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Response to Letter to the Editor regarding: "Reverse shoulder arthroplasty with and without latissimus and teres major transfer for patients with combined loss of elevation and external rotation: a prospective, randomized investigation"

In reply:

Thank you very much for your interest in our article.[6] Although this study represents the highest level of evidence on this topic, we fully acknowledge that it is not without limitations. We would like to offer some considerations in response to the previous commentary.

With regard to patient inclusion, we attempted to capture patients with severe cuff tear arthropathy presenting with combined loss of active elevation and external rotation ("CLEER"). Determining which patients truly have "pseudoparalysis" and profound weakness in ER ("positive" Hornblower sign) can be very difficult to standardize as shown recently by Tokish et al and Burks et al.[4,5] In real-life clinical practice, these clinical presentations are not always black and white; many are gray. Therefore, we found it beneficial to specifically define what constitutes a "positive" Hornblower sign for inclusion in the study. As described in the article, a patient's inability to hold the arm in an abducted, externally rotated position for 3 seconds with a "drop" of 30° or more was labeled as "positive." We therefore enrolled 2 patients with elevation above 90° secondary to scapula-thoracic compensation with profound external rotation weakness and a positive Hornblower sign. This study was conducted over a 4-year period at a tertiary-level shoulder and elbow practice by 3 high-volume shoulder arthroplasty surgeons, and the patients in our study represent the most severe cases of CLEER we see in our practice. To clarify, all patients enrolled in this study had NO ability to perform active ER preoperatively (ie, "0°"), and teres minor fatty infiltration was grade 2 or higher in ALL patients.

We have given a great deal of thought to why our patients had higher Activities of Daily Living and External Rotation (ADLER) scores preoperatively compared with previous cohorts reported in the literature.[2,3] Perhaps there are geographic variations with how severe patients with CLEER present for treatment. There is clearly a spectrum of severity. Another consideration is the tool used to assess external rotation function. At the time of study inception, we believed the ADLER score to be the best method to determine if the tendon transfer was beneficial.[1] We therefore chose it as our primary outcome tool and performed a prestudy power analysis as described in the article. The ADLER, however, is not without limitations. It assesses a patient's ability to perform key activities of daily living that require active external rotation, but it has this important instructional caveat: *all these activities should be performed without the help of flexing the neck or bending the trunk and without the help of first abducting the elbow (ie, without doing a Hornblower sign)* (see Table I). Patients in our study completed this questionnaire independently with no expert explanation of this important caveat. It is certainly possible that many patients simply answered the questions as they appeared, without "imagining" how difficult a task would be if they did not have the ability to use this compensatory maneuver. We believe that this hypothetical scenario creates confusion and speculation for the patient and may very well lead to wildly disparate results that may not allow for comparison of patients across different studies. In addition, this tool still lacks proper validation in the peer-reviewed literature. Further work is needed to determine how best to precisely assess active external rotation function across studies. It also should be noted that when comparing other validated clinical outcomes tools such as Disabilities of the Arm, Shoulder and Hand (DASH) score, American Shoulder and Elbow Surgeons (ASES) score, and Simple Shoulder Test (SST) score, there were no differences between patients who underwent reverse shoulder arthroplasty with or without latissimus dorsi and teres major tendon transfer in this study.

There clearly is a wide variation in what constitutes CLEER and how we define external rotation function. We believe that further work is needed to standardize and validate assessment tools to properly assess our

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Table I Portrays the ADLER score and associated instructions to the patient as it commonly appears in the literature

ADLER score (pre- and postoperative quantification of activities of daily living [ADL] which require active external rotation [ER])	
Activities of Daily Living requiring active External Rotation (ADLER)*	Points
1. Comb hair	3
2. Shave (men) or apply makeup (women)	3
3. Brush teeth	3
4. Dress (ie, put on a shirt or a coat without help)	3
5. Fill a glass with a full bottle (while sitting at a table)	3
6. Drink (bring a full glass to the mouth)	3
7. Eat soup (with a full spoon)	3
8. Shake someone's hand or open a door	3
9. Use a phone (at ear level)	3
10. Write a letter (or sign a paper or use a keyboard or play the piano)	3
Total:	30

0 = unable to do.
1 = very difficult to do.
2 = somewhat difficult to do.
3 = not difficult at all.
* All these activities should be performed without the help of flexing the neck or bending the trunk and without the help of first abducting the elbow (ie, without doing a Hornblower sign).

interventions. We believe that our study represents the highest quality of evidence currently available on this topic; therefore, we do not offer concomitant latissimus and teres major tendon transfer for patients with CLEER undergoing reverse arthroplasty at this time. We look forward to further research on this important clinical problem.

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