ORIGINAL ARTICLE

MICROSURGICAL RECONSTRUCTION OF THE LIPS WITH A RADIAL FLAP: ABOUT TWO CASES

RECONSTRUCCIÓN MICROQUIRÚRGICA DE LOS LABIOS CON COLGAJO RADIAL: A PROPÓSITO DE DOS CASOS

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RESUMEN

Los labios son estructuras de gran relevancia estética y funcional. Además de constituir parte importante de los rasgos faciales relacionados con la autoimagen y la sensualidad. Su espectro dinámico les hace actuar como el primer esfínter del tracto digestivo y también como estructuras de articulación de diversos puntos fonatorios; de ahí la relevancia de su reconstrucción adecuada, tanto en lo funcional como en lo estético. Cuando se pierde un porcentaje importante del labio, las opciones de reconstrucción con colgajos locales resultan insuficientes, por lo que se requieren transferencias microquirúrgicas para lograr resultados aceptables. Presentamos dos casos de reconstrucción microquirúrgica posoncológica de labios, uno superior y uno inferior, ambos con colgajos radiales libres.

PALABRAS CLAVE

Labio, Colgajo, Microcirugía, Reconstrucción, Oncológico

ABSTRACT

Upper and lower lips are structures of great aesthetic and functional relevance. In addition, they are a main aspect of the facial features related to self-image and sensuality. Their dynamics makes them function as the first sphincter of the digestive

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tract and as articulation structures of various phonatory points; hence the relevance of their adequate functionally and aesthetically reconstruction. When a significant percentage of the lip tissue is lost, local flap reconstruction options could be insufficient, requiring microsurgical flap transfers to achieve acceptable results. We present two cases of post-oncological microsurgical reconstruction, one upper and one lower lip, both with free radial flaps.

KEYWORDS

Lip, Flap, Microsurgery, Reconstruction, Oncological

INTRODUCTION

The lips are pivotal aesthetic and functional structures. Besides their integral role in facial appearance, their dynamics enable them to function as the first sphincter of the digestive system and as articulators for various phonatory points. Significant loss of lip tissue often renders local flap reconstruction options inadequate, necessitating microsurgical flap transfers for acceptable outcomes. We present two cases of post-oncological microsurgical lip reconstruction: one upper and one lower lip, both reconstructed with free radial flaps.

THEORETICAL FRAMEWORK

The function of the lips is to enable eating, speaking, and expressing emotions. They are also endowed with rich sensitivity due to their abundant nerve endings and are culturally recognized as symbols of sensuality and sexuality (Hotta, 2016).

The upper lip is bounded superiorly by the nose insertion, including the nasal ala base, columella, and nasal vestibule mucosa, and laterally by the nasolabial fold (López, 2015). Its midline is marked by the philtrum, whose lower margin forms the V-shaped "Cupid's bow" (López, 2015). The upper and lower lips join laterally at the oral commissures, anchoring muscles responsible for elevation, depression, and retraction of the mouth corners (Carey et al., 2009; López, 2015). The lower boundary of the lower lip is the mentolabial sulcus, Figure 1A (Carey et al., 2009).

The lips are composed of skin, superficial fascia, orbicularis oris muscle, submucosa, and labial mucosa (García Linares, 2014). In addition to the orbicularis oris, a group of radial dilator muscles synergistically supports its primary sphincteric function (Vuyk and Leemans; López, 2015), Figure 1B. Blood supply is provided by the superior and inferior labial arteries originating from the facial artery. These arteries run deep to the orbicularis oris muscle and anastomose to form an arterial ring (Foutsizoglou, 2017), enabling the dissection of extensive flaps without compromising vitality (Salem, 2004).

Concomitant veins follow the arterial path and drain into the internal jugular vein. Lymphatic drainage heads to the submental and submandibular lymph nodes, an important consideration in oncological lip involvement (Salem,

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2004). Motor innervation is provided by branches of the VII cranial nerve, while sensory innervation corresponds to the V cranial nerve through the infraorbital nerve for the upper lip and the mental nerve for the lower lip (Hotta, 2016).

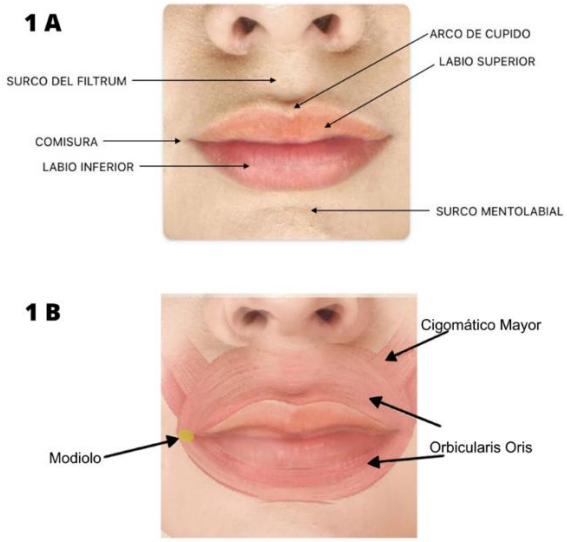

Figure 1: Anatomy of the Lips. 1A, External landmarks. 1B, Oral sphincter muscles.

Although lip injuries are common in facial trauma, most lip reconstructions, both upper and lower, are performed to repair defects resulting from malignancy excision (Luce, 2017). Approximately 90% of tumors occur in the lower lip, 7% in the upper lip, and 3% at the oral commissure. Squamous cell carcinoma is the most common histological tumor type in lip cancers, followed by basal cell carcinoma (Kerawala, 2016).

The treatment of these malignant tumors involves surgical excision with minimum margins of 4 mm for low-risk lesions and 6 mm for high-risk lesions (Connolly KL, 2017; Clements S, 2021).

METHODOLOGY

This report presents two cases involving 100% resection of the upper and lower lips, reconstructed with radial free flap microsurgery. Procedures were performed under general anesthesia, with flap dissections conducted using 6.0x magnification and vascular anastomoses performed under a surgical microscope by the same surgeon.

CASE 1

An 80-year-old male patient with a history of systemic arterial hypertension, type 2 diabetes mellitus, and dyslipidemia under medical treatment is referred by the Oncology Surgery service for immediate reconstruction planning of the lower lip following the resection of squamous cell carcinoma. He presents with an irregular exophytic and ulcerated tumor measuring 8 × 4 cm, occupying 100% of the lower lip (Fig. 2A).

Oncological resection is performed, resulting in a 10 × 8 cm defect involving the vermilion, orbicularis muscle, and vestibular mucosa (Fig. 2B). During the same surgical procedure, reconstruction is carried out using a radial forearm flap from the right upper limb, with anastomosis of the radial artery to the facial artery and two superficial veins of the flap to the external jugular vein (Fig. 2C), along with suspension using the palmaris longus tendon attached to the modiolus (Fig. 2D).

The donor site on the forearm was covered with skin grafts, which initially

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showed some superficial adhesions during tendon excursion. However, these did not limit movement and resolved spontaneously. The patient experienced a satisfactory immediate postoperative course and showed optimal evolution at six months of follow-up (Fig. 2E, 2F).

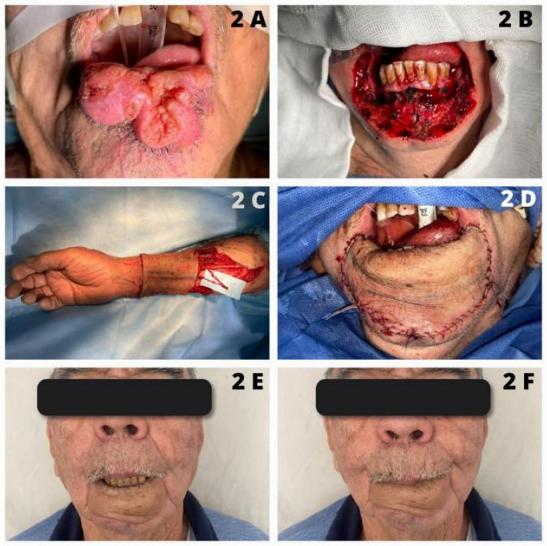

Figure 2: Case 1, Reconstruction of the Lower Lip with a Radial Free Flap. Captions in the text..

CASE 2

A 72-year-old female patient with a history of resection of nodular sclerodermiform basal cell carcinoma of the upper lip with primary closure presents with recurrence of the lesion (Figure 3A). She is scheduled for resection and temporary coverage with a graft while awaiting pathology results confirming clear margins (Figures 3B - 3C). Once confirmed, reconstruction of the upper lip with a radial free flap is planned. The resection included the proximal third of the columella, part of the nasal floor, the entire orbicularis muscle, and the vestibular mucosa (Figures 3D - 3E). The flap was designed with an extension for the base of the nasal floor, using the radial artery and the palmaris longus tendon as axes (Figures 4A - 4B), to allow suspension of the flap at both modiolus points, partially replacing the sphincter function of the resected orbicularis oris muscle and preventing tissue sagging (Figure 4C).

Vascular anastomoses were performed to the ipsilateral facial artery and vein (Figure 4D), achieving 100% flap survival without vascular complications. At six months postoperatively, the patient was satisfied with the flap's contour, healing, partial sphincter competence, and phonation (Figures 4E - 4F). There were no functional sequelae in the forearm donor site.

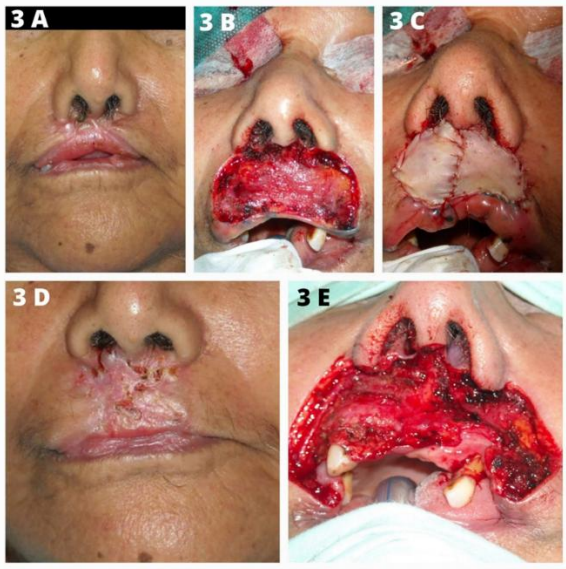

Figure 3: Case 2, Reconstruction of the Upper Lip with a Radial Free Flap. Captions in the text.

RESULTS AND DISCUSSION

The result of the microsurgical reconstruction of the lips was rated as satisfactory by our patients and their families, although it was not possible to restore the histological transitions or the

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differential volumes that give the lips their unique appearance. Sphincter competence was very close to normal, with occasional saliva leakage, and phonation was intelligible with no notable changes at the end of the clinical follow-up. The donor areas had a functional evolution without sequelae, beyond the discoloration caused by the skin grafts.

The main objectives of the surgical resection of malignant skin tumors are the complete ablation of the primary lesion locally, the removal of tissue involved in the tumor's periphery, the excision of lymph nodes or other structures invaded by metastasis, and finally, the reconstruction of the resulting defect with the best possible aesthetic and functional outcomes (Anvar BA, 2007). A controversial aspect in the reconstruction of these defects is the choice between immediate or delayed reconstruction.

The current trend is immediate reconstruction (Rogers-Vizena CR, 2015), always considering the clinical characteristics of the patient, tumor type and oncological prognosis, use of medications, and the location and dimensions of the defect (Rogers-Vizena CR, 2015). In our case, one patient was reconstructed during the same procedure as the resection, performed by an oncologic surgeon, while the other patient underwent reconstruction after serial resection and temporary coverage procedures by plastic surgery, until a histological report confirmed free margins of the tumor.

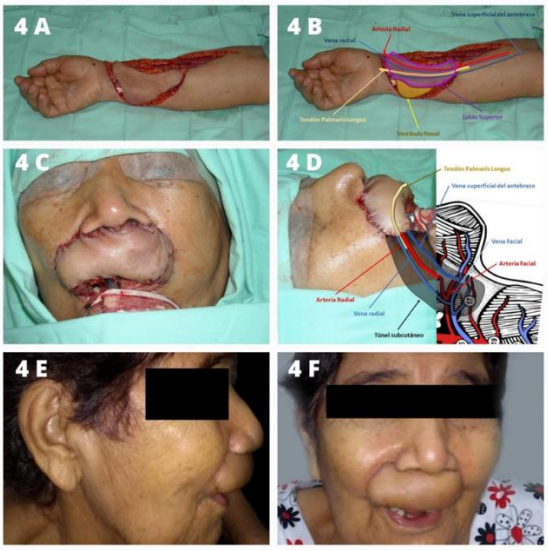

Figure 4: Case 2, Reconstruction of the Upper Lip with a Radial Free Flap. Captions in the text.

The primary goal of lip reconstruction is to restore function, without neglecting aesthetic appearance. Multiple procedures and techniques have been described for this purpose, ranging from simple methods like primary closure and grafts to progressively more complex techniques such as local flaps and even free flaps. The lips possess unique functional and aesthetic characteristics, and thus must be addressed individually. The upper lip primarily provides coverage for the dentition, while the lower lip is responsible for containing oral secretions within the mouth (Ishi, 2009). Similarly, the upper lip has unique aesthetic features not found in the lower lip, as previously described (Sanniec, 2018).

The aesthetic subunits of the upper lip were described by Burget and Menick in 1986 (Burget-Menick, 1986). They refer to two units, one lateral and one medial; if these are not respected, the

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reconstruction results in a patchy appearance that covers the defect without considering lines and contours (Fig. 5) (Luce, 2017) (Burget, 1986). Furthermore, an ideal aesthetic result requires adherence to the subunit principle, according to which if more than 50% of a subunit is affected, it should be completely reconstructed (Ishii, 2009). Another factor to consider in reconstruction is the depth of the lesion. For full-thickness defects, particularly in the lower lip, every effort should be made to restore the continuity of the muscular sphincter (Ishii, 2009).

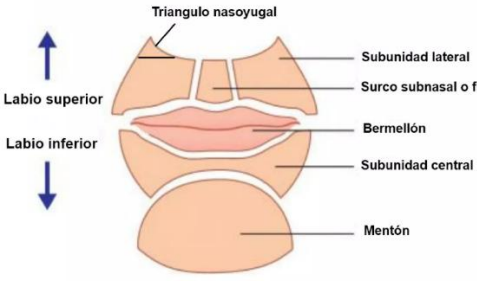

Figure 5: Aesthetic units and subunits of the face.

Full-thickness defects are typically classified according to their horizontal extent as small (up to 30%), medium (30-60%), and large (>60%) (Ishii, 2009). Generally, defects affecting less than one-third of the lip can be closed primarily. For medium-sized defects, local flaps such as those described by Estlander, Abbe, or Karapandzic can be used (Sun, 2013). However, local and regional flaps do not provide an adequate amount of tissue for covering large defects, despite having the advantage of texture and color similar to the tissue being replaced. Attempts to bring large blocks of tissue toward the midline often result in the development of microstomia (small mouth).

If the surgeon decides to reconstruct larger lip defects with local flaps, they must consider the disadvantages of mobilizing large amounts of local tissue, such as facial disfigurement and microstomia (Wang, 2018). In these cases, the use of free flaps is indicated, as they provide a greater amount of tissue with minimal adverse effects on the periphery of the lesion. Many authors accept the radial free flap as the gold standard for total lip defects (Mandrekas, 1994), either alone or combined with the palmaris longus tendon for flap suspension, as it provides both internal and external coverage and creates a sling that, in some way, attempts to restore the functional continuity of the orbicularis muscle to preserve the containment mechanism (Jeng, 2004). Kwon et al. (2018) published a survey among microsurgeons from five continents regarding their technique of choice for the hypothetical reconstruction of a complex defect involving two-thirds of the upper lip. Of 402 microsurgeons, 72.3% chose a pedicled flap. Among the remaining 27.7% of surgeons who opted for microsurgical reconstruction, 73.6% selected the radial flap as their first choice, while among the local flap options, the most voted was the Abbe flap, with 36.2%.

When designing a flap, it is necessary to calculate the extent of tissue required to achieve both internal and external coverage, and it may even be slightly overestimated. The skin left inside the oral cavity will undergo metaplasia, so there is no need to use mucosal grafts.

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After the surgical procedure, it is important to assess both the functional and aesthetic outcomes, documenting the patient's condition through photographs, both at rest and in motion. Word articulation should be evaluated, as well as oral containment during eating and spontaneous saliva drainage (Fallaha A, 2017). In our patients, the resection exceeded the boundaries of the aesthetic units and did not respect the transitions between the vermilion, white roll, and skin; therefore, the reconstruction primarily met a functional goal. In these cases, patients may opt for subsequent aesthetic refinements, such as tattoos to simulate a new vermilion or lipoinjection to restore volumes similar to those of a normal lip, among other alternatives.

Oncological follow-up should be performed every month during the first year after surgery, every two months during the next two years, every three months starting from the third year, every six months after the fourth year, and annually after the fifth year. It is important to emphasize the cessation of toxic habits, especially the consumption of alcohol and tobacco (Raza Pasha, 2001). Annual chest radiographs are recommended, and a CT scan should be considered for monitoring the primary tumor based on the risk of recurrence (Connolly KL, 2017).

CONCLUSIONS

The importance of the lips makes their reconstruction require, in addition to surgical expertise, a precise plan for the defect and the most suitable alternatives for a satisfactory and comprehensive reconstruction. Plastic surgery is a specialty rich in alternatives, involving the surgeon's sound judgment and creativity; still, despite the lack of an ideal technique, there is consensus that the radial flap is one of the main options to consider when the defect involves more than two-thirds of the lip, in order to avoid local complications such as alteration of facial dimensions and microstomia, which are common in reconstructions of large defects using local flaps.

The convenience of immediate post-resection reconstruction versus temporary closure of the defect and reconstruction in another surgical session, once definitive results of negative margins are available, is still under discussion. Although the second option seems safer in oncological terms, the socioeconomic characteristics of the patient and the environment where they will be treated can influence the choice of one or the other, as well as the size of the defect, the patient's medical conditions, and their individual preferences regarding the surgical and rehabilitation process

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