



Unusual Branching Patterns of External Carotid Artery

KEYWORDS

Common Carotid Artery, External Carotid Artery, Linguofacial Trunk, Ascending Pharyngeal Artery.

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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 60 dead fetuses to find out any unusual patterns of branching of external carotid artery as a part of post graduation research work. Cadaveric dissection was done according to the steps of Cunningham's manual. The common carotid artery and its terminal vessels external and internal carotid arteries and their branches were dissected. Along with normal branching pattern, variations like linguofacial trunk, simultaneous origin of superior thyroid artery at the bifurcation of common carotid artery, superior thyroid artery arises in common with lingual artery, bifurcation of common carotid artery at higher level were observed. 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.

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)¹. 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)². The Ascending pharyngeal artery is the first and medial branch of ECA. The ventral branches- Superior thyroid artery (STA), Lingual artery (LA) and tortuous Facial artery (FA). The posterior branches are Occipital artery (OA) and Posterior auricular artery (PAA)³. 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)⁴. 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.

RESULT:

Origin of External carotid artery normally at the upper border of thyroid cartilage corresponds to junction of c_3/c_4 , but out of 60 fetuses we found one foetus showed variation that is in one foetus the common carotid artery bifurcates at higher level that is the junction of c_2/c_3 . That means External carotid artery arises at the level of the upper border of thyroid cartilage in 98% of the specimens,

and arises higher level in 2%.

Superior thyroid artery usually arises from the External carotid artery just below the level of the greater cornu of hyoid bone. In this study we found out of 60 fetuses six fetuses showed Superior thyroid artery arises from bifurcation of Common carotid artery and one foetus showed Superior thyroid artery originated in common with Lingual artery. In the rest of the fetuses showed normal origin that is from External carotid artery. In the present study superior thyroid artery arises normally from external carotid artery in 88% of specimens, arises from the common carotid in 10% of specimens and as thyrolingual common trunk in 2% specimens.

Lingual artery normally arises from the external carotid artery opposite the tip of the of the greater cornu of hyoid bone. In this study out of 60 fetuses we found one foetus showed Lingual artery arises along with Superior thyroid artery as a Linguo thyroid common trunk just below the external carotid artery and six fetuses showed lingual artery arises along with facial artery as common Linguofacial trunk. Rest of the 53 fetuses showed normal origin from External carotid artery at the level of greater cornu of hyoid bone.

Facial artery usually arises from the External carotid artery just above the greater cornu of hyoid bone. In this study out of 60 fetuses six fetuses showed variation of origin of facial artery that is along with lingual artery it arises as common Linguo-facial trunk. Rest of the 54 fetuses showed normal origin of Facial artery. In the present study Lingual artery arises in common with Facial artery as a Common Linguo-facial trunk in 8% of specimens. In the remaining 92% of specimens, lingual artery and facial artery arises individually from Exter carotid artery.



fig-1: showing thyro-lingual trunk (superior thyroid & lingual artery arises from common trunk)



fig-2: showing linguo-facial trunk (lingual artery & facial artery arises from common trunk)



fig-3: showing superior thyroid artery arising from common carotid artery

DISCUSSION :

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)⁵. Normal branches of External carotid artery are Superior thyroid, Lingual, Facial arteries from ventral aspect, the Occipital and Posterior auricular arteries from posterior aspect, Ascending pharyngeal artery a medial branch and the Maxillary, Superficial temporal arteries its terminal branches (Standing 2005)⁶. All these branches arise independently according to their landmarks. 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 Linguo-facial trunk in 20% of the cases, a Thyro-lingual trunk in 2.5%, a Thyro-linguo-facial trunk in 2.5%, and an Occipito-auricular trunk in 12.5% of the cases (Zumre 2005)⁷. In the present study Lingual artery arises in common with Facial artery as a Common Linguo-facial trunk in 8% of specimens. In the remaining 92% of specimens, Lingual artery and Facial artery arises individually from External carotid artery.

The Lingual artery arises from a common trunk with the Facial as a Linguo-facial trunk in 10–20% of cases. Along with Linguo-facial 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)⁸.

Basekim et al found triple developmental anomalies, with bilateral absence of the External carotid arteries, a left brachiocephalic trunk, and a type I proatlantal artery. Although these anomalies are usually asymptomatic and found incidentally, they may be important in diagnosis and therapy⁹.

Gurbuz et al found carotid trifurcation during routine dissection. The left Common carotid artery gave off three terminal branches: the External carotid, Internal carotid, and Occipital arteries. The level of trifurcation was 35 mm above the superior margin of the thyroid cartilage. Further, the Superior thyroid artery arose from the Common carotid artery instead of the External carotid.¹⁰

Division of the Common carotid may occur higher, near the level of the 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 External or Internal carotid arteries which arise directly from the Aorta, on one side, or bilaterally.¹¹⁻¹² In the present study External carotid artery arises at the level of the upper border of thyroid cartilage in 98% of the specimens, and arises higher level in 2%.

Although the Common carotid artery usually has no branches, it may occasionally give rise to the Vertebral, Superior laryngeal, Ascending pharyngeal, Inferior thyroid or Occipital arteries¹²

In the present study Superior thyroid artery arises normally from External carotid artery in 88% of specimens, arises from the Common carotid in 10% of specimens and as Thyro-lingual common trunk in 2% specimens.

CONCLUSION:

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. and vascular surgeons to prevent diagnostic errors, influence surgical tactics and interventional procedures and avoid complications during surgery in the cervical region.

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