

BILATERAL DOUBLE LOOPED ANSA CERVICALIS WITH ABSENCE OF INFERIOR ROOT- A CASE REPORT¹Challa Ravi*, ²Dhivyalakshmi Gnanasekaran, ³Raveendranath Veeramani, ⁴Aravindhana K^{1,2}Junior Resident, Department of Anatomy, Jipmer, Pondicherry, India.³Assistant Professor, Department of Anatomy, Jipmer, Pondicherry, India.⁴Additional Professor and Head, Department of Anatomy, Jipmer, Pondicherry, India.***Corresponding Author: Dr. Challa Ravi**

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ABSTRACT

Ansa cervicalis frequently shows variations in its formation and distribution pattern. Knowledge on the possible deviations in the looping pattern is clinically important, to avoid iatrogenic injuries in surgical procedures. We report a case of bilateral double looped Ansa cervicalis with the absence of inferior root. On both sides, the classical presentation of the inferior root of Ansa cervicalis is lacking. On the right side, C2 and C3 roots join the descendens hypoglossi immediately one below the other whereas on the left side they join the descendens hypoglossi at two different levels. Ansa cervicalis is being popularly used for nerve reconstructive surgery in treating paralyzed larynx, tongue hemi atrophy. Anatomical variations of Ansa cervicalis may be fatal during these surgical procedures.

KEYWORDS: Ansa cervicalis, double loop, bilateral variation, reconstructive surgeries.**INTRODUCTION**

The Ansa cervicalis is a loop of nerves that originate from the ventral ramus of upper cervical spinal nerves (C1, C2, and C3) and provide innervation to the muscles involved with phonation and deglutition. It is formed by the union of the superior root and the inferior root. The superior root is descendens hypoglossi that is formed by C1 fibers that pass through the hypoglossal nerve. The inferior root is descendens cervicalis that is formed by the union of fibers of C2 and C3 spinal nerves. Nerves descend lateral to the internal jugular vein and then pass anterior to it, to join with the superior root in front of the common carotid artery embedded within the anterior layer of the carotid sheath. The branches of the Ansa cervicalis innervate the infrahyoid muscles (except thyrohyoid) which are very important in maintaining phonation and deglutition.^[1] The infrahyoid muscles exert their action mainly on the larynx by supporting the laryngeal cartilages during phonation. Therefore, any injury to these muscles through their nerve supply would cause a disturbance in phonation.^[2] The Ansa cervicalis is commonly used for nerve anastomosis with the recurrent laryngeal nerve due to its proximity to the larynx and because its sacrifice causes no serious functional or cosmetic sequelae.^[3] Because the Ansa cervicalis is located in the vicinity of major nerves and vessels of the neck, knowledge of topography and morphology of this loop is very important. Any variation in its course, formation, or branching pattern could pose complications in neurosurgery and neck dissections.^[4]

Variations in the formation, course, and branching pattern of the Ansa cervicalis are likely asymptomatic and would only be made apparent during specific radiological investigation or surgery, as incidental findings. When compared to diverse origin among the roots, the inferior root is most popular to present variant origin. This has been documented in standard anatomy textbooks. Knowledge of the variations of the Ansa cervicalis is important during skull base surgery, thyroid surgeries, thyroplasty, arytenoid adduction, teflon injection, carotid endarterectomy to avoid iatrogenic injuries to the Ansa cervicalis, and inadvertent injuries to great vessels of the neck region.^[3]

CASE REPORT

During routine cadaveric dissection of neck region for the medical undergraduate students, we observed concurrent variation in the morphology of the Ansa cervicalis. The classical form of Ansa cervicalis was lacking on both sides of the neck of a male cadaver. Double looped Ansa cervicalis without an inferior root was seen on both sides of the neck.

Right Side

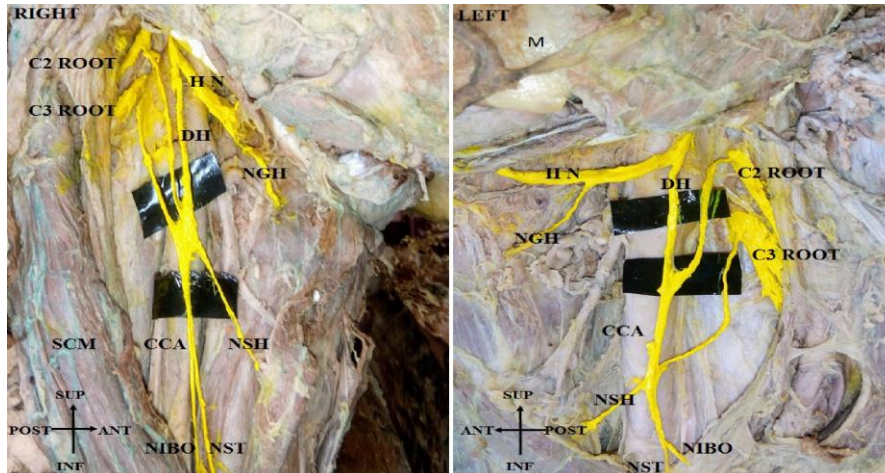
Superior root (descendens hypoglossi) of the Ansa cervicalis arose from the C1 nerve and travelled through the hypoglossal nerve. It was joined by fibers coming from the C2 nerve to form a loop. Immediately below that, it was joined by fibers from C3 nerve to form a second loop. All the three roots then joined to form a

single trunk which was superficial to the common carotid artery and branched out to supply the infrahyoid muscles (except thyrohyoid).

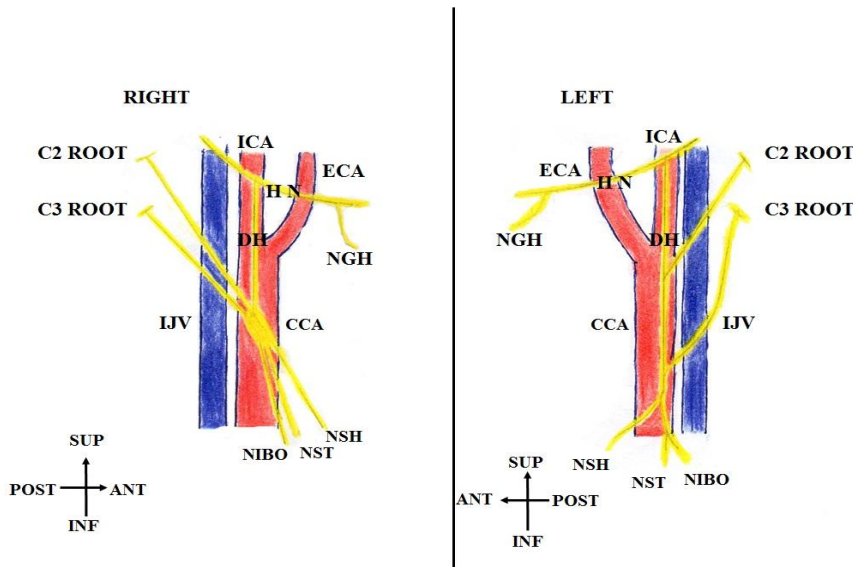
Left Side

The superior root of the Ansa cervicalis arose from the C1 nerve and travelled through the hypoglossal nerve. This was joined by fibers coming from C2 nerve to form

a loop. Single nerve trunk about 4 cm long emerged from this loop and descended downwards. This was joined by fibers coming from C3 nerve at a much lower level. A solid elongated branch incorporating fibers of C1-C3 nerves arose from this loop and ran obliquely downwards superficial to the common carotid artery and branched out to supply the infrahyoid muscles.(except thyrohyoid).



Double looping of Ansa Cervicalis on right and left sides
 HN-Hypoglossal nerve, DH-Descendens Hypoglossi, NGH-Nerve to Genio-Hyoid, NSH-Nerve to Sterno-Hyoid, NST-Nerve to Sterno-Thyroid, NIBO-Nerve to Inferior Belly of Omohyoid, SCM-Sternocleidomastoid, M- mandible



Pictorial representation of double looping of Ansa Cervicalis on right and left sides
 HN-Hypoglossal nerve, DH-Descendens Hypoglossi, NGH-Nerve to GenioHyoid, NSH-Nerve to Sterno-Hyoid, NST-Nerve to Sterno-Thyroid, NIBO-Nerve to Inferior Belly of Omohyoid, IJV-Internal Jugular Vein, CCA-Common Carotid Artery, ECA-External Carotid Artery, ICA-Internal Carotid Artery

DISCUSSION

The anatomic course and morphology of the Ansa cervicalis are intricate by its variable course and branching pattern. Formation of the Ansa cervicalis is normally from the descending branch of hypoglossal nerve and the descending branch of the cervical plexus. Many reports support the fact that, Ansa cervicalis is

known to show its variations in the origin of its roots and eventual pattern of distribution.

Ansa cervicalis is gaining much popularity in nerve-muscle transplantation approach in the treatment of paralyzed larynx resulted by the resection of recurrent laryngeal nerve.^[5,6] As Ansa Cervicalis lies very close to the larynx, its usage generally does not cause any

functional or cosmetic penalty.^[7,8] Crumley *et al.* have recommended the Ansa cervicalis branch to the sternothyroid because this branch is located very near to the recurrent laryngeal nerve.^[9] In addition to this, the Ansa cervicalis is also useful in the treatment of Hemi atrophy of tongue after facial-hypoglossal anastomosis.^[10]

The formation of inferior root varies considerably when compared to that of the superior root owing to the various cervical root contributions possible. In a study conducted by Poviraev and Chernikov on 160 cadavers, the inferior root was derived from the fibers of the C1–C4 spinal nerves, among which the C3 spinal nerve was the most important contributor.^[11]

Mwachaka *et al.* have studied discrepancies in the superior root of the Ansa cervicalis between right and left sides. They reported that the prevalence of presence of superior root was 100% on right side and 97% on left side, while inferior root was present in 89.5% on right side and 81.6% on the left side of the neck. Nearly 56% of cases superior root was lying superior to posterior belly of the digastric muscle and in 81.5% cases, the inferior root was located lateral to the internal jugular vein.^[12]

Lydia S. Quadros reported anatomical variations in the 40 hemi necks and classified Ansa cervicalis into 4 types. The present variation of Ansa cervicalis was classified under type iii category.^[13] Loukas reported the origin of superior root above the digastric muscle in 92% cases. In the same study, the prevalence of origin of inferior root from C2, C3 was found to be 38%, from C2, C3, C4 in 10%, only from C3 and C2 was 40% and 12%, respectively. The incidence of inferior root lying posterolateral to internal jugular vein was 74% and anteromedial to it was 26%.^[5]

The superior root of Ansa cervicalis contributed by hypoglossal nerve and vagus nerve was reported.^[14,15] Superior root solely formed by the vagus without any contribution from hypoglossal nerve was reported by Antony and Biswabina.^[16] The absence of inferior root of Ansa cervicalis was reported by Babu.^[17] Study conducted by Antony and Biswabina reported the cases with total absence of Ansa cervicalis. In this situation, the strap muscles were supplied by the vagus nerve.^[16]

A morphological study done by Ahmed reported four types of looping pattern of the Ansa cervicalis. Type 1 with U-shaped loop was accounted for 84% of prevalence. Type 2 with Y-shaped loop present in 8% of cases; double and fused Y-shaped loop were categorized as type 3 with the prevalence of 4% and double and separated Y-shaped loop has been classified as type 4 and its incidence was reported to be 4%. The present variation of Ansa cervicalis was classified under type iii category.^[18] N Kumar *et al.* reported a case with unilateral

double looped Ansa cervicalis belonging to type iv category of Ansa cervicalis by Ahmed.^[19]

In our case, there is a bilateral formation of double and fused y shaped loops of Ansa cervicalis. On the right side the loops are formed at a higher level whereas, on the left side, the second loop is formed at a lower level of about 4 cms after formation of common trunk by superior root and C2 fibers.

The morphology observed in this case report also highlights the fact that variations in this morphology are possible, however, the prevalence of such variations in or across different ethnic populations has not been described.

Knowledge of the variant form of Ansa cervicalis does not only helps in preventing iatrogenic injuries during procedures of thyroplasty, arytenoid adduction, and Teflon injection but also aid during operations in the neck, so as to circumvent injuring the great vessels that are intimately related to it.

CONCLUSION

The bilateral double looping of the Ansa cervicalis presented in this case is of relevance to interventions that directly involve the Ansa cervicalis and the adjacent anatomical region.

CONFLICT OF INTEREST

We declare no conflict of interests

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