

An Anatomical Variation in the Formation of the Inferior Root of Ansa Cervicalis

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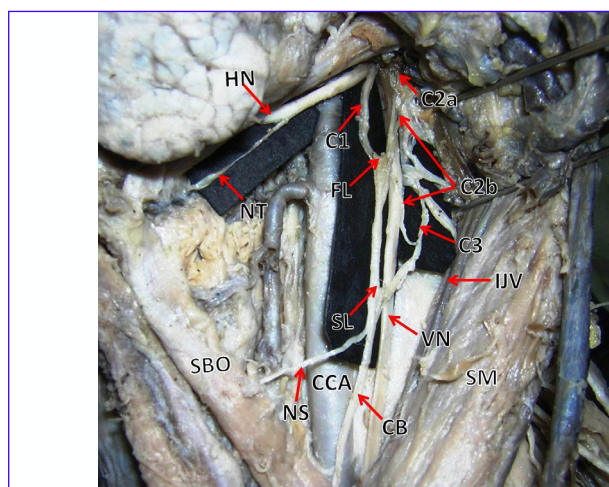
ABSTRACT

During regular dissections, we observed an unusual organization of the inferior root of Ansa Cervicalis (AC). The superior root of ansa arose normally from the hypoglossal nerve. The ventral ramus of the C2 spinal nerve divided into two branches. One of its branches joined the superior root independently to form a loop at a higher level. Another branch ran along the vagus nerve, joined with the ventral ramus of C3 spinal nerve, finally connected with the superior root and formed the second loop at a lower level. No variation was found in formation of superior root. Knowledge on the possible deviations in the formation of these roots is clinically important, to prevent iatrogenic injuries in surgical procedures such as thyroplasties, arytenoids adductions, and Teflon injections.

Key words: Ansa cervicalis, Anastomosis, Inferior root, Recurrent laryngeal nerve, Superior root

CASE REPORT

During regular dissection classes which were held for the medical students, we came across a variation in the inferior root of AC, on the left side of the neck of an adult male cadaver. As usual, the fibers of C1 joined the Hypoglossal Nerve (HN) and after a short course, separated from it and formed the superior root of AC. The common form of formation of inferior root of the AC, which is formed by the union fibres of C2 and C3, was absent. The fibers of the C2 divided into two branches (C2a and C2b) [Table/Fig-1]. One of its branches (C2a) joined the superior root independently to form a loop at a higher level and it was situated superficial to the Internal Jugular Vein (IJV). Another branch (C2b) ran along the vagus nerve, joined with the fibres of C3, finally connected with the superior root and formed the second loop at a lower level. The second loop was found to be present deep in the IJV. Superior belly of omohyoid received the nerve supply from the superior root. The other infrahyoid muscles were supplied by a common branch which arose from the second loop [Table/Fig-1].



[Table/Fig-1]: Dissection of anterior triangle of left side neck showing the formation of superior and inferior root of ansa cervicalis. (C2a & C2b: two branches of ventral ramus of second spinal nerve; C3: ventral ramus of third spinal nerve; FL: first loop; SL: second loop; HN: hypoglossal nerve; VN: vagus nerve; NT: nerve to thyrohyoid; CB: common branch to infrahyoid muscles; NS: nerve to superior belly of omohyoid; CCA: common carotid artery; IJV: internal jugular vein; SM: sternomastoid muscle; SBO: superior belly of omohyoid muscle)

DISCUSSION

The Ansa Cervicalis (AC) is a nerve loop that is formed by the union of its superior and inferior roots. As various cervical roots are involved in the inferior root formation, it frequently shows variations as compared to superior root [1]. An inferior root may be absent [2] or rarely, it may be formed by the rootlets of spinal accessory nerve and cervical plexus to sternomastoid muscle [3]. Knowledge on the anatomical variations of the AC is important, as it is frequently used to innervate the paralyzed muscles of the larynx [4]. In a cadaveric study by Poviraev and Chernikov, the classical inferior root formation by ventral rami of C2 and C3 was observed in 74% of the cases. In their study, inferior root formation was contributed by C3 in 5% of cases, C2, C3 and C4 in 14% of cases C2 in 4% of cases and by C1, C2 and C3 in 2% of the cases [5]. Caliot and Dumont have observed the formation of inferior root by C3 in 80% of cases and by C2 in 36% of the cases [6]. In another study which was done by Loukas et al., inferior root was found to be derived from the ventral rami of C2 and C3 in 38% cases, from C2, C3 and C4 in 10% cases, from C3 in 40% cases and from C2 in 12% of the cases [7]. Absence of inferior root was rarely observed. Earlier, it was reported with a frequency of up to 3% [2]. In another study, the inferior root was noted to be absent in 10.5% of the cases on the right side and in 18.4% of the cases on the left side [8]. In the present case, in addition to the usual loop, an extra loop was observed at a higher level, which was formed by one of the branches of C2 after joining the superior root.

In relation to the IJV, the course of the inferior root has been described to have three patterns: medial, lateral, and mixed types [6], [9]. If the ansa is situated deep in the internal jugular vein, then it is described as medial type, and when it lies superficial to the same vein, it is described as lateral type. Rarely, does the inferior root divide into branches that join the superior root independently [9]. In such cases, some of the branches may lie superficial to the internal jugular vein, with the rest passing deep into this vein, resulting in a mixed type. In a study which was conducted by Mwachaka et al., 81.5% of the inferior roots were found to be of the lateral type, while 19.5% were found to be of the medial type [8]. In the present case, we observed the mixed type, where one of the branch of C2 (C2a) was situated superficial to the IJV and another branch (C2b) was found to be present deep in the IJV.

Phonation malfunctions which were caused by a loss of laryngeal

muscle innervations were successfully retrieved by creating an anastomosis between the AC and the recurrent laryngeal nerve [10].

CONCLUSION

Awareness on variations of AC is clinically important, to prevent injuries to the common carotid artery and IJV. The knowledge on unusual organization of inferior root of AC is also important, to prevent iatrogenic injuries to the AC.

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