

BIFURCATION LEVELS OF THE COMMON CAROTID ARTERIES: A CADAVERIC STUDY IN SOUTH INDIAN POPULATION

K.Radha

Assistant Professor, Department of Anatomy, Karpaga Vinayaga Institute of Medical sciences, Kanchipuram, Tamilnadu, India.

ABSTRACT

Background and aim: The present study aims at finding the bifurcation level of common carotid artery and correlate it with the level of upper border of thyroid cartilage.

Materials and Methods: Forty cadavers were dissected to study the bifurcation level of common carotid artery. The symmetry between the sides were noted.

Results: The level of bifurcation of the common carotid artery was at the level of upper border of thyroid cartilage in sixty-seven cases. Only nine cases showed the higher level with the range of 3.2 mm to 19.3 mm above the level of upper border of thyroid cartilage. 4 cases showed the lower level of bifurcation in the range of 2 mm to 10 mm below the level of upper border of thyroid cartilage. In the present study, the bifurcation levels were symmetrical on both sides.

Conclusion: The bifurcation level of common carotid artery coincides with the upper border of thyroid cartilage in the present study. The awareness in the variation of bifurcation level is necessary to avoid undue complications during the surgeries and procedures done in head and neck region.

KEYWORDS: Bifurcation, Common Carotid, Thyroid Cartilage.

Address for Correspondence: S-8.Staff Quarters, Karpaga Vinayaga medical college, Chinnakolambakkam, Palayanoor Post, Madhuranthagam, Kanchipuram 603308, Tamilnadu, India.

E-mail: ajjuradha@gmail.com

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INTRODUCTION

The two common carotid arteries differ in length, for the right usually arises from the brachiocephalic artery behind the sternoclavicular joint, while the left arises from the arch of the aorta and has therefore a thoracic as well as a cervical course [1]. The bifurcation of common carotid arteries normally occurs below the superior border of the thyroid cartilage [2].

Conventional angiography is considered the most reliable method for diagnosis of carotid bifurcation diseases, such as stenosis [3]. Accurate interpretation of the level of the

bifurcation of common carotid artery with non invasive techniques remains an important goal and external anatomical landmarks can be clinically useful in predicting the bifurcation level of the carotid artery [4]. The knowledge of point of bifurcation of CCA is very important in surgeries of head and neck region to prevent vascular accidents, during catheterization of carotid arteries and intra-arterial administration of chemotherapeutic agents [5].

The present study aims at finding the bifurcation level of the common carotid artery and correlate it with the level of upper border of thyroid cartilage.

MATERIALS AND METHODS

The present study was undertaken in 40 adult formalin fixed cadavers procured from the division of Anatomy, Raja Muthiah Medical College, Chidambaram and Karpaga Vinayaga Medical College, Madhuranthagam. The dissections were carried out according to the instructions given in Cunningham's manual of practical anatomy [6]. The level of bifurcation of common carotid artery was noted and correlated with the upper border of thyroid cartilage. If the level of bifurcation was above or below the upper border of thyroid cartilage, the distance between the upper border of thyroid cartilage and bifurcation were measured. All the specimens were photographed and results were tabulated.

RESULTS

The level of bifurcation of the common carotid artery was at the level of upper border of thyroid cartilage in sixty-seven cases. Only nine cases showed the higher level with the range of 3.2 mm to 19.3 mm above the level of upper border of thyroid cartilage. 4 cases showed the lower level of bifurcation in the range of 2 mm to 10 mm below the level of upper border of thyroid cartilage. In the present study, the bifurcation levels were symmetrical on both sides (Tab. 1).

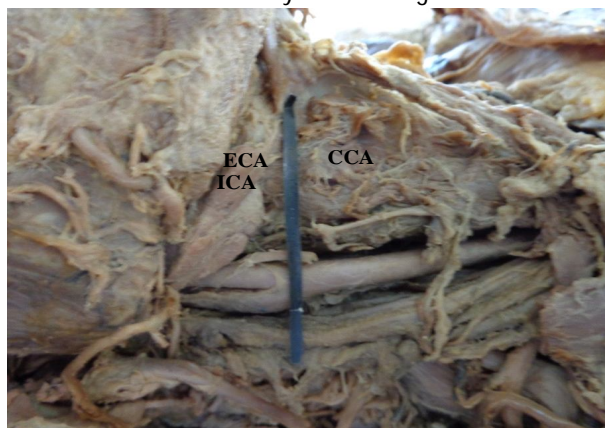
Tab 1: Levels of bifurcation of common carotid arteries.

Level of Bifurcation	Number of specimens	Percentage
At the level of upper border of thyroid cartilage	67	83.75
Above the level of upper border of thyroid cartilage	9	11.25
Below the level of upper border of thyroid cartilage	4	5

Tab 2: Comparative incidence of bifurcation level of common carotid arteries.

Bifurcation level	Amboli Manoj et al	Al Rafiah et al	Present study
At the level of upper border of thyroid cartilage	57	48.3	83.75
Above the level of upper border of thyroid cartilage	42	46.3	11.25
Below the level of upper border of thyroid cartilage	1	5	5

Fig. 1: Normal bifurcation of Common carotid at the level of thyroid cartilage.



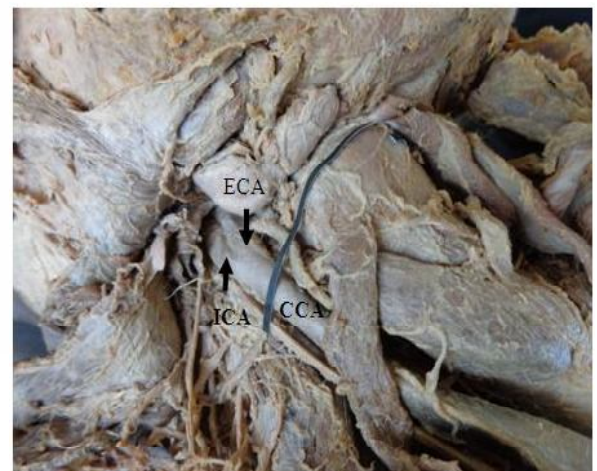
CCA-Common carotid artery, ECA-External carotid artery, ICA-Internal carotid artery.

Fig. 2: Low bifurcation of Common carotid below the level of thyroid cartilage



CCA-Common carotid artery, ECA-External carotid artery, ICA-Internal carotid artery.

Fig 3: High bifurcation of common carotid artery.



ECA-External carotid artery, ICA-Internal Carotid Artery CCA-Common carotid artery.

DISCUSSION

There were various reports regarding the bifurcation level of common carotid artery in the literature. The findings of the present study were correlated with that of Ambali Manoj et al [7] and Al Rafiah A et al [8]. (Tab. 2) The level of bifurcation of common carotid artery was found to be at the upper border of thyroid cartilage in 89% of 59 cases studied by Lo A [9] and 50% by Lucev et al [10]. The present study shows the higher incidence with the frequency of 83.75% Bifurcation as high as the hyoid bone or the styloid process and as low as the cricoid cartilage, or within 3.7 cm of its origin have previously been reported [8]. The higher level of bifurcation of common carotid artery was found to be 37.5% by Lucev et al [10]. The incidence of higher bifurcation is low in the present study (11.25%). Lower cervical bifurcation of the carotid arteries was first reported by Orr in 1906 [11]. The lower division of Common carotid has been recorded to as frequent as 30% [12]. It was reported to be 12.5% by Lucev et al [10]. Gulsen et al reported a case of bilateral low-lying bifurcation of the common carotid artery [13]. The incidence of low bifurcation was very low in the present study (5%).

In case of high bifurcation, the embolic material could extend into the common carotid artery instead of the external carotid artery with subsequent stroke [14]. A high common carotid is at a higher risk of impingement by intra-articular screws during procedures on cervical vertebrae [15].

Hypoglossal nerve lies closer in relation to the CCA bifurcation especially when it bifurcates at higher level [16].

Thoracic bifurcation of CCA may be associated with the Klippel-Feil anomaly [17]. Gulsen et al had encountered difficulties in a cervical discectomy operation in a patient with low-lying bifurcation of CCA [13]. Smith and Larsen reported that the left carotid bifurcation to be higher than the right in 50% of the cases and the right bifurcation higher than left in 22% of the cases [18].

In the present study, the bifurcation level was symmetrical on both sides.

CONCLUSION

The present study finds the incidence of bifurcation of common carotid was more or less constant at the level of upper border of thyroid cartilage in South Indian population. The incidence of higher level of bifurcation is more than lower level of bifurcation.

Conflicts of Interests: None

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