CORR Insights

CORR Insights®: Metal-on-conventional Total Hip Arthroplasty Bearing Surfaces Have a Higher Risk of Revision Than Metal-on-highly Crosslinked Polyethylene: Results From a US Registry

Richard W. McCalden MD, MPhil, FRCSC

Where Are We Now?

Highly crosslinked polyethylene (XLPE) has essentially supplanted conventional polyethylene for use in total hip arthroplasty (THA) during the past decade. There now exists good evidence to demonstrate a clear reduction in femoral head penetration (and presumably polyethylene wear) and

periprosthetic osteolysis associated with the use XLPE compared to conventional polyethylene in THA [2, 3]. While the annual reports of Australian Orthopaedic Association National Joint Replacement Registry continue to show the clinical benefits of XLPE (demonstrating a reduction in revision rates) [1], other investigators have not demonstrated a clear reduction in revision rates with the use of XLPE at mid-term followup [4].

The current study by Paxton and colleagues attempts to demonstrate the clinical benefits resulting from the use of XLPE compared to conventional polyethylene through the analysis of a large US-based patient database. Their findings demonstrate that, for two specific implant designs, the revision rate was significantly decreased for XLPE compared to the use of conventional polyethylene. Therefore, this work essentially confirms the experience reported by the Australian Orthopaedic Association National Joint Replacement Registry during the past decade. While important work, this study is limited by the observational nature of the study, inherent to all registry or database analysis, and only provides information about two specific hip designs (both of which having been replaced by more recent designs by their respective manufacturers). Furthermore, analysis of this type does not provide any radiological, functional or patient-derived outcomes

This CORR Insights® is a commentary on the article “Metal-on-conventional Total Hip Arthroplasty Bearing Surfaces Have a Higher Risk of Revision Than Metal-on-highly Crosslinked Polyethylene: Results From a US Registry” by Paxton and colleagues available at: DOI: [10.1007/s11999-014-4105-9](https://doi.org/10.1007/s11999-014-4105-9)

The author certifies that he, or any member of his immediate family, has no funding or commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted article.

All ICMJE Conflict of Interest Forms for authors and *Clinical Orthopaedics and Related Research®* editors and board

members are on file with the publication and can be viewed on request.

The opinions expressed are those of the writers, and do not reflect the opinion or policy of CORR® or the Association of Bone and Joint Surgeons®.

This CORR Insights® comment refers to the article available at DOI: [10.1007/s11999-014-4105-9](https://doi.org/10.1007/s11999-014-4105-9)

R. W. McCalden MD, MPhil,
FRCSC (✉)
University of Western Ontario,
339 Windermere Rd., London,
Ontario N6A 5A5, Canada
e-mail: richard.mccalden@lhsc.on.ca

CORR Insights

comparing the two polyethylene materials.

Where Do We Need To Go?

Clearly, longer-term followup is required to confirm the benefits of XLPE. Additionally, what is lacking through the examination of large database and joint registry data is the ability to determine the potential effect of many specific variables to the performance of XLPE. These variables include: Surgical approach, surgeon experience, implant design, the specific properties of the XLPE, femoral head size, as well as patient factors including gender, race, and activity level.

How Do We Get There?

In order to seek the answers that we require, specifically, to show the clear long-term clinical benefits associated with the use of XLPE, there needs to

be ongoing surveillance and reporting of long-term results from existing databases as well as the creation of national and/or large population-based registries, particularly from North America. Where it exists, the inclusion of validated patient outcome scores and/or functional scores, in addition to survivorship data (revision rates) should be reported. Additionally, researchers must continue to report on previously initiated randomized controlled trials comparing XLPE to conventional polyethylene in order to demonstrate the long-term benefits and ensure there are no long-term unexpected deleterious results associated with XLPE. The creation of new randomized controlled trials to compare XLPE with conventional polyethylene is arguably unethical at this point in time with the already-strong evidence to support the ongoing use of XLPE for THA. Long-term followup is required through ongoing surveillance (at 15 years to 20 years and beyond) with the addition of cross-sectional imaging (CT scan) to quantify periparticular osteolysis, which is perceived

as an important precursor to implant failure.

References

1. Australian Orthopaedic Association National Joint Replacement Registry. Hip and knee arthroplasty: Annual report. Available at: <https://aoanjrr.dmac.adelaide.edu.au/en>. Accessed January 22, 2015.
2. Kurtz SM, Gawel HA, Patel JD. History and systematic review of wear and osteolysis outcomes for first-generation highly crosslinked polyethylene. *Clin Orthop Relat Res*. 2011;469:2262–2277.
3. Kuzyk PR, Saccone M, Sprague S, Simunovic N, Bhandari M, Schemitsch EH. Crosslinked versus conventional polyethylene for total hip replacement: a meta-analysis of randomised controlled trials. *J Bone Joint Surg Br*. 2011;93:593–600.
4. Paxton E, Cafri G, Havelin L, Stea S, Pallisó F, Graves S, Hoeffel D, Sedrakyan A. Risk of revision following total hip arthroplasty: Metal-on-conventional polyethylene compared with metal-on-highly cross-linked polyethylene bearing surfaces: International results from six registries. *J Bone Joint Surg Am*. 2014;96 Suppl 1:19–24.