

Research Article

ABBERRANT PATTERNS OF BRANCHING OF EXTERNAL CAROTID ARTERY

***A. HimaBindu and B. Narsinga Rao**

*Department of Anatomy, Maharajah's Institute of Medical Sciences,
Nellimarla, Vizianagaram, Andhra Pradesh, India*

**Author for Correspondence*

ABSTRACT

Variations in the branching pattern of the external carotid artery are well documented as it is the main source of nutrition to the structures of head and neck. The present study was done on 20 cadavers to find out any anomalous patterns of branching of external carotid artery. The common carotid artery and its terminal vessels external and internal carotid arteries were dissected on both sides. All the branches of external carotid artery were traced.

Along with normal branching pattern, variations like linguofacial trunk, simultaneous origin of superior thyroid artery and linguofacial trunk at the level of hyoid bone and higher origin ascending pharyngeal artery were observed in this study. As these vessels show great variability, a better anatomical knowledge about these variations is useful to surgeons for ligation of the vessels during head and neck surgeries and for radiologist during the interpretation of angiograms.

Key Words: *Common Carotid Artery, External Carotid Artery, Linguofacial Trunk, Ascending Pharyngeal Artery*

INTRODUCTION

Common carotid arteries (CCA) are the largest bilateral arteries of the head and neck. CCA of both sides divide at the upper border of the thyroid cartilage at intervertebral disc level between the third and fourth cervical vertebrae into external and internal carotid arteries (Takenoshita, 1983). External carotid artery (ECA) extends from the level of upper border of the lamina of thyroid cartilage to a point behind the neck of the mandible. During its course it gives altogether eight branches, of which the superficial temporal and maxillary arteries are its terminal branches (Dutta, 1994). The ascending pharyngeal artery is the first and medial branch of ECA. After its origin it ascends between internal carotid artery (ICA) and side of pharynx. The ventral branches- superior thyroid artery (STA) passes downwards and medially to supply the thyroid gland, lingual artery (LA)- the main artery of tongue arises at the tip of greater horn of the hyoid and disappears behind the hyoglossus muscle and tortuous facial artery (FA) that has a looped course in the digastric triangle and enters the face for its supply. The posterior branches, occipital artery (OA) runs posterosuperiorly to supply the posterior aspect of the scalp and posterior auricular artery (PAA) to the auricle and the scalp above it. The maxillary artery is having a course in the infratemporal fossa and nourishes the structures of that region and superficial temporal artery provides blood supply to the lateral aspect of scalp and face.

ECA provides rich vascularity to the structures of head and neck. The branches of ECA are the key landmarks for adequate exposure and appropriate placement of cross clamps on the carotid artery. So the knowledge of carotid arterial system is useful to minimize the postoperative complications in the bloodless surgical field (Nakamasa, 2005). ECA anastomoses with ICA through its branches and maintain circulation in case of disturbed cerebral flow. The variations in the branching pattern of ECA are important for surgeons during plastic and reconstructive surgeries of head neck and face to avoid iatrogenic injuries and it is also important for radiologists for interpretation of angiograms of the face and neck regions.

Research Article

MATERIALS AND METHODS

The study on branching pattern of external carotid artery was done on twenty cadavers during dissection of head and neck region for undergraduate medical students. CCA and its terminal branches ECA&ICA were identified on both sides. ECA and its branches were traced according to their landmarks to know whether the branching pattern was normal or variant.

RESULTS

The present study showed bifurcation of CCA at the level of upper border of lamina of thyroid cartilage into external carotid artery and internal carotid artery. The branches of ECA were traced according to their landmarks. Three cadavers showed variant branching pattern.

A common linguofacial trunk (LFT) with higher origin of ascending pharyngeal artery was observed in two cadavers. In a cadaver, on the right side ECA gave superior thyroid artery below the hyoid bone and at the level of hyoid a common linguofacial trunk took origin which again divides into lingual artery and facial artery and further course of these vessels was normal. After the linguofacial trunk, the ascending pharyngeal artery took origin from the medial side of ECA and passed between pharynx and ICA (Figure 1). Rest of the branches was normal.

This type of similar variation was also observed on the left side of another cadaver, but here lingual artery had a posterior course compared to facial artery (Figure 2).



Figure 1: Showing the linguofacial trunk and ascending pharyngeal artery.

Figure 2: Showing linguofacial trunk with posterior course of lingual artery.

In another cadaver, on the right side CCA divided at the normal level, but all the ventral branches of external carotid artery were seen at one point. The superior thyroid artery and linguofacial trunk arose simultaneously at the level of hyoid bone and reached their target organs. Rest of the branching pattern was normal (Figure 3).

Research Article



Figure 3: Showing origin of superior thyroid artery and linguofacial trunk at one point.

DISCUSSION

The external carotid artery is the terminal branch of common carotid artery along with internal carotid artery. Normal branches of external carotid artery are superior thyroid, lingual, facial arteries of ventral aspect, the occipital and posterior auricular arteries of posterior aspect, ascending pharyngeal artery a medial branch and the maxillary, superficial temporal arteries its terminal branches (Standring 2005). All these branches arise independently according to their land marks. The variations in the branching pattern of ECA were reported in the literature.

Zumre *et al.*, in his study on variations of branches of ECA described a linguofacial trunk in 20% of the cases, a thyrolingual trunk in 2.5%, a thyrolinguofacial trunk in 2.5%, and an occipitoauricular trunk in 12.5% of the cases (Zumre 2005). The lingual artery arises from a common trunk with the facial as a linguofacial trunk in 10–20% of cases. Anatomical knowledge of variations in the branching pattern of the carotid system will be useful in angiographic studies and in surgical procedures of the head and neck region (Anil2000). Along with linguofacial trunk and occipito-auricular trunk, a simultaneous branching of the ECA into the lingual, facial, occipito-auricular and distal part of the ECA was described by Thwin *et al.*, (2010). All these branches were given after superior thyroid artery (Thwin *et al.*, 2010).

Normally the APA is the first and medial branch of ECA but the variations in the level of origin of APA was also reported in the literature. The APA is the second and smallest branch arising from the posterior aspect of the ECA (Drake 2005). The origin of the right APA from the bifurcation of the CCA was reported by Anil *et al.*, (Anil2000).

The origin of ascending pharyngeal artery from ECA is considered high or low with relation to lingual artery. It was found higher in 66% and lower origin in 9% (Nakamasa 2005). In his study on the variations of branches of ECA, Thwin *et al.*, (2010) reported a higher origin of APA. He found this branch at the linguofacial trunk or above the level of lingual artery.

The present described a variation which was very close to a rare thyrolinguofacialtrunk and higher origin of ascending pharyngeal artery as it arose after lingual artery.

Summary

External carotid artery through its branches supplies the structures of head and neck region, and variations in its branching pattern were observed. The knowledge of vascular anatomy of external carotid artery is essential for the understanding and interpretation of diagnostic angiograms, as well as performing surgical procedures.

Research Article

REFERENCES

Anil A, Turgut Hb, Peker T and Pelin C,(2000) . Variations of the branches of the external carotid artery, *Gazi Medical journal*, **11**(2) 81–83.

Drake RL, Vogl W and Mitchell AWM (2005). Gray's Anatomy for Students. Toronto: *Elsevier Churchill Livingstone* **8** 911.

Dutta AK (1994). Essentials of human anatomy In: Head and Neck. 2nd ed.Calcutta: Current Books International 127-132.

Nakamasa Hayashi Emiko Hori,yuko ohtani,osamu ohtani,naoya kuwayama et al.,(2005).Surgical Anatomy of cervical carotid artery for carotid endarterectomy. *Neurologica Medico Chirurgica* **45**(1) 25-30.

Standring S (2005). Gray's Anatomy. The Anatomical basis of clinical practice. Edinburg. *Elsevier Churchill Livingstone* **39**(31) 543-544.

Takenoshita H (1983). Case of hypoplasia of the internal carotid artery associated with persistent primitive hypoglossal artery. *Kaibogaku Zasshi* **58** 533-550.

Thwin S S, Soe M M, Myint M, Than M and Lwin S (2010). Variations of the origin and branches of the external carotid artery in a human cadaver. *Singapore Medical Journal* **51**(2) e40.

Zumre O, Salbacak A, Cicekcibasi AE, Tuncer I and Seker M (2005). Investigation of the bifurcation level of the common carotid artery and variations of the branches of the external carotid artery in human fetuses. *Annals of Anatomy* **187**(4) 361-369.