



Bilateral absence of ansa cervicalis replaced by vagocervical plexus: case report and literature review

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Summary

The bilateral absence of the ansa cervicalis was discovered during dissection of the neck in an elderly male cadaver. On both sides it was replaced by a vagocervical plexus formed by the vagus nerve and C1 and C2 ventral rami from the cervical plexus. A descending branch from this vagocervical plexus supplied the strap muscles of the neck. From a review of the literature the incidence of bilateral absence of the ansa cervicalis and its replacement by a vagocervical plexus appears to be extremely rare. Morphological variability, embryological basis, and clinical relevance of this uncommon anatomical variant are discussed.

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Introduction

Neuromuscular anomalies are quite common in the crano-cervical region. Many descriptions and reports are available on variations of the ansa cervicalis and its neurological connections (Schafer et al., 1909; Rodrigues, 1930; Wood Jones, 1946; Romanes, 1981; Caliot et al., 1986; Bergeman et al., 1988; Shvedavchenko, 1998) as well as of the hypoglossal nerve (Schafer et al., 1909; Hollinshead and Rosse, 1985; Bergeman et al., 1988; Williams

et al., 1995; Sinnatamby, 1999) that are commonly encountered in cadaveric dissections and neck surgery. However, absence of the ansa cervicalis is rare (Caliot et al., 1986; Rath and Anand, 1994).

According to standard descriptions, the ansa cervicalis or hypoglossocervical ansa is formed of two roots. The superior root contains both C1 and C2 fibers that run with the hypoglossal nerve leaving the nerve where it turns forwards to cross the external carotid artery and passing downwards to join the inferior root. Other C1 fibers in the

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hypoglossal nerve continue farther forward and give rise to branches that supply the thyrohyoid and geniohyoid muscles. The inferior root of the ansa cervicalis is formed from C2 or C3 or both anterior rami and turns forwards around the internal jugular vein and passes down to join the superior root forming a wide loop over the lower part of the vein, branches from which supply the infrahyoid strap muscles (sternohyoid, sternothyroid and omohyoid) segmentally, C1–C3 from above downwards (Romanes, 1981; Hollinshead and Rosse, 1985; Williams et al., 1995).

The purpose of this report of bilateral absence of ansa cervicalis with its replacement by a vagocervical plexus is to alert surgeons to the existence of such a rare morphological variation in the cervical region.

Materials and methods

The present neurological variant was discovered during dissection of the neck region in a 76-year-old formalin-fixed male cadaver whose cause of death was unrelated to the present study. No other abnormalities were present or evidence of operations on the neck. The topography of this anomaly was documented by photographs and supplementary diagrams.

Anatomical findings

There was no evidence of a superior root to ansa cervicalis arising from the hypoglossal nerve on either sides of the neck before it passed beneath the mylohyoid muscle. At this point only thyrohyoid and geniohyoid muscles each received a branch from the hypoglossal nerve (short arrows in Fig. 1). Consequently, no ansa cervicalis was detected on the carotid sheath. However, the remaining infrahyoid strap muscles namely, both bellies of the omohyoid, sternohyoid and sternothyroid were innervated by branches from a descending ramus that pierced the carotid sheath and could be traced proximally to its origin from the vagus nerve. The vagus nerves on both sides were seen to have communications with the ventral primary rami of C1 and, a little distally of C2. The latter contribution to the vagus was substantial (long arrow in Fig. 1). Thus the vagus nerve with the C1 and C2 components (4.5 cm long; labeled by an asterisk in Fig. 1) together with its descending ramus (7 cm long; labeled as number 1 in Fig. 1) that supply the infrahyoid muscles formed a vagocervical plexus

that replaced the classically described ansa cervicalis (hypoglossocervical plexus). The branches arising from the descending ramus of this plexus were seen to enter the deep surface of the strap muscles very close to their distal attachment (Fig. 1b). The cardiac and laryngeal branches of both vagi were normal. In the present study, C1 and C2 fibers were not traced from their origin to their terminations in the infrahyoid strap muscles.

Discussion

Incidence and topography

Whilst variations in the ansa cervicalis and its connections are relatively common, its total absence is rare. Caliot et al. (1986) reported its unilateral absence in 2 out of 80 dissected specimens (2.5%), without any mention of the alternative innervation to the infrahyoid group of muscles. In only one case out of 400 dissections (200 cadavers) was a unilateral absence of hypoglossocervical ansa reported with its substitution by a vagocervical one (Rath and Anand, 1994). They referred to this rare anomalous neurological entity as "vagocervical complex". In the present study, the ansa cervicalis was found to be totally absent on both sides and replaced by a vagocervical plexus or "complex". No previous report of a case of bilateral absence of the ansa cervicalis has been found in the literature.

The hypoglossal nerve may occasionally communicate through its descending branch with the cervical sympathetic trunk, vagus nerve, lingual nerve, and phrenic nerve (the anastomosis of Valentin) instead of its usual association with the ansa cervicalis (Turner, 1893; Schafer et al., 1909; Romanes, 1981; Caliot et al., 1986; Bergeman et al., 1988; Williams et al., 1995). In the present study, connections from the hypoglossal nerve to other neighboring neural structures were not seen, and the ansa cervicalis was totally absent on both sides, being replaced by a vagocervical plexus.

Although communicating branches from the ventral rami of C1 and C2 to the vagus nerve have been documented (Kikuchi, 1970; Romanes, 1981; Williams et al., 1995), their role in terms of nerve supply to any muscle in the neck has not been mentioned. In the present study, the C1 and C2 motor fibers to the strap muscles, instead of joining the superior root of the hypoglossal nerve, communicated with the vagus nerve. A descending motor branch, replacing the usual ansa cervicalis, was seen emerging from the vagus and piercing the

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