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CORR Insights®: Does Postoperative Glenoid Retroversion Affect the 2-Year Clinical and Radiographic Outcomes for Total Shoulder Arthroplasty?

Michael Lawrence Pearl MD

Where Are We Now?

Managing the osteoarthritic (OA) glenoid with deficient posterior bone stock and subluxation of the humeral head has been a challenge for orthopaedic surgeons since it was first discussed by

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Neer and colleagues in 1988 [14]. Advances in imaging technology, interest in the Walch classification [2], and active exploration of new surgical recommendations and implant designs have led to heightened awareness of this challenging problem [2, 16, 17]. Further complicating the decision-making process for shoulder arthroplasty surgeons are emerging reports describing the use of reverse shoulder arthroplasty in younger and active patients with OA [5, 6, 12, 13, 18].

In their study, Service and colleagues present a 2-year followup of total shoulder arthroplasty for glenohumeral OA with a surgical technique that does not rely on bone grafting or augmented glenoid components, but compromises between accepting some increased

retroversion and not over-reaming to “normalize” the glenoid version. About half of their patients (35 out of 71) had Walch B-type glenoids (those with posterior subluxation), some also with marked preoperative retroversion ranging up to 38.8°. Service and colleagues attempt to sort out which patients with OA and posterior glenoid wear, who have historically done well from shoulder arthroplasty since Dr. Neer’s first reports, might benefit from alternative methods of treatment.

It is instructive to compare the report of Ho and colleagues [8] to the present study contrasting the experience of two consummate shoulder surgeons—Dr. Iannotti in Ho and colleagues [8] and Dr. Matsen of the present study—since both used the same glenoid implant. Ho and colleagues reported that 30% of their patients at 3.8 ± 1.8 years average followup showed osteolysis around central peg, the presence of which correlated with postoperative glenoid retroversion $\geq 15^\circ$ [8]. This compared to 12% osteolysis in the present series in their patients with postoperative

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M. L. Pearl MD (✉)
Department of Orthopedic Surgery,
Kaiser Permanente, 4760 Sunset Blvd,
Los Angeles, CA 90027-6021, USA
e-mail: michael.l.pearl@kp.org

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glenoid retroversion $\geq 15^\circ$, albeit with shorter followup of 2.5 ± 0.6 years. Can this be explained on the basis of differing surgical goals? Dr. Matsen did not try to normalize version, while Dr. Iannotti aimed for near to 0° , as articulated in his methods “with the goal of achieving a component perpendicular to the plane of the scapula” [8]? Does the additional reaming from the latter approach make the difference? According to the respective manuscripts, the surgeons also differed in their preparation of the peripheral glenoid pegs; Dr. Matsen used a carbon dioxide spray (CarboJet®; Kinamed Inc, Camarillo, CA, USA), while Dr. Iannotti’s used 10% hydrogen peroxide.

In the present series, Dr. Matsen also used an anterior-offset humeral head, with possible rotator interval closure, if posterior decentring was apparent at the trial phase of the operation. Another study described plicating the posterior capsule in this context [19]. Very likely, some of the observed differences result from the limited sample size of many of these clinical series that often constitute a single surgeon’s experience. What is clear is that this subject deserves more study.

In the present state of the art, we have come to rely on two principal measures in trying to identify these patients preoperatively, glenoid retroversion and percent subluxation of the humeral head. Biomechanical, anatomical, and

clinical studies suggest that even 10° to 15° of retroversion can be extremely problematic leading to aberrant biomechanics [4], peg perforation [3], and a high risk of glenoid loosening [7]. Service and colleagues suggest that many patients with 15° or more of retroversion can be managed effectively with an otherwise well-done TSA, without specific efforts to change the version of the glenoid.

Where Do We Need To Go?

Some patients with posterior glenoid wear from glenohumeral OA who are implanted with a conventional cemented polyethylene glenoid will develop glenoid loosening (21% in Walch’s series with 77 months average followup) [19]. Future studies should seek to identify these patients ahead of time, and further evaluate whether alternative treatments such as augmented glenoid components and reverse shoulder replacement more effective.

One target within reach that also challenged the present study is standardization of the radiographic analysis. The authors in this study relied on axillary radiographs for their preoperative and postoperative measurements, albeit with justification. Most authors now use CT for their preoperative evaluation, and some for their postoperative measures. But as

postoperative CT scans are complicated by metal artifact, and involve radiation that may not be necessary for patient care, all would benefit from a better understanding of the correlation between CT measures and those done from axillary radiographs. How do measures of retroversion differ for the same anatomy between methodologies? We can do a better job of standardizing the axillary radiograph so that it better correlates with our CT measures and is done similarly in different centers. In their study, Service and colleagues note that using the axillary radiograph for postsurgical evaluation has been done before [8, 9, 11] with only Ho and colleagues [8] correlating their CT and axillary radiograph measures of retroversion. For that matter, even publications using CT and complex three-dimensional reconstructions from different authors often define retroversion based on different reference points. As these authors are inclined to posit various treatment recommendations on the basis of numerical calculations made from these images, improving our understanding of these measures would have great utility.

How Do We Get There?

As with many questions relating to arthroplasty, well-organized studies

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with longer followup are needed. Challenging this goal is ever-evolving technology that brings new treatments to the fore, changing practice patterns and making it difficult to directly compare patients over an extended period of time. Even in the series by Walch and colleagues [19] that encountered 20.6% glenoid loosening, implant designs changed during the time of the study from a flat backed glenoid to a curved component. Still, researchers exploring the various alternatives such as augmented glenoids for posterior wear or reverse shoulder arthroplasty would serve the science well by studying their patients as long as possible, preferably beyond the 5-year mark. Additionally, it is reasonable to expect that insight into these and other concerns will emerge from the various shoulder implant registries that have come into existence in recent years [1, 10, 15].

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