

Biomethrics Study of the Upper and Lower Labial Artery in Human Cadavers

Estudio Biométrico de las Arterias Labiales Superiores e Inferiores en Cadáveres Humanos

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SUMMARY: The face is richly vascularized by various branches of the facial artery. Among them are the upper and lower lips branches irrigate the lips and cheeks. The purpose of this study was to analyze the biometric characteristics of labials arteries of human corpses. It dissected 18 human midfaces, preserved on the basis of formalin and the arterial system repleted with red latex. It noted the trail of the facial artery and the presence of the upper and lower labial arteries. Anatomical fixed points were established to measure the distribution pattern of facial artery in the facial region and the origin and route of the upper and lower labial arteries. Of the 18 analyzed samples, 100% labial arteries presented an independent origin of the artery facial with an average distance 36.61mm (SD 8.51) between them. The upper labial artery originated on the oral angle and lower labial artery basilar closest to the edge of the jaw. The values obtained reported a wide variation in the origin and behavior of the upper and lower labial artery

KEY WORDS: Upper and lower labial artery; Facial artery; Biometric study.

INTRODUCTION

The irrigation of the lips is contributed principally by the labial arteries proceeding from the facial artery, with participation of the infraorbital artery in the upper lip and mental artery in the inferior lip (Kleinheinz *et al.*, 2005).

Testut & Latarjet (1979) as well as Latarjet & Ruiz Liard (1983) described the birth of the labial arteries at the level of the oral commissure, whereas Figún & Garino (2001) added that these arteries form a common trunk at its origin.

Niranjan (1988) described a great quantity of variations in the distance, the manner of completion of the facial artery, and the form in which the labial arteries originate.

Koh *et al.* (2003) indicated that in 71% of a sample of 91 corpses the labial arteries originated from independent locations from the facial artery with an average distance of 30.9 millimeters of separation between them. According to this study, only 12.8% of the labial arteries are born from a joint trunk. Kawai *et al.* (2004) established that the lower lip artery have different origins from the facial artery. They described that in 12 cases, eight came from the facial artery near the basilar edge from the jaw, three came from the fa-

cial artery at the level of the oral commissure, and two directly from a joint trunk with the upper labial artery on the oral commissure. These are similar to the results reported by Midy *et al.* (1986).

Crouzet *et al.* (1998) stated that in 40 cases studied, it was determined that the origin of the upper lip artery was higher to the oral commissure in 35 cases, inferior to oral commissure in four cases, and at the same level in one case; only in one case labial arteries constituted a common trunk at its origin. Edizer *et al.* (2003) indicated that variations exist in the form as the labial arteries originate to the right and left sides in the same subject.

Loukas *et al.* (2006) examined 284 half-heads and observed the behavior and distribution of the facial and upper lip arteries; in 47.5%, facial artery was bifurcated in the upper lip and in the lateral nasal arteries; in 8.4%, facial artery ends as the upper lip artery; and in 3.8%, the angle of the artery appears directly from facial artery rather than as the completion of the lateral nasal artery.

The knowledge of the varieties in the form and distribution of the facial and labial arteries is relevant in

maxillofacial surgery. For Borroni *et al.* (2006), the facial artery takes part in the supplementary irrigation of the teeth thus establishing anastomotic circles with the dentogingival circulation proceeding from the alveolar arteries.

The purpose of this study was to analyze the biometric characteristics of the labial arteries of human corpses.

MATERIAL AND METHOD

Ten human corpses were used, which were obtained from the Laboratory of Normal Anatomy of Universidad Cardenal Herrera-San Pablo CEU in the city of Valencia, Spain. Nine were male and one was female, whose ages were between 38 and 76 years old (mean = 51 years) and with a normal body mass index.

All these corpses were submitted to the process of embalming through the carotids, injecting a mixture of formaldehyde, alcohol, distilled water, and urotropine, with death date average of 2 days. In addition to observing in detail, the path of the arterial system was injected with a solution of latex mark, Laitex MX-10, mixed with a red vermilion dye universal mark, Alp Paintings, by the same route.

The dissection was performed according to the conventional technique, carefully pulling the skin of the facial and neck region, to fully present their facial artery with collateral, which was then identified. The following anatomical reference points were marked (Fig.1.):

- MA (mandibular angle): The most prominent point in the angle formed between the basilar edge and the edge of the posterior ramus of the mandible.
- BM (basilar edge at the level of the mandibular curvature of the facial artery): The point at the level to the basilar edge, anterior to the insertion of masseter muscle, where the facial artery enters the genian region.
- OC (oral commissure): Union between the upper and lower lips in the oral angle.
- NW (nasal wing): The point where the lateral margin of nose wing with the upper lip converges.
- UM (upper portion of orbicular oral muscle): The point where the upper lip artery penetrates between the muscle fibers of upper orbicular oral muscle.
- LM (lower portion of orbicular oral muscle): The point where the lower lip artery penetrates between the muscle fibers of lower orbicular oral muscle.

-FA (facial Artery): The point in the facial artery at the oral commissure.

- ULA (upper lip artery): At this point, the artery originates from the facial artery.

- LLA (lower lip artery): At this point, the artery originates from the facial artery.

On the basis of the points made that describe how labial arteries originated and by using a digital caliper, the distance from the origin of the upper and lower lip arteries to wing nasal points, oral commissure, orbicular oral muscle, basilar edge, and angle of the mandible was measured.

The values obtained were analyzed by using Excel Office 2007 for Windows, thus obtaining a description of the statistical sample.

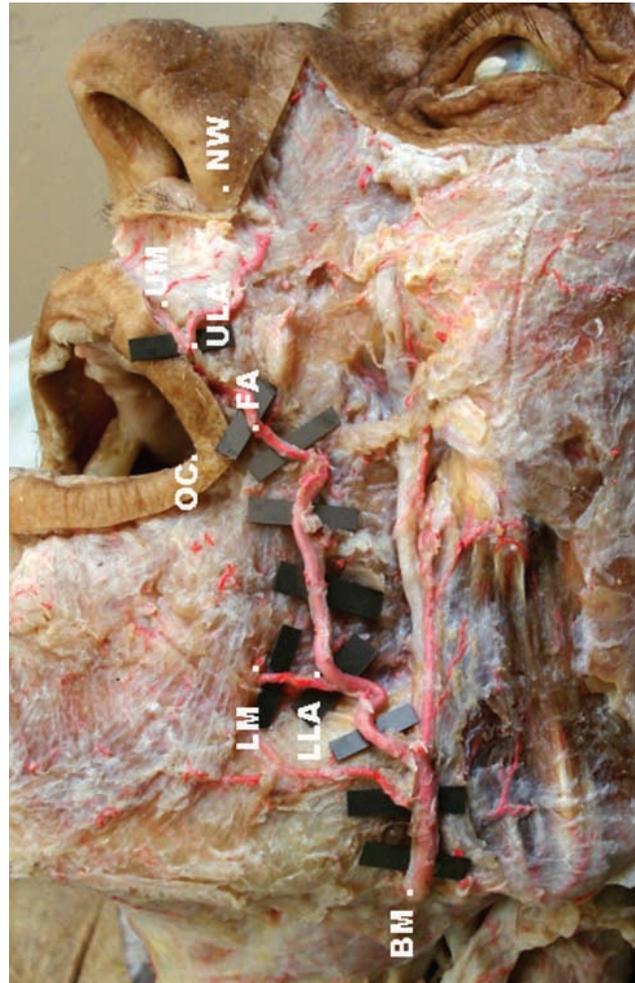


Fig. 1. Facial and lips arteries dissections, in the figure shown: MA (mandibular angle), BM (basilar edge at the level of the mandibular curvature of the facial artery), OC (oral commissure), NW (nasal wing), UM (upper portion of orbicular oral muscle), LM (lower portion of orbicular oral muscle), FA (facial Artery), ULA (upper lip artery), LLA (lower lip artery).

RESULTS

Of 18 samples, all presented a facial artery path from the basilar edge toward the oral commissure and was very tortuously covered by platysma muscle fascicles and muscles that make up the modeolus, near the oral commissure and zygomatic muscles in a superior segment.

In all the samples tested, upper and lower labial arteries originated independently from the trunk of the facial artery.

In all samples, the upper lip artery originated above the oral commissure.

The lower lip artery presented a greater variation at the point of origin and distances measured. This artery originated directly from the facial artery closer to the basilar edge than the commissure of the lips, with a route longer than the upper lip before entering the oral orbicular muscle. A summary of the values obtained from these measurements is given in Table I.

Table I: Mean distance and standar desviation of the upper (ULA) and lower (LLA) labial artery, respect to nasal wing, oral commissure, orbicular oral muscle and mandibular angle points.

Measurement Point	Mean (mm)	SD (mm)
OC - ULA	11,7	5,3
OC - LLA	30,5	3,8
ULA - LLA	36,1	8,1
NW - ULA	33,3	3,9
NW - LLA	67,0	7,02
MA - ULA	63,4	17,5
MA - LLA	45,2	7,8
ULA - UM	5,8	2,8
LLA - LM	11,3	5,3
BM - ULA	58,5	13,0
BM - LLA	27,2	10,3

DISCUSSION

Several authors described the origin of the upper and lower lip arteries directly from the facial artery, both at the level of the oral commissure (Testut & Latarjet; Rouvière & Delmas, 1999; Moore & Dalley, 2002; Latarjet & Ruiz Liard). These are similar to findings in the present study and contrary to what has been said by Figún & Garino who

described the formation of a common trunk at the origin of these vessels.

In all samples, the upper lip artery originated on the oral commissure with an average distance of 11.7 mm (SD 5.32), coinciding with 72.3% of cases observed by Edizer *et al.*

The proximity of the lower lip artery to its origin was presented at an average distance nearest to the basilar edge (mean = 26.11 mm, SD = 10.5) of the oral commissure (mean = 30.78 mm, SD = 15). This coincides with the description given by Kawai or by Crouzet *et al.* who stated that the artery arises frequently under the oral commissure.

The high variability found in the measurements shows that it is difficult to determine the position of these vessels in surgical reconstruction or when planning cosmetic procedures. Gardetto *et al.* (2002) authorizes the use of horizontal and vertical lines to locate the route of the facial artery. However, he concludes that it is difficult to determine the position of the vessels that irrigate the labial region. This difficulty, along with the importance of the location of the vascular in labial flap justifies the use of mines preoperatively.

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RESUMEN: En humanos la cara está ricamente vascularizada por diversas ramas de la arteria facial. Entre ellas se encuentran las ramas labiales superiores e inferiores destinadas a irrigar los labios y mejillas. El propósito de este estudio fue analizar las características biométricas de las arterias labiales de cadáveres humanos. Se disecaron 18 hemicabezas humanas, conservadas en formalina y con el sistema arterial repletado con látex rojo. Se observaron el trayecto de la arteria facial y la presencia de las arterias labiales superiores e inferiores. Se establecieron puntos anatómicos fijos para medir el patrón de distribución de la arteria facial en la región geniana y el origen y trayecto de las arterias labiales superiores e inferiores. De las 18 muestras analizadas, el 100% las arterias labiales presentaron un origen independiente de la arteria facial con una distancia promedio entre ellas de 36,61mm (DS 8,51). La arteria labial superior se originó sobre la comisura oral y la arteria labial inferior más cercana al borde basilar de la mandíbula. Los valores obtenidos informan de una gran variación en el origen y comportamiento de las arterias labiales superiores e inferiores.

PALABRAS CLAVE: Arteria labial superior e inferior; Arteria facial; Estudio biométrico.

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