

The trifold superior transverse scapular ligament: a case report and review of the literature

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During dissection of a 75-year-old Caucasian female cadaver, a trifold superior transverse scapular ligament (STSL) was found. The suprascapular nerve and vessels ran inferior to the STSL through the suprascapular notch. Measurements of the structures of the suprascapular region were taken using two complementary but independent methods: a classical method using an electronic digimatic calliper and a new one based on an analysis of digital photographic documentation of the STSL. The knowledge of anatomic variations of the STSL is important because this structure is the most commonly recognised possible predisposing factor of suprascapular nerve entrapment and can be helpful in diagnosis and surgical and arthroscopic treatment of this pathology. (Folia Morphol 2012; 71, 2: 118–120)

Key words: superior transverse scapular ligament, anatomical variation, suprascapular entrapment, suprascapular nerve and vessels

INTRODUCTION

The superior transverse scapular ligament (STSL) converts the suprascapular notch (SSN) into a foramen through which the suprascapular nerve (SN) and vein run. This region is very interesting and clinically important because it is the most common site for SN entrapment [10, 15]. The clinical findings of this neuropathy are deep and diffused pain, weakness of external rotation, and abduction of the upper extremity. The nonspecific symptoms of this pathology result in late diagnosis and atrophy of the supraspinatus and infraspinatus muscles. Considering the anatomical variations, the morphologic characteristics of the STSL and SSN are the most commonly recognised possible predisposing factors of SN entrapment. Several previous morphological studies confirm that anatomical variation of this re-

gion is an important factor in the possible compression of the nerve [4–7, 13–16].

This report describes a very rare morphological variant of the STSL on the left side of a cadaver dissected in the Department of Angiology, Chair of Anatomy, Medical University of Łódź, Poland.

CASE REPORT

In a study of 80 separate upper limbs, a very rare morphological variation of the trifold STSL was found. The suprascapular region of the left upper extremity of a 75-year-old formalin-embalmed Caucasian female was dissected. The study was initiated by removing the skin over the scapula and then dissecting free the overlying trapezius muscle by removing its bony attachments from the vertebrae and spine of the scapula, and reflecting the muscle lat-

erally. Next, the supraspinatus muscle was transected laterally and reflected so that the underlying SN region was identified. The omohyoid muscle was found and followed distally to its attachment into the medial lip of the SSN. The suprascapular nerve and corresponding vessels were identified and the trifold STSL was exposed. The measurements of the STSL were taken using two complementary but independent methods: a classical method using an electronic digimatic calliper (Mitutoyo Company, Japan) and a new one based on analysis of digital photographic documentation of the STSL taken using MultiScanBase v.14.02 software (Computer ScanningSystem II, Warsaw, Poland).

In the presented study, the STSL had a common proximal attachment to the medial border of the SSN. It extended laterally with three fibrous bands that attached separately to the lateral border of the SN (Fig. 1). The common proximal portion was 7.36 mm wide. The upper, middle, and lower parts at the point of distal attachment were respectively 5.13 mm, 4.67 mm, and 7.49 mm wide. The length of the superior band was 26.2 mm, middle 27.31 mm, and inferior 27.13 mm. The distance between the middle points of the STSL and the deepest point of the SSN was 17.52 mm, and the area of the opening limited by the inferior border of the STSL and osseous border of the SSN was 31.94 mm². The suprascapular nerve, vein, and artery ran inferior to the STSL through the suprascapular notch (Fig. 1). The diameter of the SN was 2.82 mm. The contralateral shoulder in the cadaver revealed a single fan-shaped STSL.

DISCUSSION

The STSL is one of only a few ligaments in which both attachments are to the same bone. The most probable function of this structure is the protection of SN that pass from the front of the scapula to the supraspinatus fossa situated posteriorly [15]. On the other hand, the STSL is the most recognised possible predisposing factor for compression of the SN at the SSN [4]. Ticker et al. [16] believe that the bifid type of entity might be one of the possible causes of SN entrapment, especially for individuals who are involved in violent overhead activities, such as volleyball and baseball players. In addition, Alon et al. [1] describe SN entrapment in a patient with bifid STSL.

Recent literature has shown a few cases of bifid STSL [1, 4, 6, 16] but only one trifold [16]. A study by Ticker et al. [16] revealed that in 2 (3%) of the 79 shoulders examined, multiband STSL was found.

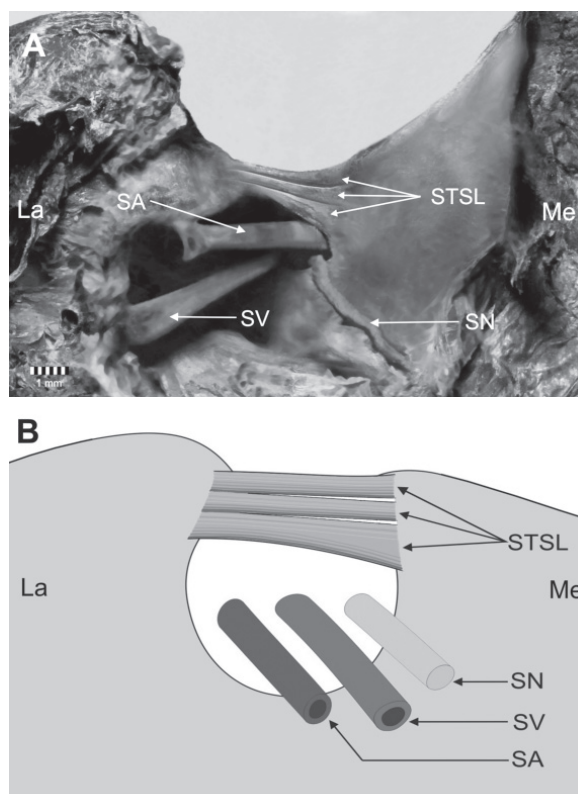


Figure 1. Anterior view of structures at the suprascapular region; **A.** Structures at the cadaver; **B.** Schematic arrangements; STSL — trifold type of superior transverse scapular ligament; SV — suprascapular vein; SA — suprascapular artery; SN — suprascapular nerve.

A branch of the SN runs between two parts of the bifid STSL. The trifold STSLs were found in a large “U” shaped SSN. The middle band was completely ossified.

However, to our knowledge, the trifold type of the STSL described in this study has not yet been well documented photographically. We propose that one case of a trifold STSL studied by Ticker et al. [16] described a bifid STSL plus a singular fibrous band extending on the anterior side of the SSN, below the STSL, that Avery et al. [2] named the anterior coracoscapular ligament.

Bayramoglu et al. [4] described five types of STSL, but not a trifold form. The first, most common type of ligament bore a uniform fan shape (53.1%), while the second had an additional anterior coracoscapular ligament (18.8%). The third type (15.6%) consisted of anterior and posterior parts, and the fourth, least common type (12.5%) of ligament was calcified.

Moriggl et al. [11] described a study of seven STSLs (5 males, 2 females), age range 32–75 years.

Bony spurs (osteophytes) were seen at the medial entheses of 3 specimens and the lateral entheses of another. In addition, a small bony nodule (i.e. comparable to a sesamoid bone in a tendon) was present in the central part of the specimen, which had a bony spur laterally. The mean thickness of the investigated STSLs was 1.2 ± 0.6 mm.

An important factor of suprascapular entrapment can be a completely ossified STSL. The frequency of such cases varies throughout the world. In the European population it was found in: 6.1% (Italian; Vallois [19]), 6.5% (French; Vallois [18]), 7% (Polish; Polguy et al. [13, 14]), 7.3% (German; Natsis et al. [12]), and 6.0–12.5% (Turkish; Urguden et al. [17] and Bayramoglu et al. [4]) of cases. Complete ossification of the STSL in the US population was found in 3.7–5.5% of cases (Rengachary et al. [15], Ticker et al. [16], Edelson [7], and Avery et al. [2]). However, in some populations complete ossification was very rare, e.g. Alaskan Eskimos 0.3% (Hrdicka [9]) or Native Americans 2.1–2.9% (Hrdicka [8]), but in some it was more frequent than usual, e.g. Ancient Egyptian — 13.6% (Hrdicka [8]). The middle band of trifid STSL described by Ticker et al. [16] was completely ossified. In our study we did not find any signs of ossification in the ligament.

The STSL probably protects the SN at the SSN, but is also considered to be one of the important factors causing suprascapular entrapment; therefore, the knowledge of its rare morphological variant described in this case is useful in medicine, especially in orthopedy. Arthroscopic techniques for SN decompression have recently been described with successful results [3, 5, 10]. However, the safety and success of these arthroscopic procedures are predicated on a thorough understanding of the anatomy of the suprascapular region.

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