

BILATERAL FOUR AND SIX HEADS OF THE STERNOCLEIDOMASTOID MUSCLE. A CADAVERIC FINDING

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ABSTRACT

Background: The sternocleidomastoid muscle present a wide patterns of variations which including supernumerary muscular heads.

Aim: The aim of the present study is report bilateral four and six heads of the sternocleidomastoid muscle.

Materials and Methods: The anatomical variation was found during routine dissection performed in the laboratory of Morphology of the University of Pamplona.

Findings: On the right side, two sternal head were a continuous sheet with a small gap of 1 mm; the third head originating from sternoclavicular joint until the clavicular head. The fourth, clavicular head that arose from the medial and middle third of the clavicle. On the left side of the neck, two sternal heads were lying side by side. Of the four clavicular heads, two were superficial and another two lying in a deep plane.

Conclusions: Knowledge of these anatomical variations is important for any therapeutics and diagnostic intervention in the region neck.

Key Words: Anatomical variations, sternocleidomastoid muscle, four heads, six heads, lesser supraclavicular fossa.

INTRODUCTION

The sternocleidomastoid (SCM) muscle is a prominent landmark in the neck. It divides the neck into anterior and posterior triangles, and is intimately related to many neurovascular structures. 1 Classically, it has a medial (sternal) head and a lateral (clavicular) head. The sternal head is tendinous and arises from the anterior surface of the manubrium sterni, whereas the clavicular head is muscular and arises from the superior surface of the medial third of the clavicle. 2 Both of these heads are separated by a triangular interval, termed the lesser supraclavicular fossa, which corresponds to a surface depression that is used as a clinical landmark for various clinical procedures. 3 The anterior and posterior rim of the SCM serves as the boundary for the division of each hemineck into the anterior and posterior cervical triangle respectively. As they ascend, the clavicular head spirals behind the sternal head and blends in with its deep surface, forming a thick, rounded belly prior to its insertion into the lateral surface of the mastoid process and the lateral half of the superior nuchal line. 4 E.C.M muscle provides coverage to many important deeper

lying structures such as the accessory nerve, brachial plexus, cervical plexus nerves, common carotid artery, internal jugular vein, and jugular chain lymph nodes. 5,6 The aim of the present study is report a rare bilateral anatomical variation in the origin of the sternocleidomastoid muscle, which consist in four and six heads. These variations have been reported in different studies individually, but the presence of these, in the same cadaver, is very rare in the literature.

MATERIALS AND METHODS

This work was previously approved by the Ethics Committee in Research and Environmental Impact of the University of Pamplona, conformed by resolution 030 of January 16 of 2014 and Resolution No. 008430 of 1993 of October 4 of the Ministry of Health of Republic of Colombia, which regulates the scientific, technical and administrative norms for health research. The anatomical variations were observed on the right and left side of the cervical region of a 75-year-old male cadaver that was dissected in the Laboratory of Morphology of the University of Pamplona. This work was carried out by routine dissection classes for undergraduate medical

students. Topographic details of the variations were examined, recorded and photographed. Measurements were taken with assistance of a sliding Vernier caliper with an accuracy of 0.01 mm during the course of the anatomical dissection.

FINDINGS

On the right side, four heads of the SCM muscle were recorded, the medial of the four heads had anatomy corresponding to the usual sternomastoid portion. It was extending from the sternal manubrium to the mastoid process tip. The second head (lateral sternal head) extending from the sternoclavicular joint and terminated at the occipital bone just inferior to the insertion of the sternomastoid head, both heads were a continuous sheet, with a small gap of 1 mm. The third muscle head was a narrow strap-like muscle extending from the sternoclavicular joint and the proximal third of the clavicle, conjoined with the portion clavicular of the SCM muscle at the level of crossing with the omohyoid muscle. The muscular bundle reduced the interval between clavicular and, sternal head and additional head, causing significant stenosis of the minor supraclavicular fossa, dividing it into two fossa, which were named as medial and lateral lesser supraclavicular fossa. Figure 1. The fourth muscle head corresponding to the clavicular head, which was seen as a broad and continuous muscle sheet arose from the medial third and the middle third of the clavicle, thereby reducing the gap between the trapezius and sternocleidomastoid muscle. Coursed upwards, posteriorly, and obliquely, in a parallel course to the previously described muscles heads and inserted into linea nuchae superior on occipital bone, extending to the posterior edge of the mastoid process, through a broad and continuous muscle sheet, deeper, laterally and inferior to the insertion of the sternal head and additional head of the SCM muscle. Figure 1.

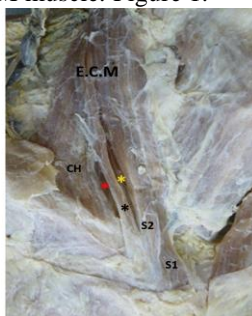


Figure 1. Right side of the neck. E.C.M: sternocleidomastoid muscle; S1: medial sternal head, S2: lateral sternal head; CH: clavicular head; black asterisk: muscular bundle originating from sternoclavicular joint and fused with the laterally situated clavicular head of the sternocleidomastoid muscle; yellow asterisk: medial lesser supraclavicular fossa; red asterisk: lateral lesser supraclavicular fossa.

On the left side, six heads of the SCM muscle were recorded, two sternal and four clavicular. Out of the two sternal heads, the medial fleshy head arose from the

anterolateral surface of the manubrium sterni, while the lateral tendinous head was arising from the sternum close to sternoclavicular joint. Out of the four clavicular heads, two were superficial and two were deep, all had fleshy insertions at the clavicular level. The medial of the superficial clavicular head arose from the medial end of the clavicle near the sternoclavicular joint just lateral to the sternal heads while the lateral was arising in the middle third of the clavicle from its superior aspect, thereby reducing the gap between the trapezius and sternocleidomastoid muscle. The superficial heads formed a single belly at the junction of the upper two-thirds and lower one-third of the SCM but remained separated from the deep clavicular heads. Two clavicular heads present in the deep plane (Figure 2) were lying side-by-side arising from the junction of medial one third and lateral two third of the clavicle in its superior aspect. All the clavicular heads and sternal heads fused with each other near their attachment to the mastoid process and the superior nuchal line. These additional heads, the sternal and the clavicular, reduced the interval between them causing significant stenosis of the minor supraclavicular fossa medially. Laterally, an even narrower additional minor supraclavicular fossa laterally and posterior cervical triangle was found, while the major supraclavicular fossa was shortened considerably.



Figure 2. Left side of the neck. S1: medial sternal head; S2: lateral sternal head; C1: medial superficial clavicular head; C2: lateral superficial clavicular head; C3: medial deep clavicular head; C4 lateral deep clavicular head.

All the heads of the sternocleidomastoid muscle, on both the right and the left, were seen supplied by the spinal accessory nerve and ventral rami of second and third cervical spinal nerves.

DISCUSSION

The SCM is a landmark for physicians such as orthopedic, surgeons, neurosurgeons and especially

anesthesiologists who intervene in the lesser supraclavicular fossa (LSF). LSF is an anatomical point for the anterior central venous catheterization approach for internal jugular vein (IJV) cannulation, is often preferred it is associated with a lower rate of pneumothorax. 6 Stenosis of LSM could pose problems during IJV cannulation; it can cause inadvertent puncture of the adjoining neurovascular structure leading hemorrhage or even nervous deficits.

Sirasanagandla et al., 7 reported additional head originated from the investing layer of cervical fascia in the roof of the subclavian triangle close to the clavicle and traversed obliquely upward, forward and fused with clavicular head. Raikos et al., 8 reported multiple aberrant muscular anatomy of the right anterior and lateral neck region involving the sternocleidomastoid muscle. Notice the muscular bundle originating from the sternoclavicular joint and fused with the laterally situated cleido-occipital muscle at the level of the lower half of the omohyoid muscle. Our finding are similar at the Raikos et al., 8 but it differs because in our case the muscular bundle was a narrow strap-like muscle extending from the sternoclavicular joint and the proximal third of the clavicle, reduced the interval between clavicular and sternal head causing significant stenosis of the minor supraclavicular fossa.

Boaro and Frago Neto, 9 reported the presence of three clavicular heads, while the sternal head was normal on a nine-month-old infant. Natsis et al., 10 noticed bilateral supernumerary heads of the SCM that had an additional sternal head and four additional clavicular heads, making six heads in total. Kaur et al., 11 also observed that the right SCM was formed by six heads, two sternal and four clavicular, whereas the left SCM was without any variation. In addition to these variations, similar to our case, they revealed that the lesser supraclavicular triangle was very narrow.

Surgeons can use the additional muscle bundles as myocutaneous flap for reconstruction of head and neck defects as well as for restoration of oral cavity. Moreover, along with part of clavicle, it can be used for mandibular reconstruction. Strengthening the suture line thereby, protecting the carotid and innominate artery is also done using these flaps. 12 SCM flaps have an edge over other flaps in providing soft tissue contour, coverage of facial nerves, nerve grafts; also act as healthy graft bed for skin grafts. 13,14 They are very efficient for preventing Frey's syndrome following parotidectomy and closure of parotid fistulas. 15 Role of SCM graft for facial animation in order to rehabilitate the paralyzed face is well established. 12,16

CONCLUSION

The frequency of bilateral additional heads of the SCM muscle is still rarer anatomical variations. Knowledge of these variations is important for anatomist, general surgeons, plastic surgeons, anesthesiologists,

neurosurgeons, orthopedics, head and neck surgeons, physiatrists, physiotherapists, occupational therapists, radiologists while approaching the region neck or lesser supraclavicular fossa for any surgical, therapeutics and diagnostic intervention. Additional muscular bundles of the sternocleidomastoid muscle may cause functional deficits by compressing the neurovascular structures, mimic pathological masses, complicate clavicle fractures or internal jugular, subclavian, and external jugular vein cannulation, could lead to potential problems in interscalene brachial plexus block.

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COMPETING INTERESTS

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REFERENCES

1. Standring S. Head and Neck. In: Standring S, ed. Gray's Anatomy: The Anatomical Basis of Clinical Practice, 40th ed. London: Elsevier, 2008:440-1.
2. Saha A, Mandal S, Chakraborty S, Bandyopadhyay M. Morphological study of the attachment of sternocleidomastoid muscle. Singapore Med J. 2014 Jan;55(1):45-7.
3. Arias-Hurtado DK, Ferreira-Arquez H. Bilateral supernumerary sternocleidomastoid heads with clinical and surgical implications. J Chem Pharm Res. 2016; 8(5):527-37.
4. Ferreira-Arquez H. Muscular variation in the neck region with narrowing of the minor and major supraclavicular fossa. International Archives Of Medicine, 2017, 10. Available from: <http://imedicalsociety.org/ojs/index.php/iam/article/view/2328> DOI: <https://doi.org/10.3823/2478>.
5. Ferreira-Arquez H. Multi Headed Sternocleidomastoid Muscle: An Anatomical Study. Int J Pharma Bio Sci. 2018 January; 9(1): (b) 249-56.
6. Botha R, van Schoor AN, Boon JM, Becker JH, Meiring JH. Anatomical considerations of the anterior approach for central venous catheter placement. Clin Anat. 2006;19: 101-5.
7. Sirasanagandla SR, Bhat KMR, Pamidi N, Somayaji SN. Unusual third head of the sternocleidomastoid muscle from the investing layer of cervical fascia. Int. J. Morphol. 2012; 30(3):783-5.
8. Raikos A, Paraskevas G, Triaridis S, Kordali P, Psillas G, Brand-Saberi B. Bilateral supernumerary sternocleidomastoid heads with critical narrowing of

- the minor and major supraclavicular fossae: clinical and surgical implications. *Int. J. Morphol.* 2012; 30(3):927-33.
9. Boaro SN, Fragoso Neto RA. Topographic variation of the sternocleidomastoid muscle in a just been born children. *Int J Morphol.* 2003;21:261-4.
 10. Natsis K, Asouchidou I, Vasileiou M, Papathanasiou E, Noussios G, Paraskevas G. A rare case of bilateral supernumerary heads of sternocleidomastoid muscle and its clinical impact. *Folia Morphol.* 2009; 68: 52-4.
 11. Kaur D, Jain M, Shukla L. Six heads of origin of sternocleidomastoid muscle: a rare case. *Internet Journal of Medical Update* 2013;8: 62-4.
 12. Conley J, Gullane PJ. The sternocleidomastoid muscle flap. *Head Neck Surg.* 1980;2:308-11.
 13. Bugis SP, Young JE, Archibald SD. Sternocleidomastoid flap following parotidectomy. *Head Neck.* 1990;12(5):430-5.
 14. Ferreira-Arquez H. Manual de disección humana. Cabeza, cuello, tórax y miembro superior. Saarbracken; Editorial Académica Española;2016.p. 172-177
 15. Filho WQ, Dedivitis RA, Rapoport A, Guimarães AV. Sternocleidomastoid muscle flap preventing Frey syndrome following parotidectomy. *World Journal of Surgery.* 2004;28(4):361-4.
 16. Singh S, Chauhan P, Loh HK, Mehta V, Suri RK. Absence of Posterior Triangle: Clinical and Embryological perspective. *J Clin Diagn Res.* 2017 Feb;11 (2):AD01-AD02.