Case Report

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A rare variation of the sternocleidomastoid muscle in a Turkish male cadaver: a case report of four clavicular heads on sternal head and an accessory head

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Abstract

During a routine dissection at Hacettepe University Department of Anatomy a variation of the sternocleidomastoid muscle was found unilaterally on the left side, in a 75-year-old Turkish male cadaver. At first the skin was removed, then the superficial cervical fascia along with the platysma muscle. Four clavicular heads (CH1, 2, 3, 4) and an accessory head of sternal part were observed on the left side along with one typical sternal head. The length, width and distance from the anterior border of the trapezius muscle, the acromioclavicularjoint and the sternoclavicular joint of each muscle were measured twice by two investigators using a digital caliper. Surgeons need to study thoroughly about the variations before any neck surgeries. For a successful muscle flap harvesting, central venous catheterization, cervical examination and many other procedures involving the neck region, we need to aware of all kind of variation of the sternocleidomastoid muscle.

Keywords: anatomy; dissection; neck surgery; sternocleidomastoid muscle

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Introduction

The sternocleidomastoid muscle (SCM) is a superficial neck muscle which descends diagonally along the edge of the neck. The lower part of the muscle generally separates into 2 heads at its point of attachment. Embryologically, the SCM shares a common origin with the trapezius muscle from the sixth branchial arc.[1] Between the 4th and 5th months of embryologic developmental period, the muscle attachments significantly increase.[2] In an adult, the sternal head begins from the anterior surface of the manubrium sterni and extends posterolaterally. The clavicular head originates above the middle 1/3 of the clavicle and extends vertically. The sternocleidomastoid muscle is attached by a strong tendon to the lateral aspect of the mastoid process and to the superior nuchal line by a thin aponeurosis. Clavicular fibers extend more to the mastoid process, while sternal fibers extend transversely and superficially to the occiput.[3]

The sternocleidomastoid muscle has usually 5 heads consisting of two layers. It is often divided into cleidomastoid and sternomastoid parts. In addition, it consists of a superficial layer; namely the superficial sternomastoid, sterno-occipital, cleido-occipital and a deep layer; the deep sternomastoid and cleidomastoid. A sixth part has been seen in addition to these five parts which has been described as sternomastoideus profundus.[4]

Case Report

During a routine dissection at Hacettepe University Department of Anatomy, a variation of the SCM was found unilaterally on the left side, in a 75-year-old Turkish male cadaver. At first, the skin was removed, then the superficial cervical fascia along with the platysma muscle. Four clavicular heads (CH1, 2, 3, 4) and an accessory head of sternal part (AH) was observed on the left side along with on typical sternal head (SH) (**Figures 1** and **2**). The length, width and distance from the ante-

rior border of the trapezius muscle, the acromioclavicular joint and the sternoclavicular joint of each muscle part was measured twice by two investigators using a digital caliper. The average values were given as result.

The SH originated from the anterior and superior part of manubrium sterni. The AH originated from the superolateral part of manubrium sterni and sternoclavicular joint capsule. They both terminated at the mastoid process. The AH length was 171.77 mm and width was 1.83 mm. The SH had a length of 194.21 mm and width of 18.92 mm. The length of CH1 was 167.43 and width was 15.52 mm. CH muscle length was 162.41 mm and width was 15.52 mm. CH3 muscle had a length of 152.47 mm and width of 3.10 mm. The length of CH4 was 148.05 mm and width was 4.67 mm. The distance from the sternoclavicular joint to the CH, CH2, CH3, CH4 was 21.06, 23.74, 31.81, 44.42 mm respectively. The distance from the acromioclavicular joint to the SH, AH, CH1, CH2, CH3, CH4 was 152.31, 153.69, 129.46, 139.46, 130.49, 119.23 mm respectively. The distance from the anterior border of the trapezius muscle to the SH, AH, CH1, CH2, CH3, CH4 was 116.23, 110.58, 101.43, 91.62, 76.84, 65.70 mm respectively.

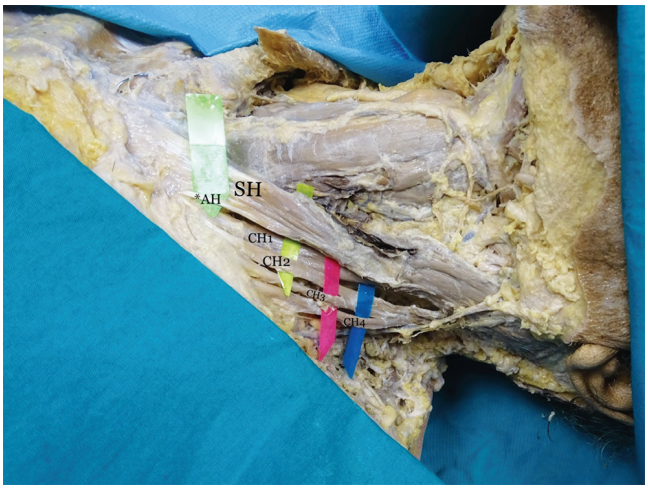

Figure 1. Left lateral view of the neck region showing variation of the sternocleidomastoid muscle with four clavicular heads, one sternal and one accessory head. **AH:** accessory head; **CH:** clavicular head, **SH:** sternal head.

Discussion

The sternocleidomastoid muscle typically originates from the manubrium sterni and medial aspect of the clavicle and attaches to the mastoid process of the temporal bone and superior nuchal line.[5]

Variations in the SCM muscle are diverse. Nayak et al.[6] reported a case with an additional sternal head arising from the capsule of the sternoclavicular joint and the superolateral border of the manubrium sterni in both sides of a cadaver. The width of this additional sternal head was 1.2 cm on the left and 0.7 cm on the right side. The clavicular part was joining the muscle at a distance of 5.2 cm on the left and 6 cm on the right from its origin.

Kim et al.[7] reported bilateral four-bellied sternocleidomastoid muscles in a 67-year-old Korean male cadaver. On the right side; there were 2 sternomastoids, 1 cleidomastoid, 1 cleido-occipital and on the left, 1 sternomastoid, 1 cleido-occipital, 2 cleidomastoids.

Another case of a 60 year-old male cadaver reported by Surendran et al.[8] the clavicular head of the right sternocleidomastoid muscle was revealed to had 4 bellies. The most medial belly of the clavicular head had 3 tendons, the 2nd belly had 3 tendons, the 3rd belly had 4 tendons, and the 4th belly had 2 tendons.

Heo et al.[9] revealed a multiheaded sternocleidomastoid muscle on the left side of a 85-year-old Korean male cadaver. The authors noted three heads and an accessory belly on the sternal head. One of these three parts has

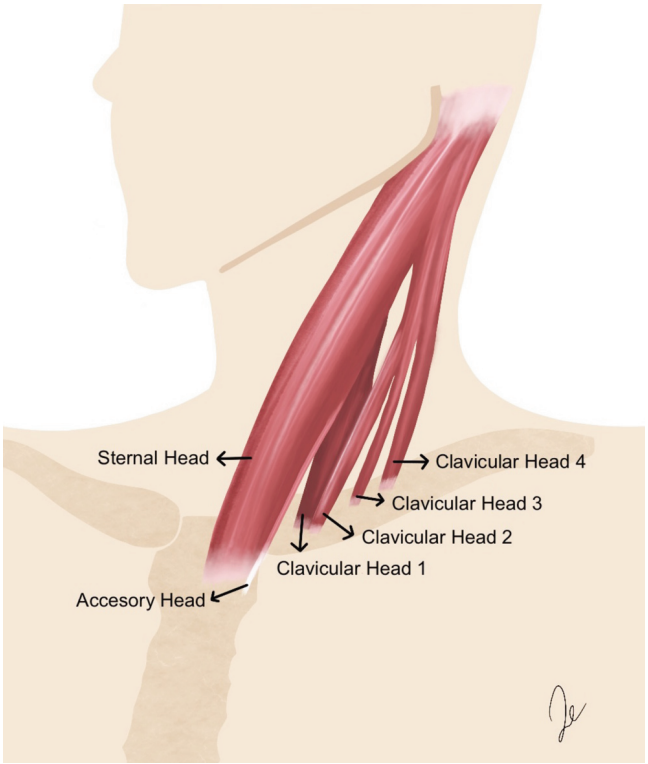

Figure 2. Illustration of the left lateral view of the neck region showing variation of the sternocleidomastoid muscle with four clavicular heads, one sternal and one accessory head.

been reported as the sternal head, the others as the medial clavicular and lateral clavicular head. The width of th sternal head was 12.8 mm and the length was 189.4 mm. The accessory head was located lateral to the sternal head and was 77.6 mm in length and 3.7 mm in width. The length of the lateral clavicular head was 137.8 mm and the medial clavicular head length was 143.6 mm. Its insertion has been reported to be corresponding to the normal anatomy (mastoid process and superior nuchal line). Being aware of variations in the SCM is important for surgeons to plan ahead in case they suddenly encounter any anatomical variations during invasive neck procedures such as central venous catheterization (CVC).[9] For example, Dupont et al.[10] reported an 81-year-old fresh-frozen male cadaver with 2 separate headed SCM connected bilaterally to the occiput and mastoid and showed 6 tendon insertions on the occiput. As seen in the case report of Dupont et al.[10] the variability of the attachment points of the SCM should be well known before planning interventions to the neck.

The SCM has proven to be important in many areas of medical education and clinical pathologies, so its variations need to be known and studied. Examination of the sternocleidomastoid muscle forms part of the examination of the cranial nerves. It can be felt on both sides of the neck when a person moves their head to the opposite side.[11]

The triangle formed by the sternal and clavicular heads of the clavicle and sternocleidomastoid muscle is used as a landmark to determine the correct location for CVC. Correct CVC placement prevents serious complications, especially intracardiac implamentation, which can be fatal. As seen in a study by Chen et al.[12] both the length of the SCM muscle and the body height are statistically significant for predicting the depth of CVC placement. In their study on the standardization of botulinum toxin injection into the SCM, Torun et al.[13] emphasized the significance of considering the lower part of the muscle, particularly for toxin administration in cases of torticollis. They highlighted that this region, which is thinner and in close proximity to the structures beneath the jugular vein, should be avoided. Similarly, in our study, we have identified variations in the lower part of the SCM, underscoring the importance of taking these variations into account in clinical practice.

Conclusion

The SCM is a large, superficial muscle located in the anterior part of the neck. Due to its anatomical movements and structure, it plays an important role in many areas of medicine. Surgeons need to make a thorough study of the variations of this muscle before any neck surgery. The SCM muscle also acts as a landmark and a useful flap during head and neck dissections.[14] For a successful muscle flap harvest, central venous catheterization, cervical examination and many other procedures involving the neck region, we need to be aware of all possible variations of the SCM.

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Conflict of Interest

The authors have no conflicts of interest to disclose.

Author Contributions

ZÇ: cadaver dissection, manuscript writing, data collection, drawing the illustration; SK: cadaver dissection, manuscript writing, data collection; MÜ: cadaver dissection, manuscript editing, approval of the fina version; BEG: manuscript editing, data management, approval of the final version.

Ethics Approval

This study has been prepared in accordance with the Helsinki Declaration. There were no ethical violations in the creation of this work.

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References

1. Cherian SB, Satheesha N. A rare case of unilateral third head of sternocleidomastoid muscle. Int J Morphol 2008; 26:99–101.
2. Marecki B, Lewandowski J, Jakubowicz M. Anthropomorphology of sternocleidomastoid muscle. Gegenbaurs Morphol Jahrb 1989;135: 491–503.
3. Standring S. Gray's anatomy: the anatomical basis of clinical practice. 41st ed. London: Elsevier; 2016. p. 448–9.
4. Bergman R, Afifi A, Miyauchi R. Illustrated encyclopedia of human anatomic variation: Opus I: Muscular System: Alphabetical listing of muscles: [Internet]. [Retrieved on January 13, 2023]. Available from: https://www.anatomyatlases.org/AnatomicVariants/MuscularSystem/Text/S/28Sternocleidomastoideus.shtml.
5. Kohan EJ, Wirth GA. Anatomy of the neck. Clin Plast Surg 2014;41: 1–6.
6. Nayak SR, Krishnamurthy A, Kumar Sj M, Pai MM, Prabhu LV, Jetti R. A rare case of bilateral sternocleidomastoid muscle variation. Morphologie 2006;90:203–4.
7. Kim SY, Jang HB, Kim J, Yoon SP. Bilateral four heads of the sternocleidomastoid muscle. Surg Radiol Anat 2015;37:871–3.

8. Surendran S, Nayak SB, Reghunathan D, Nelluri VM. Sternocleidomastoid muscle with five fleshy bellies and thirteen heads of origin. Online Journal of Health and Allied Sciences 2016;3:11.
9. Heo YR, Kim JW, Lee J-H. Variation of the sternocleidomastoid muscle: a case report of three heads and an accessory head. Surg Radiol Anat 2020;42:711–3.
10. Dupont G, Iwanaga J, Altafulla JJ, Lachkar S, Oskouian RJ, Tubbs RS. Bilateral sternocleidomastoid variant with six distinct insertions along the superior nuchal line. Anat Cell Biol 2018;51:305–8.
11. Fehrenbach MJ, Herring SW. Illustrated anatomy of the head and neck. Philadelphia (PA): Elsevier; 2012. p. 87.
12. Chen CK, Tan PP, Lee HC. Sternocleoidomastoid muscle length predicts depth of central venous catheter insertion. Acta Anaesthesiol Taiwan 2007;45:211–5.
13. Torun Bİ, Kendir S, Aysun U. Standardization of sternocleidomastoid for botulinum toxin applications. Anatomy 2017;11:128–32.
14. Rao TR, Vishnumaya G, Prakashchandra S, Suresh R, Ramesh R, Vishnumaya G. Variation in the origin of sternocleidomastoid muscle. Int J Morphol 2007;25:621–3.

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