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Original Research Paper

Anatomical Study of the Facial Artery: Origin and Branching Patterns in Adult Cadavers

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ABSTRACT:
The facial artery is a crucial vessel responsible for supplying oxygenated blood to the face. This artery plays a significant role in reconstructive surgeries, particularly in plastic and maxillofacial surgery, due to its extensive vascular network. The current study aims to investigate the mode of origin and branching patterns of the facial artery in adult cadaveric specimens. Thirty hemifaces from 15 adult cadavers were dissected between January 2021 and December 2023. The results revealed that 86.67% of the specimens exhibited a separate origin of the facial artery from the external carotid artery, while 13.33% showed a common linguofacial trunk. In terms of branching patterns, 73.33% of specimens showed the facial artery terminating as the angular artery, 20% as the lateral nasal artery, and 6.67% as the superior labial artery. These findings provide essential anatomical insights with significant implications for surgical planning, particularly in reconstructive and aesthetic facial procedures.

Keywords: Facial artery, branching patterns, dissection, external carotid artery, cadaveric study.

1. INTRODUCTION:

The facial artery, also referred to as the external maxillary artery, is an essential vessel responsible for providing blood to various structures of the face. It arises from the external carotid artery and has a critical role in the vascularization of facial tissues. In plastic and reconstructive surgery, its importance is particularly notable due to its high vascularity, which facilitates rapid healing in post-surgical recovery. The facial artery supplies key branches, including the superior labial, inferior labial, and lateral nasal arteries, which are crucial in facial surgeries involving reconstruction or aesthetic enhancement.

Anatomical variations in the origin and branching patterns of the facial artery are important for surgical interventions, as these variations may influence the outcome of head and neck surgeries. Understanding the specific arterial pathways helps in minimizing complications related to tissue perfusion and enhances the success rate of reconstructive surgeries. This study aims to systematically examine the variations in the origin and branching patterns of the facial artery through dissection of adult cadaveric specimens.

2. MATERIALS AND METHODS:

2.1 Study Design and Specimens:

This anatomical study was conducted from January 2021 to December 2023 using 30 hemifaces from 15 adult cadavers. The cadavers were sourced from the Mahaveer Institute of Medical Sciences & Research, Bhopal. The inclusion criteria consisted of adult cadaveric specimens, while decomposed, pediatric, and damaged specimens were excluded from the study.

2.2 Dissection Technique:

The dissection followed the standard protocol outlined in the 11th edition of Cunningham's Manual of Practical Anatomy. A midline incision was made to expose the carotid triangle and surrounding structures. After reflecting the deep cervical fascia, the external carotid artery and its branches, including the facial artery, were identified and traced distally. The mode of origin, branching patterns, and terminal branches of the facial artery were carefully documented during the dissection process.

2.3 Data Collection:

Data were collected regarding the mode of origin of the facial artery, its branching patterns, and the relationships of the arterial branches to surrounding structures. Descriptive statistics were applied to summarize the data, and inferential statistics were used to examine significant differences where applicable. Statistical analysis was conducted using IBM SPSS software (version 22), with a significance level set at $p < 0.05$.

3. RESULTS:

3.1 Mode of Origin of the Facial Artery:

The facial artery's origin was classified into two main types: separate origin from the external carotid artery, and origin from a common linguofacial trunk. The distribution of these origin types is shown in Table 1.

Table 1: Mode of Origin of the Facial Artery from the External Carotid Artery

Origin	Frequency (N = 30 Hemifaces)	Percentage
Separate origin	26	86.67%
Common linguofacial trunk	4	13.33%

As seen, 86.67% of specimens had a separate origin of the facial artery from the external carotid artery, while 13.33% exhibited a common linguofacial trunk.

3.2 Branching Pattern of the Facial Artery:

The branching pattern of the facial artery was classified into three types, as outlined in **Table 2**.

Table 2: Branching Pattern of Facial Artery in the Face

Branching Pattern	Frequency	Percentage
Type I: Angular artery	22	73.33%
Type II: Lateral nasal artery	6	20%
Type III: Superior labial artery	2	6.67%

The most common branching pattern (73.33%) involved the facial artery terminating as the angular artery (Type I). In 20% of cases, the artery ended as the lateral nasal artery (Type II), while 6.67% ended as the superior labial artery (Type III).

4. DISCUSSION:

4.1 Mode of Origin of the Facial Artery:

The predominant origin of the facial artery was from a separate branch of the external carotid artery (86.67%), which is consistent with prior studies, including those by Midy et al. (1986) and Lohn et al. (2011). A common linguofacial trunk was observed in 13.33% of cases, which is slightly lower than the 14% observed by Lohn et al. (2011). The presence of the linguofacial trunk is of significant surgical importance, as it can impact the blood supply to the face and may influence surgical planning, especially in procedures involving the face and neck.

4.2 Branching Patterns of the Facial Artery:

The most common pattern observed was the termination of the facial artery as the angular artery (73.33%). This finding is consistent with earlier studies, such as those by Loukas et al. (2006), who observed a similar pattern in a large sample size. The lateral nasal artery and superior labial artery were less frequently seen as terminal branches (20% and 6.67%, respectively). These variations in the facial artery's branching patterns are crucial for surgical procedures, particularly in aesthetic and reconstructive surgeries, where precise knowledge of the arterial anatomy is essential.

5. CONCLUSION:

This study provides valuable anatomical insights into the facial artery's origin and branching patterns in adult cadaveric specimens. The majority of specimens exhibited a separate origin of the facial artery from the external carotid artery, and the most common branching pattern involved the angular artery. The study also highlighted variations, including the presence of a common linguofacial trunk, which has significant implications for surgical planning, especially in reconstructive, plastic, and aesthetic surgery. Understanding these variations is critical for improving surgical outcomes and minimizing complications in facial procedures.

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