certain designs)?

This question is unlikely to be answered in a randomized trial; rather, this calls for a cohort study (enrollees matched for age, gender, BMI, and preoperative activity level) comparing 20-year survivorship of an acceptable MOM hip resurfacing implant design (perhaps the Birmingham Hip Resurfacing) with a THA construct whose performance and longevity have been demonstrated.

2. Which MOM hip resurfacing designs and techniques are best and how should patients be selected?

A randomized, controlled trial comparing two acceptable MOM hip resurfacing device systems could determine which MOM hip resurfacing designs and techniques are best.

Retrieval studies, registry studies, and systematic screening program cohort studies similar to that of Reito et al., also will continue to help expose the design elements that account for MOM THA's poor performances.

3. What are the design elements that account for the poor performance of those that have not fared well?

A randomized controlled trial comparing socket positioning with and without computer navigated and/or robotic assisted acetabular component placement could potentially verify whether MOM hip resurfacing is warranted in certain circumstances.

4. If MOM hip resurfacing is warranted in certain circumstances, and survivorship is so tied to minor differences in acetabular component positioning, what surgical training methods and intraoperative acetabular component position optimization methods should be employed?

This topic, likewise, is ripe for investigation using randomized trials.

5. How should hip surgeons manage MOM hip arthroplasty patients?

At present, yearly followup is suggested for all MOM hip arthroplasty patients, including asymptomatic patients at relatively low-risk. The algorithms for the management of high-risk and mildly symptomatic patients are more complex. In a position statement, the American Association of Hip and Knee Surgeons, American Academy of Orthopaedic Surgeons, and The Hip Society suggest that, "future research focusing on validation of the current diagnostic tools for detecting adverse local tissue reactions, as well as optimization of MOM bearings and modular connections to further diminish wear and corrosion is warranted" [4].

While we await the results of these high-quality studies, surgeons should focus on a few key issues: approaching and employing future "technology" with a healthy level of skepticism, working locally to have their institutions participate in the American Joint Replacement Registry, adopting systems for tracking outcomes and quality, and considering the creation of "collaboratives" which facilitate the performance of multicenter studies.

References

1. Baker RP, Pollard TC, Eastaugh-Waring SJ, Bannister GC. A medium-term comparison of hybrid hip replacement and Birmingham hip resurfacing in active young patients. *J Bone Joint Surg Br.* 2011;93B:158–163.
2. de Steiger RN, Hang JR, Miller LN, Graves SE, Davidson DC. Five-year results of ASR XL acetabular system and the ASR hip resurfacing system: an analysis from the Australian Orthopaedic Association national Joint Replacement Registry. *J Bone Joint Surg Am.* 2011;93:2287–2293.
3. Garbuz DC, Tanzer M, Greidanus NV, Masri BA, Duncan CP. The John Charnley Award: metal-on-metal hip resurfacing versus large-diameter head metal-on-metal total hip arthroplasty. *Clin Orthop Relat Res.* 2010;468:318–325.
4. The American Association of Hip and Knee Surgeons, American Academy of Orthopaedic Surgeons, and The Hip Society. Current concerns with metal on metal arthroplasty. Available at: <http://www.aaahks.org/member/healthpolicy/currentconcernsMOM.pdf>. Accessed May 31, 2013.