

Mucomuscular Elastic Flap for Lower Lip Vermilion Reconstruction: Experience in a Series of Cases in Pediatric Patients

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Abstract: The mucocutaneous line and the lip vermilion are important structures from an esthetic standpoint but also in relation to the functionality of the mouth. In the literature, several types of flaps have been described for reparation of labial defects in adults. In this study, the authors analyze results of surgical reconstruction of the lower lip in the pediatric population using unilateral or bilateral mucomuscular elastic flaps for labial reconstruction. A retrospective analysis of 10 patients operated between 2003 and 2018 at our institution was made. The following demographic and clinical data were collected: age, sex, diagnosis, type of flap, follow-up, results, and complications. The Strasser scale was chosen for assessment of postoperative photographic results. Average age was 8.1 years (range 3–18). The most frequent etiology was arteriovenous malformation seen in 60% of cases. All cases corresponded to a defect of the lower lip. The average percentage of lip compromised was 44% and the largest length of compromise observed was 60% of the lip. Follow-up was on average 2.4 years. Esthetic results according to the Strasser method were as follows: 1 patient presented an excellent esthetic result, 5 good, 4 regular, and 0 poor.

Considering the esthetic outcomes and low incidence of complications of the mucomuscular elastic flap, it is an acceptable and recommended technique of choice for lip vermilion reconstruction.

Key Words: Defect closure, lip reconstruction, lower lip flaps, myomucosal advancement flap

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The mucocutaneous line and the lip vermilion are important structures from an esthetic point of view and also in relation to the functionality of the mouth. The vermilion is a unique anatomical

structure that presents texture, color, movement, and special functions. This region plays a fundamental role in interpersonal relationships, phonetics, and sphincter function.² This is why lesions that compromise a wide extension of this structure pose a reparative challenge and should be handled preferentially by plastic surgeons, to reduce the esthetic and functional sequelae that may arise in future.

Several types of flaps have been described for reparation of labial defects in adults.^{2,5,6,9–10} Goldstein³ was the first to describe a specific flap for the reconstruction of lip vermilion. He proposed an ipsilateral vermilion flap adjacent to the defect, based on the elastic properties of this arterialized myocutaneous tissue. This technique was subsequently modified by Sawada^{1–4} consists of a bilateral advancement flap of the vermilion for the surgical closure of the central defect in the upper and lower lip.¹ The inherent elasticity of the lip tissue offers a unique advantage that allows the released flap to be mobilized up to twice its original length.³

The objective of this work is to evaluate our experience with unilateral or bilateral mucomuscular elastic flaps for the reconstruction of lower lip vermilion in children.

METHODS

A retrospective analysis was carried out of a series of ten pediatric patients with lower lip vermilion reconstruction using arterialized mucomuscular elastic flaps to repair the defect, treated in the plastic surgery unit of Clínica Alemana de Santiago between 2003 and 2018. The following variables were reviewed: age, sex, diagnosis, type of flap, follow-up, results, and complications.

An objective evaluation of the esthetic results of the lip reconstruction was carried out by 4 plastic surgeons external to the medical team, through the assessment of postoperative photographs using the Strasser scale,¹¹ which includes distortion, incorrect position, asymmetry, labial commissure deformation, and remaining scar.

Inclusion criteria were pediatric patients under the age of 18 years. The surgical indication was loss of lower lip tissue as a consequence of trauma or secondary to surgical removal of a tumor. In all cases, the residual defect did not exceed 60% of the total length of the vermilion. In cases of vascular etiology, specifically arteriovenous malformations (AVMs), all subjects received preoperative treatment in the interventional radiology unit with sclerotherapy. Patients diagnosed with persistent infantile hemangiomas (IH) were previously treated with propranolol and managed by the dermatology unit.

The exclusion criteria for this surgical technique was a previous orbicular artery lesion.

The surgical technique in all cases was performed by a single surgeon (first author), using general anesthesia with nasotracheal intubation to avoid distortion of the affected area. The reconstruction was designed depending on the size and location of the vermilion tissue loss. In the lateralized defects, unilateral flaps were used (Fig. 1 A-B). In central or large defects, opposite bilateral flaps were lifted and secured in the middle area (Fig. 1C). All flaps

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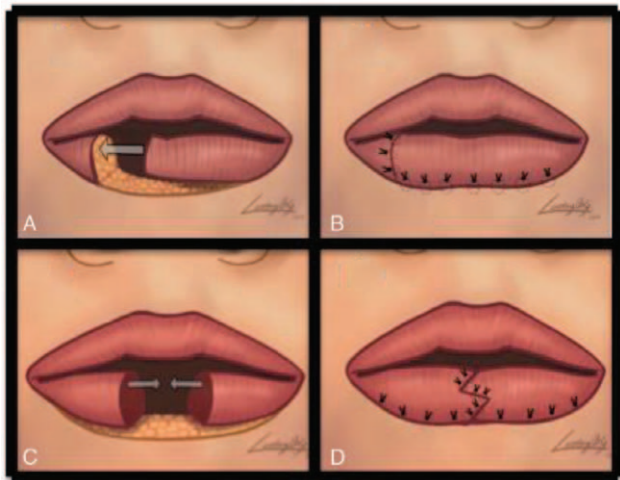


FIGURE 1. (A) Mucomuscular vermilion flap for lateralized lip defects, (B) Postoperative figure of unilateral flap, (C) Opposite flaps for central to large lip defects, (D) Postoperative figure of bilateral flap with Z-plasty in suture line.

were lifted by an external incision in the mucocutaneous line and transfixing incision in the residual vermilion, paying particular attention to preserving the orbicular artery in the flap. The dimensions of the advancement flap in relation to the length depended on how large an area needed to be covered. In cases where bilateral flaps were performed the complementation of a mucosal Z-plasty in the terminal anastomosis was preferred to avoid a notch in the subsequent healing period (Fig. 1D). The closure was performed using Vicryl 4/0 for the muscle, Vicryl 5/0 for sulcus mucosa, and nylon 6/0 for vermilion mucosa.

Following surgery, physiotherapy, occupational therapy, or scar rehabilitation was indicated in all cases, with the aim of recovering function and elasticity of the tissue and reducing the risk of esthetic and functional sequelae in commissures.

RESULTS

A total of 10 patients underwent surgical intervention for lower lip reparation. Seven were females (70%) and three were males (30%). Average age was 8.1 years (range 3–18). The most frequent etiology was AVM as seen in 60% of cases followed by persistent infantile IH (20%) and finally traumatic injuries (20%). All cases corresponded to a defect of the lower lip. The average percentage of lip compromised was 44% and the largest length compromised corresponded to 60% of the lip. In 6 patients, a unilateral flap was performed whilst 4 patients required a bilateral opposite flap reconstruction due to larger vermilion defects. The average follow-up was 2.4 years, with 5 years being the maximum time of follow-up. Most subjects had a good esthetic outcome according to the Strasser scale (1 patient presented with an excellent esthetic result, 5 with good results, 4 with regular results, and zero patients with poor results) Surgical complications were reported in 2



FIGURE 2. Traumatic defect due to dog bite. (A) Before surgery, (B) immediately postoperative, (C) after surgery frontal view and (D) oblique view. Final Strasser score: 0 (excellent).



FIGURE 3. Patient with persistent infantile hemangioma (IH) of the lower lip. (A) Before surgery, (B) immediately postoperative, (C) after surgery. Final Strasser score: 1 (good).

patients from the series of cases, both corresponding to distortion of the commissure (microstomy), one a retraction towards the medial line (Fig. 5) and the other case a caudal retraction of the lip corner. Both of these complications were not severe and required a scar rehabilitation treatment with occupational therapy.

A summary of the characteristics of the study group is described in Supplemental Table 1, <http://links.lww.com/SCS/C146>.

An example of traumatic defect of the lower lip is shown in Figure 2 (corresponding to case 2). The reparation of a lip defect by IH is shown in Figure 3 (corresponding to case 4). Two examples of AVM of the lower lip are shown in Figures 4 and 5 (corresponding to cases 1 and 3, respectively).

DISCUSSION

The lips are structures with extreme esthetic relevance. Due to its constant exposure, the possibility of hiding any defect in this area is very limited. Considering the above, any scar, deformation, or lesion on the lips can cause a serious psychological and social impact on a person, preventing adequate personal development in children. Therefore, reconstruction of lip defects with good esthetic results is important for the child’s self-esteem.

Children from the age of 5 years acquire the concept of self-image and self-esteem, which coincides with the start of formal school years.¹² The degree of facial deformation confers a variable psychological impact according to each individual. The goal of surgery in these cases is to achieve as close to normal a cosmetic appearance.

Several techniques have been developed over time for labial defect reconstruction, in which the objective is functional and esthetic conservation; however, they often have poor results and present with limitations in oral opening.^{3–5} Although multistage procedures, such as the Abbé-Estlander Flap, have reported good results,⁶ patients often prefer 1-time procedures because it reduces the feeling of anxiety regarding the final esthetic result.

In children, reconstructive plastic surgery in such cases is a major challenge as these patients are constantly growing and anatomical structures vary according to the age of the child. Most techniques described in the literature refer to global defect of the lip, both cutaneous and vermilion components, and mostly correspond to experiences in adult patients. This piece of work aims to contribute to the limited body of literature concerning lip repair in children.

Our series includes exclusively pediatric patients, with different etiology to adults where the most frequently reported vermilion



FIGURE 4. Patient with arteriovenous malformation (AVM) of the lower lip. (A) Before surgery frontal view and (B) oblique view. (C) After surgery frontal view and (D) oblique view. Final Strasser score: 3 (good).

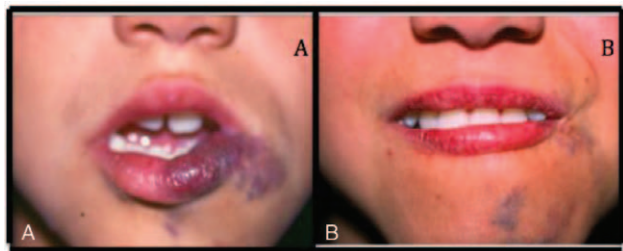


FIGURE 5. Patient with predominantly venous AVM. (A) Before surgery, (B) After surgery. Final Strasser score: 3 (good).

reconstruction is due to carcinoma.^{1,4,7,8} In contrast, Goldstein presents a case report of a 15-year-old girl with IH and in this series, benign tumors and traumatic lesions represent the most frequent etiologies of lower lip vermilion defect.

In our experience, traumatic cases (20%) require immediate repair, whereas patients with vascular abnormalities which constituted the most frequent etiology (80%) first required medical treatment before surgery. The cases with IH were treated with beta blockers, currently considered the first line of treatment.^{13–15} The cases with AVM received sclerotherapy treatment with Polidocanol.

The first description in the literature of an elastic flap was made by Goldstein in 1984,³ where he described a single myocutaneous vermilion flap for a lateralized lower lip lesion. Later in 1988, Swada described a bilateral tissue expanding flap for the reconstruction of the mid-vermilion border. In our surgical experience, the single mucomuscular elastic flap is useful for lateralized injuries, whereas in cases with central defects we prefer the use of 2 opposite flaps that are sutured in the central area of the lip. A technical detail performed in the described cases is the addition of a mucosal Z-plasty at the terminal-terminus junction of the 2 flaps, to avoid the appearance of a notch in the subsequent healing and scarring period (Fig. 1)

The size of the defect was considered as a percentage of the total inferior lip length affected. The literature suggests that repair can be performed for up to 50% of labial compromise as according to Goldstein,³ or up to 66% as reported by Swada and even as much as 80% compromise as described in a case report by Yadranko.⁸ In our experience with larger lip defects of up to 60% of total length, an opposite bilateral tension-free flap was performed with excellent esthetic results (Fig. 2).

In our opinion, it is not appropriate to add scars on the skin area of the lips in cases where only the vermilion part of the lip has been affected. This is one of the key advantages of the mucomuscular elastic flap reviewed in this work. This is in contrast to what Yadranko described in his report,⁹ where V incisions are added to the technique to achieve compensation of the repair in the cutaneous side of the lip.

The esthetic and functional scar rehabilitation of the reconstructed vermilion is essential to avoid further complications. It should be noted that there is no mention of scar rehabilitation in the

literature. Perhaps 1 explanation for this is that the vast majority of published works involve adults, in whom growing tissues is not a consideration. However, in children who are continually growing one is more likely to find scars that present with retractions and functional defects.

In our experience, after a follow-up of 2.4 years on average, the mucomuscular elastic flap for reconstruction of the labial vermilion constitutes a safe and reproducible method to be used in children. The majority of results were favorable according to the Strasser scale (10% excellent, 50% good, 40% regular, and no bad results). There was a non-significant incidence of complications in 2 patients relating to mild microstomy secondary to scar tissue, which was managed with rehabilitation treatment. There was no loss of tissue or necrosis of the flap observed in any patient contributing to a good outcome for this reconstruction technique.

CONCLUSIONS

We propose that this technique is a reproducible and recommended method for the reconstruction of lip defects with loss of vermilion tissue in children, it has good esthetic and functional results with low rates of complications.

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