

Unilateral four heads of sternocleidomastoid muscle: a rare case report

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SUMMARY

A rare case of two additional slips in the origin of the sternal and clavicular head of the left sternocleidomastoid muscle was found during routine dissection of neck in a 65-year-old male cadaver. One of the additional heads originated in the clavicle and another head shared its origin in both the clavicle and the sternum. Both the additional heads joined with the main heads of the sternocleidomastoid muscle in the middle of the neck. The insertion, nerve supply, and blood supply were normal. The aim of our study was to report a case of variation in the sternal and clavicular origin of the sternocleidomastoid muscle and to provide detailed information about this new variation. This case may be important for head-and-neck surgeons for muscle grafting, as well as for radiologists while interpreting MR/CT scans of neck region.

Key words: Sternocleidomastoid muscle – Additional heads – Premuscle mass – Anatomical variation – Supraclavicular fossa

INTRODUCTION

The sternocleidomastoid muscle (SCM) is present across the side of the neck and forms the prominent landmark when contracted. The sternocleidomastoid arises with two heads: the

sternal head arises from the upper part of the anterior surface of the *manubrium sterni*, and the clavicular head arises from the superior surface of the medial third of the clavicle.

The two heads are directed upwards, separated at their origin by a triangular interval called lesser supraclavicular fossa and the two heads blend into a thick muscle and get inserted into the lateral surface of mastoid process and lateral part of superior nuchal line (Williams et al., 1995; Standring et al., 2005). The SCM consists of two layers (superficial and deep) and five parts. The superficial layer of these parts consists of superficial sternomastoid, sterno-occipital, cleido-occipital parts. The deep layer has the deep sterno-mastoid and cleido-mastoid parts (Bergnan et al., 1988; Sanli et al., 2006). The sternocleidomastoid divides the side of the neck into the anterior and the posterior triangle; and it is an important surgical landmark, as it is related to many neurovascular structures in the neck.

The sternocleidomastoid gets its motor nerve supply from the spinal accessory nerve, and the proprioceptive innervation from the 2nd, 3rd, 4th spinal nerves. The muscle gets its arterial supply from the occipital, posterior auricular, superior thyroid and suprascapular arteries.

The muscle, while acting alone, flexes the neck laterally and turns the face to the opposite side. When the they muscles of the two sides contract simultaneously, flex the head and neck. Spasm of sternocleidomastoid causes flexion deformity at the neck known as wry neck or torticollis (Williams et al., 1995).

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CASE REPORT

During the routine dissection of a 65 year old male cadaver, we found a rare case of variation of the sternocleidomastoid muscle on left side. The variation is characterised by presence of two additional heads arising from the clavicle, and a head sharing origin from both the *manubrium sterni* and the clavicle.

Both the additional heads fused with the main heads near the middle of the sternocleidomastoid muscle. The presence of these additional heads almost completely occluded the minor supraclavicular fossa. The size of the additional heads was half the size of the normal heads of the muscle. All the heads were blending into a thick rounded muscle belly, which was inserted by a tendon into the mastoid process and the superior nuchal line. Innervation of both additional heads was derived from spinal accessory nerve. No neurovascular variations were observed and other musculature



Fig. 1. Left lateral view of the neck showing four heads of the sternocleidomastoid. SH – sternal head of sternocleidomastoid; AH1 – additional head sharing its origin from both sternum and clavicle; CH – clavicular head; AH2 – additional clavicular head.

displayed normal morphology.

DISCUSSION

The sternocleidomastoid muscle shows a number of variations with respect to its origin with additional heads. The causes of these variations may depend upon alteration of its sequential development. Knowledge of human embryology is an important tool in understanding anatomical variations.

The sternocleidomastoid and the trapezius share a common source of origin. Both muscles form a common pre-muscle mass from the last two occipital and upper cervical myotomes; hence it can be fused with the trapezius muscle. The fusion of these two muscles is considered to be a normal feature. Tendinous intersections have been noted in the sternocleidomastoid. The intersections are probably due to the development of the muscle by several myotomes (Bergman et al., 1988).

According to comparative anatomy, the sternocleidomastoid muscle is composed of four muscles, which are the sternomastoid, the sterno-occipital, the cleidomastoid, and the cleidocranial occipital. It is also called the “quadrigenum muscle of the neck”. In humans the four beams forming the quadrigenum are more or less welded instead of staying in a state of complete independence, as in some animal species (Le Double, 1897).

However, other comparative anatomical studies have concluded that the sternocleidomastoid muscle is composed of five parts arranged in two layers: a superficial layer consisting of a superficial sternomastoid, sterno-occipital, and a cleido-occipital part, and a deep layer consisting of a deep sternomastoid and a cleidomastoid part. To these five parts a sixth has been seen and described as *sternomastoideus profundus*. The names adequately indicate the attachments of the

Table 1. List of references regarding the number of additional bellies of the sternocleidomastoid, as well as the side on which this was found and the sex of the cadaver.

Authors	Number of additional bellies	Right side	Left side	Sex
Coskun et al., 2002	Three	Three		Male
Boaro and Fragoso Neto, 2003	Two		Two	
Nayak et al., 2006	Two	One	One	Male
Ramesh et al., 2007	Two	One	One	Male
Cherian and Nayak, 2008	One		One	Male
Natsis et al., 2009	Eight	Four	Four	Male
Amorim et al., 2010	One		One	Male
Rani et al., 2011	One		One	Female
Mehta et al., 2012	One		One	Male

various parts (Bergman et al., 1988). The amount of fusion of the two layers of this muscle varies considerably. They are frequently separated into cleidomastoid and sternomastoid parts; this has been regarded as normal by some authors.

A supernumerary cleido-occipital muscle (Wood) more or less separate from the sternocleidomastoid has been reported with a frequency of 33% (Bergman et al., 1988). Apart from Wood's, new cases of cleido-occipital muscle were reported by several anatomists (Testut, 1884; Le Double, 1897).

The presence of additional bellies bilaterally has been reported (Nayak et al., 2006; Ramesh et al., 2007; Natsis et al., 2009). The presence of additional bellies unilaterally has been reported (Boaro and Fragoso Neto, 2003; Cherian and Nayak, 2008; Amorim et al., 2010; Rani et al., 2011; Mehta et al., 2012) (Table 1).

Coskun et al. (2002) have reported multiple variations of the sternocleidomastoid muscle. The SCM shows a great variation in its clavicular origin. The clavicular head can be as narrow as the sternal head, or it can be up to 8 cm of width. When the clavicular origin is wide, it is occasionally subdivided in various slips, separated by narrow interval which occludes the lesser supraclavicular fossa. Our data differ little from other literature in the way that one of the additional heads shares its origin from both sternum and clavicle. The two additional heads are supplied by their own nerve, and their insertion followed the normal pattern.

All these variations, including the present case, are very important for Head-and-Neck and plastic surgeons and radiologist. It is essential to be aware of these possible variations during head and neck surgeries, as well as MRI and CT image observations of neck region. The SCM has been implicated in various reconstructions of head and neck region. It may be utilized as a myocutaneous flap in reconstructing the oral floor, as a suture line to protect the carotid arteries or along with portion of the clavicle to reconstruct the mandible (Conley and Gullane, 1980; Casler and Conley, 1991). The posterior border of SCM is an important landmark for radiological parameter. So additional heads should be kept in mind while judging the various levels of CT and MRI images (Hamoir et al., 2002). The additional interval created due to additional heads should be kept in mind while approaching the internal jugular vein for various catheterization procedures, as repeated efforts to cannulate the internal jugular vein may result in haemorrhage. The minor supraclavicular fossa is important for anaesthesiologists, because the anterior central venous catheterisation approach is an anatomically

accurate technique (Botha et al., 2006).

Moreover, the presence of this variation could alter the dosage of botulinum toxin injection administered to patients with irradiation induced muscle spasm, as individuals having additional mass of SCM may need a larger dose of the botulinum toxin (Marino, 2007).

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