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CORR Insights®: Is the Survivorship of Birmingham Hip Resurfacing Better Than Selected Conventional Hip Arthroplasties in Men Younger Than 65 Years of Age? A Study from the Australian Orthopaedic Association National Joint Replacement Registry

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Where Are We Now?

THA has been called the operation of the century, and has revolutionized the treatment of patients with osteoarthritis [8]. Most patients can expect to have pain relief and restored quality of life, including the ability to perform physically demanding activities. However, some patients experience problems after THA, and some patients subsequently undergo revision because of complications.

Beginning in the late 1990s, an increased incidence of polyethylene-associated complications after THA with conventional (metal-on-polyethylene) bearing surfaces led to a renewed interest in hip resurfacing prostheses using a metal-on-metal articulation [3, 4, 6]. The purported advantages of these prostheses include a reduced risk of dislocation, preservation of femoral bone stock compared with conventional stemmed THA, greater ROM, a biomechanically near-normal joint, the possibility of returning to sports activities, and easier revisions, if necessary [15]. Use of these devices grew, but ultimately the results of several designs were disappointing because of early revisions caused by loosening, femoral neck fracture, and pseudotumors. Revision rates in some studies have been high compared with those after conventional THA [1, 7, 9]. Female sex, older age, and smaller femoral-head sizes have been identified as risk factors for revision [13].

The Birmingham hip resurfacing (BHR) prosthesis is the best-performing resurfacing prosthesis, with reported revision rates similar to or even lower than those for conventional THA implants, especially in younger men [3, 14]. Despite concerns about an increased risk of revision with the use of hip resurfacing prostheses, the BHR prosthesis is still used in some countries [2, 11]. To get a sense of how this prosthesis compares with a good contemporary alternative, Stoney et al. [16] compared the results of the BHR prosthesis and the three best-performing conventional THA prostheses based on data in the Australian Orthopaedic Association National Joint Replacement Registry. When used only in patients for whom the BHR prosthesis is recommended (male patients younger than 65 years with a femoral-head size > 50 mm), the BHR prosthesis had a higher all-cause revision rate at 17 years than the selected conventional THA prostheses did.

This is important because a low revision rate compared with conventional

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THA prostheses has been an important justification for the use of the BHR prosthesis. In light of these findings, surgeons might want to reconsider further use of the BHR prosthesis.

Where Do We Need To Go?

This study [16] raises some important questions: (1) With a higher risk of reoperation than for conventional THA protheses, should the BHR prosthesis still be used? (2) If so, should the target population of the BHR prosthesis be narrowed further? (3) Can the other benefits of the BHR prosthesis justify continued use of this prosthesis?

The morbidity, mortality, and economic burden of revision are substantial. From the perspectives of the patient, surgeon, and society, the surgeon should strive to reduce the risk of revision as much as possible. In addition to patient-related factors such as sex, age, and comorbidities, surgery-related factors such as the surgical approach, implant fixation, and type of implant may also influence the revision risk. In the study by Stoney et al. [16], the number of revisions was higher for the best-performing resurfacing prosthesis than for conventional THA implants, even when used only in the recommended target population of younger men. One can therefore question the continued use of the BHR. One of the proposed advantages of hip resurfacing prostheses is better hip function [12]. Any revision can reduce the patient's quality of life and hip function, and revision of a resurfacing arthroplasty is associated with a high risk of re-revision [18]. Some particularly active patients, such as athletes, have high demands in terms of function and stability. These patients may still accept a higher revision rate if a well-functioning BHR prosthesis provides better function. However, as always, before orthopaedic surgery, these patients should be thoroughly informed about the expected outcome and possible complications. The introduction of highly cross-linked polyethylene in acetabular cups or inserts has reduced the number of polyethylene-associated complications. Accordingly, the prosthesis head size may be increased without resulting in polyethylene wear problems. A conventional THA implant with a 36-mm metallic femoral head and a highly cross-linked polyethylene acetabular cup or insert will most likely give sufficient stability for the most active and demanding patients, and with a reduced risk of metal-associated complications and revisions. There is a further need for studies comparing the functional results of the BHR prosthesis with the results of conventional THA implants. In light of the increased risk of revision and possible long-term neurologic and cardiovascular consequences of increased metal-ion levels of cobalt and chromium in the blood, the functional advantages of the BHR prosthesis must be substantial if it will continue to be used.

The consequences of a revised BHR prosthesis for a patient's quality of life and hip function also need to be explored further. The results of the study by Stoney et al. [16] remind us of the need for continued follow-up of patients with metal-on-metal hip resurfacing prostheses. Pseudotumors may initially be asymptomatic, but will eventually become symptomatic and result in revision. Frequent surveillance is important, particularly for patients with a known pseudotumor or those with high metal-ions in the blood [9]. Compliance with updated guidelines regarding follow-up of these patients is also important [10].

How Do We Get There?

Although encumbered with selection bias, national and regional arthroplasty registries have been shown to be useful in monitoring and comparing orthopaedic implants, and they have contributed substantially to detecting inferior implants and techniques [4, 17]. Stoney et al. [16] demonstrated the impact of an arthroplasty registry. Through close cooperation between registries and health authorities, it is important to make critical information available to surgeons and hospitals [17]. Hospital results should be made available and hospital performance and adherence to guidelines should be monitored using these registries. Collaboration between arthroplasty registries with merged data to increase power has been useful [17], and further studies should detect implant outliers. Randomized controlled studies, on the other hand, are limited by low generalizability, prohibitive costs, and insufficient power to make conclusions about the risk of reoperation, but they may be useful for comparing functional outcomes.

A registry-based randomized clinical trial combines the advantages of a randomized trial with the strengths of a large registry [5]. By randomizing patients in an arthroplasty register, a registry-based randomized controlled trial may have increased efficiency and cost-effectiveness compared with a traditional randomized controlled trial. However, initiating such a large study with a high number of patients is not justified, given the increased revision risk for the BHR prosthesis. Instead, hospitals and surgeons who decide to continue using the BHR prosthesis have a responsibility to include these patients in clinical trials. Continued use of the BHR prosthesis must be based on patient-reported outcomes that are

superior to those after conventional THAs. Accordingly, there is a need for studies about functional outcome and quality of life after arthroplasty with the BHR prosthesis and conventional implants, using sensitive-enough patient-reported outcome measures. In particular, these studies should focus on the impact of revision on these outcomes. In addition to performing randomized controlled studies on selected subgroups of patients who are good candidates for the BHR prosthesis, one should take advantage of already existing registers by routinely collecting patient-reported outcome measures from all patients undergoing prosthetic surgery. The results of such studies will facilitate decision-making regarding the type of prosthesis for individual patients and will be useful when informing patients on the expected outcome.

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