Editor's Spotlight/Take 5

Editor's Spotlight/Take 5: Poor Survivorship and Frequent Complications at a Median of 10 Years After Metal-on-Metal Hip Resurfacing Revision

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Novelty resides at the heart of orthopaedic surgery. All of the life-transforming innovations surgeons use as part of routine care now—hip and knee arthroplasty, intramedullary fixation, the arthro-

scope—were uncertain, untested innovations before they became normative. But things do not always turn out that well, and when unintended harms arise, as happened in the last decade with bone morphogenetic protein in the spine and with metal-on-metal (MoM) bearings in the hip (among others), we find ourselves asking hard questions. How do new technologies gain such a quick foothold in orthopaedic surgery, and how can we help our patients avoid being stung by unintended consequences of new interventions? Should we think differently—whether in educational programs, at the society level, or from the vantage point of device regulation—about how we introduce new implants, devices, or approaches? And how do we balance risk and reward when we think about the interventions with lifelong implications that we perform in young

patients? Recent experiences with MoM THA in particular—and perhaps with MoM total hip resurfacing arthroplasty—provide an instructive if sobering case for analysis, one that should matter even to nonarthroplasty surgeons.

What if the following well-intentioned statements prove to be incorrect?

- “The success of metal-on-metal hip resurfacing in the medium-term in young and active patients is becoming evident” [10].
- Advantages of minimally invasive hip resurfacing “include less damage to soft tissue, muscle and bone; smaller scars; less blood loss; and shorter hospital stays and rehabilitation” [2].
- “Hip resurfacing arthroplasty is less invasive than total hip resurfacing and addresses the problem of preserving femoral bone stock” [7].
- The procedure [total hip resurfacing arthroplasty] is especially attractive for “young, active patients, particularly because of

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In “Editor's Spotlight,” one of our editors provides brief commentary on a paper we believe is especially important and worthy of general interest. Following the explanation of our choice, we present “Take Five,” in which the editor goes behind the discovery with a one-on-one interview with an author of the article featured in “Editor's Spotlight.”

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the conservative nature of this treatment and its ability to preserve femoral bone. It is more anatomic and physiologic than stem-type hip replacements, and it represents a truly minimally osteoinvasive procedure" [4].

What if hip resurfacing arthroplasty—which still has its supporters, and which is perceived by some to be advantageous especially in younger, larger patients both for clinical [5, 11] and medical-economic reasons [8]—turns out to have a higher risk of revision than conventional THA? What if there is a high risk of repeat revision among those who undergo revision of total hip resurfacing arthroplasty devices?

Although the question of whether hip resurfacing arthroplasties are more likely than THAs to come to revision surgery remains a topic of controversy in some circles, serious concerns on this point continue to mount and recent, robust studies (including large reports [9], economic analyses [6], and registry data [12]) appear to favor THA over resurfacing even for young patients. And last year, *Clinical Orthopaedics and Related Research*® published a registry study suggesting that repeat revisions following a first revision of a total hip resurfacing arthroplasty are disconcertingly common [13].

In this month's Hip Society Proceedings in *CORR*®, Professor David

W. Murray's team from the University of Oxford in England confirmed those findings in a more-detailed, single-site drill down, demonstrating that nearly 40% of patients undergoing his resurfacing arthroplasty revision will undergo a second revision at a minimum followup of 7 years. Professor Murray's group further determined that if the index revision was performed for pseudotumor, both Oxford Hip Scores and UCLA activity scores were likely to remain low. Rather disconcertingly, they found that 45% of these patients experienced serious complications following the first revision of the resurfacing component. These batting averages are worse than those reported in contemporary series of revisions for pelvic discontinuity [1, 3], and certainly do not reflect what surgeons had hoped for when performing (or even when revising) what had been billed as a bone-preserving primary procedure ideal for young patients.

The moral of this story applies broadly, and the events that took us here should be of interest even to surgeons who never inserted or revised a hip resurfacing component; indeed, they should provoke introspection even among nonarthroplasty surgeons for reasons noted earlier.

Join me in the Take-5 interview that follows with Professor Murray for the answers to those and other questions.

Take Five Interview with David W. Murray MD, FRCS (Orth), senior author of *Poor Survivorship and Frequent Complications at a Median of 10 Years After Metal-on-Metal Hip Resurfacing Revision*

Dr. Leopold: *Congratulations on this thought-provoking work. MoM designs achieved wide use in many countries for a period of time, but there was particular enthusiasm for them in Great Britain, where you are from. How did they grow so popular so fast, if we could turn back the clock, what might we—as a specialty—have done differently, and how have your findings in particular changed your clinical perspective?*

Professor Murray: The designers of the Birmingham Hip Resurfacing arthroplasty spent many years developing it and refining the indications

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and techniques. Their clinical results and early results from independent centers were encouraging, especially given the young patient population treated with these implants, which lead to an increase in use of this device. However, these results were incorrectly extrapolated to apply to other MoM hip resurfacing designs and stemmed MoM THAs, with these devices being rapidly introduced and implanted widely. In hindsight, these other MoM hip resurfacing arthroplasty designs and stemmed MoM THAs were introduced too early and did not have the appropriate evidence base for their widespread clinical use.

In light of our findings, and those published by others, we have stopped implanting MoM hip resurfacing arthroplasties at our center.

Dr. Leopold: *What structural changes—whether educational, regulatory, or at the specialty-society level—should be considered to avoid the problems observed with MoM THA and resurfacing designs from happening again with future orthopaedic innovations?*

Professor Murray: It is important for the orthopaedic community to learn lessons from the MoM experience. There were three issues that contributed to the major problems with MoM bearings: (1) The main failure mechanism, the adverse reaction to metal debris, was relatively novel and

was unexpected; (2) the failures could be catastrophic with destructive pseudotumors; and (3) the failures did not become apparent until the devices had been used in appreciable numbers for 5 years. Therefore, for novel devices, a minimum of 5 years good clinical data should be required before widespread use. Good-quality clinical studies are important because they will identify problems before national registries.

Dr. Leopold: *On one hand, young patients undergoing hip arthroplasty have the most to gain when surgeons consider new devices, since there is a perception that a traditional metal-on-polyethylene THA will not be a lifelong solution for many patients under the age of 50. On the other hand, young patients may have the most to lose when given an approach—perhaps like MoM, or hip resurfacing designs—that seems to offer durability but in fact has not been proven effective over the long term and, as we saw with MoM, may not deliver on its apparent potential. How do you see this, and, in the future now that the MoM experience is mostly behind us, how will you advise your young patients considering new approaches?*

Professor Murray: I would advise the use of implant designs and techniques that have already been shown to work well in young patients. I would also advise caution when considering new designs and approaches in young

patients until there is sufficient evidence to support their use. There is a need for improvements in hip arthroplasty in the young and this work should be encouraged, however good clinical data is required before these innovations are widely used.

Dr. Leopold: *Regardless of best efforts and good intentions, sometimes patients will request a particular device or design—perhaps because of direct-to-consumer marketing, or recommendation of a friend—that a surgeon may perceive as not being in that patient's best interests. How do you suggest surgeons seeing such patients might deal with such requests in the office?*

Professor Murray: I would tell patients my opinion about the best course of management. If a patient wishes to consider an alternative intervention that I do not feel is in their best interests, then I would refer him or her to a surgeon who routinely performs that intervention.

Dr. Leopold: *Some national registries have spoken to the questions you've asked here [13]. How do you your findings compliment or extend large-scale registry studies, what role do you see the registries having in answering questions like the ones you addressed here, and how do you balance registry data with single-center data in informing your own practice on questions like these?*

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Professor Murray: Registry data have a number of advantages compared to single-center studies, such as the inclusion of large numbers of cases and reporting on a wide and unselected patient/geographical population therefore reducing the risk of sampling bias. However, limitations of registries must be acknowledged, which include the potential for underreporting failures, incomplete data entry, and lacking the detail contained in single center studies. Registries were never designed to answer specific research questions so it is not possible to infer causality when associations are identified. Furthermore, I believe that single-center studies tend to identify problems before registries. We therefore consider registry data to be complementary to single center data or multicenter data and are cautious interpreting the data whatever the source.

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