



Invited commentary on “Outcomes of ceramic bearings after revision total hip arthroplasty in the medicare population”

Martyn Porter¹, Anna Louise Rose Porter², Asim Rajpura¹

¹Centre for Hip Surgery, Wrightington Hospital, England, UK; ²University of Newcastle, England, UK

Correspondence to: Martyn Porter. Centre for Hip Surgery, Wrightington Hospital, England, UK. Email: martynporter@hipkneeclinic.com.

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Revision total hip arthroplasty (R-THA) represents an increasing and important burden following primary total hip arthroplasty (P-THA) and the outcomes of R-THA are significantly worse than those following P-THA.

Dislocation following R-THA is a significant complication that increases the risk of mortality in the elderly population (1). Metal-on-metal bearings (MoM) were commonly used in the USA at R-THA mainly because of the ability to use large head sizes to reduce this dislocation risk. Since the recognition of high rates of failure and adverse soft tissue reactions associated with MOM bearings it is important that alternative bearings are studied in order to know which other combinations are used, and more significantly if they are effective. The contemporary bearing options are metal on polyethylene (MoP), ceramic on polyethylene (CoP) and ceramic on ceramic (CoC).

Kurtz *et al.* (2) in their recent publication on the use of Medicare data try and address some of these issues. This large observational study of over 31,000 R-THAs carried out between 2005 and 2013 in patients over the age of 65 years looked at the utilization and outcomes of different bearing combinations.

They identified a marked increase in the use of CoP bearings from 5.3% to 26.6% over the study period and a more modest increase in the use of CoC bearings from 1.8% to 2.5%. It was surprising that although the use of MoM bearings did fall from 27.3% in 2005 that in 2013 10% of R-THAs were performed with MoM bearings- despite the recognition of adverse outcomes.

Outcomes of interest included relative risk of 90-day

re-admission, infection, dislocation, further revision and mortality at any time point after index revision.

They found no significant difference in risk of revision or mortality for either the CoP or CoC cohorts compared with the reference cohort of MoP. The unadjusted 5-year revision estimates were 83.7% for MoP and 82.2% for CoP. Despite there being no significant difference these survivorship rates are vastly inferior to those following P-TA at 5 years.

In comparison there were significant differences in relation to reduction for 90-day readmission with a benefit for CoP compared to MoP, Hazard ratio 0.9 [95% confidence interval (CI), 0.84–0.96] and for dislocation reduction for CoC compared to MoP, Hazard ratio 0.76 (95% CI, 0.58–0.99).

The strengths of this study are that a large population size is used and there is detailed information on the comorbidities of the patients requiring R-THA. This allowed the use of propensity score matching to reduce the effect of confounding between the study groups.

However, the main weakness is the lack of detailed implant descriptors such as brand, head size and stem/acetabular combinations. Therefore, it is difficult to ascertain if the reduced risk of dislocation and re-admission is exclusively related to the use of ceramic bearings, or whether other factors play an important role. The study would have benefited from a breakdown of the reasons and types of the revisions, especially as the paper states that the reason for the revision contributed significantly to the type of complication that the patient experienced. A further limitation was that only 31–33%

of all revisions on the Medicare database had information on bearing codes and therefore many procedures were excluded from the analysis.

Other evidence

Bearing choice in primary and R-THA is of considerable importance. The use of bearing selection in P-THA is well reported and the use of a ceramic bearing is increasing. Data from the National Joint Registry (NJR) of England and Wales has shown that approximately 10% of uncemented P-THA utilized a CoP bearing in 2008. This increased to 30% in 2015. In comparison, the use of CoC bearings in the same group has fallen from about 45% to 30% over the same period (3). However 60% of all uncemented P-THA included ceramics in their bearing couple in 2015.

The question is why is the use of ceramics so popular? Possible reasons include potential concerns of taper performance with a metal head, improved wear properties and potentially a lower incidence of infection (4). With CoC bearings, the use of a large head size may help reduce dislocation. Conversely there are concerns regarding ceramic fracture which is now a rare event and squeaking or noises generated from CoC articulations which are more common.

The 2016 annual report of the NJR reported on 78,130 revision hips that had a cumulative re-revision rate of 14.83% at 10 years (3). When the primary of the revision hip was also recorded in the NJR [20,962], the re-revision rate was 20.56% at 10 years. These figures compare to revision rates following P-THA of between 3–4% over the same time period.

The Australian registry in 2015 reported on 10,629 first revisions and found a further revision estimate between 22% and 25% at 10 years but did not break down by bearing used at first revision (5).

In the Kurtz study the revision rates at 5 years (16–18%) were greater than the England and Wales and Australian estimates. The reasons for these differences are unclear.

Pitto and Sedel looked at 84,894 P-THAs from the New Zealand Registry (4). They found that there was a lower risk of deep infection when CoC bearings were used compared to all other bearing couples over the whole observation period (15 years). Kurtz noted a similar trend but for CoP rather than CoC reported from New Zealand, hazard ratio 0.88. This reduction was not statistically significant, 95% CI: 0.74–1.04. One should note that the study was

supported with institutional funding from CeramTec, the world's largest manufacturer of ceramic bearings, which should be taken into account in terms of considering a potential conflict of interest.

Despite some limitations this work by Kurtz *et al.* contributes significantly to our understanding of the outcomes we can expect from the use of ceramic bearings. However, despite the large population size used there are areas we have highlighted that require further investigation and hopefully other large observational datasets (registries) will publish in more detail to provide clarity into the advantages and disadvantages of ceramic bearings. Cost effectiveness data will also be important.

In the meantime this well-constructed study provides reassurance that the trend in the use of ceramic bearings in R-THA is justified in terms of some important outcome parameters, namely re-admission and dislocation.

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Footnote

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