



HYPOPLASIA OF THE FACIAL ARTERY SUBSTITUTED BY TRANSVERSE FACIAL ARTERY

N. Yotova^{1*}, S. Novakov¹, A. Fasova¹, P. Timonov²

¹Department of Anatomy, Histology and Embryology, Medical Faculty, Medical University – Plovdiv, Plovdiv, Bulgaria

²Department of Forensic Medicine and Deontology, Medical Faculty, Medical University – Plovdiv, Plovdiv, Bulgaria

ABSTRACT

PURPOSE. The facial artery is one of the main arteries which supply the face with blood. The different types have been researched not only for anatomical purposes but also to facilitate the different medical specialties. **METHODS AND RESULTS.** Our team found an unusual case of a facial artery with smaller lumen. The region, which it supplies, is partially substituted by the transverse facial artery. In the observed course the facial artery had a considerably smaller caliber than usual. After it appears on the surface of the face it divides into two untypical branches - anterior and superior. Contrariwise the transverse facial artery has a significantly bigger lumen. The separate branches, which usually originate from the facial artery, here arise from the aforementioned artery. **CONCLUSIONS.** These types of anatomical variations are very important for muscle and skin flaps in plastic surgery of the face. Every deviation from the normal anatomy of the main blood vessels can also lead to errors in invasive surgery procedures and medical imaging. The vascularization of the face and its variations is subject for many different disciplines.

Key words: facial artery, transverse facial artery, facial surgery, facial flaps

INTRODUCTION

The blood supply of the face is provided mainly by the facial, transverse facial and infraorbital arteries which are in a hemodynamic balance. The position and size of the vessels vary between different individuals and even in the same person from one side to the other. There are also some racial differences concerning their origin and ramification patterns (1). Traditional anatomical descriptions of the facial artery have been based on the course of the main trunk, the number of branches and those seen most frequently (2).

The facial artery is frequently rudimentary. It may terminate as a submental artery, not reaching the face, or as a labial or alar nasi artery and not as the angular (43%) of cases

studied. The artery and its collaterals are extremely variable as regards its mode of termination (3).

DESCRIPTION

During a routine dissection carried out on the head of an adult male cadaver, the following vascular variation was found bilaterally: facial artery was significantly smaller in size than usual. A branch of the external carotid artery it passed through the submandibular gland and the submandibular trigone, curved around the body of the mandible and after a very short course ended in the buccinator muscle and the surrounding muscles, previously bifurcating. Transverse facial artery was significantly larger in size than usual. It went forward to the oral fissure and reached the oral angle. Here it gave off the superior labial artery and proceeded upward to the root of the nose to end with its terminal branch – angular artery (**Figure 1**).

***Correspondence to:** Nina Yotova, Department of Anatomy, Histology and Embryology, Medical University – Plovdiv, 15a Vasil Aprilov blv. Plovdiv, Bulgaria, e-mail: ninayotova2004@yahoo.com, Tel. +359894812045



Figure 1. Our case - smaller facial artery ended in the buccinator muscle and transverse facial artery gave off the superior labial artery to end with its terminal branch – angular artery.

DISCUSSION

The facial artery is important for the reconstruction of the face and has been studied frequently. Bruë et al. (4) presented a percentage distribution of different types of facial artery according to several authors: Kozielec observed the angular artery in 58 % of the cadaveric dissections, Midy – 28 %, Niranjana – 68 %, Soikkonen – 22% and Mitz in 4 % of the cases. Nasal type of facial artery was observed by Midy in 30 % of cases, Mitz – 78 %, Niranjana – 26 % and Soikkonen – 49 %. Labial type was described by Kozielec in 42 % of dissections, by Midy in 40 %, Mitz – 10 %, Niranjana – 4 % and Soikkonen in 20 %. Our findings confirm the data reported by the other authors and the angular, nasal and labial types of facial artery are presented on **Figures 2, 3 and 4**.



Figure 2. Angular type of facial artery.



Figure 3. Labial type of facial artery.

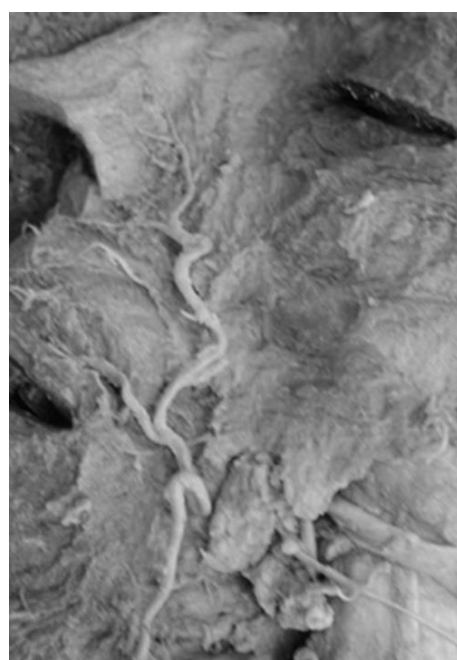


Figure 4. Nasal type of facial artery.

Anatomical knowledge of the facial artery is of importance to clinicians and surgeons during procedures such as musculomucosal, island flaps and aesthetic dermatology (5).

Variations related to the facial artery or its branches have two aspects of interest: in operations of the face and lip, during reconstructive and reparative procedures, and in radiologic anatomy, in the field of malignancy for the treatment of some facial tumors by embolization. The facial artery is also carefully chosen as a target for intra-arterial chemotherapy in treatments for some cancers of the head (6).

The various vascular regions of the face, first described by Mitz and Whetzel, are described by Bruë et al. Based on these observations, and on Lasjaunia's theory of the triple

hemodynamic balance, the authors proposed a functional analysis of the arterial blood supply of the face. According to this analysis, the anatomic variations observed are determined by regional hemodynamic balances. These observations influence the design and creation of certain local facial flaps, such as the submental, nasolabial and buccinator flap. They may also influence present concepts concerning the hemodynamics of arteriovenous malformations of the face (4). The long rotational arc of the nasolabial flap is particularly suitable for anterior palatal defects that are otherwise difficult to treat with local flaps (7). The use of the nasolabial flap may be considered for eyelid reconstruction when squamous cell carcinoma is found. The full-thickness subtotal defect can be reconstructed with the Huges procedure (8).

The face is richly vascularized and construction of several facial flaps is possible. Reconstruction of lip defects using procedures like the Abbe flap and other lip flap procedures involves surgical manipulation of one of the major facial artery branches, mainly the superior labial artery (9). The facial artery musculo-mucosal flap is a recent technique with many advantages, but its use is restricted due to vast variations in the course of the facial artery. The facial artery is also carefully chosen as a target for intra-arterial chemotherapy in treatments for some cancers of the head (10).

The clinical importance of the anatomic variations of the facial artery can be summarized as follows: reconstructive and reparative surgery of the face and lips, reconstructive surgery of the nasal and oral cavity malignant processes, reconstruction of congenital malformations of the tongue, palate and oral clefts, during the mandibular osteotomy and parotidectomy.

CONCLUSION

The precise knowledge regarding the detailed anatomy of the facial artery is of utmost importance. Maxillofacial and plastic surgeons must have detailed knowledge of such variations before deciding on any grafts or surgical interventions on the face. Knowledge regarding such variations is also imperative for general surgical practitioners and specialists, for the effective management of any injuries, or correction of congenital anomalies like cleft

lip and palate. Such anomalous variations therefore warrant use of a noninvasive in vivo technique for evaluation of the facial artery anatomy in order to facilitate preoperative planning in complex facial reconstructions (5).

REFERENCES

1. Adachi, B., Das arteriensystem der Japaner. Band 1, pp 1-440. *Kyoto*: Verlag der Kaiserlich-Japanischen Universität zu Kyoto, 1928.
2. Lasjaunias, P., Berestein, A., Doyon, D., Normal functional anatomy of the facial artery. *Radiology*, 133:631-638, 1979.
3. Bergman, R. A., Thompson, S.A., Afifi, A.K. and Saadeh, F.A., Compendium of Human Anatomic Variation: Catalog, Atlas and World Literature. Urban & Schwarzenberg, Baltimore and Munich, 1988.
4. Bruë, E., Bey, E., Cariou, J.L., Facial artery. Embryological review, descriptive and functional anatomy based on a review of the literature. *Annales de Chirurgie Plastique Esthétique*, 45(4):461-84, 2000.
5. Niemann, K., Lazarus, L., Rennie, C., An Anatomical Study of the Facial Artery. *International Journal of Morphology*, 37(4):1310-1315, December 2019.
6. Padur, A., Kumar, N., Unusual branching pattern and termination of facial artery and its clinical implications for facial operations. *J Vasc Bras*, 18:e20190021, 2019 Jul.
7. Dupoirieux, L., Plane, L., Gard. C., Penneau. M., Anatomical basis and results of the facial artery musculomucosal flap for oral reconstruction. *Br J Oral Maxillofac Surg*, 37(1):25-28, 1999.
8. Tei, T.M., Larsen, J., Use of the subcutaneously nasolabial flap in lower eyelid reconstruction. *Br J Plast Surg*, 56(4):420-3, Jun 2003.
9. Loukas, M., Hullet, J., Louis, R.G. Jr., et al. A detailed observation of variations of the facial artery, with emphasis on the superior labial artery. *Surg Radiol Anat*, 28(3):316-24, 2006.
10. Shimizu, T., Sakakura, Y., Hattori, T., Yamaguchi, N., Kubo, M., Sakakura, K., Super selective intraarterial chemotherapy in combination with irradiation: preliminary report. *Am J Otolaryngol*, 11(2):131-6, 1990.

