Case report:

Bilateral variation of facial artery and its implication for facial surgery: A case report

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Abstract:
Face is supplied by the three main arterial trunks: the facial, transverse facial and infraorbital arteries. Facial artery is known to show some variation in its origin, course and branching pattern. It gives three branches on the face, the inferior labial, superior labial and the lateral nasal and finally continues as the angular artery. The anatomical understanding of the facial artery and its branches are especially important in the practice of medical and dental care, in the surgeries of neck and face and also for the radiologist to understand and interpret facial artery imaging when undertaking head angiography. In the present case report we observed that the facial artery terminated as inferior labial artery (end artery) on both side of the face. The other branches for the face namely superior labial, lateral nasal and angular arteries arises from the transverse facial artery. Thus the transverse facial artery is making a significant contribution to blood supply of face. This type of atypical branching of facial artery deserves attentions because of large number of interventions on this region, not only in case of trauma, but also in the case of elective surgeries of face pathologies.

Key words: Facial artery, Transverse facial artery, Inferior labial artery

Introduction:
Vascular variations are congenital morphological differences that arise in the human body. Although, for the most part, do not cause injury to the individual, may be important in cases where it is necessary a specific access to the vascular system. For surgeons it is very important to know the exact frequency and variations of the arteries in the areas where they have to operate on.¹¹

Face receives a rich blood supply from the facial and superficial temporal arteries. It is also supplied by branches of maxillary and ophthalmic arteries. Facial artery normally arises in the neck from the external carotid artery, just above the lingual artery, at the level of greater cornu of hyoid bone in the carotid triangle.²² It runs upward and forward, passes deep to the superficial part of submandibular salivary gland making a characteristic loop and wind around the inferior margin of the body of the mandible at the anteroinferior border of masseter muscle, where its pulse can be felt as it cross the mandible. The artery is deep to the skin, fat of cheek, risorius, zygomaticus major and minor muscles near the angle of mouth, and superficial to buccinators and levator anguli oris muscles. In the face the artery tortuously runs upward and forward lateral to the angle of
mouth and terminates as angular artery at medial angle of eye. It may pass over or through the nose towards the medial corner of the eye. At its termination it is embedded in levator labii superioris alaeque nasi muscle.\[3\]

Occasionally the facial artery barely extend beyond the angle of the mouth in which case its normal territory beyond this region is taken over by an enlarged transverse facial branch from the superficial temporal artery and by branches from the contralateral facial artery. The facial artery supplies branches to the muscles and skin of the face. Its named branches on the face are the Premasseteric artery, Superior and Inferior labial arteries and the Lateral nasal artery. The part of the artery distal to its terminal branch is called the Angular artery. The facial artery is tortuous throughout its extent. The cervical part is tortuous to adapt to the movements of pharynx during deglutition and the facial part is tortuous to adapt to the movements of mandible, lips and cheek. The anesthetists often feel the facial pulse for monitoring the patient during surgery that is why it is called \textit{Anesthetists artery}.\[4\]

**Materials & Methods:**

We used donated dead bodies for the purpose of medical education and research in the Department of Anatomy, Teerthanker Mahaveer Medical College and Research Centre, Moradabad, UP, India. The study involved the head and neck dissection of a middle aged Indian female cadaver fixed in formalin based preservative (10% formaldehyde). The dissection of head and neck was carried out carefully and strictly following the instructions by \textit{Cunningham's Manual of Practical Anatomy} and observed for variations in the branching pattern of facial artery during the year 2014-2015. Appropriate photographs were taken and labeled as shown in figure 1.

**Case report:**

After the proper dissection of face we observed that the right facial artery originating from the external carotid artery just superior to the lingual artery. It runs forward without forming any loop in the submandibular region and crosses the inferior margin of the body of mandible at anteroinferior border of masseter muscle. Here it gives a premasseteric branch and a submental branch and further runs forward and terminate as inferior labial artery (end artery). The transverse facial artery which is the branch of superficial temporal artery in parotid gland behind the neck of mandible continue forward tortuously on masseter muscle and gives superior labial artery and lateral nasal artery. Thus the transverse facial artery making a significant contribution to blood supply of face. This variation was present on both the right and left side of the face.

**Discussion:**

Face is supplied by the three main arterial trunks: the facial, transverse facial, and infraorbital arteries. The facial artery is usually the largest and dominant artery and plays a major role in supplying blood to the face. However there are huge variations on its size and extent between different individuals and even between different sides of the face. In the present study transverse facial artery become dominant and supply most area of the face which is normally supplied by the facial artery.\[5\]

The anatomical study of the facial artery and its branches has two important aspects of interest: first, surgical anatomy in plastic and reparative surgery of the face and lip in cases of trauma and congenital malformation and in the surgery of malignant disease; second, radiological anatomy in the
treatment of certain facial tumors by embolization procedures. [6,7,8]

According to a study of 40 facial arteries by Midy D et al., the facial artery has terminated as angular artery in 27.5% cases, superior labial in 40%, nasal in 30% cases and abortive artery in only one case. When the facial artery terminated before reaching the lower lip, it has been called abortive artery. [9]

The examination of 284 hemifaces by Loukas M et al., showed five types of facial artery termination labeled “A” through “E”. Type A (47.5%): facial artery terminated by bifurcating into superior labial artery and lateral nasal; Type B (38.7%): facial artery terminating as superior labial artery and lateral nasal and further lateral nasal continuing as superior alar artery; Type C (8.4%): facial artery terminating as superior labial artery; Type D (3.8%): facial artery ending as superior alar artery; Type E (1.4%): facial artery terminating as a rudimentary twig without providing any significant branches. [10]

Koh, Kim, Oh et al. studied the topography and the course of the facial artery in 91 faces of Korean cadavers. They reported that the final branch of the facial artery was the lateral nasal branch in 44.0% whereas it was the angular branch in 36.3% of the cases. In 54.5% of the cases, the facial artery ended symmetrically. [11]

LOHN, JW et al. studied the course, branching patterns, terminations and anomalous variants of the facial artery and vein on 201 cadaveric dissections. All branches originated from a single facial arterial trunk in 86% of specimens and branching patterns were symmetrical in 53%. The facial artery predominantly terminated as a lateral nasal artery (49%). In 5 cases, the facial artery was undetectable with the transverse facial arterial dominance (1 case bilateral). [12]

Ezure H et al. also reported a case where the left facial artery was completely absent and it was compensated by transverse facial artery which had a larger than normal diameter. [13]

Understanding of the anatomy of facial artery is necessary not only because it can be used as a pedicle for some flap, such as nasolabial skin and oral mucosal flap, but because it is involved in other type of facial surgery such as rhinoplasty and orofacial surgery. Therefore, knowledge about the precise course and branching pattern of the facial artery is required. [14,15]

**Conclusion:**
The main arterial supply of face comes from facial artery. The knowledge about the anomalous branching pattern of facial artery is very essential for general practitioners and traumatologists who receive profusely bleeding facial injuries for first aid and specialized management respectively. Maxillofacial and plastic surgeons should also give due honour to these anomalies before deciding about grafts and other surgical interventions in this region. Thus it is very important for general surgical practitioners and specialists to know about this anomalous branching pattern of facial artery for efficient management of injuries, correction of congenital anomalies like cleft lip, cleft palate and while dealing with other pathologies of maxillofacial region. The present case may provide useful information for clinical applications in different fields of oral and maxillofacial surgery.
Figure 1: Dissection of the right side of the face showing facial and transverse facial artery. (TFA: transverse facial artery; ILA: inferior labial artery; SLA: superior labial artery; LNA: lateral nasal artery; AA: angular artery)

Bibliography:


