

# Supernumerary Septal Branch with Atypical Origin, Course and Depth: a Case Series Study with Possible Implications for Nasal Trauma and Orofacial Harmonization

Maria Clara Correia Melo Costa<sup>1</sup>, Bianca Farias dos Santos Nascimento<sup>1</sup>, João Argel Candido da Silva<sup>1</sup>, George Azevedo Lemos<sup>2</sup>, Katharina Jucá de Moraes Fernandes<sup>3,5</sup>, Jacieli Benedito de Oliveira<sup>4</sup>, Olavo Barbosa de Oliveira Neto<sup>2,5</sup>

<sup>1</sup>Faculty of Dentistry, Federal University of Alagoas, Maceió, AL, Brazil

<sup>2</sup>Anatomy Division, Institute of Biological and Health Sciences, Federal University of Alagoas, Maceió, AL, Brazil

<sup>3</sup>State University of Health Sciences, Maceió, Alagoas, Brazil

<sup>4</sup>Department of Anatomy, Biosciences Center, Federal University of Pernambuco, Recife, PE, Brazil

<sup>5</sup>CESMAC University Center, Maceió, AL, Brazil

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## ABSTRACT

**Introduction:** the present study reports three unusual cases of a supernumerary septal branch (SSB) originated directly from the facial artery and with a horizontal course towards the nasal septum. In addition, possible repercussions to nasal trauma and to procedures on orofacial harmonization were discussed. Analyzes were carried out by means of dissection of the facial artery, the SSB, the superior labial artery and the septal branch of the superior labial artery. Five measures were taken for each case using a digital caliper. The course and depth of both the SSB and the regular septal branch were registered and reported. The presence of a SSB, especially with an atypical origin, shows the importance of solid anatomical knowledge for the areas of orofacial harmonization and nasal trauma. Dental surgeons, plastic surgeons, and other healthcare professionals that performed procedures on the nose and upper lip areas may benefit from the findings of the present study.

**Keywords:** Facial artery; Septal branch; Orofacial harmonization; Anatomical variation; Supernumerary branch.

## Introduction

The septal branch (or nasal septal artery) is often originated on the superior labial artery (SLA) in a paramedian position at the level of the philtrum, between the orbicularis oris muscle and the mucosa. It has an ascending course towards the nasal septum to irrigate the anterior portion of the local mucosa<sup>1,2</sup>.

When the septal branch reaches the nasal septum, it participates in an anastomosis with the greater palatine, anterior ethmoidal, posterior ethmoidal, and sphenopalatine arteries on the anterior portion of the nasal septum's mucosa, comprising the anterior nasal plexus (Kiesselbach's plexus, within the Little's area), in which epistaxis are of common occurrence after local mechanical trauma, surgical vascular accidents and post-surgical complications, or even by injury with chemical substances or in patients with systemic arterial hypertension<sup>3,4</sup>.

With the increasing popularity of orofacial harmonization techniques, aesthetic procedures have been sought to improve quality of life and self-esteem by the maintenance of facial esthetics, with increasing satisfactory results<sup>5</sup>. To reach these goals, professionals have to deal with an increasingly demanding public and with a wide range of techniques such as the use of

biocompatible and absorbable facial fillers, botulinum toxin, among other existing procedures. Thus, the knowledge regarding topographical anatomy of the face and possible anatomical variations with clinical repercussions is paramount for the success of clinical and surgical procedures<sup>6</sup>.

The present study reports three unusual cases of a supernumerary septal branch (SSB) originated directly from the facial artery and with a horizontal course towards the nasal septum. In addition, possible repercussions to nasal trauma and procedures on orofacial harmonization were discussed.

## Materials and Methods

This is a descriptive case series study that was performed in conformity with the Brazilian Federal Law 8.501 of November 30, 1992. All reported cases occurred during routine dissections of human cadavers fixed in 10% aqueous formaldehyde solution.

By means of dissection and visual inspection, the side and depth of the SSB and of the regular septal branch of the SLA were registered and reported.

In addition to dissection and visual inspection, for each case, five measures were performed by a single trained and experienced researcher using a digital

caliper (0-150 mm, error +/- 0,02 mm, MTX®, Tools World, Guarulhos, SP, Brazil - MTX-316119), as follows:

M1 (mm) - distance from the origin of the supernumerary septal branch to the wing of the nose;

M2 (mm) - distance from the origin of the supernumerary septal branch to the median line;

M3 (mm) - distance from the septal branch to the median line;

M4 (mm) - thickness of the supernumerary septal branch;

M5 (mm) - thickness of the trunk of the facial artery where it originates the supernumerary septal branch.

M1 was obtained considering, as reference, the lateral most region of the wing of the nose. M2 was obtained considering, as reference, the region in which the SSB was originated from the trunk of the facial artery. For M3, the reference was the inferior most region of the septal branch, where it has a vertical course, parallel to the median line. M4 and M5 were obtained, respectively, on the region immediately after the initial course of the SSB from the trunk of the facial artery and on the region of the trunk of the facial artery where the SSB was originated (Figure 1).

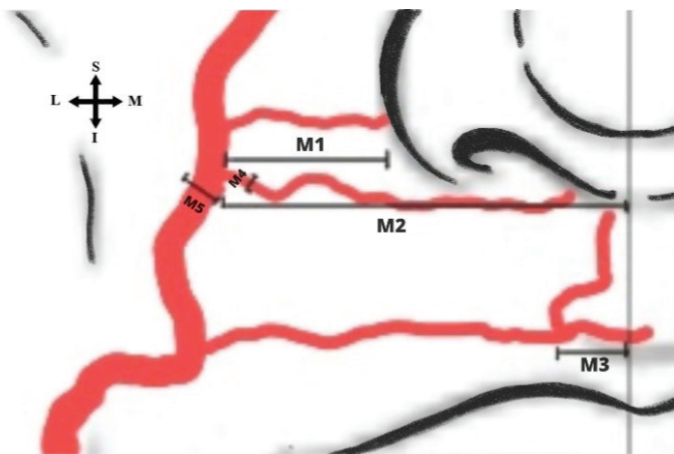


Figure 1. Illustration of the performed measures described on methodology.

## Results

The dissection of Case 1 occurred on the Department of Anatomy (Biosciences Center, Federal University of Pernambuco - UFPE, Recife, Pernambuco, Brazil), in 2019.

Cases 2 and 3 were dissected on the Human Anatomy Division of the Federal University of Alagoas (UFAL), in 2022. Table 1 summarizes the findings regarding collected measures, side, and depth of the SSB and of the regular septal branch of the SLA.

### Case 1

An adult male cadaver presented a SSB emerging from the trunk of the facial artery. This branch emerged from the facial part of the facial artery, laterally to the right wing of the nose, on the region of the nasomelolabial triangle, between the skin and

the subcutaneous tissue layers. The SSB, still located between the skin and the subcutaneous tissue layers, ran horizontally from its origin towards the columella (Figure 2).

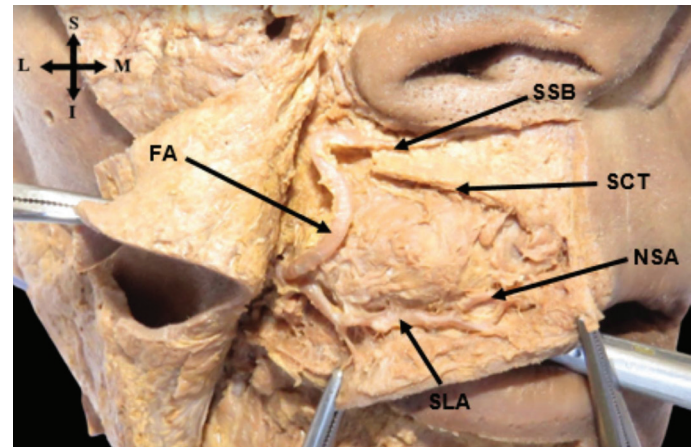


Figure 2. Anterolateral view of the right side showing the supernumerary septal branch (SSB) coursing superficially to the subcutaneous layer (SCT) of the superior lip. SLA = superior labial artery; NSA = nasal septal artery; FA = facial artery.

The SLA was also dissected, and its septal branch was also found. Both the SLA and its septal branch presented themselves on their usual courses on the submucosal layer of the superior lip, i.e., between the muscular (represented, on this region, by the orbicularis oris muscle) and the mucosa layers. Lesser salivary glands were also found close to the dissected blood vessels on the submucosal layer of the superior lip.

Collected measures were: M1 = 5,80mm; M2 = 21,93mm; M3 = 6,32mm; M4 = 0,75mm; M5 = 1,66mm (Table 1).

### Cases 2 and 3

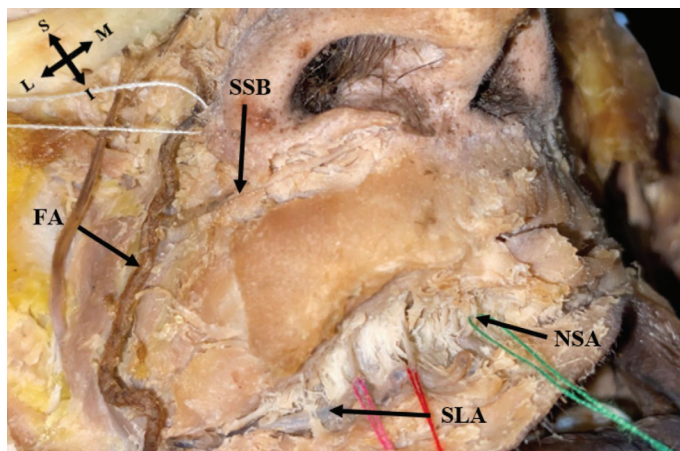
Two adult male cadavers presented a SSB emerging from the trunk of the facial part of the facial artery.

On Case 2, the SSB originated laterally to the right wing of the nose, with a horizontal course to the vicinities of the columella. However, differently from Case 1, the SSB of this case was located between the subcutaneous and muscle layers (Figures 3 and 4). The SLA was also dissected, and its septal branch was identified. Both the SLA and its septal branch presented usual courses and depths, located on the submucosal layer of the superior lip. Collected measures were: M1 = 11,25mm; M2 = 33,01mm; M3 = 2,03mm; M4 = 0,78mm; M5 = 1,02mm (Table 1).

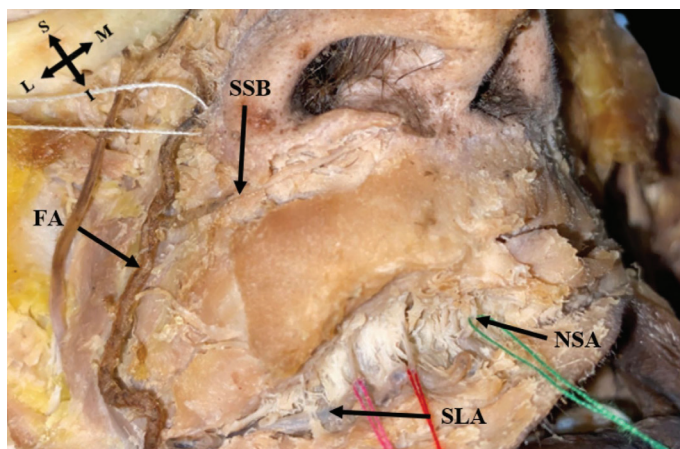
On Case 3, the SSB originated laterally to the left wing of the nose, also (i.e. similarly to Case 2) between the subcutaneous and muscle layers (Figure 5). The course of the SSB and the course and depth of the SLA and its septal branch were similar to Case 2. Collected measures were: M1 = 7,51mm; M2 = 21,67mm; M3 = 4,02mm; M4 = 0,87mm; M5 = 0,95mm (Table 1).

**Table 1.** Collected measures, antimeres, and reported depth of the supernumerary septal branch and the nasal septal branch. SSB = supernumerary septal branch; NSB = nasal septal branch; R = right; L = left; mm = millimeter.

	M1 (mm)	M2 (mm)	M3 (mm)	M4 (mm)	M5 (mm)	SIDE	Depth	
							SSB	NSB
<b>CASE 1</b>	5,80	21,93	6,32	0,75	1,66	R	Between skin and subcutaneous tissue	Between muscular layer and mucosa
<b>CASE 2</b>	11,25	33,01	2,03	0,78	1,02	R	Between subcutaneous tissue and muscular layer	Between muscular layer and mucosa
<b>CASE 3</b>	7,51	21,67	4,02	0,87	0,95	L	Between subcutaneous tissue and muscular layer	Between muscular layer and mucosa



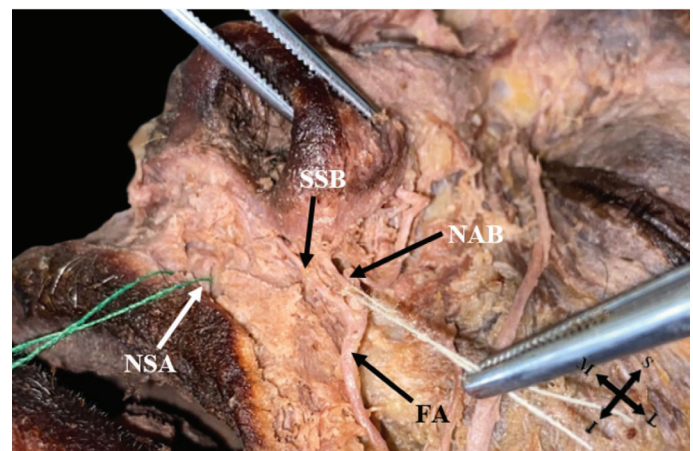
**Figure 3.** Anteroinferior view of the right side. The supernumerary septal branch (SSB) is coursing deeply to the subcutaneous layer (SCT) of the superior lip. Red and pink threads indicate muscular branches of the superior labial artery. SLA = superior labial artery; NSA = nasal septal artery (green thread); FA = facial artery.



**Figure 4.** Anterolateral view of the right side. The nasal alar branch (NAB, white thread) is located superiorly to the supernumerary septal branch (SSB). FA = facial artery.

**Discussion**

The present study reports the occurrence of the supernumerary septal branch, originated from the trunk of the facial part of the facial artery in addition to the normal occurrence of the septal branch of the superior labial artery on three Brazilian adult male cadavers. Analyzes began with the dissection of the complete course of the facial artery, the SSB, the SLA and its septal branch (i.e. the nasal septal branch,



**Figure 5.** Lateral view of the left side showing the nasal alar branch (NAB, white thread), the supernumerary septal branch (SSB) and the nasal septal artery (NSA, green thread). FA = facial artery.

NSB). Five measures were also performed for each case (Table I).

The course of the facial part of the facial artery begins when it crosses the inferior margin of the mandible, anteriorly to the anteroinferior angle of the masseter muscle, more superficially when compared to its course on the neck region. From this point on, the facial artery crosses the cheek region, running laterally to the angle of mouth; then, it runs laterally to the nose and ends as angular artery medially to the medial palpebral commissure<sup>7</sup>. The SLA is usually originated on the angle of mouth region and sends a septal branch (NSB) on the philtrum region, which ascends to the nasal septum<sup>1,2</sup>. However, a SSB was found with an atypical origin laterally to the wing of the nose, directly from the trunk of the facial artery. Moreover, all SSBs had horizontal courses towards the nasal septum (Figures 2, 3, 4 and 5).

Both the SLA and its septal branch are classically described as located between the mucosa and the orbicularis oris muscle<sup>2,7</sup>. If compared to the normal septal branch, the three cases reported on the present study showed SSBs in a more superficial occurrence; on Case 1, the SSB was located between the skin and the subcutaneous tissue; on Cases 2 and 3, the SSB was found between the subcutaneous tissue and the muscle layer (Figure 3, 4 and 5)<sup>7-8</sup>.

Classical textbooks on Human Anatomy do not report the occurrence, number, course, or depth of the SSB<sup>1-3,7-8</sup>. Scientific articles did report what can be understood as the SSB, however, with different nomenclatures, such as “inferior alar branch/artery” and as “subalar branch”<sup>11,13-17</sup>. These and other information are available on Table 2.

One might notice a remarking resemblance between the SSB and the artery called by Loukas *et al.* (2006)<sup>11</sup> as “inferior alar artery”, where both originate from the trunk of the facial part of the facial artery, laterally to the wing of the nose, and run horizontally towards the nasal septum, as can be seen both on the present study and on the figures within the aforementioned

**Table 2.** Origin and depth of the supernumerary septal branch and the nasal septal branch as reported by previous studies.

AUTOR	Report of the SSB	Origin of the SSB	Depth of the SSB	Report of the NSB	Origin of the NSB	Depth of the NSB
Figún and Garino, 2003	-	-	-	X	Superior labial artery	Between orbicularis oris muscle and glandular layer, near the mucosal surface
Teixeira; Reher, P. and Reher, V., 2020	-	-	-	X	Superior labial artery	-
GOSS, 1988	-	-	-	X	Superior labial artery	Between the mucous membrane and orbicularis oris muscle
Rouvière and Delmas, 2005	-	-	-	X	Anastomosis of contralateral superior labial arteries	Beneath the orbicularis oris muscle
Testut and Latarjet, 1984	-	-	-	X	Anastomosis of contralateral superior labial arteries	Between the muscular layer and the submucosal glands layer
Madeira, 2008	-	-	-	-	-	-
Al-hoqail and Meguid, 2008	*	Facial artery above the superior labial artery	-	X	Superior labial artery	-
Jiang <i>et al.</i> , 2021	*	Lateral nasal artery and superior alar artery	In the subcutaneous tissue or superficial to the levator labii superioris alaeque nasi muscle	X	Superior labial artery	In the subcutaneous layer and in the submucosal layer
Lee, H. <i>et al.</i> , 2017	*	Main trunk of the facial artery or the alar trunk	-	X	Superior labial artery	Either deep or superficial to the orbicularis oris muscle
Lee, J. <i>et al.</i> , 2015	*	Facial artery	Deep to the levator labii superioris and the zygomaticus minor	X	Superior labial artery	-
Loukas <i>et al.</i> , 2006	*	Lateral nasal artery**	-	X	Superior labial artery	Between the orbicularis oris muscle and the oral mucosa and partially invested by the orbicularis oris muscle
Pinar; Bilge and Govsa, 2005	*	Facial artery or superficial ascending branches	-	X	Superior labial artery	Between the skin and the orbicularis oris muscle (superficial branches) and through the muscle or between the muscle and the mucosa (deep branches)

X = reported, - = non-reported, \* = reported, but following a different nomenclature (inferior alar branch/artery and subalar branch). \*\* According to classic literature, the branch considered by the authors as the “lateral nasal artery” corresponds to the trunk of the facial artery.

article. Nevertheless, it is our understanding that the term “inferior alar artery” should not be used because it does not represent the complete course of this blood vessel, as well as it does not represent the territory of irrigation of the reported artery. Moreover, the suggested term on the present study, despite is not present on Anatomical Terminology, is closer to the terms currently associated to the facial artery<sup>12</sup>.

Considering the arteries that comprise the anterior nasal plexus (Kieselbach's plexus contained on the Little's area)<sup>3</sup>, the reported variation is clinically important for the treatment of epistaxis in cases where retrograde nasal tamponade is not effective and ligature or even embolization are indicated<sup>9</sup>. Thus, especially in these cases, the knowledge regarding the SSB is important for surgical practice to avoid risks related to embolization, such as necrosis by ischemia<sup>9</sup>. In addition, the depth of the SSB should be considered on surgical procedures of reconstruction of the superior lip using subcutaneous pedicle<sup>10</sup>, where, because of the proximity to the subcutaneous layer, the SSB may be inadvertently injured during surgery. Moreover, the reported variation is important for orofacial harmonization procedures, especially on fillings with hyaluronic acid. Possible associated complications are ecchymosis due to vessel rupture and necrosis by ischemia if the hyaluronic acid is applied on blood vessels.

The present study reports three occurrences, topographical features and morphometric data of an anatomical variation not found on classical anatomical

literature. The clinical importance of the reported variation should also be considered, and, hence, may help clinicians and surgeons to prevent accidents or complications during procedures performed on the superior lip and on the nose region, especially on the nasal septum and on the nasomelolabial triangle. The main limitations of the present study are associated to study design and to the limited sample, as well as the absence of formal statistical analysis. Future studies should be conducted to overcome these limitations.

## Conclusion

The presence of a supernumerary septal branch, especially with an atypical origin, shows the importance of solid anatomical knowledge for the areas of orofacial harmonization and nasal trauma. Dental surgeons, plastic surgeons, and other healthcare professionals that performed procedures on the nose and upper lip areas may benefit from the findings of the present study.

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### Mini Curriculum and Author's Contribution

1. Maria Clara Correia Melo Costa - Undergraduate student in Dentistry. Contribution: preparation & draft of manuscript. ORCID: 0000-0002-6705-6442
2. Bianca Farias dos Santos Nascimento - Undergraduate student in Dentistry. Contribution: preparation & draft of manuscript. ORCID: 0000-0001-6734-7672
3. João Argel Candido da Silva - Undergraduate student in Dentistry. Contribution: preparation & draft of manuscript. ORCID: 0000-0001-8408-6099
4. George Azevedo Lemos - DDS, MSc, PhD. Contribution: preparation & draft of manuscript, critical review & final approval. ORCID: 0000-0002-2140-216X
5. Katharina Jucá de Moraes Fernandes - DDS, MSc. Contribution: critical review & final approval. ORCID: 0000-0003-0002-3133
6. Jaciel Benedito de Oliveira - DDS, MSc, PhD. Contribution: preparation & draft of manuscript, critical review & final approval. ORCID: 0000-0001-5967-1800
7. Olavo Barbosa de Oliveira Neto - DDS, MSc, PhD. Contribution: preparation & draft of manuscript, critical review & final approval. ORCID: 0000-0003-1280-659X

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Corresponding author  
Olavo Barbosa de Oliveira Neto  
E-mail: olavo.neto@icbs.ufal.br