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Anatomical study of the vascular territories of the maxilla: Role of the facial artery in allotransplantation



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KEYWORDS

Allotransplant;
Vascularization;
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Summary *Background:* Facial composite tissue allotransplantation has recently become a surgical option. The maxilla, which forms the upper jaw and plays an important role in facial allotransplantation, consists of the maxillary and facial arteries. The maxillary artery is located deep within the tissue and considered the main artery of the maxilla; however, the facial artery is easy to access. The objective of this study was to examine the territories of the maxillary and facial arteries within the maxilla.

Materials and methods: We excised and examined 22 maxillae. Of these, 18 were injected with latex and four with India ink.

Results: We observed that the ascending palatine artery, which was collateral with the facial artery, vascularized the maxilla through its dorsal part. The facial artery vascularized the maxilla through its ventral part with the philtral and columellar branches of the superior labial artery. Therefore, the facial artery formed, through the nasal and palatine mucosa, an arterial circle with a dorsal and ventral pole. Angiosomes formed by both the facial and maxillary arteries were also observed. The India ink injected into the facial and maxillary arteries delineated specific territories for each artery.

Discussion: This study allowed us to determine the anatomical structures that provide vascularization to the maxilla and describe their different forms. The whole of the maxilla was vascularized by the facial artery, despite the caution imposed by several studies on the removal of the facial artery alone. Indeed, the removal technique was found to be safer when it preserved the anastomoses between the facial and maxillary arteries. Therefore, previous clinical

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experience and our anatomical study definitively demonstrate that the facial artery vascularizes the maxilla.

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Introduction

Facial composite tissue allotransplantation has become a clinical reality^{1,2} and makes the study of vascularization of the face important. In particular, reconstruction of the middle part of the face, when there is a significant loss of substance, poses complex functional and esthetic problems. Composite tissue allotransplantation of the face is one promising solution.

The maxilla, which forms the upper jaw, is a major component of facial reconstruction surgery. The maxillary artery is considered the main artery of the maxilla and the removal of these two components is considered a reliable, successful graft.^{3,4} However, the artery is located deep within the tissue and is difficult to access. Instead, dissection and removal of the facial artery would be quicker and easier than the maxillary artery and could provide a valuable alternative for facial allotransplantations. The objective of this study was to describe the ways in which the maxilla is vascularized by the facial artery and to describe in detail these arterial territories.

Materials and methods

In total, 22 maxillae were excised and examined in this study. Of these, 18 were injected with latex using manual pressure on the common carotid artery. Next, six edentulous maxillae were injected with India ink: three in the maxillary artery and three in the facial artery. The injections contained 15 mL of ink and were administered in a progressive manner at constant pressure and with the aid of an electric syringe.

Once the tissues were prepared, Le Fort III-type osteotomy, sectioning of the zygomatic arch, and resectioning of the mandibular ramus were carried out. A dissection of the external carotid artery and its branches was also performed, as well as a dissection of the facial artery and its maxillary corollaries. Finally, the tissue territories soaked in India ink were observed.

Results

Our dissection revealed that the facial artery ascended collaterally with the ascending palatine artery. The ascending palatine artery, which stemmed 15 mm from the origin of the facial artery, extended to the external carotid artery in 13 out of 22 cases (Figure 1). The ascending palatine artery stemmed from the external carotid artery in four of the cases, branching off to the pharynx as far as the posterior orifice of the nasal cavity. It anastomosed with

the ascending palatine artery contralateral to the posterior face of the pharynx. In two of the cases, the ascending palatine artery stemmed from the junction between the facial artery and the external carotid artery. In two cases, the ascending palatine artery detached from the pharyngomeningeal artery and passed between the superior constrictor of the pharynx and the medial pterygoid muscle. Finally, in one case, the ascending palatine artery stemmed from the submandibular artery, which was itself a collateral branch of the external carotid artery.

The facial artery formed an arterial circle that passed through the nasal cavity, through the branches of the facial

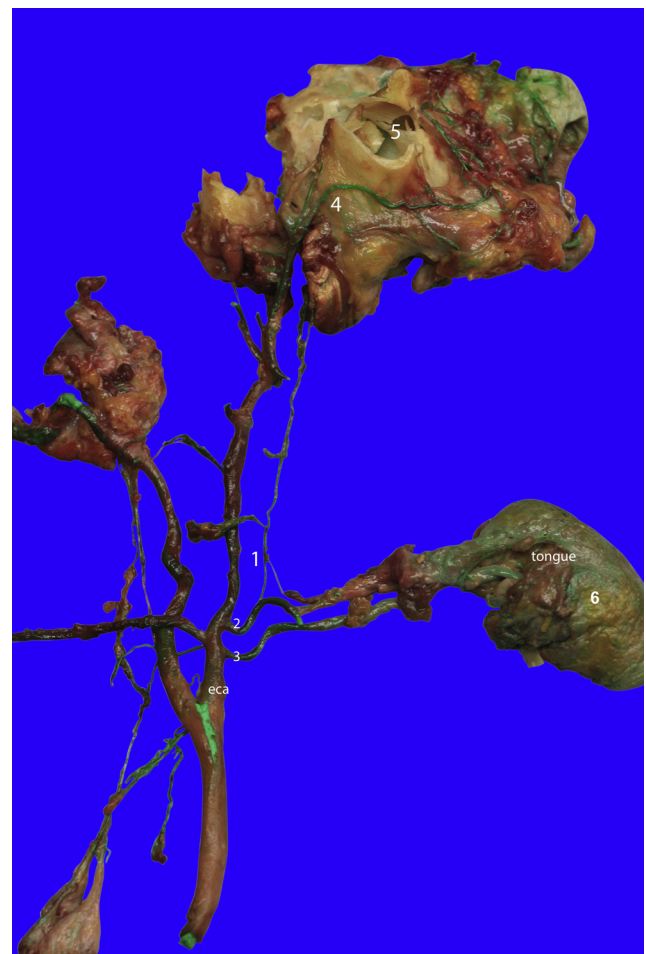


Figure 1 Arterial lines of the neck and right maxilla Eca: external carotid artery; 1: ascending palatine artery; 2: facial artery; 3: lingual artery; 4: right maxilla and posterior superior alveolar artery; 5: maxillary sinus and membrane; and 6: tongue.

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