

A unique muscle bridge between sternohyoid and sternothyroid muscles

Murat Çetkin¹, Mustafa Orhan², İlhan Bahşi², Piraye Kervancioğlu²

¹Department of Anatomy, Faculty of Medicine, Istanbul Medeniyet University, Istanbul, Turkey

²Department of Anatomy, Faculty of Medicine, Gaziantep University, Gaziantep, Turkey

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.^[1,2] 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.^[2] Infrahyoid muscles are innervated by the branches separating from ansa cervicalis.^[1,3]

There are variations related to sternohyoid or sternothyroid muscles in the literature.^[4–6] Sternohyoid mus-

cle variations may be seen as double or absent, augmented by a clavicular slip, or interrupted by a tendinous intersection.^[2] The absence of sternal attachment of the sternohyoid muscle is more frequently found than the absence of clavicular attachment.^[3] 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 sternohyoid from the lateral. This bridge was determined to join the sternohyoid on 30.9 mm inferior of oblique line of thyroid cartilage, which is the ending point of sternohyoid. 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 sternohyoid 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.^[7,8] 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.^[3] Tripathy and Preetam^[9] 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.^[8] 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.^[7] Nayak et al.^[5] 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.^[4] detected the presence of an accessory belly of sternothyroid which helded 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

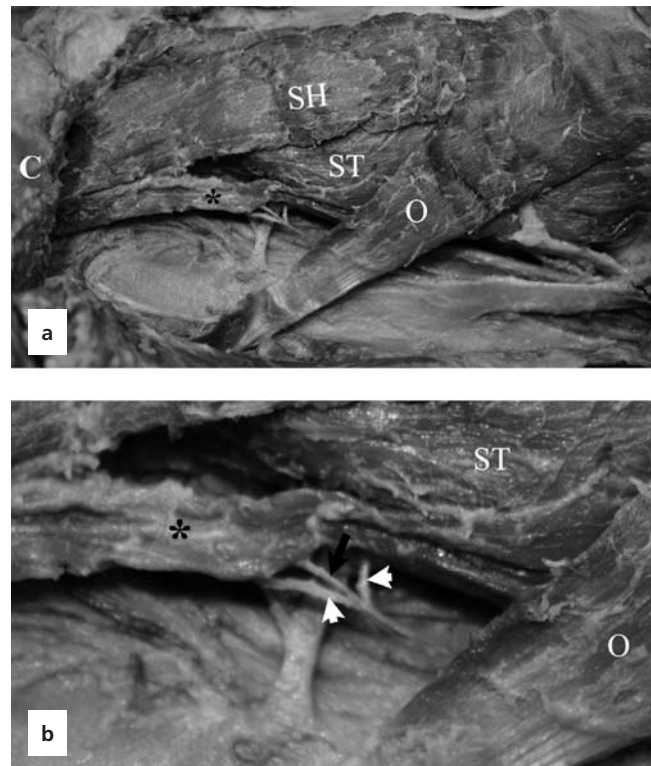


Figure 1. (a) The unique muscle bridge between sternohyoid and sternothyroid muscles; (b) The innervation of muscle bridge and sternothyroid. *muscle bridge; **black arrow**: the middle branch separating from a branch of ansa cervicalis innervate to muscle bridge; **C**: clavicle; **O**: omohyoid muscle; **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.^[9] 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.

References

1. Moore KL, Dalley AF, Agur AM. Clinically oriented anatomy. 7th ed. Baltimore (PA): Lippincott Williams and Wilkins; 2014. p. 1001–2.
2. Bergman R, Afifi A, Miyauchi R. Illustrated encyclopedia of human anatomic variation. Opus I: muscular system: omohyoideus, sternohyoideus, thyrohyoideus, sternothyroideus [Internet] 1996. [Revised on March 29, 2017]. Available from: <http://www.anatomy-atlases.org/AnatomicVariants/AnatomyHP.shtml>
3. Standring S, editor. Gray's anatomy: the anatomical basis of clinical practice. 41st ed. London (UK): Elsevier Churchill and Livingstone; 2016. p. 449–450.
4. Kang DW, Byeon Y, Yoon SP. An accessory belly of the sternothyroid muscle on the anterior neck. *Surg Radiol Anat* 2015;37:215–7.
5. Nayak S, Rai R, Krishnamurthy A, Prabhu LV, Potu B. An anomalous belly of sternothyroid muscle and its significance. *Rom J Morphol Embryol* 2009;50:307–8.
6. Sato I, Ueno R, Sato T. A consideration of the normal and abnormal human suprahyoid and infrahyoid musculature. *Okajimas Folia Anat Jpn* 1987, 64:17–37.
7. Rai R, Ranade A, Nayak S, Vadgaonkar R, Mangala P, Krishnamurthy A. A study of anatomical variability of the omohyoid muscle and its clinical relevance. *Clinics* 2008;63:521–4.
8. Raikos A, Agnihotri A, Yousif S, Kordali P, Saberi M, Brand-Saberi B. Interl jugular vein cannulation complications and elimination of the muscular triangle of the neck due to aberrant infrahyoid muscles. *Rom J Morphol Embryol* 2014;55:997–1000.
9. Tripathy PR, Preetam C. Unilateral absence of the sternohyoid muscle with contralateral tendinous belly of superior belly of omohyoid muscle: a very rare form of infrahyoid muscle variation. *International Journal of Anatomy and Research* 2015;3:1302–5.

Online available at:
www.anatomy.org.tr
 doi:10.2399/ana.17.044
 QR code:

deomed®



Correspondence to: Murat Çetkin, MD
 Department of Anatomy, Faculty of Medicine,
 Istanbul Medeniyet University, Istanbul, Turkey
 Phone: +90 533 867 62 16
 e-mail: muratcetkin@hotmail.com

Conflict of interest statement: No conflicts declared.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported (CC BY-NC-ND3.0) Licence (<http://creativecommons.org/licenses/by-nc-nd/3.0/>) which permits unrestricted noncommercial use, distribution, and reproduction in any medium, provided the original work is properly cited. *Please cite this article as:* Çetkin M, Orhan M, Bahşi İ, Kervancıoğlu P. A unique muscle bridge between sternohyoid and sternothyroid muscles. *Anatomy* 2017;11(3):157–159.

Author Index to Volume 11, 2017

(The bold typed references are the ones in which the person is the first author.)

A		D		K		S	
Abdulfatai A	1	D'Antoni AV	133, 146	Karaer E	99	Sargon MF	137
Abegaz BA	26	Daniel AT	79	Kendir S	128	Sasikala P	67
Adamu YW	153	Demir M	21	Kennedy H	133	Serindere G	30
Adekilekun TA	79	Duran M	133	Kervancioğlu P	157	Shahsavaripour S	87
Adekomi DA	79			Khan AA	51	Singh S	67
Adelodun TS	93	E		Köksal V	149	Steele AE	46
Adewole OS	79, 93	Enaibe BU	107			Stone VM	46
Adigun FM	107	Erbil N	61	L			
Adigun OO	107	Ertekin T	149	Lee CB	146	T	
Akintunde WO	1	Ezenwaka K	12	Loukas M	121	Temitayo LI	1
Arayombo BE	93					Tiruneh ST	153
Arogundade TT	107	F		M		Topping D	37
Avnioğlu S	149	Fabrizio PA	37	Malek A	72	Torun BI	128
Awad O	72	Faizal M	51	Mashriqi F	146	Tubbs RS	121, 133,
Awoke DG	26	Fayne A	133	Matthews K	133		141, 146
Aydın OÖ	115	Firat A	61	Mayo K	146	Tucker RP	46
						Turamanlar O	6
B		G		O-Ö		Turgut M	121
Bahşi İ	157	Gardner B	121	Obasi KK	1	U	
Barbarestani M	87	Gbadamosi IT	107	Ochieng SJ	72	Ulupınar E	115
Barut Ç	99	Göçmen R	61	Odieal DD	46	Unno F	146
Bejide R	93	Gündüz K	30	Ofusori DA	93	Uz A	128
Bekel AA	153			Ogeng'o J	72		
Beker Acay M	6	H		Olusola SS	93	W	
Bodon G	141	Hassanzadeh G	87	Orhan M	157	Wilson C	146
Bulut E	30	Havaslı F	21	Oskouian RJ	121	Woldeyes DH	153
		Horata E	6	Öztürk K	6	Wolfe K	37
C-Ç		I		P		Y	
Choi PJ	141	Igbokwe CO	12	Polat Çorumlu E	115	Yawson EO	1
Collin P	133	Iwanaga J	141	Protas M	121	Yoldaş A	21
Cornwall J	42					Z	
Çetkin M	157	J		R		Zdilla MJ	104
Çiçek M	21	Johnson SE	46	Rastegar T	87		

Acknowledgment

www.anatomy.org.tr

Anatomy 2017;11:160, © 2017 TSACA

Acknowledgment of Reviewers for Volume 11, 2017

The Editorial Staff of Anatomy expresses their appreciation to the following reviewers who have evaluated the manuscripts for Volume 11, 2017.

Esat Adigüzel
Nihal Apaydın
Çağatay Barut
Neslihan Boyan
Mete Ertürk
Merve Didem Eskin
Quentin Fogg
Z. Aslı İkiz

David Kachlik
S. Tuna Karahan
Piraye Kervancioğlu
Kenan Köse
Zeliha Kurtoğlu
Kaan Orhan
Mustafa F. Sargon
Levent Sarıncıoğlu

Erdoğan Şendemir
İbrahim Tekdemir
Trifon Totlis
İbrahim Tuğlu
Elgin Türköz Uluer
Emel Ulupınar
Ayşegül Uysal
Hülya Üçerler
Tuncay Varol