



ANOMALOUS ORIGIN OF SUPERIOR THYROID ARTERY FROM THE COMMON CAROTID ARTERY – CASE REPORT

T. Ramesh Rao and Suresh R. Rao*

Department of Preclinical Sciences, Faculty of Medical Sciences, University of the West Indies, St. Augustine, Trinidad and Tobago, West Indies.

***Corresponding Author: Dr. Suresh R. Rao**

Department of Preclinical Sciences, Faculty of Medical Sciences, University of the West Indies, St. Augustine, Trinidad and Tobago, West Indies.

Article Received on 07/08/2016

Article Revised on 28/08/2016

Article Accepted on 19/09/2016

ABSTRACT

Variant anatomy of superior thyroid artery is important for surgeons while conducting neck surgeries. It is important for the clinicians, surgeons and the radiologists to be aware of all possible variations in the carotid arteries and their branches in the carotid triangle. A case of abnormal origin of right superior thyroid artery from the common carotid artery was encountered during routine dissection of the anterior triangle. In addition, its relationship with the neighbouring nerves and other blood vessels is important to assess the outcome of thyroid surgery. 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. It is also helpful to the radiologists in interpreting the angiograms.

KEYWORDS: Common carotid artery, external carotid artery, superior thyroid artery, arterial supply of thyroid gland.

INTRODUCTION

The common carotid arteries differ on the right and left sides with respect to their origin. On the right, the common carotid arises from the brachiocephalic artery as it passes behind the sternoclavicular joint. On the left, the common carotid artery comes directly from the arch of the aorta in the superior mediastinum. The right common carotid follows ascending passage for the lateral region of the neck, deep to the sternocleidomastoid, sternohyoid, and sternothyroid muscles. The right common carotid artery ascends until near the upper border to the thyroid cartilage in the transverse process of the 4th cervical vertebra, where divides into an internal and an external carotid artery^[1]. Division of the common carotid may occur higher, near the level of hyoid bone, or, more rarely, at a lower level alongside the larynx. Very rarely it ascends without division, so that either the external or internal carotid is absent, or it may be replaced by separate internal and external carotid arteries which arise directly from the aorta, on one side or bilaterally. Although the common carotid artery usually has no branches, it may occasionally give rise to the vertebral, superior thyroid, superior laryngeal, ascending pharyngeal, inferior thyroid or occipital arteries. Superior thyroid artery is the first ventral branch of the external carotid artery^[2].

CASE REPORT

During routine dissection in a formalin preserved middle aged male cadaver, used for teaching of medical undergraduates in the Department of Anatomy, we encountered variation in the origin of superior thyroid artery on the right carotid triangle of the neck. The common carotid artery bifurcated at its normal level of the superior border of thyroid cartilage. The superior thyroid artery was found arising from the common carotid artery about 0.5cm proximal to its bifurcation. From its origin the superior thyroid artery passed downwards towards the apex of the lobe of the thyroid gland. Although superior thyroid artery was arising abnormally from the common carotid artery, it was still accompanied by the external laryngeal nerve. Following the dissection, the bifurcation the common carotid artery and the origin of the superior thyroid artery from the right common carotid artery was photographed (Fig. 1). However such variation was not found in the opposite half of the neck.

DISCUSSION

The superior thyroid artery is the first branch of the external carotid artery, and arises from the anterior surface of the external carotid just below the level of the greater cornu of the hyoid bone it is one of the main artery supplying thyroid gland and larynx. A detailed knowledge of variations of superior thyroid artery are important during surgical procedures in the neck region,

such as during emergency cricothyroidotomy, radical neck dissection, carotid catheterization, reconstruction of aneurysm and carotid endarterectomy^[3].

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 our study 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. 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^[4].

The Superior thyroid artery commonly arises from the External carotid artery just above the carotid bifurcation. It may also arise from the Common carotid artery or from the bifurcation of Common carotid artery. Less frequently the Superior thyroid artery arises from subclavian artery or as a common trunk with the lingual and facial branches of external carotid artery. Rarely The Superior thyroid artery may be absent. As per the research conducted by Abhijeet Joshi *et al.* the superior thyroid artery arises from external carotid artery in 66.67% cases, from carotid bifurcation in 31.81% cases and from common carotid artery in 1.51% cases. Past studies have reported the incidence of origin of the superior thyroid artery from the common carotid artery in 5-45% cases^[5].

Common carotid artery is a branch of brachiocephalic trunk on the right side and arch of aorta on the left side. It normally does not give any other branch in the neck except terminal branches, external and internal carotids arteries. There are reports in the literature about the origin of superior thyroid, vertebral and inferior thyroid arteries from common carotid artery. The origin of thyrolingual trunk from external carotid artery has been reported with an incidence of range from 0.7-3%. A rare anomalous origin of thyrolingual trunk from right common carotid artery is reported by Babu BP^[6].

Though rare, anomalous branches arising from the common carotid artery have been described, including the superior and inferior thyroid arteries, lingual, ascending pharyngeal, bronchial, facial artery and others.

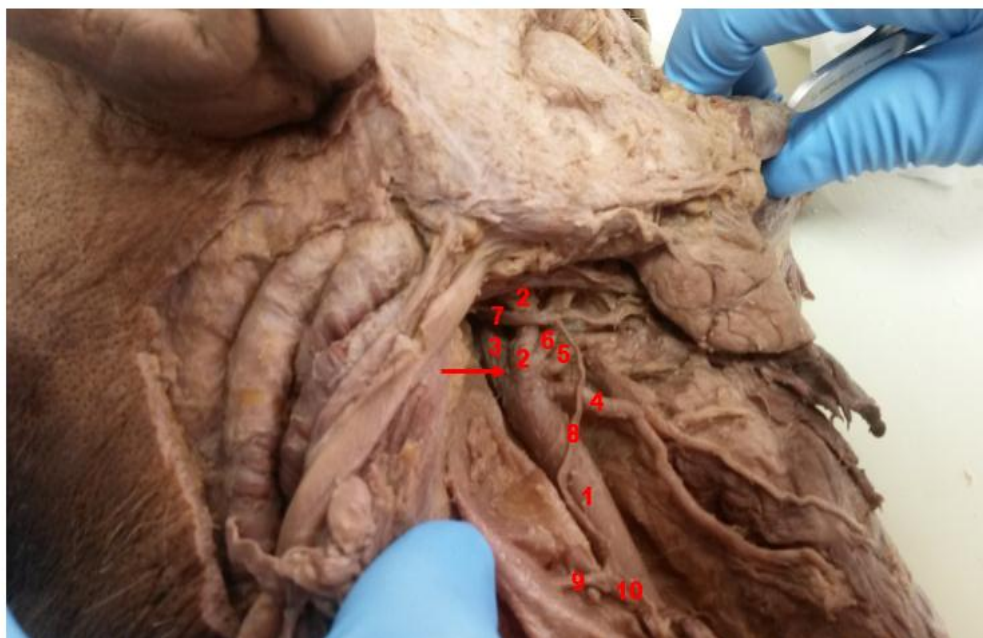
The literature reports anomalies of the common carotid artery but without their anatomical characteristics. Lemaire *et al.* reported a case of anomalous origin of the superior thyroid and lingual arteries originating from the common carotid artery through a common core. Kaneko *et al.* presented a case of superior thyroid, lingual and facial arteries arising from the common carotid as well as a common trunk that originates the auricular, maxillary, and superficial temporal arteries^[1].

The superior thyroid artery is the main source of artery to the thyroid gland, upper part of larynx and neck region. Lucev *et al.* reported that the superior thyroid artery arises more often from the common carotid artery in 47.5% cases; 16% of cases by Hollinshead and in 10% of cases by Banna and Lasjaunias. Very few literatures regarding the low origin of superior thyroid artery is available with respect to Asian subcontinent especially in India. Previous studies indicate that a low origin of superior thyroid artery is more common in females than in males. In the present case, the low origin of superior thyroid artery was reported in a male cadaver. Vandana *et al.* reported origin of superior thyroid artery 0.5 cm proximal to bifurcation of common carotid artery. They also reported absence of right superior thyroid artery. But in our case, the right superior thyroid artery was present and normal in morphology. Previous reports also indicate that the origin is very rarely more than 1 cm proximal to the bifurcation^[7].

The vasculature of the neck region is provided early in embryogenesis by 2 dorsal aortic roots and 2 ventral pharyngeal arteries connected by 6 aortic arches. These arches do not exist simultaneously, and some of these disappear during embryogenesis. The second arch gives rise at the hyoid artery. The stapedial artery sprouts from the hyoid artery and will later develop into the middle meningeal artery. The third arch forms the first part of the internal carotid artery while the fourth arch will form the adult aortic arch of the left side and the brachiocephalic artery on the right. The external carotid artery occurs from the union of the ventral pharyngeal artery and the stapedial artery. The origin of external carotid artery branches by the common carotid artery can be explained by connection of the dorsal pharyngeal artery and the external carotid artery via the second and not the third aortic arch. However, this explanation is not completely satisfactory, raising questions about origins of the middle meningeal artery. The superior thyroid artery is reported to occur more often from the carotid bifurcation or the common carotid artery if the carotid bifurcation is high^[8].

Figure 1: Superior thyroid artery

- | | |
|--|----------------------------|
| 1. Common carotid artery | 2. External carotid artery |
| 3. Internal carotid artery | 4. Superior thyroid artery |
| 5. Lingual artery | 6. Facial artery |
| 7. Hypoglossal nerve | 8. Descendens hypoglossi |
| 9. Descendens cervicalis | 10. Ansa cervicalis |
| 11. Arrow indicating the level of termination of common carotid artery | |

**CONCLUSION**

The superior thyroid artery is the dominant arterial supply of the thyroid gland, upper larynx and the neck region. The knowledge of variations in possible patterns of origin, courses, and branching pattern of the superior thyroid artery is also important for surgical procedures in the neck region, such as total bilateral lobectomy, total unilateral with partial contralateral lobectomy and partial or subtotal lobectomy, emergency cricothyroidotomy, radical neck dissection, catheterization, reconstruction of aneurysm, carotid endarterectomy and intervention radiology which is helpful to prevent complications such as bleeding or damage to laryngeal nerves.

REFERENCES

1. Fernando Oliveira de Menezes, Zeferino Demartini Jr, Luiz Afonso Dias Matos, José Maria Pereira de Godoy, Antonio Ronaldo Spotti, Marcio Luiz Tostes dos Santos. Anomalous branch of the right common carotid artery. *Arq Neuropsiquiatr*. 2008; 66(4): 916-917.
2. Standring, S.; Berkovitz, B. K. B.; Hackney, C. M.; Ruskell, I. G. L. *Gray's Anatomy. The Anatomical Basis of clinical practice*. 39th Churchill & Livingstone, Edinburgh, 2005; 543-544.
3. Mahajan A ,Patil S J. Anomalous origin of superior thyroid artery and its significance. *Int j clin surg adv*. 2013; 1(1): 11-13.
4. Mehta V, Suri RK, Arora J, Rath G, Das S. Anomalous superior thyroid artery. *Kathmandu Univ Med J*. 2010; 8(32): 429-31.
5. Joshi A, Gupta S, Vaniya VH. Anatomical variation in the origin of superior thyroid artery and it's relation with external laryngeal nerve. *National Journal of Medical Research*. 2014; 4(2): 138-141.
6. Babu B.P. Anomalous Origin of Thyrolingual Trunk From Right Common Carotid Artery — A Case Report. *J Anat. Soc. India*. 2001; 50(1): 47.
7. Pakhiddey R and Samanta PP. Variation in the origin of left superior thyroid artery from left common carotid: a case report. *International Journal of Anatomical Variations*. 2013; 6: 143-144.
8. Theodore Troupis, Adamantios Michalinos, Ioannis Dimovelis, Theano Demesticha, Konstantinos Vlasits, and Panayiotis Skandalakis, Bilateral Abnormal Origin of the Anterior Branches of the External Carotid Artery. *Annals of Vascular Surgery*. 2014; 28: 494.e5–494.e7.