

# A unique muscle bridge between sternohyoid and sternothyroid muscles

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## Abstract

During cadaveric dissection, a unique muscle bridge on the left anterior cervical region of male cadaver was detected and morphometric measurements were performed. The unique muscle bridge was between the sternohyoid and sternothyroid muscles. Ipsilateral sternohyoid muscle started from the lower back surface of the sternal extremity of the clavicle and from costoclavicular ligament, but it had no fibers starting from the sternum. Three nerve branches were observed separating from ansa cervicalis on the lateral of that muscle bridge; the top and the lowest nerve branches went to the sternothyroid muscle, the median branch innervated the muscle bridge. As a result of the thorough literature review made, no case similar to the variation detected in this study was encountered. During the surgical interventions such as tracheostomy, thyroidectomy and trachea resections, knowing the presence of this muscle bridge can reduce the iatrogenic injuries to this structure.

**Keywords:** infrahyoid; muscle bridge; muscle variation; sternohyoid; sternothyroid

Anatomy 2017;11(3):157–159 ©2017 Turkish Society of Anatomy and Clinical Anatomy (TSACA)

## Introduction

Infrahyoid muscles consist of four pairs of muscles, as superficially located sternohyoid and omohyoid and deeply located sternothyroid and thyrohyoid muscles. These muscles are responsible for movements of the hyoid bone and thyroid cartilage during talking, swallowing and mastication. Infrahyoid muscles develop from hypaxial divisions of cervical myotomes and can have variations during their embryologic development.<sup>[1,2]</sup> The sternohyoid muscle originates from the posterior face of sternal end of clavicle, the posterior upper face of costoclavicular ligament and manubrium of sternum, and inserts on to lower side of the body of hyoid bone. Being shorter and wider, the sternothyroid muscle originates from the posterior surface of the manubrium sterni inferior to the origin of sternohyoid muscle and posterior edge of the cartilage of the first rib and attaches to the oblique line on the lamina of the thyroid cartilage.<sup>[2]</sup> Infrahyoid muscles are innervated by the branches separating from ansa cervicalis.<sup>[1,3]</sup>

There are variations related to sternohyoid or sternothyroid muscles in the literature.<sup>[4-6]</sup> Sternohyoid mus-

cle variations may be seen as double or absent, augmented by a clavicular slip, or interrupted by a tendinous intersection.<sup>[2]</sup> The absence of sternal attachment of the sternohyoid muscle is more frequently found than the absence of clavicular attachment.<sup>[3]</sup> As a result of the thorough literature review made, no case similar to the variation detected in this study was encountered.

## Case Report

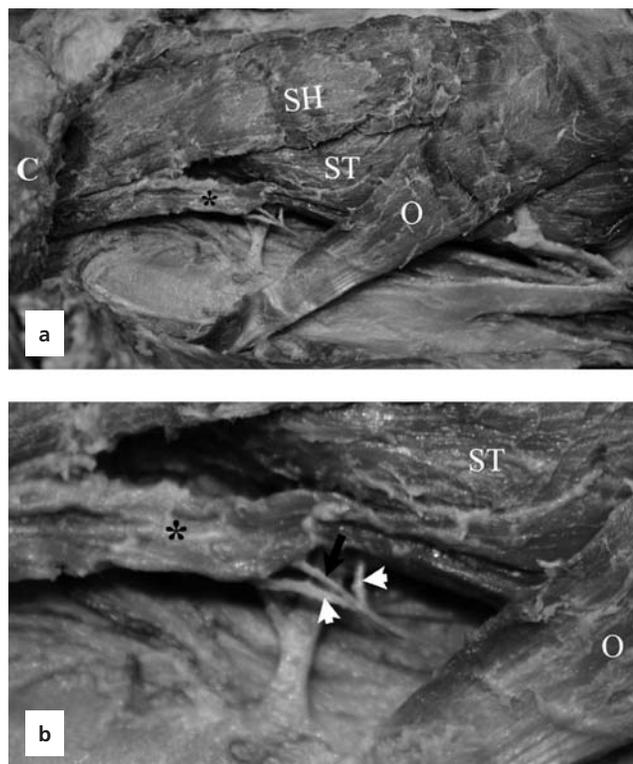
During routine cadaveric dissection carried out in the laboratory of Department of Anatomy, Gaziantep University School of Medicine, a unique muscle bridge was detected between the sternohyoid and sternothyroid muscles on the left anterior cervical region of a 33-year-old male cadaver (**Figure 1a**). Ipsilateral sternohyoid muscle started from lower back surface of sternal end of the clavicle and from costoclavicular ligament, but it had no fibers which originated from the sternum. Some fibers headed upwards from the lateral of clavicular origin of sternohyoid muscle, proceeded upwards and inwards in the form of a muscle bridge by separating from the sternohyoid at 26.4 mm higher from the clavicular origin of the muscle, and joined

the sternothyroid from the lateral. This bridge was determined to join the sternothyroid on 30.9 mm inferior of oblique line of thyroid cartilage, which is the ending point of sternothyroid. The length of the muscle bridge between sternohyoid and sternothyroid was 15.5 mm; the width of midpoint was 5.2 mm. The width of midpoint of sternohyoid on the same side was measured 18.1 mm. The width of midpoint of sternohyoid on the opposite side was 24.5 mm. There was no variation on infrahyoid muscles on right side. Three terminal nerve branches separating from a branch of ansa cervicalis on the lateral of that muscle bridge were observed. The top and the lowest nerve branches went to sternothyroid by passing behind the muscle bridge, and the middle branch innervated the muscle bridge (**Figure 1b**). The caliper with the precision of 0.05 mm was used in all morphometric measurements.

## Discussion

Different anatomic variations can be seen on infrahyoid muscles, depending on embryological developmental process. While, among infrahyoid muscles, the variations related to omohyoid are seen most frequently in the literature, not too many publications related to the variations of sternohyoid or sternothyroid were encountered in the literature. In some studies, the fibers of sternohyoid and omohyoid are seen to fuse.<sup>[7,8]</sup> The omohyoid muscle is the most frequently absent amongst the infrahyoid group. Absence of one belly is more frequently observed than absence of bellies. Sometimes, the inferior belly may be doubled, with the second belly possibly arising from the coracoid process.<sup>[3]</sup> Tripathy and Preetam<sup>[9]</sup> defined a unique case sample in which upper belly of omohyoid on left side of the neck is in tendinous form, sternohyoid is not present on right side. Raikos et al.<sup>[8]</sup> detected that muscle fibers separating from the lower part of sternohyoid headed towards the lateral and fused with the fibers of omohyoid muscle on the lower part of the neck. Sternohyoid and omohyoid fibers can also merge at the level of the hyoid bone on the upper part of the neck.<sup>[7]</sup> Nayak et al.<sup>[5]</sup> defined two-belly sternothyroids as lateral and medial. The lateral belly inserted to oblique line of thyroid cartilage. Abnormal medial belly turned into a tendinous form and crossed with thyroid artery, then inserted on the same side hyoid bone and to intermediate tendon of digastric muscle. Kang et al.<sup>[4]</sup> detected the presence of an accessory belly of sternothyroid which held onto the right lamina of thyroid cartilage by arising from the inferomedial of origin of the left sternohyoid and heading rightward and upwards.

Unlike the previously observed variational cases, a unique muscle bridge was determined between sternohyoid and sternothyroid muscles in this study. Embriologically



**Figure 1.** (a) The unique muscle bridge between sternohyoid and sternothyroid muscles; (b) The innervation of muscle bridge and sternothyroid. \*muscle bridge; **black arrow**: the middle branch separating from a branch of ansa cervicalis innervate to muscle bridge; **C**: clavicle; **O**: omohyoid muscle; **SH**: sternohyoid muscle; **ST**: sternothyroid muscle; **white arrow head**: the top and the lowest nerve branches separating from a branch of ansa cervicalis innervating the sternothyroid by passing behind the muscle bridge.

developing from a muscle primordium in the anterior cervical area, the infrahyoid muscles are first divided into a superficial layer and a deep layer. The deep layer develops to the sternothyroid and thyrohyoid muscles. The superficial layer becomes the splenius spreading in the cervical region, the intermediate part of which becomes degenerated in humans and the splenius is separated into the internal and external muscles. The internal muscle becomes the sternohyoid muscle and the lower part of the external muscle becomes the omohyoid muscle that runs obliquely in the lateral cervical area.<sup>[9]</sup> The unusual connection, which was generated between deep and superficial layers during the embryonic development, may have led to the presence of that unique variation between sternohyoid and sternothyroid.

During surgical interventions such as thyroidectomy, trachea resection and infrahyoid myocutaneous flap, the surgeon should take care into presence of this muscle

bridge. The reason that the left sternohyoid is narrower than the right one may be that the fibers separating from the left sternohyoid build up a bridge which separates from the muscle and joins sternothyroid. This case contributes to literature by the knowing the presence of this type variation by surgeons in the operations.

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 doi:10.2399/ana.17.044  
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*Conflict of interest statement:* No conflicts declared.

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