



## Subscapularis tendon tear involving the first facet

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The subscapularis (SSC) is the largest and most powerful muscle of the rotator cuff and is more important for arm elevation than either the supraspinatus or infraspinatus. Tears of the SSC tendon were once thought uncommon but the incidence has been reported to range from 30% to 50% [1,2]. They can present as an isolated injury, often after trauma, but most are associated with degenerative superior rotator cuff tears [3].

SSC tendon tears were first described in a cadaver study by Smith in 1834, whereas the first description of SSC repair was published in 1954 by Hauser [4]. Gerber refocused attention on the SSC in 1996 when he published the outcomes of open repair of isolated SSC tendon tears [5]. Burkhart and Tehrani [6] published the first series of arthroscopic SSC repairs in 2002. Although the SSC has historically received less attention than posterolateral rotator cuff tears, recent advances in arthroscopic shoulder surgery have led to greater detection of SSC tendon tears, especially partial tears [2].

Despite increased identification of SSC tendon tears, there is no universally accepted description or classification of SSC tears. A few have tried to classify SSC tendon tear patterns, and there are several anatomical footprint studies in the literature. However, most described the footprint anatomy of SSC tendon insertion as a two-dimensional area in the coronal plane. Because the SSC tendon has very broad and long fibers with multiple planes and complex fiber orientations, especially at its insertion site, a more detailed description of its morphologic features is needed. A better understanding of the SSC footprint is essential to accurately

determining tear size and achieving anatomical restoration of torn tendons.

The SSC tendon footprint anatomy is generally described as having two distinct regions: a strong superior tendinous region and a predominantly muscular inferior region. Klapper et al. [7] first described a consistent pattern in the distribution of tendinous bands of the SSC muscle in a histomorphologic cadaveric study. The bands are evenly distributed in the midportion of the muscle and, as they traverse laterally, they coalesce in the superior two-thirds of the muscle as it inserts into the lesser tuberosity. The inferior one-third portion of the muscle is devoid of fibrous tissue. This has been further explored in detail by Yoo et al. [1], who showed that the SSC insertional anatomy has four different facets on the lesser tuberosity. The first or superiormost facet of the SSC tendon footprint consists of approximately one-third of the entire footprint, and the first two facets consist of 60% of the entire footprint. They also reported that among SSC tendon tears, less than or equal to 80% are first facet tears. Tebaa et al. [3] showed that the SSC tendon is composed of two layers distinguishable by the orientation of the collagen bundles on histologic analysis. The thinner deep layer is composed of parallel collagen fibers and inserts into the lesser tuberosity. The superficial layer is thicker, composed of interwoven bundles of collagen fibers, and splits into two bands that form a stabilizing sling around the long head of biceps tendon.

Based on this background, Kim et al. [8] evaluated postoperative clinical outcomes and radiological healing of SSC tendon

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tears according to each layer of detachment in the first facet. This study showed that complete detachment of the deep layer may be related to high re-tear and low healing rates regardless of detachment of the superficial layer, but also that clinical outcomes may not be related to detachment of specific layers in the first facet.

A series of studies on the anatomical footprint of the SSC show that more accurate recognition and repair of the detached deep layer of the SSC in the first facet may restore its biomechanical function and therefore improve clinical outcomes. These findings should be carefully considered by surgeons before SSC tendon repair and further clinical studies on SSC tendon tears involving the first facet are needed.

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