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Surgical Lip Cancer Reconstruction in the COVID-19 Era: Are Free Flaps or Loco-Regional Flaps Better?

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Abstract: Lip carcinoma is one of the most frequent conditions affecting the general population. It is among the ten most common neoplasms, but despite advances in research and therapy, its prognosis has not improved in a significant way in the past few years, making it a challenge in the medical research field and in surgical treatment. This study was conducted with the aim of evaluating the available reconstructive surgical options for the treatment of lip carcinomas in order to define which could be the most appropriate technique to achieve satisfying aesthetic and functional outcomes considering hospital resources in the COVID-19 era. Seventeen patients were included in this retrospective study, which took place between January 2019 and April 2021. There were two groups: seven patients who underwent a radial forearm free flap and ten who underwent locoregional flaps. The statistical analysis was performed to evaluate four different endpoints. Surgical length, ICU stay, and hospitalization time were minor for locoregional flaps. There was no statistically significant difference between the two groups when considering post-operative complications. Locoregional flaps have a more aesthetically pleasing result, but from a functional point of view, the results can be superimposable. Both techniques are associated with adequate speech, mouth opening, sealing, and symmetry. Given the impact of the COVID-19 pandemic on the healthcare system, locoregional flaps have been proven to be a good surgical option in the reconstruction of lip defects both in terms of aesthetics and functional outcome.

Keywords: head and neck; reconstruction; local flap; lip cancer; health facilities

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1. Introduction

Lip cancer accounts for 20% of tumors in the oral cavity, and it is frequently diagnosed in males. In most of the cases, this tumor arises in sun-exposed body parts, mainly in the lower lip (89%), the upper lip (7%), and only 4% affecting the commissure [1]. The most common form is the exophytic one. Sometimes it may be presented as a keratinized, white-brown thickening with an irregular surface. The infiltrative form is visible more rarely [2]. The tumor may therefore appear as a flat, white lesion, or it can be slightly elevated. It may also present as a non-healing ulcer, and, due to the perineural invasion of the mental nerve, the patient may describe tingling, pain, or numbness of the lip or skin around the mouth.

Surgical options for lip reconstruction [3], depending on the size and location of the tumor and on the type of planned reconstruction, consist of performing locoregional (pedunculated) flaps or free flaps.

Since the beginning of 2020, the COVID-19 pandemic has spread throughout our nation, having a significant impact on our National Health Service [4,5]. In order to handle the situation, it was necessary to increase the number of intensive care unit (ICU) seats for COVID-19 patients. The elective surgical activities had to be delayed since the majority

of the ICU beds were used to treat COVID patients and because there was a high risk of nosocomial transmission of the infection [6,7]. Despite the emergency, our cancer patients had to start receiving therapy right away. Reevaluating treatments for patients with head and neck cancer is important in order to have a flexible and emergency plan in case a COVID-19 surge of cases strikes the health-care system.

Due to these considerations, it was necessary to reevaluate conventional head and neck oncology treatment, in particular in our study for lip cancer, taking into account the unique hazards of surgery during the COVID-19 pandemic [8]. When planning surgery for cancer patients, it is important to consider the criticality of the sanitary system and the availability of resources [9,10].

When surgery is the unique option, careful preoperative preparation is recommended with the implementation of COVID-19-specific perioperative guidelines, to provide the highest level of safety throughout both the surgical procedure and oncological care [11,12].

As a result, micro-vascular free tissue transfer is frequently our first choice for head and neck reconstruction. Since the COVID-19 epidemic began with a very difficult crisis, we must change our method of practice by descending the reconstructive ladder [13,14].

This purpose of this study was to compare the available reconstructive surgical options for the treatment of lip carcinomas in order to determine which could be the most appropriate, cost-effective, and time sparing technique to achieve satisfying aesthetic and functional outcomes while keeping in mind resource constraints in hospitals imposed by the COVID-19 era.

2. Materials and Methods

Seventeen patients were included in this retrospective study, and was carried out in the Maxillofacial Unit of the Università degli Studi della Campania "Luigi Vanvitelli" between January 2019 and April 2021.

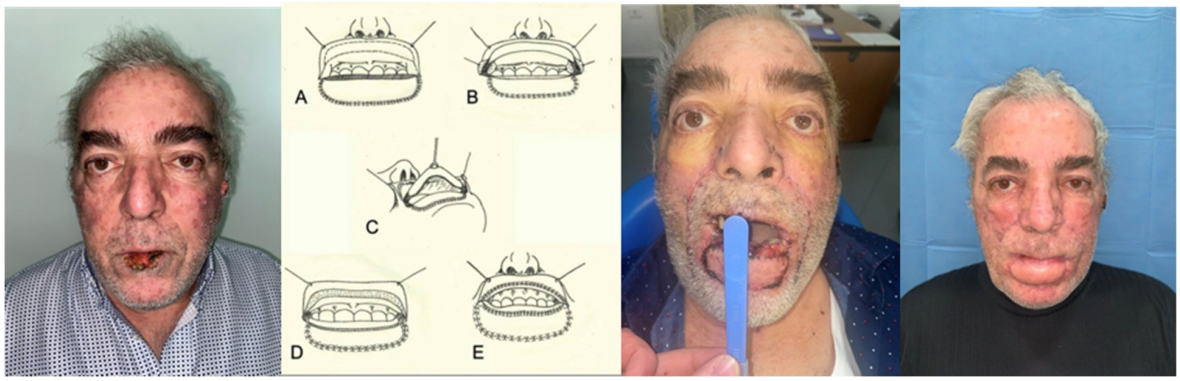
The patients were divided into two groups based on the type of surgery they underwent. Specifically, seven patients were treated with radial Free Flaps (Figure 1) while for the remaining ten were subject to reconstructions using locoregional Flaps, which included two modified Camille Bernard flaps, three Karapandzic flaps, two Bernard/Fusama flaps (Figure 2), one Gilles flap, two Bernard/Gupta flaps (Figure 3). The patients' medical records were analyzed in order to acquire several pieces of data: patient characteristics (age and gender), presence of comorbidities, diagnosis and staging, location of the primary tumor, surgical approach chosen, surgical length, hospitalization time with days in ICU, and post-operative complications.

(**a**) (**b**) (**c**)

Figure 1. (**a**) Carcinoma of lower lip mucosa involving the skin (stage IV), (**b**) reconstruction of the surgical defect with radial free flap, (**c**) photograph of the patient 4 weeks after surgery.

(**a**) (**b**) (**c**)

Figure 2. (**a**) Carcinoma of lower lip mucosa involving the skin (stage IV), (**b**) closure of the surgical defect with a double Bernard/Fusama flap, (**c**) photograph of the patient 4 weeks after surgery.



(**a**) (**b**) (**c**) (**d**)

Figure 3. (**a**) Carcinoma of lower red lip mucosa involving the skin (stage IV), (**b**) Surgical planning with the Bernard/Gupta flap, (**c**) photograph of the patient 2 days after surgery, (**d**) photograph of the patient 4 weeks after surgery.

All patients who underwent a lip reconstruction in our ward were included in this study, regardless of age, gender, ethnicity, or tumor type. As exclusion criteria, we decided not to include patients with more than two comorbidities and metastatic disease who underwent palliative surgery.

As is known, free flaps are used when extensive reconstructions are required. This technique is, of course, more invasive and is generally reserved for more advanced tumors and in younger individuals who do not have significant comorbidities.

Surgeons usually decide to reconstruct defects with locoregional flaps when these are not extensive, i.e., in the case of smaller tumors, when dealing with elderly patients who anamnestically report having several comorbidities.

The statistical analysis was performed through QuickCalcs, GraphPad software®, and MEDCALC® software. A comparison between the two groups was made using a Student's *t*-test and a Chi-squared test. A p-value < 0.01 was considered significant.

This is a retrospective study approved by the ethical committee (N. prot. 0013333, 29 April 2021). Informed consent was obtained from all patients whose pictures were used for publication purposes.

3. Results

Seventeen patients who underwent surgical reconstruction of a defect following lip cancer were included in the study (Table 1). There were two groups: seven patients who underwent a radial forearm free flap procedure while the remaining ten underwent different locoregional flap procedures, among which two were modified Camille Bernard flaps, three Karapandzic flaps, one Abbé/Staircase flap, one Gillies flap, one Bernard Gupta flap, and two Bernard/Fusama flaps.

Table 1. Patients' epidemiology and reconstructive strategies. HTN = hypertension; COPD = chronic obstructive pulmonary disease; T2D = type 2 diabetes; AF = atrial fibrillation; CHF = congestive heart failure; CAD = coronary artery disease; SCC = squamous cell carcinoma.

Case n.	Age	Gender	Comorbidities	Diagnosis	Site	TNM	Treatment Choice
1	50	M	HTN	SCC	Lower lip involving right commisure	pT4aN0M0	Radial Free Flap
2	54	M	None	SCC	Lower lip involving left commisure	pT3N1M0	Radial Free Flap
3	48	M	None	SCC	Middle-lower lip	pT4aN2M0	Radial Free Flap
4	56	F	HTN	SCC	Lower lip involving right commisure	pT3N0M0	Radial Free Flap
5	45	M	None	SCC	Lower lip involving right commisure	pT4aN1M0	Radial Free Flap
6	62	F	COPD	SCC	Lower lip involving right commisure	pT3N2M0	Radial Free Flap
7	52	F	None	SCC	Lower lip involving left commisure	pT4aN1M0	Radial Free Flap
8	70	M	COPD, HTN	SCC	Lower lip involving both commisures	pT4aN1M0	Modified Camille/Bernard flap
9	76	M	T2D, HTN	SCC	Lower lip involving right commisure	pT3N1M0	Bernard/Fusama flap
10	69	M	CAD	SCC	Lower lip involving left commisure	pT2N0M0	Karapandzic flap
11	54	F	AF	SCC	Lower lip involving right commisure	pT2N0M0	Karapandzic flap
12	65	F	None	SCC	Lower lip involving left commisure	pT4aN1M0	Bernard/Fusama flap
13	63	M	None	Verrucous Carcinoma	Philtrum of upper lip	pT2N0M0	Gillies flap
14	55	M	HTN	Verrucous Carcinoma	Right commisure	pT2N0M0	Abbè/Staircase flap
15	63	M	T2D, CHF	SCC	Lower lip	pT4aN1M0	Bernard/Gupta flap
16	58	F	CAD	SCC	Lower lip involving left commisure	pT3N1M0	Karapandzic flap
17	50	M	None	SCC	Lower lip involving left commisure	pT3N1M0	Modified Camille/Bernard flap

The RFFF group included four males and three females with a mean age of 52.4 (ranging from 45 to 62). Among these, only three patients presented with mild comorbidities such as hypertension (two patients) and COPD (1 patient). All patients were affected by SCC, located at the lower lip (six patients, 85.7%, three involving the right commissure while three involving the left one). The remaining patients had a SCC located in the middle-lower lip (1 patient, 14.3%).

The locoregional flap group included seven males and three females with a mean age of 62.3 (range 50 to 76). Comorbidities were reported by several patients and included hypertension (three patients), type 2 diabetes (two patients), COPD (two patients), atrial fibrillation (one patient), CAD (two patients), and CHF (one patient). Eight patients (80%) were diagnosed with SCC. The remaining two patients (20%) were affected by verrucous carcinoma involving the philtrum of the upper lip (one patient) or the right commissure (one patient).

3.1. Reconstructive Strategies

The type of surgery to be performed was chosen according to the size of the primary tumor and the patient's general condition (Table 1). The tumor mean size of the RFFF group was 49.4 mm ± 4.5 mm, and that of the local flap group was 42.2 ± 7.6 mm. Statistically evaluating the size of tumor lesions, there are statistically significant differences between the two groups (p value 0.021) considering the reconstructive choice to be performed. The need for loco-regional flaps, even for extensive lesions, was prompted by the need to reduce hospital stay time and the duration of surgical procedures. In addition, for patients with extensive lesions and comorbidities at higher surgical risk (type 2 diabetes, atrial fibrillation, and heart failure), given the reduced availability of ICU beds, the use of surgical alternatives with locoregional flaps, as opposed to the gold standard (free tissue transfer), was considered. This change in approach was thus induced by the new critical issues that emerged during the COVID-19 pandemic. In the pre-pandemic period, 90 percent of surgical stage IV lesions were treated with the use of free flaps, in contrast to the pandemic period, where the percentage dropped below 65 percent. In addition, it is important to point out that in 80% of the cases involving free flaps, their use was induced by the morpho-anatomical characteristics of the patients, which made it impossible to reconstructively approach large lesions with loco-regional flaps.

3.2. Surgical Length

As mentioned, the surgical length required to perform a RFFF is longer compared to locoregional flaps (Table 2). Specifically, the mean time for an RFFF in our group was 9 h 18 min + 2 h 12 min (range 7 h to 12 h). On the other hand, locoregional flaps need less time in the OR to be performed, averaging 3 h 58 m + 2 h 20 min (ranging from 1 h 30 min to 8 h). It is therefore possible to understand that the difference in surgical length between the two procedures is statistically significant (p-value < 0.0001).

Table 2. Surgical length, hospitalization time (days), intensive care unit stay (days).

	Locoregional Flap	**Free Flap**
1. Surgical Lenght		
Mean	3 h 58 min	9 h 18 mim
SD	2 h 20 min	2 h 12 min
p-value	0.0001	
2. Hospitalization time		
Mean	2.9 days	7.14 days
SD	0.8 days	1.3 days
p-value	0.0001	
3. ICU stay		
Mean	0.10 days	1.00 days
SD	0.32 days	0.82 days
p-value	0.006	

3.3. Hospitalization Time

Considering that radial free flaps require more time in the OR and the harvesting of the flap is not an easy procedure, it is easy to see why, when compared to locoregional flaps, patients need to be hospitalized for longer periods of time to be monitored for possible complications (Table 2). In particular, the mean hospitalization time for patients that underwent RFFF was 7.14 d + 1.3, whereas patients in the locoregional flap group were discharged in 2.9 d + 0.8. Furthermore, the data in this case revealed a statistically significant difference between the two groups (p-value < 0.0001).

3.4. ICU Stay

Only one patient (10%) who was reconstructed with a locoregional flapsrequired one day of ICU monitoring (mean 0.10 d + 0.33) while five patients (71%) who underwent RFFF needed one or more days in the ICU (mean 1 d + 0.88) (Tables 2 and 3). Cases 1, 5, and 6 spent 24 h in the ICU while cases 2 and 7 required more stringent control and spent 48 h in the intensive care unit. As predicted, the difference between the two groups is statistically significant (p-value < 0.006).

Table 3. Resume of post-operative progress (surgical length, ICU stay, NG tube, and tracheostomy).

Case n.	Surgical Length (h)	Hospitalisation Time (Days)	ICU (Days)	NG Tube	Tracheostomy
1	7 h	1 w	1 d	Yes	No
2	8 h	6 d	None	Yes	No
3	12 h	1 w 1 d	2 d	Yes	Yes
4	7 h 30 min	5 d	None	No	No
5	9 h	1 w	1 d	Yes	Yes
6	8 h	1 w 1 d	1 d	No	No
7	10 h	1 w 2 d	2 d	Yes	No
8	8 h	4 d	1 d	Yes	No
9	3 h 30 min	2 d	None	No	No
10	4 h	3 d	None	No	No
11	3 h 30 min	4 d	None	No	No
12	3 h	4 d	None	No	No
13	4 h 30 min	2 d	None	No	No
14	2 h	2 d	None	No	No
15	1 h 30 min	2 d	None	Yes	No
16	3 h 30 min	3 d	None	No	No
17	2 h 20 min	3 d	None	No	No

3.5. Post Operative Complications

Our data demonstrated no statistically significant difference between the two groups when considering post-operative complications (p-value 0.9). In particular, six locoregional group patients (60%) did not develop complications following the intervention. After the RFFF procedure, four patients (57%) did not report any issues. A statistical difference between the two was seen when considering the post-op need for commissuroplasty (p-value of 0.01). Specifically, no patient (0%) in the RFFF group required commissuroplasty, while six patients (60%) who were reconstructed with a locoregional flap needed it (Table 4).

Table 4. Post operative complications.

Post Operative Complications	Loco-Regional Flap	Free Flap
None	6	4
Infection	0	0
Orocutaneous fistula	0	1
Fullness or blunting of the involved oral commissure	0	0
Adequate mouth opening	4	7
Adequate blood supply	9	6
Adequate oral seal	7	5
Symmetrical mouth opening	10	7
Commissuroplasty	6	0
Wound dehiscence	1	1

4. Discussion

4.1. Surgical Techniques for Malignant Tumors of the Lips

Reconstructive lip surgery is a very complex topic that requires the evaluation of many parameters for success and the selection of the correct reconstructive technique to be used. There are numerous surgical options which can be distinguished by site and extent. The following locoregional flaps are utilized for the reconstruction of upper lip for defects involving the with roll:

- Webster flap: allows the reconstruction of the lateral third of the lip but leads to lip regression with microstomia and modifications of the labial commissure [15].
- Nasogenian flap: this flap allows an extended repair towards the midline. It can be used to perform a complete reconstruction of the superior lip.

Locoregional flaps for the reconstruction of the upper lip for defects involving the red lip equal to or smaller than one third are:

- Abbé flap: this flap is advantageous because it preserves the sphincter function of the mouth with aesthetically pleasing results.
- Estlander flap: it is similar to the Abbé flap but used to reconstruct lateral juxta commissural defects. For this reason, it is also referred to as Abbé-Estlander. The point of rotation of the flap will function as the new commissure, which will be subject to commissuroplasty in order to increase opening.

When defects are greater than one-third, the reconstructive options are:

- Karapandzic flap: it is similar to the fan flap of Gillies, but in contrast to it, the mucosa is preserved, thus not being a full-thickness incision. This technique can be unilateral or bilateral.

It is used for the reconstruction of large upper lip and lower lip defects. Two disadvantages must be underlined: microstomia with labial incontinence and commissural displacement [16].

- Gillies flap: it can be used for total upper lip reconstructions. This guarantees good functionality, but, on the other hand, it leads to microstomia [17].

When the defects involve the lower lip and measure one to two thirds, the reconstruction options are:

- Abbé-Estlander flap: the technique is the same as that used for upper lip reconstruction.
- Johanson step technique: used for the reconstruction of defects measuring at least 2 cm. This technique preserves sphincteric function and lip vascularization, but it is associated with microstomia [18].

- Gillies fan flap: it is a full-thickness, quadrangular flap that is moved as a fan around the juxta commissural region up to the defect. This is followed by commissuroplasty [17].

When the defects are greater than two thirds, the flaps that can be used are:

- Camille Bernard flap: this technique consists of two advancement malar flaps that used to repair the entire lower lip. In elderly patients, this procedure is facilitated by the laxity of the tissues. The functional results of this flap are mediocre: the inferior lip tends to regress, there is malocclusion, and loss of saliva from the mouth [19].
- Modified Camille Bernard flap: Webster modified the aforementioned technique in order to ameliorate the functional aspect. As mentioned, this technique leads to better functional outcomes, but there is still insufficient labial competence with important lower lip retraction. Moreover, it is often possible for the upper lip to be projected outward. Few techniques can compensate for this complication. One possible option is represented by placing a thick tongue flap to reconstruct the vermilion.

It is important to underline that these techniques are not mutually exclusive. In fact, in clinical practice, it is often common to perform combinations.

However, defects 80% or greater create a different challenge, and adjacent skin and soft tissue are usually inadequate to reconstruct this type of defect. These defects are best repaired with a free flap.

Free flaps options are multiple and have evolved in recent years [20].

The radial forearm free flap (RFFF) is the most common free flap used in the reconstruction of the lip as it provides adequate soft tissue and skin. In 1989, Sakai et al. harvested a RFFF in a manner such that the palmaris longus tendon (PLT) remained vascularized in the soft tissue of the flap [21]. The ends of the tendon were used for suspension to avoid downward distortion of the lower lip.

Several variations of this technique were made over the years, specifically focused on the various types of suspension to provide and sustain an appropriate lip height.

Different options are available if the orbicularis muscle is not preserved. In some cases, the surgeons may use the lascia lata (TFL) instead of the PLT to have a longer suspension material. To make the sling dynamic, Sawhney et al proposed attaching it to the masseter, while Jeng et al. suggested attaching it to the orbicularis oris at the philtrum columns, thus bringing the sling in a circular direction [22,23].

One proposed alternative to the RFFF is the antero- lateral thigh flap (ALT) [24]. Another soft tissue alternative to the ALT and RFFF is a double-paddle peroneal flap, and one additional soft tissue reconstruction option is the latissimus dorsi free flap (LDFF) [25].

Reconstruction with free flaps, however, results in functional reduction, particularly for the lower lip. The desire to create a more natural movement with lip reconstruction led to the search for a working dynamic muscle reconstruction option.

In the microvascular community, functional muscle-free flaps are well known and extensively documented. The most popular and often used flap for lip reconstruction is the gracilis muscle flap (GF). Many surgeons choose the GF as their primary option for facial nerve rehabilitation when trying to imitate natural facial motions [26]. Because of its usage in facial reanimation and the need to develop a dynamic, functional lower lip reconstruction, this flap looked to be a logical extension of that use. The serratus anterior muscle flap (SAM), also known as a serratus myo-osseous free flap, has previously been reported for the repair of scalp, face, maxilla, and mandibular abnormalities.

4.2. Lip Reconstruction in the COVID-19 Era

Approximately 447,571 new cases of oral cancer are reported each year, making it a significant public health issue globally [27]. Reconstructive surgery plays a paramount role in this field due to its influence on patients' quality of life (QoL). Although QoL has been demonstrated to arise from an interweaved multifactorial basis [28], COVID-19 has severely limited public health care options, with a significant impact on patient outcomes. Such a complex situation forced the WHO to declare a global public health emergency, which necessitated a change in the surgical workflow.

In view of the numerous surgical procedures cancelled during the peak weeks of the pandemic (approximately 28 million) [29], given the lengthening surgical waiting times, overloading of health care facilities, and increased resource utilization, it is necessary to adopt more targeted surgical strategies to respond to the new critical issues highlighted by the COVID-19 pandemic [30,31]. It is therefore incumbent, in addition to carefully considering the specific condition of each patient, to carefully evaluate reconstructive strategies. Factors that should be taken into consideration include, limiting interventions across multiple teams, carefully assessing healthcare costs, and considering simpler reconstructive plans, such as regional flaps, versus free flap transfer [32–35].

Although the usual surgical care provided to patients with head and neck cancers should be somewhat comparable to that provided during the non-COVID era, the management strategy we adopted was considerably different with respect to the soft tissue reconstruction in the advanced stage of the disease. Of the 17 patients who had lip malignancies, 10, either because there were not enough ICU beds available or because they had chronic comorbidities, prevented free flap repair, had soft tissue reconstruction with pedicle/local flaps as the main modality of reconstruction. Free flap reconstruction, as seen in the study, not only uses up a lot of ICU space but also increases hospitalization time, the use of health care resources by virtue of longer operative times, and an increased risk of COVID-19 infection [36].

When surgical time was taken into account, the pedicle flap reconstruction was quicker than the free flap reconstruction and afterwards had better survival than the free flap reconstruction. The pedicle/local flap reconstruction greatly decreased the amount of time needed for surgery, as this study has shown ($p = 0.0001$). It is also important to note that there is a reduction in hospitalization time for the pedicled flap group ($p = 0.0001$). Between the two patient groups, there was no discernible difference in postoperative problems (p-value = 0.09). However, a statistical difference was found between the two groups when considering the postoperative need for commissuroplasty in the pedicled flap group (p-value = 0.01).

In contrast to pedicle flaps, where only one patient was transferred for short-term vitals monitoring, each patient with free flaps required ICU backup ($p = 0.006$). Due to the bulk of ICU beds being diverted to critically ill patients with severe COVID pneumonia during the COVID-19 pandemic, making room in the ICU was a significant difficulty.

Finally, considering the aesthetic/functional aspects, free flaps taken from different anatomical sites are correlated with a poorer aesthetic result, as already highlighted in other studies in the literature [37,38].

Particularly in individuals with good skin laxity and when other flaps are not an option, the Karapandzic flap was discovered to be a workable choice for medium- to large-sized full-thickness abnormalities. Microstomy and lip asymmetry are considerable, but they offer the opportunity for single-stage repair with strong oral competency. Although it can also be utilized for the top lip, this single-stage flap is mostly employed for the lower lip. It has good oral competence and sensation, but our investigation also showed that it is linked to microstomy [39–41].

The nasolabial flap (Bernard/Fusama-Bernard/Gupta) has been utilized for commissural defects and big full-thickness labial defects in patients who cannot tolerate microstomy. However, modest oral incompetence associated with commissural abnormalities may get better over time. The patient claims that there has been a protracted loss of feeling at the surgery site. The naso-labial sulcus is the best place to conceal the donor site scar. This flap is adaptable to many configurations [42,43].

Large full-thickness defects, such as total lip defects and lip defects with buccal mucosal defects, are only treated with free flaps, such as the free forearm radial artery flap with or without a palmaris longus sling, when local tissue is unavailable for reconstruction and microstomy cannot be tolerated. Microstomy is not a problem for patients receiving radial free flap treatment, though, if the flap is the right size. If nerve-type coaptation is not done, there will always be chronic hypoesthesia. If primary closure cannot be achieved, a skin graft is necessary for the donor location. The free flap is a good alternative for

full-thickness full-lip defect restoration when local tissue is unavailable, as shown by earlier studies, but its functional and aesthetic effects are limited due to the difference in color, elasticity, texture, and volume of the donor tissue [44,45].

From a functional point of view, the results may be comparable, as both techniques are associated with adequate speech, mouth opening, tightness, and symmetry, although this has already been pointed out in other clinical studies [46,47].

When reinnervated, free flaps are associated with better functional outcomes but poorer aesthetic results. One option that should be carefully evaluated is the use of the reinnervated gracilis flap [48].

Locoregional flaps have been shown to be a viable option even for patients with large tumors, and thus to be an excellent surgical reconstruction strategy compared with free flaps, considered the gold standard to date [49].

It is however important to underline that the sample size used in this retrospective study is small; in order to obtan more reliable data, it would be better to include more patients. Nevertheless, our results are in line with those reported in the literature.

5. Conclusions

Free flaps used to be considered the standard of choice for extensive defects. However, in light of the COVID-19 pandemic's impact on the healthcare system, locoregional flaps have been proven to be a good surgical option in the reconstruction of lip defects both in terms of aesthetic and functional outcome. The hospital costs are decreased if these techniques are used because the surgical length and hospital stay are statistically shorter compared to those required if more advanced flaps were performed. These criteria are extremely important if we keep into consideration that most patients are old with several comorbidities and would likely not be able to withstand an extensive surgical procedure.

In summary, considering the optimal aesthetic and functional results associated with locoregional flaps, these can now be considered a valid choice compared to free flaps in the reconstruction of lip defects.

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