CASE REPORT

Dual innervations of mylohyoid muscle: a case report

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Abstract

Mylohyoid and anterior belly of the digastric muscles are supplied by a branch from the inferior alveolar nerve called the mylohyoid branch. Here we present an unusual finding in a 60-year-old male cadaver in which the mylohyoid muscle is supplied by a branch from hypoglossal nerve in addition to its usual nerve supply. Hypoglossal nerve after giving superior root of the ansa cervicalis and muscular branches to thyrohyoid and geniohyoid muscles gave another branch to supply the mylohyoid muscle. Any variation in the formation and/or branching pattern of ansa cervicalis or hypoglossal nerve can cause confusion and may complicate the procedures involving this nerve such as skull base surgery, neck dissection, and anterior cervical spinal approach. Developmentally mylohyoid muscle is from the mesoderm of the first arch, therefore, must be innervated by the mandibular nerve. Hence, we report this uncommon variation based on embryology and the clinical implications.

Keywords: mylohyoid muscle, mylohyoid nerve, ansa cervicalis, hypoglossal nerve, variation.

Introduction

Inferior alveolar nerve just before entering the mandibular canal gives off a small mylohyoid branch that pierces the sphenomandibular ligament and enters a shallow groove on the medial surface of the mandible. It passes below the origin of mylohyoid to lie on the superficial surface of the muscle, between it and anterior belly of the digastric, both of which it supplies [1]. Accessory innervations to the pulps of both anterior and posterior mandibular teeth by the sensory component of this nerve have been reported [2].

The ansa cervicalis is a neural loop in the neck formed by the union of two main nerve roots, namely superior and inferior roots, derived from the ventral rami of the cervical nerves. The inferior root of the ansa cervicalis (descendens cervicalis) is formed by the union of a branch from the second with another from third cervical ramus. The superior root of the ansa cervicalis (descendens hypoglossi) contains fibers from the first cervical spinal nerve. The nerves to thyrohyoid and geniohyoid muscles arise near the posterior border of the hyoglossus muscle. They represent the remaining fibers from the first cervical nerves [1].

A number of variations in the course and branching pattern of the hypoglossal nerve and ansa cervicalis have been reported. The right and left hypoglossal nerves may be connected by the crossing fibres situated between the genioglossus and geniohyoid muscles or in the substance of the geniohyoid (ansa suprathyoid hypoglossi of Hyrtl). The reported frequency is 8–10% of individuals [3]. According to Compendium of Human Anatomic Variation, hypoglossal nerve may send branches to mylohyoid, digastric and stylohyoid muscles [4], but detailed information are lacking.

Material and Methods

The variation was observed during routine dissection of a male cadaver in the dissection hall of the Department of Anatomy, Kasturba Medical College, Mangalore, Karnataka. The history of the individual and cause of the death is not known. The branches of the hypoglossal nerve were traced carefully until their termination to the muscles. The dissection was carried out according to the Cunningham’s Manual of Practical Anatomy [5].

Results

During routine dissection of the submandibular region, mylohyoid nerve supplying anterior belly of the digastric and mylohyoid muscle was noted. Later while dissecting the anterior triangle of the neck following variation was observed. The hypoglossal nerve with its normal course gave superior root of the ansa cervicalis and a muscular branch to the thyrohyoid muscle. Further, the hypoglossal nerve proceeded forward superficial to hyoglossus muscle and gave a branch to mylohyoid muscle (Figure 1). The variation was unilateral (on left side only). Then the hypoglossal nerve ascends between geniohyoid and genioglossus muscles giving branches to them. This was an isolated variation and no other anomalies were observed in this region or in this cadaver.

Discussion

Variations in the branching pattern or distribution of nerves are less common when compared to blood vessels. Such variation in the distribution of nerve is important from its clinical significance as well as embryological basis.
Figure 1 – Hyoglossus muscle and hypoglossal nerve with its variant branch.

Developmentally mylohyoid muscle is a first branchial arch muscle, hence supplied by mandibular nerve. The branchial muscle may migrate from the original position, but once it is innervated by the nerve of the arch the muscle retains its innervation irrespective of its location. In the present case, the mylohyoid is supplied by mylohyoid nerve, but interestingly it is also (mylohyoid muscle on both sides) supplied by the hypoglossal nerve.

Developmentally the occipital or pre-cervical somites are initially four in number; later the first somite disappears. The occipital myotomes are innervated by the pre-cervical nerves; subsequent union of these nerves forms the composite hypoglossal nerve. When the rudiments of the tongue develop in the floor of the pharynx involving first, second and third branchial arches, the occipital myotomes migrate forwards and invade the substance of the tongue [6].

The dual nerve supply to mylohyoid muscle raises the question as to whether the mylohyoid muscle is derived from the mesoderm of first branchial arch or from the occipital myotomes. It may be due to the close proximity between the first arch mesoderm and the occipital myotomes leading to migration of cells from occipital myotomes to first arch mesoderm could probably explain the embryological basis for these dual innervations.

Hyoglossal nerve is known to carry fibers from the ventral ramus of the first cervical nerve to supply geniohyoid and the thyrohyoid muscles. In the present case, it gave a branch to mylohyoid muscle in addition to thyrohyoid and geniohyoid muscles. The fibers are also likely to be derived from ventral ramus of first cervical nerve and not from hypoglossal nucleus of medulla oblongata, because hypoglossal nerves innervate muscles derived from occipital myotomes (muscles of tongue). It is also possible that, this branch of hypoglossal nerve supplying the mylohyoid muscle will be carrying the proprioceptive fibers to the mesencephalic nucleus of the brainstem. However, such details can only be proved with more work in this field using anterograde and transganglionic transport techniques.

To the best of our knowledge, this variation was not reported so far in any journal or standard anatomy textbook. We have been reporting it for first time. Hence epidemiological parameters, age, sex, origin country, race are not applicable. But, future studies can be carried out to see such epidemiological specificity of this type of variation.

Hypoglossal nerve palsy is uncommon. Damage to this nerve produces characteristic clinical manifestations, of which unilateral atrophy of the tongue musculature is the most important. In the case of hypoglossal nerve innervating mylohyoid muscle as in the present case, it may involve mylohyoid muscle also. Mylohyoid elevates the floor of the mouth in the first stage of deglutition and elevates the hyoid bone or depress the mandible. Hence, hypoglossal nerve injury can interfere with deglutition.

Conclusions

With the expanding use of the ansa cervicalis for reinnervation procedures and the fact that it is located near major nerves and vessels of the neck, knowledge of the topography and morphology of this loop is quite desirable in the modern era. Variation such as reported in this case is also to be noted before surgical procedures in the neck region.

References


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