

An Unusual Presentation of Spinal Accessory Nerve

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Abstract: The spinal accessory nerve is entirely motor nerve. It is also called as Nerve of Willis named after Thomas Willis (Willis,1965). The nerve is derived from 6th branchial arch. This nerve is made up of 2 components: cranial and spinal root. We report a finding of the termination of spinal accessory nerve into the substance of sternocleidomastoid muscle without continuation in the posterior triangle. Radical neck dissection is the first line of treatment to diagnose and prevent cervical lymph metastasis in the patients of head and neck malignancy. Preoperative knowledge of such variation is crucial to identify the structures.

Key Words: spinal accessory nerve, sternocleidomastoid muscle, nerve of Willis

INTRODUCTION

The spinal accessory nerve is entirely motor nerve. It is also called as Nerve of Willis named after Thomas Willis (Willis,1965). The nerve is derived from 6th branchial arch. This nerve is made up of 2 components: cranial and spinal root. The cranial root actually represents the detached part of vagus nerve that is why it is called as spinal accessory nerve. The cranial root takes origin from nucleus ambiguus and also from dorsal nucleus of vagus. It innervates the muscles of pharynx and other structures in the form of plexus after communicating with the vagus nerve. Whereas the spinal root innervates the sternocleidomastoid and trapezius muscle. Then the nerve rootlets unite and emerge through the posterolateral sulcus of medulla below the attachment of the vagus nerve. The nerve then becomes the component of the intermediate compartment of jugular foramen. Here they unite with the spinal root. The spinal accessory along with the vagus nerve is covered by a common sheath of dura mater. It then passes laterally, either in front of the internal jugular vein in 33% of individuals or behind the vein in 66% of individuals. Sometimes very rarely it passes through the vein.¹

Here it is accompanied by the sternomastoid branch of the occipital artery which is a branch of the external carotid artery. At this level, it is situated deep to the styloid process and the muscles and structures attached to it. It is also related to the posterior belly of digastric. Here it becomes the content of the digastric triangle. The nerve then descends downward and the nerve then pierces the sternocleidomastoid muscle and supplies it. Then it traverses through the substance of the muscle and joins with the C2. From the nerve point or Erb's point, it then emerges out and lies superficially covered by the investing layer of deep cervical fascia. Here it is surrounded by a group of lymph nodes. Then it lies over the levator scapulae muscle and communicates with C2 & C3. The nerve then passes deep to the trapezius and joins with C3 & C4 Cervical nerve.

We report a finding of the termination of spinal accessory nerve into the substance of sternocleidomastoid muscle. Radical neck dissection is the first line of treatment to diagnose and prevent cervical lymph metastasis in the patients of head and neck malignancy. Preoperative knowledge of such variation is crucial to identify the structures.

FINDINGS

This was found on the right side of the neck dissection among 20 sides of neck dissection during the routine dissection as the part of regular teaching curriculum in Anatomy As per the guidelines in the Cunningham's Practical Manual of Anatomy, we made the incisions to reflect the triangles of neck. The structures to be introduced are: from superficial to deep: skin, superficial fascia containing the platysma muscle, the cervical branch of facial nerve from the deeper aspect, investing layer of deep cervical fascia, retromandibular vein, Common facial vein, facial artery. After reflecting the anterior belly of digastric muscle, we found the hypoglossal nerve looping along the lingual artery. The spinal

accessory nerve deep to the posterior belly of digastric, present medial to the internal jugular vein then it crosses the internal jugular vein and the external carotid artery laterally. Here it is related to the sternomastoid branch of occipital artery. The nerve then divided into multiple rootlets in the upper zone of sternocleidomastoid muscle, 12cm below the upper attachment of the muscle. Here it got communication from the cervical plexus. Here the spinal accessory did not come out from the midpoint of the posterior border of sternocleidomastoid muscle.

On further dissection, we found that the rootlets are terminated in the substance of the muscle. Then to confirm the nerve supply of trapezius, we found that a branch coming from the cervical plexus underneath the sternocleidomastoid muscle without piercing it, then it lies over the levator scapulae providing the innervation to the trapezius muscle, mostly the C3, C4.



FIGURE 2: showing the branches derived from the cervical plexus to the trapezius.

PICTURES



FIGURE 1: showing the spinal accessory piercing the sternocleidomastoid muscle.

DISCUSSION

The current finding is a very rare presentation to be reported. Knowledge of such variation with its vicinity is tremendously important to the surgeons, anatomists and students for their interest. Some other type of variations of spinal accessory have been reported but not similar.

Restrepo C E et al (2016) reported a variation inside the dura mater of the course of spinal accessory.

Johal J et al (2019) reported some variations related to accessory nerve in a review article such as intracranial duplication and connection with facial nerve.

Takaoka et al (2022) reported a case where the spinal accessory nerve passes through the internal jugular vein.

Embryologically, the nerve develops as a cluster of cells by the influence of a homeodomain containing transcription factor, the cells which form the nerve end as a mass of condensed mesoderm. It acts as a precursor to the sternocleidomastoid muscle.

Here we report that the sternocleidomastoid muscle is innervated by the spinal accessory nerve from its medial border. On the right side, the spinal accessory nerve terminated as a numerous filaments into the substance of the muscle. the trapezius got its nerve supply from the cervical plexus as a sub-trapezoid plexus.

CONFLICTS

No conflicts of the study to be reported by the authors.

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