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CORR Insights®: The John Charnley Award: Highly Crosslinked Polyethylene in Total Hip Arthroplasty Decreases Long-term Wear: A Double-blind Randomized Trial

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Where Are We Now?

The last few years have seen several disasters in hip arthroplasty which, as recently

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as 2007, had rightly been described in *The Lancet* [3] as “the operation of the century.” But the withdrawal of the DePuy ASR™ (DePuy Inc, Warsaw, IN, USA) metal-on-metal (MoM) hip in August 2010, after almost 100,000 had been implanted worldwide, simply served as the precursor to problems with other MoM hips, of which hundreds of thousands have been implanted into patients. While the first ASR cases in the United States may have settled, legal proceedings in other countries are ongoing. Additionally, higher-than-expected revision rates with other designs of MoM hips have seen legal proceedings commence. Problems have also been identified with modular-neck hip implants, which raised several pertinent questions as to how such implants came to market, how they were tested in vitro, whether the 510 k/

CE marking procedure was effective, and how quickly were clinical problems identified and acted on.

Given such a turbulent background, it may be that new implants, which are claimed to be innovative, should be treated with additional caution. It may also be that orthopaedic surgeons will now look to technologies that have been proven during longer timescales. As such, the clinical results offered in the paper by Thomas and colleagues are to be welcomed.

Where Do We Need To Go?

The paper by Thomas et al. contributes long-term data on the wear performance of highly crosslinked polyethylene in THA. At 10 years, there was a substantial reduction in volumetric wear between the highly crosslinked and conventional ultra-high molecular weight polyethylene liners, with 14 mm³ and 98 mm³ reported, respectively. Of those patients in both groups available for

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followup, none required revision operations. All bearing surfaces were of 28-mm diameter. Some have argued [2, 4], that the problem of wear in most THAs has been solved through the use of highly crosslinked polyethylene. To many, this is a reassuring hypothesis. How might it be proven? Longer-term studies would be most useful, as would those involving greater numbers of patients than those reported by Thomas et al. Other researchers might consider the bearing surface and ask if a ceramic femoral head might result in lower wear than a metallic femoral head. While there are several types of crosslinked polyethylene available, we should not assume that they are created equal. There are those who claim uncemented fixation is superior to cemented fixation, and this sometimes heated debate likely will continue. The Thomas et al. paper clearly reports that wear is reduced from the use of highly crosslinked polyethylene, and it is likely that osteolysis will be reduced too. Yet, the authors noted in their study, “Osteolysis resulting from wear is only one of many potential causes of revision.”

How Do We Get There?

To obtain answers to the questions indicated above, a number of studies would be required. It may well be that arthroplasty registers could provide key insights. The National Joint Registry of England, Wales, and Northern Ireland now claims to be the largest in the world, and its copious data, which is being strengthened with time, has already been used in peer-reviewed publications to provide understanding of the performance of various subgroups of total joint replacements. The latest Australian Orthopaedic Association National Joint Replacement Registry [1] shows a lower rate of revision for crosslinked polyethylene compared to noncrosslinked polyethylene acetabular components. Such joint registry data can also look at issues such as femoral head size and the Australian registry has reported that the use of crosslinked polyethylene has allowed larger head sizes to be used with a subsequent decrease in dislocation rates. The registry [1] states that a head size of 32 mm has the lowest rate of revision, which is somewhat larger than the 28 mm heads used in the Thomas et al. study. The

data from registries can be augmented by high quality but small scale data from long-term trials like that reported by Thomas et al., which will be forthcoming in the future.

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