

Absence of Inferior root of Ansa Cervicalis – A Case Report

Mariya¹, Nitya J²

1. Assistant Professor, Department of Anatomy, Shadan Institute of Medical Sciences, Hyderabad, Andhra Pradesh, India; Email: drmariya@gmail.com
 2. Lecturer, Department of Anatomy, Shadan Institute of Medical Sciences, Hyderabad, Andhra Pradesh, India

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ABSTRACT

Ansa cervicalis is a slender nerve loop supplying the infrahyoid muscles, present in the carotid triangle of the neck. It is formed by two roots from the cervical plexus, a superior root carrying C₁ fibres which leave the hypoglossal nerve as descendens hypoglossi and an inferior root the descendens cervicalis arising from the branches of 2nd and 3rd cervical nerves. The two roots form a communicating loop (ansa) overlying the carotid sheath. We report here a rare unilateral variation of formation of ansa cervicalis observed on the right side of an adult male cadaver. The contributions from the C2 and C3 cervical nerves coursed posteromedial to the internal jugular vein and joined the superior root separately without forming an inferior root. The nerve thus formed supplied the two bellies of omohyoid, sternohyoid and sternothyroid. Close proximity of ansa cervicalis to the great vessels of the neck, increased susceptibility to iatrogenic injuries during neck surgeries like teflon injections, thyroplasty, arytenoid adduction and its increasing use in the recent years for laryngeal reinnervation as a nerve muscle pedicle to paraglottic space or nerve reconstruction following Recurrent laryngeal nerve paralysis makes it essential for the surgeon to be well conversant with the morphology, topography and variant anatomy of ansa cervicalis.

Key Words: Ansa cervicalis, inferior root, laryngeal reinnervation, thyroplasty

1. INTRODUCTION

Ansa cervicalis is a complex communicating nerve which consists of ventral rami of C1, C2, C3 nerve fibres of the cervical plexus (Susan Standring et al.2008). It is formed by 2 roots, the superior root (descendens hypoglossi) carrying ventral rami of C1 fibres descends from the hypoglossal nerve anterior to the IJV, internal and common carotid artery and supplies the superior belly of omohyoid, the inferior root (descendens cervicalis) is formed by the ventral rami of C2 and C3 cervical nerves behind the internal jugular vein. It initially lies lateral to the vein and then crosses it from the lateral to the medial side in the middle of the neck, runs with common carotid artery and joins the

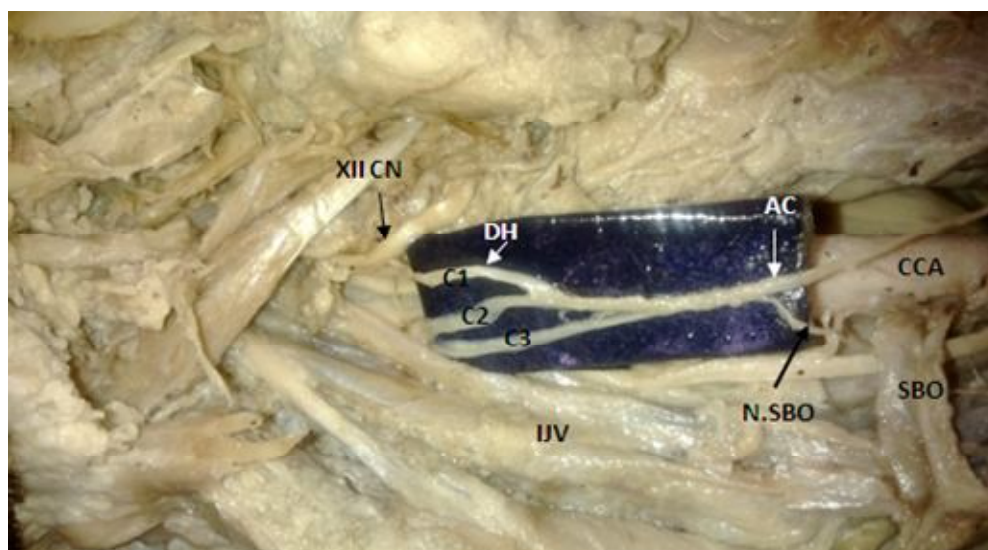


Figure 1

Absence of Inferior root of Ansa Cervicalis (AC). C2 and C3 join the Descendens Hypoglossi (DH) separately

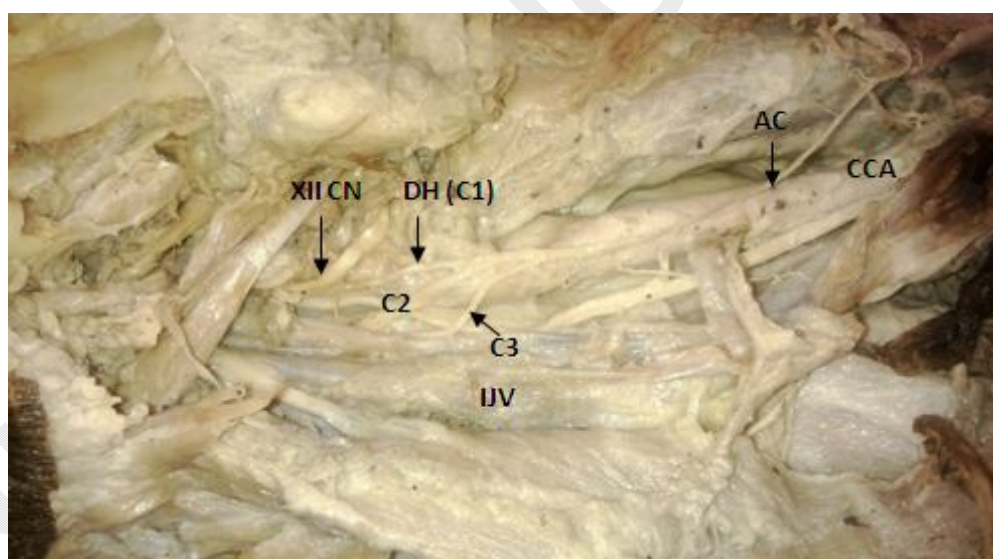


Figure 2

Relation of Ansa Cervicalis (AC) to the great vessels of neck; AC- Ansa cervicalis, DH- Descendens hypoglossi, CN- Cranial nerve, IJV- Internal jugular vein, CCA- Common carotid artery, SBO- Superior belly of omohyoid, N.SBO- Nerve to superior belly of omohyoid

superior root forming a loop communication (ansa) over the lower part of the larynx. The sternohyoid, sternothyroid and the inferior belly of omohyoid are supplied from the convexity of the loop (Romanes, 1981).

Recurrent laryngeal nerve paralysis (RLNP) following the carcinoma of the oesophagus or the thyroid gland and iatrogenic injury to the RLN during surgeries like thyroidectomy or cervical lymphadenectomy is treated by laryngeal reinnervation by nerve implantation or neuromuscular transfer, the nerve of choice used for the procedure being Ansa cervicalis as it is placed close to the larynx and can be sacrificed without any functional or cosmetic loss (Mwachaka, et al. 2010). A surgeon should be well versed with the possible variations and topographic relations of ansa cervicalis to the great vessels of the neck in order to have a successful surgical outcome.

2. CASE REPORT

Routine dissection for the MBBS students at Shadan Institute of Medical Sciences revealed an unusual variation of Ansa cervicalis on the right side of the neck of a formalin fixed adult male cadaver. The superior root of ansa cervicalis

formed as usual by the ventral rami of C1 fibres which course through the hypoglossal nerve and leaves it as descendens hypoglossi. The C2 and C3 fibres coursed posteromedial to the internal jugular vein and instead of forming the inferior root joined the superior root separately in front of the internal carotid artery, the nerve thus formed supplied the infrahyoid muscles namely the superior and the inferior belly of omohyoid, sternohyoid and sternothyroid. However there were no variations in the formation of the ansa cervicalis on the left side.

3. DISCUSSION

Ansa cervicalis supplies the infrahyoid muscles which play an important role in steadying the larynx and are active during phonation and deglutition. Any injury to the nerve or the muscles may affect the quality of voice in the long run due to the lack of support to the laryngeal cartilages during phonation (Vollala et al. 2005). Review of literature reports numerous variations of formation, course and location of ansa along the important structures of the neck. Ansa cervicalis is commonly formed by the first, second and the third cervical spinal nerves but occasionally only second and third cervical spinal nerves may contribute in the formation of ansa (Babu, 2011). The variations of the inferior root of ansa are more common when compared to the superior root. The inferior root is often formed by the C2 and C3 cervical spinal nerves but it may also receive branches from C1 and C4 cervical spinal nerves (Babu, 2011). According to a study by Poviraev and Chernikov (1967), C2 and C3 contributed to the inferior root in 74%, C2, C3 and C4 in 14%, and only C3 in 5%, only C2 in 4% C1, C2 and C3 in 2% of the cases. Clot and Dumont (1986) in their study reported that C3 contributed to the inferior root in 80% of the cases and C2 in 36% of the cases.

According to Loukas (2007), the inferior root originated from C2 and C3 in 38%, C2-C4 in 10%, C3 in 40% and C2 in 12% of the cases. In 74% of the cases it ran posterolateral to the IJV and in 26% anterolateral. Rarely the inferior root may be absent Chhetri and Berke (1997), have reported incidence of absence of inferior root in 3% of the cases. They also reported rare origin of inferior root from vagus nerve or superior root. In a study conducted in 38 cadavers by Mwachaka (2010), the inferior root was absent in 10.5% cases on the right side and 18.4% of the cases on the left side. Khaki et al. (2006) have reported an unusual case of two roots of inferior root of ansa cervicalis from spinal nerve and C2, C3 on left side.

The infrahyoid muscles develop from the myoblasts of the hypaxial division of the cervical myotomes, the innervation of these myotomes by the cervical spinal nerves is regulated by the chemoattractants and chemorepellents in a highly coordinated site specific fashion. Altered signals between the neuronal growth cones and mesenchymal cells during development leads to variations (Sadler, 1995). Ansa has been widely used for treatment of phonation malfunction caused due to RLNP. Frazier and Mosser (1926) were the first to treat RLNP using anastomosis with the Ansa cervicalis. Over the years, with the improvement of operating techniques there has been a tremendous rise in the use of ansa cervicalis for laryngeal reinnervation procedures, the nerve to superior belly of omohyoid being the nerve of choice as a nerve muscle pedicle (Tucker, 1981). Kukwa et al. (1994) have also reported the use of ansa cervicalis to prevent hemiatrophy of the tongue following the facial hypoglossal anastomosis. The present case is an unusual variation of formation of ansa cervicalis with only one similar left sided variation reported in the literature by Babu (2011).

4. CONCLUSION

Increased utilization of ansa cervicalis in the recent years for the treatment of phonation disorders as a nerve muscle pedicle, nerve - nerve anastomosis or neurotization of the RLN and its relationship to the great vessels of the neck makes it essential for the surgeon to be well aware of the wide range of variations associated with the morphology and topography of ansa cervicalis.

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