Editorial

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Improving arthroscopic subscapularis repair: the essential role of surgical anatomical landmarks

Sung Il Wang

Department of Orthopaedics Surgery, Jeonbuk National University Medical School, Research Institute for Endocrine Sciences and Research Institute of Clinical Medicine of Jeonbuk National University–Biomedical Research Institute of Jeonbuk National University Hospital, Jeonju, Korea

Despite being the largest and strongest muscle in the rotator cuff, the subscapularis was once considered the "forgotten tendon," with tears described as "hidden lesions" [1]. Increased awareness along with enhancements in imaging quality and the widespread adoption of arthroscopic techniques for managing rotator cuff tears have led to increases in the diagnosis and repair of subscapularis tear. However, arthroscopic repair of the subscapularis remains challenging due to the complexity of its anatomy and the technical demands of surgical access. Consequently, numerous studies have explored the area of the subscapularis footprint and its surrounding anatomical landmarks. The subscapularis footprint, consisting of a proximal tendinous part and a distal muscular part, is trapezoid-shaped—widest at the top and tapering toward the bottom, with the proximal tendinous part measuring approximately 26×18 mm [2,3]. Ide et al. [4] noted a bare area between the subscapularis footprint and the articular cartilage of the humeral head. Arai et al. reported that the biceps tendon and its sheath are closely associated with the subscapularis tendon, such that the superior border of the subscapularis tendon forms the floor of the biceps groove and interdigitates with the supraspinatus fibers [5]. The superior glenohumeral and coracohumeral ligaments also contribute to forming the reflection pulley, which is the superior-medial border of the biceps sheath. Any signs of instability or tearing of the long head of the biceps, or disruption of this pulley, should prompt a careful examination of the subscapularis tendon, as these conditions often co-occur [6].

A recent study by Gabardo et al. [7] provides crucial anatomical landmarks for arthroscopic repair of subscapularis tendon tears based on an anatomical study of 12 shoulders from 6 cadavers. According to their findings, the average safety distance from the bottom tip of the footprint to the axillary nerve was 32 mm, and the deepest fibers of the subscapularis tendon covered the floor of the upper portion of the bicipital groove. Additionally, the mean footprint size was 37.3×16 mm, and the mean distances from the footprint to the humeral head cartilage were 3.2 mm superiorly, 5.4 mm in the middle part, and 15.9 mm inferiorly.

This study is timely and significant given the increasing preference for arthroscopic techniques in subscapularis repair, offering valuable insights into the surgical anatomy needed for effective and safe subscapularis repair while opening several avenues for discussion regarding patient safety and surgical outcomes. First, the study underscores the inherent challenges of visualizing and accessing the subscapularis tendon via arthroscopy. The detailed anatomical dissections presented highlight the proximity of important structures such as the axillary nerve, emphasizing the need for precision in surgical planning and procedures. However, given the study's small, cadaver-based sample size, it raises questions about the generalizability of the findings to clinical patient

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Correspondence to: Sung Il Wang
Department of Orthopaedics Surgery, Jeonbuk National University Medical School, Research Institute for Endocrine Sciences and Research Institute of Clinical Medicine of Jeonbuk National University–Biomedical Research Institute of Jeonbuk National University Hospital, 20 Geonji-ro, Deokjin-gu, Jeonju 54907, Korea
Tel: +82-63-250-1760, Fax: +82-63-271-6538, E-mail: wsi1205@naver.com, ORCID: https://orcid.org/0000-0002-3890-6516

populations. Second, the subscapularis tendon insertion is closely associated with the most superior part of the bicipital groove floor. If the subscapularis tendon is torn, the medial biceps pulley may also be disrupted. Therefore, to reconstruct the medial pulley, it is crucial to reattach the superior fibers of the subscapularis tendon to their anatomical original position. Gabardo et al. [7] recommended biceps tenodesis or tenotomy if reconstruction is not feasible due to chronic lesions. We agree that the medial biceps pulley plays a critical role in the progression of medial subluxation of the biceps tendon and subscapularis tears [8,9]. However, previous studies have not found evidence to support the need for tenodesis or tenotomy of the biceps long head when the medial pulley was not reconstructed. This brings up the question of need for tenodesis or tenotomy on the biceps long head in the absence of changes or instability in the tendon itself. Therefore, it is important to carefully evaluate preoperative physical examinations, imaging data, and arthroscopic findings for subluxation or medial dislocation of the biceps tendon.

Third, Gabardo et al. [7] reported that the subscapularis insertion is broad proximally and tapers distally. Their two-dimensional approach is useful for rapidly identifying basic anatomical locations and landmarks but may be limited in surgical planning and procedures without considering the complexity of three-dimensional structures. Yoo et al.'s three-dimensional approach compensates for these limitations [10], enabling more accurate diagnosis and treatment planning, and may be especially effective for subscapularis tears, which have a complex attachment structure. Finally, more recent studies have shown the presence of bare space between the articular cartilage and the subscapularis attachment, which is narrower in the upper part of the footprint and broader toward the lower part [4,7]. A sufficient anatomical understanding of this bare space can prevent over-diagnosis of subscapularis tears and reduce the risk of damage to the humeral head cartilage by correctly placing anchors during arthroscopic surgery.

Arthroscopic repair of the subscapularis is difficult due to the anatomical complexity and technical demands of the surgical approach. For accurate implant positioning with safer tendon release, it is crucial to consider important anatomical landmarks when repairing the subscapularis tendon tear. Thus, during arthroscopic repair, anterior visualization is needed to ensure direct control over anatomical landmarks.

NOTES

ORCID
Sung Il Wang https://orcid.org/0000-0002-3890-6516

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