Clin Orthop Relat Res (2016) 474:2200–2201 / DOI 10.1007/s11999-016-4971-4

Clinical Orthopaedics and Related Research®
A Publication of The Association of Bone and Joint Surgeons®

CrossMark

Published online: 14 July 2016

CORR Insights

CORR Insights®: Do the Reasons for Ceramic-on-ceramic Revisions Differ From Other Bearings in Total Hip Arthroplasty?

Luigi Zagra MD

Where Are We Now?

In their study, Migaud and colleagues address an important topic—the reasons why ceramic-on-ceramic (CoC) bearings in primary THA fail. Previously published studies have examined why metal-on-polyethylene (MoP) and metal-on-metal (MoM) bearings fail, but there is little evidence to suggest why CoC bearings fail and require revision. The authors focus on the time and reason for CoC revision, but not on the failure rate of bearings as the number of primary procedures is not known.

After studying MoP, MoM, and CoC, Migaud and colleagues found that cup loosening was the main reason for revision for each bearing, though CoC bearings had a lower proportion of cup loosening than MoP. CoC bearings fail earlier (after a median of 3 years) compared to MoP (13 years). However, CoC bearings fail around the same time as MoM bearings (4 years) and crosslinked polyethylene (2 years). These data can be partially influenced by demographics that differ in the groups. The CoC population is composed of younger, more active patients, with a high proportion of men, and a greater reported diagnosis of avascular necrosis—all factors in favor of earlier revision.

According to Migaud and colleagues, infection is the second most common cause of revision for CoC bearings, while osteolysis is sixfold less likely for CoC compared to MoP. The third most common revision is directly related to ceramic use, even though squeaking is only reported in a small number of patients. CoC bearings are more sensitive to earlier mechanical complications compared to MoP.

We have no clear evidence to determine the best bearing option for long-term survival of implants. However, not all, but many surgeons in some European countries consider CoC as the best option for young and active patients. For this reason, understanding the mechanics of failure for CoC bearings is essential and could further improve the management of ceramics, leading to fewer complications and better clinical results.

This CORR Insights® *is a commentary on the article* "Do the Reasons for Ceramic-on-ceramic Revisions Differ From Other Bearings in Total Hip Arthroplasty?" *by Migaud and colleagues available at:* DOI: 10.1007/s11999-016-4917-x.

The author certifies that he, or a 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/s11999-016-4917-x.

L. Zagra MD (✉)
Hip Department, IRCCS Istituto Ortopedico Galeazzi, via R. Galeazzi, 4, 20161 Milan, Italy
e-mail: luigi.zagra@fastwebnet.it

CORR Insights

Where Do We Need To Go?

Future studies should investigate the differences in the rate of articular noises and ceramic fracture among the different bearing and implant brands. Interestingly, Migaud and colleagues found that psoas irritation increased the risk of revision for ceramic bearings. Perhaps the cup design, rather than cup diameter, may have influenced this unusual finding, but this, too, requires further investigation.

In vitro studies and finite element analyses have several limitations in anticipating in vivo performance. Ceramic bearings are more sensitive to handling of the components, cup orientation, and surgical technique. Because of this, surgeon experience and education will play a major role in reducing the risk of complications such as squeaking, ceramic damage, and fractures.

We still have unanswered questions. Are the clinical results of CoC bearings the same in both high- and low-volume centers? Do they differ by surgeons trained on ceramic use? Registry data are useful for survival, but comparative trials on selected populations are necessary. Because impingement between the neck of the stem and the rim of the ceramic liner and the consequent subdislocation are the major causes of ceramic damage, indication in special situations where this risk is higher such as in developmental dysplasia of the hip or posttraumatic cases when the orientation can be critical, or in case of soft-tissue laxity, excessive ROM in young women or overweight men doing impact activity, are debatable. Modern ceramic 32 mm and 36 mm heads mitigate some specific CoC complications, but do not eliminate them entirely.

How Do We Get There?

Future studies should examine the different types of ceramic bearings, specifically focusing on behavior, head diameters, and implant positions of each. We may find that what is around the ceramic bearing (design, alloy, thickness, surface finishing and locking mechanism of the metal back, stem taper and neck) is potentially even more of an indication for failure. But also tools for implantation avoiding deformation or damage during insertion and assembling of the components need improvement.

Surgeons who are less experienced with using CoC bearings may not recognize that ceramics are more sensitive to handling and alignment. Surgeons should be trained on managing the metal back of the CoC bearing in order to avoid impingement and edge loading, gentle and precise ceramic liner insertion, and drying and cleaning of the stem taper.

After more than three decades, these issues are not completely solved and must be part of a continuous surgical education both in high and in low-volume centers. Only future research will help us determine the best bearing option for each of our patients according to age, activity level, hip anatomy, and implant features.