

UNUSUAL ORGANIZATION OF THE ANSA CERVICALIS: A CASE REPORT

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ABSTRACT

The superior root of the ansa cervicalis is formed by C1 fibers carried by the hypoglossal nerve, whereas the inferior root is contributed by C2 and C3 nerves. We report a rare finding in a 40-year-old male cadaver in which the vagus nerve fused with the hypoglossal nerve immediately after its exit from the skull on the left side. The vagus nerve supplied branches to the sternohyoid, sternothyroid and superior belly of the omohyoid muscles and also contributed to the formation of the superior root of the ansa cervicalis. In this arrangement, paralysis of the infrahyoid muscles may result following lesion of the vagus nerve anywhere in the neck. The cervical location of the vagus nerve was anterior to the common carotid artery within the carotid sheath. This case report may be of clinical interest to surgeons who perform laryngeal reinnervation and neurologists who diagnose nerve disorders.

Key words: Ansa cervicalis, hypoglossal nerve, vagus nerve, variations

INTRODUCTION

The ansa cervicalis is a nerve loop formed by the union of superior and inferior roots. The superior root is a branch of the hypoglossal nerve containing C1 fibers, whereas the inferior root is a branch formed by the union of C2 and C3 fibers [9]. The inferior root descends on the lateral side of the internal jugular vein to cross this vessel in the mid-neck region and continues forward to join the superior root anterior to the common carotid artery, thereby forming the ansa cervicalis [2,8,9].

Although there have been reports of abnormal communications involving the ansa cervicalis, few case studies have described the extracranial union of the vagus and hypoglossal nerves associated with emergence of the superior root of the ansa cervicalis from the vagus nerve [1,4]. The hypoglossal nerve is responsible for motor innervation of the extrinsic and intrinsic muscles of the tongue but, when the vagus nerve unites with the hypoglossal nerve, there is the possibility that the vagus nerve may also supply the tongue musculature. This additional contribution from the vagus nerve is presumably of considerable clinical significance.

CASE REPORT

During routine dissection, we detected an unusual ansa cervicalis on the left side in a 40-year-old male

cadaver. The right side was normal. The neck region was dissected and the neural structures in the carotid and muscular triangle regions were exposed, with particular attention given to the organization of the ansa cervicalis. The muscle, nerve and blood vessel arrangements were recorded and the specimen was photographed (Fig. 1).

Observations

a) Superior root

The hypoglossal and vagus nerves were fused over a length of 3 cm immediately below their exit through hypoglossal canal and jugular foramen, respectively. The C1 nerve joined the hypoglossal nerve as usual, and the hypoglossal nerve gave off branches to the thyrohyoid and geniohyoid muscles. A branch arose from the vagus nerve at the upper border of the body of the hyoid bone and supplied the sternohyoid, sternothyroid and superior belly of the omohyoid muscles. Another branch originated from the vagus nerve 0.5 cm caudal to the previous branch and formed the superior root of the ansa cervicalis. The vagus nerve was located anterior to the common carotid artery in the carotid sheath.

b) Inferior root

The inferior root of the ansa cervicalis was formed by the C2 and C3 nerves, as usual. The inferior root united with the superior root and formed a loop in front of the internal jugular vein, at the level of the lower border of the thyroid cartilage. The

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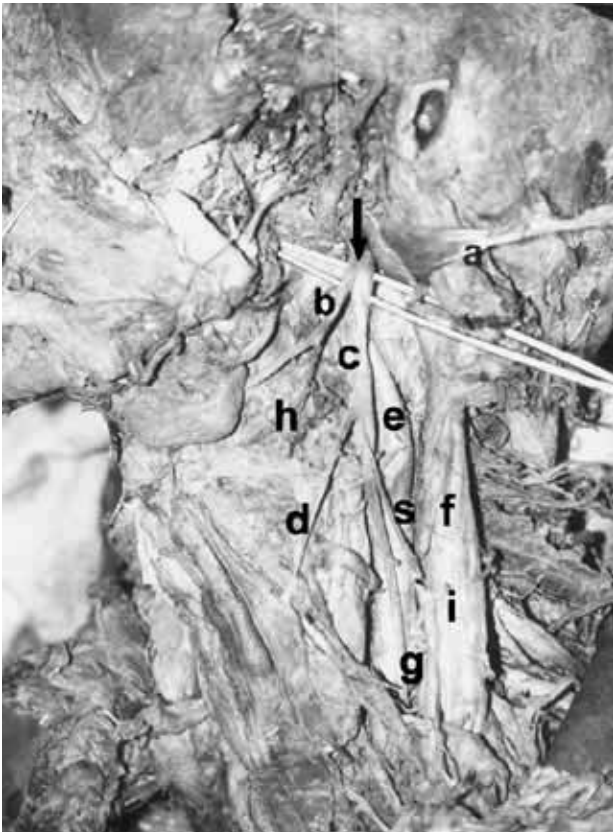


Figure 1: The dissected ansa cervicalis on the left side showing: (a) posterior belly of the digastric muscle, (b) hypoglossal nerve, (c) vagus nerve, (d) nervous branch to the sternohyoid muscle, (e) common carotid artery, (f) internal jugular vein, (g) branch from the loop supplying the inferior belly of omohyoid muscle, (h) nervous branch to thyrohyoid muscle, (i) inferior root of the ansa cervicalis and (s) superior root of the ansa cervicalis. The fused hypoglossal and vagus nerves are identified with an arrow (↓).

inferior belly of the omohyoid muscle was supplied by the loop of the ansa cervicalis.

There was no evidence of any pathological involvement of the tongue or respiratory tract.

DISCUSSION

After its exit from the condylar canal, the hypoglossal nerve runs inferolaterally behind the internal carotid artery and the glossopharyngeal and vagus nerves [6]. As it continues its descent, this nerve passes between the internal carotid artery and the internal jugular vein and then curves around the inferior vagal ganglion [9]. Normally, this is the position at which the hypoglossal nerve is connected to the vagus nerve by connective tissue [5,9]. In the present case, the vagus nerve joined the hypoglossal

nerve anterior the internal carotid artery after exiting the skull. This peculiar arrangement is rare. In classical textbook descriptions, the superior root of the ansa cervicalis emerges from the hypoglossal nerve, i.e the descendens hypoglossi [9]. However, in the present case, the contribution of the vagus nerve to the formation of the superior root of the ansa cervicalis could be viewed as the descendens vagi. An imprecise anatomical knowledge of such variations could result in inadvertent injury during neck surgery.

Previous studies have described the role of the vagus nerve in replacing the hypoglossal nerve in the formation of the ansa cervicalis [7]. An earlier study reported the association of the superior branch of the ansa cervicalis with the vagus nerve [1], and an abnormal branch of the vagus nerve has also been reported to contribute to the formation of the ansa cervicalis [10]. Abnormal branches from the cervical plexus have also been reported to join the vagus nerve and then separate from it [12]. In the present case, the vagus nerve contributed to the formation of the ansa cervicalis and also gave off branches to the sternohyoid, sternothyroid and the omohyoid (superior belly). The vagus nerve can supply the infrahyoid muscle when the ansa cervicalis is absent [7]. As shown here, there was an unusual participation of the vagus nerve in the formation of the ansa cervicalis. The vagus nerve, popularly known as the vagabond's nerve, justifies its name by providing an additional supply to the infrahyoid muscles. The vagus nerve was located anterior to the common carotid artery, in agreement with an earlier report [3].

In the present case, the hypoglossal nerve received its fibers from the C1 nerve and from the vagus that joined it. This arrangement suggests that the muscles of the tongue may have an additional supply provided by the vagus nerve.

The superior belly of the omohyoid muscle is an important landmark for locating the loop of the ansa cervicalis during surgery [2]. Anomalies such as that described here could confuse surgeons. Since the infrahyoid muscles have an important role in laryngeal steadiness and excursion during phonation and deglutition [2], any anomaly involving the muscle or its nerve supply could be of considerable clinical significance.

During exposure of the thyroid gland, the sternohyoid and sternothyroid muscles are often divided

[2]. The nerve to the superior belly of the omohyoid is the nerve of choice for nerve-muscle pedicle innervation of the larynx. An awareness of the anomalous innervation of these muscles, such as described here, would be beneficial to neck surgeons [11].

In conclusion, we have described an unusual case of the vagus nerve innervating the omohyoid muscle. Such anatomical variations in the ansa cervicalis are clinically relevant to surgeons, especially in view of newer techniques that involve the use of the ansa cervicalis in laryngeal reinnervation. The ansa cervicalis is a prime choice for laryngeal reinnervation because of its proximity to the larynx and its activity during phonation [2]. An awareness and knowledge of possible anatomical variations may be important for surgeons operating in the neck region.

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