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Original Research Article

An Observational Study of the Origin and Branching Pattern of the Facial Artery in CA Davers

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Abstract:

Background: The facial artery is a major branch of the external carotid artery and plays a crucial role in supplying blood to the face. Variations in its origin and branching pattern are clinically significant for maxillofacial surgery, plastic surgery, radiology, and interventional procedures. Detailed anatomical knowledge helps prevent surgical complications and ensures safe operative outcomes.

Aim: To observe and document the origin and branching pattern of the facial artery in adult cadavers and to analyze its anatomical variations.

Materials and Methods: This descriptive observational study was conducted on 28 adult embalmed cadavers in the Department of Anatomy. Bilateral dissection of the neck and facial regions was performed following standard anatomical procedures. The origin of the facial artery, its course, branching pattern, termination, and any variations were carefully noted and photographed. Measurements were recorded where necessary and analyzed descriptively.

Results: In the majority of specimens, the facial artery originated from the external carotid artery above the lingual artery. However, variations were observed, including origin from a linguofacial trunk and thyrolinguofacial trunk in a small percentage of cases. The branching pattern showed typical cervical and facial branches, including inferior labial, superior labial, lateral nasal, and angular arteries. Variations in termination and course, including tortuosity and hypoplasia, were also documented.

Conclusion: The study highlights significant anatomical variations in the origin and branching pattern of the facial artery. Awareness of these variations is essential for surgeons and interventional radiologists to minimize intraoperative complications and improve surgical precision.

Keywords: Facial artery, External carotid artery, Anatomical variation, Cadaveric study, Branching pattern.

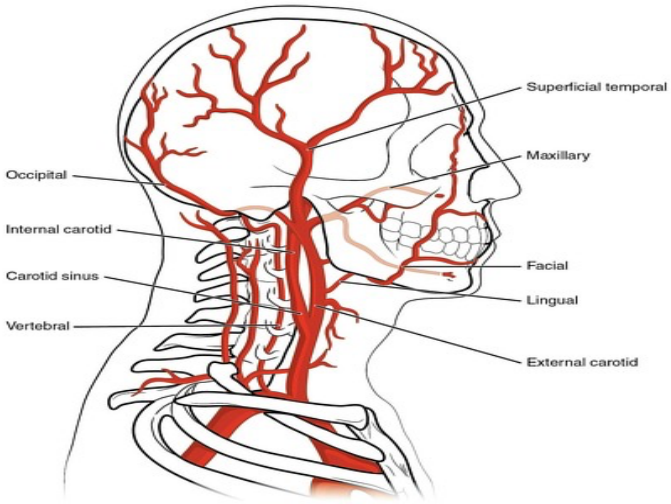
Introduction

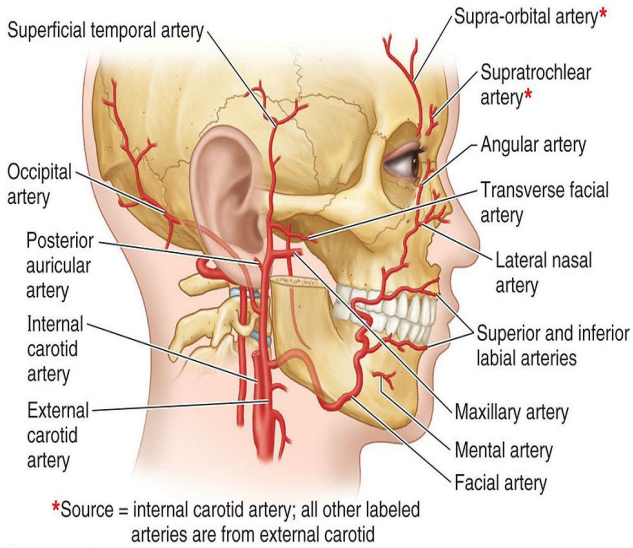
The **facial artery** is one of the principal arteries supplying the superficial structures of the face. It typically arises from the external carotid artery in the carotid triangle of the neck, just above the lingual artery. After originating in the neck, it courses upward and forward, passing deep to the posterior belly of digastric and stylohyoid muscles, grooves the posterior surface of the submandibular gland, and winds around the inferior border of the mandible to enter the face. On the face, it follows a tortuous path toward the medial angle of the eye, where it usually terminates as the angular artery.

The facial artery gives several cervical and facial branches. The cervical branches include the ascending palatine, tonsillar, glandular, and submental arteries, while the facial branches commonly include the inferior labial, superior labial, lateral nasal, and angular arteries. These branches play a crucial role in supplying blood to the lips, nose, eyelids, and surrounding facial musculature. Anatomical variations in the origin, course, branching pattern, and termination of the facial artery are frequently reported. Variations may include origin from a linguofacial trunk, thyrolinguofacial trunk, or altered branching and termination patterns. Such differences are of considerable clinical importance in maxillofacial surgery, reconstructive and plastic surgery, head and neck oncology, dental procedures, and interventional radiology. Inadequate knowledge of these variations can lead to inadvertent vascular injury, excessive bleeding, flap necrosis, or failure of reconstructive procedures.

Cadaveric studies provide a reliable method for documenting morphological variations and establishing baseline anatomical data for specific

populations. Therefore, the present observational study was undertaken to examine the origin and branching pattern of the facial artery in adult cadavers and to analyze its anatomical variations, thereby contributing valuable information for clinical and surgical practice.





Materials and Methods

Study Design: The present study was a descriptive observational cadaveric study conducted in the Department of Anatomy, at Nalanda Medical College and Hospital Patna, Bihar. Study duration is one years.

Study Sample: A total of 28 adult embalmed cadavers (56 sides) were included in the study. Cadavers with gross deformities, trauma, or previous surgical procedures in the head and neck region were excluded.

Dissection Procedure: Bilateral dissection of the neck and facial regions was performed according to standard anatomical dissection procedures. Skin, superficial fascia, and platysma were carefully reflected to expose the carotid triangle. The external carotid artery was identified and traced to locate the origin of the facial artery.

The facial artery was dissected from its origin in the neck, followed through its cervical course, and traced as it curved around the lower border of the mandible onto the face. Its course, branching pattern, termination, and any variations were carefully observed.

Parameters Observed

The following parameters were recorded:

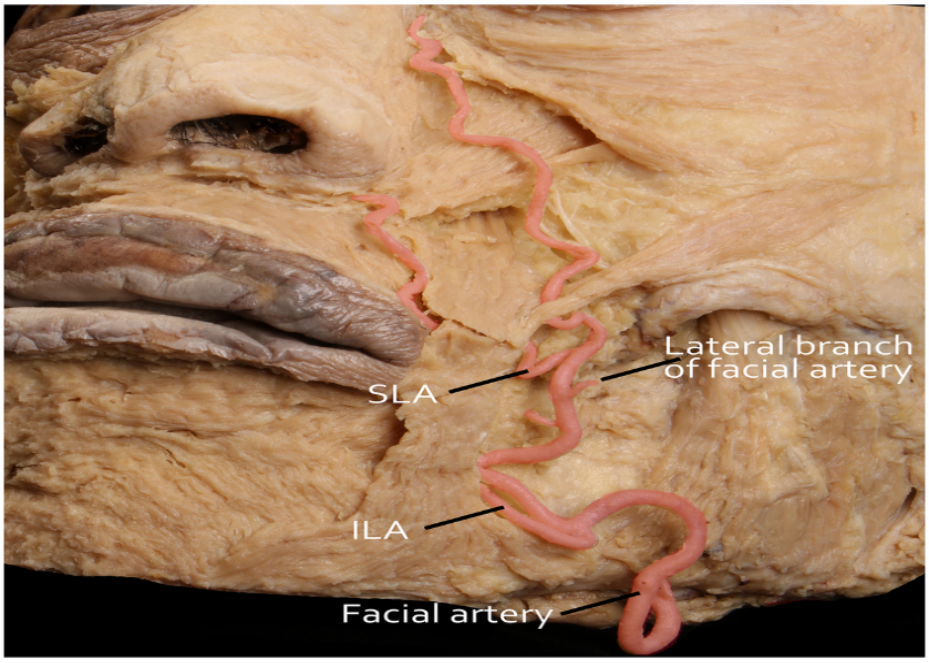
- Site of origin of the facial artery
- Presence of common trunks (e.g., linguofacial trunk, thyrolinguofacial trunk)
- Cervical branches (ascending palatine, tonsillar, glandular, submental)

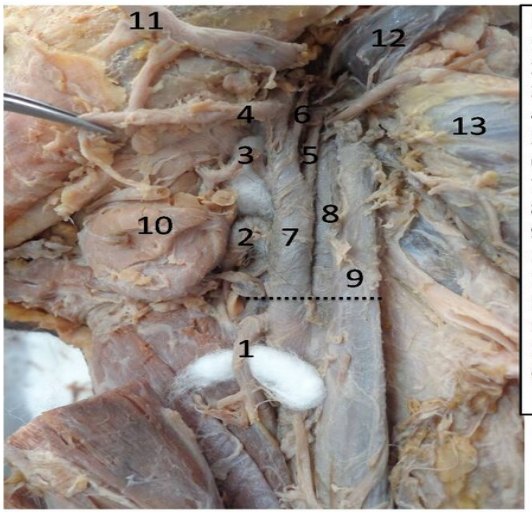
- Facial branches (inferior labial, superior labial, lateral nasal, angular)
- Termination pattern
- Presence of hypoplasia, duplication, or unusual tortuosity

Where necessary, measurements were taken using a digital vernier caliper. Photographs were captured for documentation.

Data Analysis

Observations were tabulated and analyzed using descriptive statistics. The frequency and percentage of variations were calculated for comparison.





black line- bifurcation of CCA
1-superior thyroid artery
2- lingual artery
3-glandular branch
4- facial artery
5- occipital artery
6- posterior auricular artery
7- external carotid artery
8- internal carotid artery
9- internal jugular vein
10- submandibular gland
11-common facial vein (retracted)
12- posterior belly of digastric muscle (retracted)
13- sternocledomastoid muscle (retracted)

Dissection of left side of neck

Results

A total of 28 adult cadavers (56 sides) were studied to observe the origin and branching pattern of the facial artery.

1. **Origin of the Facial Artery**
   - In 48 out of 56 sides (85.7%), the facial artery originated independently from the external carotid artery above the lingual artery (normal pattern).
   - In 6 sides (10.7%), the facial artery arose from a linguofacial trunk.
   - In 2 sides (3.6%), it originated from a thyrolinguofacial trunk.
2. **Course**
   - In all specimens, the artery followed a tortuous course in the face.

- The artery crossed the lower border of the mandible anterior to the masseter muscle in 52 sides (92.8%).
- In 4 sides (7.2%), slight variation in the point of crossing was observed.

3. Branching Pattern

Cervical Branches:

- Ascending palatine artery was present in 53 sides (94.6%).
- Tonsillar branch was observed in 51 sides (91.0%).
- Submental artery was present in 54 sides (96.4%).

Facial Branches:

- Inferior labial artery was present in 55 sides (98.2%).
- Superior labial artery was present in 56 sides (100%).
- Lateral nasal branch was observed in 54 sides (96.4%).
- Angular artery as terminal branch was seen in 50 sides (89.3%).

4. Termination

- In 50 sides (89.3%), the artery terminated as the angular artery near the medial angle of the eye.
- In 6 sides (10.7%), termination occurred as the superior labial or lateral nasal artery.

5. Variations

- Hypoplastic facial artery was noted in 2 sides (3.6%).
- No duplication of the artery was observed.
- Minor variations in branching pattern were noted in 8 sides (14.3%).

Table 1: Origin of the Facial Artery (n = 56 sides)

S. No.	Origin of Facial Artery	Number of Sides	Percentage (%)
1	From External Carotid Artery (Normal)	48	85.7%
2	Linguofacial Trunk	6	10.7%
3	Thyrolinguofacial Trunk	2	3.6%
	Total	**56**	**100%**

Table 2: Course of Facial Artery at Mandible (n = 56 sides)

S. No.	Course at Lower Border of Mandible	Number of Sides	Percentage (%)
1	Anterior to Masseter (Normal)	52	92.8%
2	Variation in Crossing Point	4	7.2%
	Total	**56**	**100%**

Table 3: Cervical Branches of Facial Artery (n = 56 sides)

S. No.	Cervical Branch	Present (n)	Percentage (%)
1	Ascending Palatine	53	94.6%
2	Tonsillar Branch	51	91.0%
3	Submental Artery	54	96.4%

Table 4: Facial Branches of Facial Artery (n = 56 sides)

S. No.	Facial Branch	Present (n)	Percentage (%)
1	Inferior Labial	55	98.2%
2	Superior Labial	56	100%
3	Lateral Nasal	54	96.4%
4	Angular Artery	50	89.3%

Table 5: Termination Pattern of Facial Artery (n = 56 sides)

S. No.	Termination Pattern	Number of Sides	Percentage (%)
1	Angular Artery (Normal)	50	89.3%
2	Superior Labial / Lateral Nasal	6	10.7%
	Total	**56**	**100%**

Discussion

The present cadaveric study was undertaken to observe the origin and branching pattern of the facial artery and to document its anatomical variations. The findings demonstrate that although the classical description of the artery is commonly observed, notable variations do exist. In the majority of cases (85.7%), the facial artery arose independently from

the external carotid artery, which is consistent with standard anatomical descriptions. However, variations such as origin from a linguofacial trunk (10.7%) and thyrolinguofacial trunk (3.6%) were also observed. These findings are in agreement with previous anatomical studies that have reported common trunks arising due to developmental alterations in the aortic arch derivatives. Such variations may be attributed to persistence or regression of embryonic vascular channels during development.

The artery crossed the lower border of the mandible anterior to the masseter muscle in 92.8% of specimens, which corresponds to the typical anatomical description. Variations in the crossing point, although minimal, are clinically important during procedures such as submandibular gland surgery, mandibular fracture fixation, and facial flap elevation, where accidental injury to the vessel may result in excessive hemorrhage. Regarding the branching pattern, most cervical and facial branches were consistently present, particularly the superior labial artery (100%) and submental artery (96.4%). The angular artery was observed as the terminal branch in 89.3% of cases, while in 10.7% of specimens the artery terminated as superior labial or lateral nasal branches. Such variations in termination are significant in reconstructive and cosmetic procedures involving the periorbital and nasolabial regions. The tortuous course of the facial artery observed in all specimens facilitates facial movements and prevents stretching during mastication and expression. However, excessive tortuosity may complicate catheterization during interventional radiological procedures.

Overall, the variations observed in the present study are comparable with findings reported in earlier cadaveric studies across different populations. Minor differences in percentages may be attributed to ethnic variation, sample size, and methodological differences.

Clinical Significance

Knowledge of the variations in the origin, course, and termination of the facial artery is essential for:

- Maxillofacial and reconstructive surgeons
- Plastic and cosmetic surgeons
- Dental surgeons performing invasive procedures
- Interventional radiologists
- Head and neck oncologic surgeons

Accurate anatomical understanding reduces the risk of hemorrhage, flap necrosis, and iatrogenic vascular injury.

Conclusion

The present cadaveric study on 28 adult cadavers (56 sides) demonstrates that the facial artery most commonly arises independently from the external carotid artery and follows the classical anatomical course with termination as the angular artery. However, significant anatomical variations were observed in its origin, branching pattern, and termination.

Variations such as origin from a linguofacial trunk or thyrolinguofacial trunk and altered termination patterns were identified in a small but clinically relevant percentage of specimens. Although the majority of cervical and facial branches were consistently present, minor deviations in branching were also documented. These findings emphasize that the facial artery exhibits considerable anatomical variability. Therefore, thorough knowledge of its possible variations is essential for maxillofacial surgeons, plastic surgeons, dental practitioners, and interventional radiologists to prevent intraoperative complications and ensure safe and effective surgical outcomes.

Further large-scale studies involving different populations are recommended to establish comprehensive anatomical data and enhance clinical applicability.

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