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Letter to the Editor regarding Hagiwara et al: "Effects of joint capsular release on range of motion in patients with frozen shoulder"

To the Editor:

After reading the article by Hagiwara et al[8] with interest, we would like to raise some concerns.

In this article, the authors demonstrated their method for evaluating true glenohumeral range of motion that excluded scapula-thoracic motion by using text and video. The scapula was fixed by one of the examiner's hands during the measurement, and the authors repeatedly emphasized the importance of measuring the true glenohumeral range of motion in the discussion. As could be seen in Table 1, the mean range of motion (ROM) of the affected shoulders was measured to be 162° for forward flexion and 170° for lateral elevation. The mean ROM of the unaffected side was 141° for forward flexion and 150° for lateral elevation. These findings raised some questions for us.

Firstly, is it possible that such a large angle of arm elevation could be achieved while the scapula was truly fixed?

Only a limited number of studies explained how they used a measurement method similar to that of Hagiwara et al[8]; that is, true glenohumeral ROM was measured while the shoulder motion was fixated by the examiner's hand under general anesthesia. To our knowledge, most of these studies on the treatment of stiff shoulders and ROM measurements did not describe how they controlled scapulothoracic motion in detail.[3,4,12,15,18] Nevertheless, by dividing the main characteristics of the measurement method in this study, such as (1) under general anesthesia (muscle-relaxed), (2) passive motion by the examiner, (3) scapula stabilized, and (4) arm elevation in the coronal and sagittal plane, it was possible to review and combine several studies to find whether or not these large angles of arm elevation could be achieved. Gagey et al[6] studied the arm elevation motion of 100 fresh normal human shoulder cadaver specimens, with their scapula fixed onto a rigid frame and all muscles of the glenohumeral joint detached. Additionally, they measured the range of passive abduction of healthy volunteers under general anesthesia and stabilized the scapula firmly using the examiner's forearm. They found that pure glenohumeral elevation of more than 120° was impossible even after sectioning the inferior glenohumeral ligament and detaching all muscles.

Harryman et al[9] analyzed shoulder ROM (they measured the humerothoracic angle) of 12 and 7 shoulders that had undergone glenohumeral joint arthrodesis and scapulothoracic joint arthrodesis, respectively. Regardless of the plane of elevation, mean maximal elevation of the pure glenohumeral joints and scapulothoracic joints was 103° and 49°, respectively. Furthermore, the 1:2 ratio of scapulohumeral rhythm that they found turned out to be applicable in any plane of arm elevation.[10,13] This study did not disclose whether they measured active or passive motion; however, their illustrations suggest that they measured active motion.

Moreover, many studies have shown that the ratio of scapulothoracic motion during passive arm elevation, regardless of the elevation plane, is similar to that of active elevation.[5,14,17]

Considering the aforementioned studies, it looks like the measured value of ROM in this study reflects the lack of full scapular stabilization. We understand it is difficult to achieve the same level of scapula stabilization when using manual pressure compared to scapulothoracic arthrodesis. However, after reviewing the supplemented video of their ROM measurement method, we noted that the examiners were only applying a small amount of pressure on the patient's shoulder and that their hands were not in continuous contact with the shoulder. Considering the emphasis that the authors have placed on "true glenohumeral ROM," we believe this could be a considerable problem when interpreting the results of this study.

Our second question is about the sequential release technique that the authors performed. It was interesting that they released the rotator interval (RI), coracohumeral ligament (CHL), and superior capsule separately. To our knowledge, the RI is an anatomic region that contains the CHL, and the RI capsule is regarded as a capsular structure that is reinforced by the CHL externally and the superior

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glenohumeral ligament internally.[11,16] Hence, we reviewed the references they cited about the surgical technique and histoanatomic study.[1,2,7,11,19] Based on the technical note published by the same authors as this study,[7] it could be inferred that the procedures described in Figures 2, 3, and 4 are matched to the RI, CHL, and superior capsule release procedure, respectively. However, releasing CHL is mentioned in all 3 steps of the procedure, which makes the boundary of each step somewhat ambiguous. Taking into account that this study measured ROM after each step of the release procedure, it would be valuable if the authors detailed each step of the sequential procedure.

Disclaimer

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