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CORR Insights®: Economic Decision Model Suggests Total Shoulder Arthroplasty is Superior to Hemiarthroplasty in Young Patients With End-stage Shoulder Arthritis

Gregory N. Lervick MD

Where Are We Now?

Roughly 15 years ago, one of the most controversial topics in shoulder arthroplasty was the management of the younger, more-active patient with severe osteoarthritis. Researchers discussed and debated

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several approaches including total shoulder arthroplasty, humeral head arthroplasty, or humeral head arthroplasty with resurfacing of the glenoid with biologic surfaces (meniscal allograft, tensor fascia lata autograft).

Most peer-reviewed studies published in the last 10 years to 15 years have suggested better outcomes with total shoulder arthroplasty as compared to humeral head arthroplasty [1–4]. As a result, the enthusiasm for humeral head arthroplasty (and other resurfacing options) has cooled somewhat. Still, the treatment of our youngest patients (ie, under age 50) remains controversial. Can we truly extrapolate the published experience with total shoulder arthroplasty versus humeral head arthroplasty, which has

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G. N. Lervick MD (✉)
Minnesota Orthopedic Sports Medicine
Institute, Twin Cities Orthopedics,
Edina, MN 55435, USA
e-mail: greglervick@tcomn.com

primarily studied older patients, to our youngest and most-active population? Is glenoid loosening a significant concern? Is that an issue more challenging than persistent glenoid arthritis?

The success of reconstructive joint arthroplasty comes down to the quality of life improvement (pain relief, function, activity) and the durability of the intervention (how long will it last without the need for further intervention or surgery). The use of economic- and outcome-based models to assist in this evaluation, as the authors of the current study have done, is a potentially powerful tool to assess the impact of total shoulder arthroplasty as opposed to humeral head arthroplasty in a younger age population, where randomized clinical trials may be difficult or controversial to perform.

Where Do We Need To Go?

The current study by Bhat and colleagues provides further evidence that total shoulder arthroplasty likely

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performs better than humeral head arthroplasty, even in our youngest and most-active patients, in terms of quality of life years and avoidance of further revision surgery. Further research and development of implant designs will be important to improve function and longevity of total shoulder arthroplasty in younger, active patients. The concern for implant loosening, wear, and potential need for revision continues to drive the evolution of prosthetic design. Short-stem or stemless humeral components, and glenoid components that include either polyethylene or metal pegs that (may) promote bone in-growth, or step cut designs to accommodate glenoid erosion are just a few examples. Evaluation of these design evolutions will take commitment and time to study, and the determination of whether these designs lead to improved outcomes and better durability will take many years, highlighting the need for long-term prospective studies.

The development of ongoing, detailed, followup clinical studies investigating total shoulder arthroplasty in younger (under age 50) patients will be important to determine the true durability and efficacy of this operation in a younger age cohort. In particular, patient expectations with regards to not only daily function, but athletic and recreational pursuits will be important. Currently, much

controversy exists as to what extent and type of activity may be allowed after total shoulder arthroplasty. Which activities are harmful? Which ones are not? These will be important questions for surgeons and patients to answer. Continued use, and further development of more-sensitive joint-specific outcome instruments would help determine the functional differences that may be more important in our youngest, and most-active patients.

How Do We Get There?

Investigation of newer prosthetic designs with ongoing radiographic and clinical follow-up will be crucial to determining whether these particular changes are safe and effective. In particular, comparative studies examining various humeral and glenoid designs would be of potential interest. The challenge with any randomized trial involving implant design is that such studies require strict inclusion and exclusion criteria, with regard to patient age, diagnosis, and anatomic considerations (such as congruent versus biconcave glenoid). As an example, some younger patients have had prior shoulder surgery due to trauma or glenohumeral instability and their inclusion may confound results in comparison to those with primary osteoarthritis. Additionally, inclusion

of patients with considerable deformity, such as glenoid hypoplasia or severe biconcave (ie, B2) glenoid anatomy must be controlled for, to provide a true “apples-to-apples” comparison. Finally, a commitment to long-term data collection is necessary, as it may require years to determine clinically relevant differences in implant longevity and function over time.

Ultimately, the best method for obtaining the information may be a total joint registry, involving multiple centers and prospective data collection. Such registries have been established in Europe on a national level and are beginning to be used in the United States. In fact, some health systems and practices are developing these as well. It would be good to see these registries integrate and be consistent in their methodology, to further improve power to determine differences in outcome.

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