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CORR Insights®: Higher Frequency of Reoperation With a New Bicruciate-retaining Total Knee Arthroplasty

Clifford W. Colwell Jr MD

Where Are We Now?

In their study, Christensen and colleagues suggest that the high risk of dissatisfaction among many total knee replacement patients may be a function of the fact that standard cruciate-retaining or cruciate-substituting prostheses do not result in natural knee kinematics [5, 6]. To try to address this, they performed a large, comparative (but not randomized) study in which they compared a new bicruciate-retaining prosthesis to a standard posterior cruciate-retaining implant. Unfortunately, patients receiving the new implant were more likely to undergo reoperation than those who received the standard posterior cruciate-retaining device. They are to be complimented on their willingness to report this, as well as the fact that it took longer to insert the new device, and that it did not seem to improve clinical outcome metrics or ROM at all. They were unable to establish whether the increased risk of early reoperation and extended operative time were the result of the surgical learning curve or to an inferior design. The fact that the patients were not randomized also left the reader unsure as to how patient selection played into the results. At the conclusion of this study, there is no indication that this prosthesis should be used in lieu of a standard posterior cruciate-retaining prosthesis. Although this bicruciate-prosthesis does not appear to be the answer—at least in the short-term—we should continue to look for solutions to improve patient reported outcomes following total knee replacement surgery.

Where Do We Need To Go?

We have not yet determined whether the dissatisfaction many patients express with knee replacement is the result of altered kinematics caused by traditional knee arthroplasty approaches and implants. And if indeed that is the problem, we still do not know whether a bicruciate-retaining prosthesis will solve it.

How Do We Get There?

In order to recommend a new bicruciate-retaining prosthesis for general

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C. W. Colwell Jr MD (✉)
Scripps Clinic, 11025 North Torrey Pines Road, Suite 200, La Jolla, CA 92037, USA
e-mail: colwell@scripps.edu

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use, a clinical trial would need to be carried out, preferably a randomized trial, ideally performed by surgeons who are beyond their learning curves with the new device. The authors have alluded to the fact that a clinical trial of this type is underway; in any such trial, it would be important to evaluate patient-reported outcomes scores for the two cohorts in the short-to-long-term time periods, failure modes, and proportions of patients who undergo reoperation. Presently, available implant designs for primary TKA, such as traditional PCL-retaining or PCL-substituting designs, have shown excellent long-term survival rates and the new bicruciate-retaining prosthesis would need to at least match these results [1, 3].

Taking a step back, it also seems reasonable to start with cadaveric studies under dynamic load and a full range of motion against a standard cruciate-retaining implant. If one were able to show substantially improved kinematics with the bicruciate-retaining prosthesis, then a prospective randomized trial would be justified. A power analysis would be required to establish the numbers necessary to evaluate clinical differences for the parameters studied and then to determine whether to conduct a superiority, an equivalency, or noninferiority type trial. These parameters should include early failure rates, patient reported outcomes, radiographic findings, and ultimately long-term survival and revision rates. These parameters are a part of any long-term registry with level three and four data already established in many advanced countries and gaining momentum in the United States through the American Joint Replacement Registry [2, 4].

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