

## Accessory cleido-occipitalis muscle: case report and review of the literature

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### Abstract

An aberrant muscular fascicle, the so-called "accessory cleido-occipital muscle", originated from the anterior border of the cleido-occipital portion of the right trapezius muscle, was detected during a routine dissection of a female cadaver. The aforementioned muscular bundle coursing in the posterior cervical triangle, almost parallel to the anterior border of the trapezius muscle, inserted ultimately to the clavicle's medial third. In addition, prior to its insertion, the muscle provided a fibrous arch attached to the midportion of clavicle, overlying the main trunk of supraclavicular nerves. We noted that during abduction of the right arm, the fibrous arch entrapped the supraclavicular nerve trunk, presumably leading to sensory disturbances in nerve's area distribution. We review the relative restricted data in the available literature concerning that muscular variant and elucidate its importance during differential diagnosis of a mass and surgical exploration of the posterior cervical triangle.

**Keywords:** cleido-occipital, trapezius muscle, variation, supraclavicular nerves, compression.

### Introduction

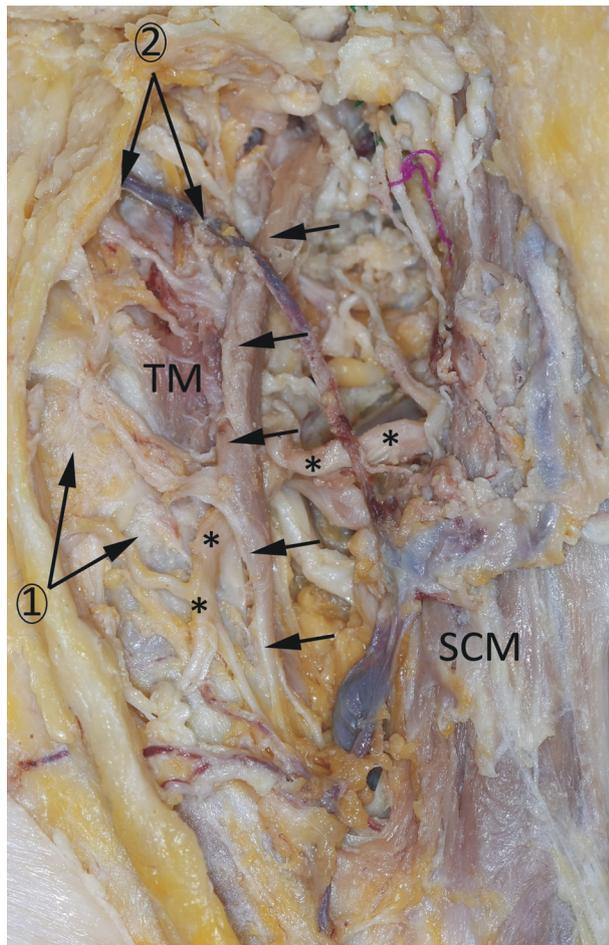
The variable morphology of the trapezius muscle (TM) concerns mainly its attachments [1]. Cases of partial absence of the superior [2] or the inferior portion of the TM [3], as well as cases of TM's total absence [4] have been observed. The presence of distinct separated bundles of the TM is very rarely documented in the literature termed "anomalous cleido-occipitalis muscle" [5] or "cleido-occipitalis cervicalis muscle" [6]. These supernumerary muscular fascicles can be mistaken as pathological enlarged lymph nodes, cyst, thrombosed vein or levator claviculae muscle [7, 8]. Furthermore, an accessory TM's variant could result in difficulties during the procedure of subclavian or internal jugular vein catheterization [9, 10].

In the current study, we present a very rare case of an aberrant bundle of the TM, the so-called "accessory cleido-occipital muscle" detached from the TM's superior portion and inserted into the clavicle. Such a TM's variant, apart from its surgical significance during exploration of the supraclavicular fossa, obtains an additional importance for the physician, since its arched tendinous insertion seems to compress the supraclavicular nerve's trunk, resulting likely to conditions resembling to nerve's entrapment.

### Materials, Methods and Results

During routine dissection of a 78-year-old formalin-fixed female cadaver, utilized for educational and research purposes in our Department of Anatomy, we came across a very rare variant of the TM. In particular,

by means of the classical method of dissection, and after removing the overlying skin and fascial layers of the right posterior cervical region we encountered an aberrant fascicle of the right TM. That muscular slip was originated from the anterior border of the superior or cleido-occipital portion of the right TM and detaching from the main muscular muscle, it was directed almost parallel to the anterior border of the muscle to insert by a round tendinous portion into the medial third of the supero-posterior aspect of the right clavicle nearby the origin of the sternocleidomastoid muscle. That muscular fascicle that was separated by the TM by a fissure was overcrossed at its middle part by the transverse cervical vein, whereas prior to its musculotendinous junction provided a fibrous arch attached to the midportion of the clavicle. This fibrous arch was overlying the main trunk of the supraclavicular nerves. We noticed the presence of nerve's impression just underneath the fibrous arch that was becoming more prominent during abduction of the right arm. The muscular slip exhibited a length of 6.3 cm and a width of 0.6 cm (Figure 1). After careful exploration of the area, no other variations of the surrounding anatomical structures were detected. Moreover, no scars from previous surgical interventions and no traumatic conditions in the region were documented. However, from the medical history of the specimen, cervical spondylosis and supraspinatus tendinosis with pain and sensory disorders of the right shoulder and upper arm were detected. Our finding was repeatedly documented as photographs and measurements with assistance of a sliding vernier caliper, accurate to 1 mm during the course of the anatomical dissection.



**Figure 1** – The right major supraclavicular fossa has been dissected, demonstrating the so-called “accessory cleido-occipitalis muscle” (arrows) detached from the trapezius muscle (TM). The aberrant muscle is shown to compress the underlying trunk of the supraclavicular nerves (asterisks). 1: Clavicle; 2: Transverse cervical vein; SCM: Sternocleidomastoid muscle.

## Discussion

The TM as it is well known extends as a flat triangular muscle over the dorsum of the neck and the upper thorax and converges on the outer part of the pectoral girdle. It is medially attached to the medial third of the superior nuchal line, external occipital protuberance, ligamentum nuchae, spinous processes and supraspinous ligaments of all twelve thoracic vertebrae. The superior occipital fibers are inserted into the lateral third of the clavicle at its posterior border, the middle fibers are attached along the medial border of the acromion and the superior slip of the scapular spine’s crest, whereas the inferior fibers from the lowest half-dozen thoracic spines are inserted into the medial end of the scapular spine [2, 11]. The superior, middle and inferior fibers of the TM have been referred as cleido-occipitalis, dorso-scapularis superior and dorso-scapularis inferior, respectively [12].

The variability of the TM concerns mostly the extent of muscle’s attachments. Thus, the cranial attachment is found constantly [13] or in 67.5% of cases [1]. It has been supported that the right TM displays usually a more extensive area of cranial origin than the left [14]. As for the extent of the vertebral origin of the TM, it has been

noticed that in 81.3% the seventh cervical vertebra was the highest point of vertebral origin, whereas the lower level of spinous attachment varied from the eight thoracic to the second lumbar vertebra. Moreover, it has been postulated that there is likely a tendency for the right TM to extend more caudally than the left one [1].

The three portions of the TM are occasionally separated, whereas rarely a partial absence of the superior [2] or the inferior portion of the TM [3] may be noted. Gross-Kieselstein E and Shalev RS observed a total absence of TM in two brothers, suggesting a likely genetic etiology via an autosomal recessive mutation with a male predominance [4]. With the exception of a muscular slip extending from the tip of the arch of the atlas to the deep surface of the muscle, Beaton LE and Anson BJ were not able to detect other aberrant fascicles of the TM [1]. Similarly, Rauber AA claimed that TM’s supernumerary bundles are uncommon [15].

It is described that the clavicular attachment of the occipital portion of the TM sometimes reaches the middle of the clavicle and occasionally blend with the sternocleidomastoid muscle [2]. Rahman HA and Yamadori T (1994) described a so-called “anomalous cleido-occipitalis muscle”, that was an accessory bundle derived from the conjoint fibers of the occipital and cervical portion of the TM inserted into the junction of medial and middle part of the clavicle [5]. Kwak *et al.* (2003) found a so-called “cleido-occipitalis cervicalis muscle” consisted of a slip of the occipital portion of the TM fused partially with that portion and inserted into the clavicle at its midportion [6]. The independent bundle of the TM encountered in the current study constitutes an additional case of the extremely rarely noticed “anomalous cleido-occipitalis muscle”. We consider that the aforementioned term is inappropriate because such a muscular slip does not represent an anomaly since it neither compress any vascular elements and nerves, nor induces any pathologic condition. The term “cleido-occipitalis cervicalis muscle” proposed by Kwak HH *et al.* [6] is more appropriate since it determines the location of that muscle in the cervical region and distinguishes that muscle from the normal cleido-occipital portion of the TM. However, since it is apparent that such a muscle is situated in the cervical region, we suggest as more suitable the term “accessory cleido-occipitalis muscle of the TM”.

This muscle should not be confused with the known “cleido-occipital muscle” that represents a more or less separate portion of the sternocleidomastoid muscle. Specifically, this muscle is constituted by the posterior fibers of the clavicular head of the sternocleidomastoid muscle inserted into the occipital bone [11, 16]. That muscle described firstly by John Wood in 1866 was detected with variable incidences, such as 36.3% [16] or 4.16% [17].

As regards TM’s embryological development, it derives from the brachial mesoderm as well from the neighboring myotomes. The TM and sternocleidomastoid muscle appear a common anlage from the occipital area. In particular, an anterior and posterior portion of that anlage are separated, providing the sternocleidomastoid muscle and TM, respectively [18]. Owing to that origin, the TM receives nerve supply, beyond from the accessory nerve, from the cervical nerves because of its close

association during development with myotomes [19]. Moreover, the most superior and most inferior origins of the TM are expansions occurring late in embryonic life [14], a fact explaining the variance occurring in muscle's proximal and distal attachments. We consider that our variant is a muscular slip detached from the TM's anlage during separation of the common anlage to anterior part, for the sternocleidomastoid and posterior part, for the TM. Such a theory has been proposed previously by Rahman HA and Yamadori T [5] and Kwak HH *et al.* [6].

Such an aberrant muscular bundle of the TM could be misinterpreted as levator claviculae muscle [8] lymphadenopathy, thrombosed vein or cyst in imaging [7, 20]. In addition, an aberrant muscle of the posterior triangle of the neck may induce difficulties during vein catheterization [9, 10]. Our case exhibits a further importance, since we observed that the insertion of our variant into the clavicle formed a fibrous arch superior to supraclavicular nerves. Furthermore, we noticed that during slight abduction of the ipsilateral arm, the fibrous arch entrapped the underlying supraclavicular nerves. From the medical history of the specimen, pain and sensory disturbances of the ipsilateral upper arm and shoulder were documented. These symptoms were attributed to cervical spondylosis and were associated with tendinosis of the supraspinatus muscle. Presumably, such a clinical picture could be attributed partially to entrapment of the supraclavicular nerves under circumstances. Rahman HA and Yamadori T [5], as well as Kwak HH *et al.* [6] observed that their homologous muscular variations did not compress any vascular or nervous structures. Only Rahman HA and Yamadori T reported not in the text, but in figure legend that the tendinous portion of their aberrant muscle is crossed by the supraclavicular nerves [5].

## ☐ Conclusions

A profound awareness of such a muscle variant is essential for the physician in order to better determine the nature of a mass in the posterior cervical region, for the surgeon in order to gain a better exploration of the region and for the anesthesiologist in order to perform with more accuracy and safety the catheterization of the area's veins.

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