Anomalous Superior Thyroid Artery

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ABSTRACT

The variations in the pattern of distribution of superior thyroid artery assume paramount importance for neck surgeons, in view of its vital topographical relationship to the external laryngeal nerve. In this study, we report an unusual variation in the arterial supply of the thyroid gland, which was detected during a routine dissection of an adult male cadaver. The right superior thyroid artery was absent whereas the left superior thyroid artery took origin from the left common carotid artery and showed a dominant pattern of distribution supplying the superior aspect of both the left and right lobes of the thyroid gland. It exhibited a usual relationship with the left external laryngeal nerve. The inferior thyroid arteries did not show any unusual distribution. Knowledge of such arterial variations related to the thyroid gland is immensely helpful for surgeons in order to put ligature on anomalous artery and to avoid damage to vital structures in this area, such as the external laryngeal nerve.

Key Words

thyroid gland, anatomy, superior thyroid artery, variation, surgery.

INTRODUCTION

Variations in the thyroid vasculature are frequently documented in classical anatomical, surgical and radiological textbooks.[1,2,3] The superior thyroid artery normally takes its origins from the external carotid artery. Past studies have reported the incidence of origin of the superior thyroid artery from the common carotid artery in 5-45% cases.[4]

Identification of anatomic variations including arterial variations related to the thyroid gland is of immense importance in formulating planned surgical approaches to the thyroid gland and in alerting the surgeon to avert inadvertent injuries to the vital anatomical structures in this area. Additionally, a detailed knowledge of these explicit arterial variations is extremely helpful while carrying out procedures like carotid angiographies, neck dissections and thyroid resections.[5] The implications of such variations of superior thyroid arteries may be important for academic and clinical purposes.

CASE REPORT

During the routine neck dissection of a 45 year old male cadaver at the Department of Anatomy, Vardhaman Mahavir Medical College, New Delhi, the right superior thyroid artery was found to be absent. Interestingly, the left superior thyroid artery was found to originate from the left common carotid artery instead of left external carotid artery (Figure 1.). Additionally, it presented a remarkable distribution by forming an inverted 'Y' shaped loop that splayed over the superior poles of both the lobes of the thyroid gland thus supplying the superior aspect of right lobe also. The stem of the 'Y' arose 0.5 cm distal to bifurcation of the left common carotid artery (marked with an asterix in Figure 1.) into its external and internal branches and the two limbs of the 'Y' supplied the superior aspect of the two lobes. The left external laryngeal nerve displayed its usual relationship with left superior thyroid artery. However, the right-sided nerve was unremarkable. The inferior thyroid arteries exhibited normal morphology.

DISCUSSION

The arterial supply to the human thyroid gland consists of paired superior and inferior thyroid arteries as compared to the mammals and reptiles that have solitary superior and inferior arteries respectively.[6] The lowest incidence arterial anomalies of the thyroid gland have been recorded in the Swiss population with the highest in the Americans.[7, 8] However, there is paucity of literature with regard to anomalous superior thyroid arteries in the Asian subcontinent especially in India.

A case of low origin of right superior thyroid artery was reported earlier where the left sided vessel was undeveloped.[4] Strikingly, the present case appears to be unique with respect to the absence of the right superior thyroid artery and an apparent dominance of the left superior thyroid artery. There is a greater propensity for the low origin of superior thyroid artery to occur in females and on the left side.[4] However, the observations in our case are not in accordance with these findings. There is a definite and clear proximal shifting of the origin of the superior thyroid artery in Japanese subjects[4] but such findings are yet to be quantified in Indian subjects.

A past study revealed the absence of the left sided superior and inferior thyroid arteries.[9] In this case, the thyroidea ima artery originating from the internal thoracic artery supplied the thyroid gland. An ontogenic explanation for the anomaly in the present case could be the persistence of the original retiform vascular system in connection with the common carotid arteries.[10,11] These persisting channels supplement or substitute the regular arteries, thereby ensuring an ample and sufficient blood supply to that side of thyroid gland, which is devoid of regular vessels.

It seems reasonable to propose that a surgical approach for thyroid resection or carotid sheath dissection should be exercised with extreme caution in the presence of such arterial variations.

Additionally, the surgeons should perform operative manoeuvre commencing the approach to the thyroid gland 3cm proximal to the common carotid bifurcation, identifying superior belly of omohyoid as a reliable landmark.[4]

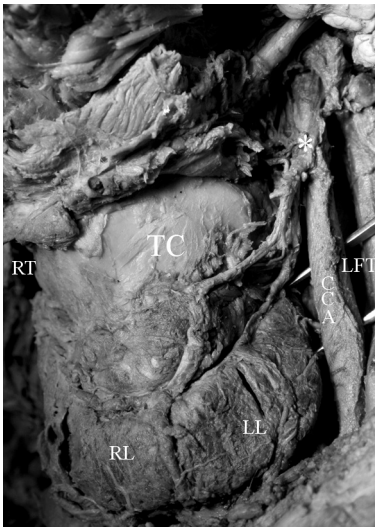
In lieu of the absent superior and inferior thyroid arteries, the thyroidea ima artery was of remarkable diameter and proved to be a major source of the blood supply to the thyroid gland. However, our study revealed the absence of the right superior thyroid artery with remarkable and unique dominance of the left superior thyroid artery which was noted to appear to be a fork-like distribution over the superior aspect of both the lobes of the thyroid gland.

Past research defined the fact that the superior thyroid artery was more frequently present as compared to the inferior thyroid artery.[12] The same study described that the presence and the variability of the superior thyroid artery may be influenced by the anthropological factors.[12] Perhaps studies in a larger group of population may provide much useful results. Researchers have opined that the superior thyroid artery is a constant vessel whereas the inferior thyroid artery does not exist in many mammals.[13] But our findings proved the contrary.

Variations of the thyroid arteries deserve a special mention in anatomical, radiological and surgical studies. The absence of any artery supplying the thyroid gland may be a boon to any surgeon who has many problems in combating the blood loss during any thyroid surgery. Surgeons may be unexpectedly exposed to the vagaries of the vascular system and prior anatomical knowledge may be beneficial. A profound anatomical insight into the variations of vessels in this region is important in correct interpretations of angiographic studies and in carrying out neck surgeries including dissections, thyroid resections and tracheostomies.[14, 15]

CONCLUSION

A description of arterial variations, especially if they are of rare occurrence, is important for the reporting of angiographic procedures and other modern imaging studies. In addition, all diagnostic and surgical interventions in the neck region require a cautious approach on account of the possibility of arterial variations in this vital region.



LL - Left lobe of thyroid gland

RL - Right lobe of thyroid gland

CCA - Common carotid artery

TC - Thyroid cartilage

Figure 1. Dissection of the neck region of an adult male cadaver showing absence of right superior thyroid artery, anomalous origin and distribution of left superior thyroid artery

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