

Research Article

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Reconstructive Flap Techniques Following Surgery for Advanced Lip Carcinoma: A Retrospective Study of 35 Cases

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ABSTRACT

Background: Lip cancers are among the relatively common malignancies encountered in the practice of Otorhinolaryngologists in our country. In their advanced stages, these tumors lead to significant functional and aesthetic sequelae and can be life-threatening, highlighting their severity and the challenges associated with their management, both in terms of oncologic resection and reconstruction.

Objectives: To describe the epidemiological, clinical, paraclinical, and therapeutic features of advanced lip carcinomas managed surgically in our department, and to evaluate the reconstructive flap techniques used together with their functional and aesthetic outcomes.

Methods: Our study is a retrospective analysis over 11 years, involving 35 cases of advanced lip carcinomas managed in the department of Otorhinolaryngology - Head and Neck Surgery at 20 August 1953 Hospital in Casablanca during the period from January 2012 to November 2024 (2021 and 2022 excluded). Epidemiological, clinical, paraclinical, therapeutic, and evolutionary data were analyzed.

Results: The age of our patients ranged from 32 to 90 years, with a mean age of 64.71 years and a clear male predominance (sex ratio = 3.37). The main risk factors identified were chronic smoking, prolonged sun exposure, and poor oral hygiene, no precancerous lesions were detected in our study cohort. The mean interval to consultation was 29.54 months. The predominant tumor location was the lower lip (77.14%), and the macroscopic appearance was predominantly ulcerative-proliferative (65.71%). Histopathological examination confirmed that squamous cell carcinoma was the predominant histological type (97.14%). Tumors were classified as T1-T2 in 65.71% of cases, and lymph node metastases were present in 28.57% of cases. All patients underwent surgical resection, with a safety margin of 10-15 mm. Complete margins were achieved in 34 of 35 patients. Lymph node dissection was performed in 30 patients. Reconstruction was performed with local or regional flaps in 100% of cases, with no requirement for distant flaps; the technique selected depended on the site and extent of the resulting defect. Functional and aesthetic outcomes were satisfactory in most cases. Restricted mouth opening was the most common postoperative complication. From both functional and aesthetic perspectives, the outcomes were deemed satisfactory in most cases. The most common postoperative complication in our study was restricted mouth opening.

Conclusion: Local and regional flaps allow satisfactory oncologic, functional, and aesthetic outcomes in the reconstruction of extensive lip defects following resection of advanced lip carcinoma, provided the reconstructive technique is tailored to the site and extent of the defect.

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Received: September 08, 2026; **Accepted:** September 15, 2026; **Published:** September 28, 2026

Keywords: Lip Neoplasms, Squamous Cell Carcinoma, Reconstructive Surgical Procedures, Surgical Flaps

Introduction

The lips are musculocutaneous folds that form the anterior boundary of the aerodigestive tract. Their functional complexity makes their reconstruction a genuine therapeutic challenge [1]. Several factors can contribute to the development of lip tumors [2,3]. Among the malignant tumors that may arise from the lip, squamous cell carcinoma is by far the most common, with a marked male predominance and a typical predilection for the lower lip [1,4].

Because of their visible location, lip tumors are readily accessible to inspection and should be detected at an early stage. Diagnosis relies on clinical examination and histopathology [1].

These tumors may originate from either the cutaneous (white) or the mucosal (red) portion of the lip, which explains the implication of two principal carcinogenic risk factors: tobacco smoking and sun exposure [2].

Treatment of these tumors is essentially surgical, and malignant lip tumors represent the leading cause of lip tissue loss. This surgery follows well-defined principles to ensure an optimal outcome. Repair can occasionally be achieved by simple suture, but local

flaps are required in most cases; their success is judged against two essential criteria: the functional integrity of the lip and the aesthetic quality of the repair [5].

The aim of this retrospective study was to describe the surgical management of lip tumors and the various techniques of flap reconstruction of the lips used in our department.

Materials and Methods

Study Design and Setting

This was a retrospective, descriptive, and analytical study of patients with lip tumors hospitalized and operated on in the Department of Otorhinolaryngology - Head and Neck Surgery, 20 August 1953 Hospital, Ibn Rochd University Hospital, between January 2012 and November 2024.

Ethics Statement

This study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained from the Ethics Committee of 20 August 1953 Hospital. Written informed consent was obtained from all participants prior to inclusion. All patient data were handled with strict confidentiality throughout the study.

Study Population

Inclusion Criteria: histologically confirmed lip tumor; patients requiring surgical resection for curative or palliative intent; patients reconstructed with lip reconstruction flaps following tumor excision; and exploitable medical records.

Exclusion Criteria: metastatic tumors, simple suture closure, healing by secondary intention, congenital lip malformations, non-tumoral tissue loss, systemic disease, active infection and non-exploitable medical records.

Data Collection

Data were collected for each patient from archived medical records held in the Department of Otorhinolaryngology at 20 August University Hospital, and from postoperative follow-up consultations.

Statistical Analysis

Categorical variables were compared using the chi-square test or Fisher's exact test, as appropriate. Continuous variables were compared using Student's t-test. Proportions are reported with 95% confidence intervals (CI) calculated using the Wilson score method. All tests were two-tailed, and a p-value < 0.05 was considered statistically significant. Because of the limited sample size, multivariate logistic regression could not be reliably performed.

Results

Epidemiological Data

Over an 11-year period (January 2012 to November 2024, excluding 2021 and 2022), 35 patients with lip tumors underwent surgical treatment with reconstruction in our department. The mean age at diagnosis was 64.71 years (range, 32-90 years). The series comprised 27 men and 8 women (male-to-female ratio, 3.37), indicating a clear male predominance.

Chronic smoking was noted in 45.71% of patients, and alcohol use in 14.28%. Poor oral and dental hygiene was noted in 22 patients (62.86%). No patient in this cohort developed a malignant lip tumor on a pre-existing precancerous lesion. One patient presented

with a second lip tumor - located on the lower lip - seven years after excision of an upper lip tumor.

The interval between the appearance of the tumor and consultation ranged from 2 months to 20 years, with a mean consultation delay of 29.54 months.

Clinical Presentation

Presenting complaints included swelling with ulceration (n = 23), swelling alone (n = 7), ulceration alone (n = 5), pain (n = 9), contact bleeding (n = 8), and pruritus (n = 0); several patients presented with more than one symptom.

The lower lip was the most frequent tumor site (77.14% of cases), followed by the commissure (17.14%) and the upper lip (5.71%). The macroscopic appearance was predominantly ulcerative-proliferative (23 cases, 65.71%), followed by proliferative (7 cases, 20%) and purely ulcerative lesions (5 cases, 14.28%). Tumor size ranged from 2 to 12 cm, with a median of 3.56 cm (Fig 1).

Clinical examination of the head and neck revealed endobuccal infiltration in 13 patients and infiltration of the nasal fossae in 2 patients. Local extension involved the commissure (n = 10), the cheek (n = 11), the alar rim (n = 1), the chin (n = 1), the floor of the mouth (n = 4), the mandible (n = 3), and the contralateral lip (n = 3).

Clinically palpable cervical lymphadenopathy was present in 6 patients (5 ipsilateral, 1 contralateral). Somatic examination revealed no clinical evidence of distant metastasis in any patient.



Figure 1: Illustrates the Macroscopic appearance of Two Representative Lip Carcinomas: A Proliferative Lesion of the Lower Lip (Left) and An Ulcerative-Proliferative Lesion of the Lower Lip (Right)

Histopathology

All patients underwent a diagnostic biopsy. Histological typing was as follows: squamous cell carcinoma, 34 cases (97.14%); basal cell carcinoma, 0 cases; neuroendocrine carcinoma, 1 case (2.86%).

Paraclinical Investigations

Neck ultrasound was performed in 3 patients with squamous cell carcinoma and demonstrated bilateral cervical lymphadenopathy in 1 patient. Cervicofacial CT was performed in 13 patients and confirmed nodal extension in 7, infiltration of adjacent structures in 10 and bone lysis in 5. Cervicofacial MRI was performed in 2 patients and showed nodal involvement in 1, with no bone lysis in either patient. Chest radiography, performed in all patients as part of the preoperative work-up, showed no secondary localization. No patient underwent abdominal ultrasound.

TNM Classification

On the basis of clinical and paraclinical findings, tumors were staged according to the 2018 UICC TNM classification (8th edition).

Table 1: TNM Distribution of Squamous Cell Carcinomas

	N0	N1	N2a	N2b	N2c	N3
T1	5	-	-	-	-	-
T2	14	-	1	1	1	1
T3	5	-	-	-	-	-
T4	1	2	-	1	3	-

Surgical Treatment

Surgical planning was based on tumor size, location, and locoregional extension. Tumor excision was performed in all 35 patients, with resection margins ranging from 10 to 15 mm. In patients with tumors invading adjacent structures, resection was extended to the commissure and surrounding regions, including mandibular or maxillary resection when required (Fig 2).

Complete resection margins were achieved in 34 patients; one patient had incomplete margins. Neck dissection was performed in 30 patients - a functional (triangular) dissection of levels I-IV in all 30 cases, with no radical dissections performed.



Figure 2: Intraoperative Picture Showing the Surgical Defect after Tumor Excision from the Lower Lip, Prior to Flap Reconstruction

Reconstruction Techniques

Reconstruction was performed in the same operative sitting as tumor resection and neck dissection in all patients. The choice of reconstructive technique was guided by the site and size of the tumor and the extent of the resulting tissue defect.

Table 2: Reconstruction Techniques by Anatomical Site

Site	Reconstructive technique	Number of cases
Lower lip	Karapandzic flap	12
	Rhomboid flap	3
	Gillies fan flap	3
	Abb�-Estlander flap	1
	Nasolabial flap	1
	Advancement flap	1
Upper lip	Rhomboid flap	1
	Webster flap	1
Commissure	Rhomboid flap	5
	Abb�-Estlander flap	1
	Advancement flap + Karapandzic flap	1
Combined techniques	Gillies fan flap + Karapandzic flap	3
	Advancement flap + Gillies fan flap	1
	Karapandzic flap + Nasolabial flap	1



Figure 3: Two Intraoperative Pictures showing Early Postoperative Flap Suturing following Excision and Reconstruction of a Lower Lip Tumor

Postoperative Complications

Early Surgical Complications

Early surgical complications were rare: no flap suffering or necrosis was observed, no cervical collection (infectious or hematic) occurred, and only one case of suture dehiscence with loss of substance was reported.

Reoperations

Reoperation was required in two patients: revision of resection margins (1 case) and secondary suture (1 case); no flap revision was necessary. No tumor recurrence was observed during follow-up.

Mid- and Long-Term Functional Complications

Mid- and long-term functional complications were dominated by restricted mouth opening, observed in 21 patients, and microstomia in 17 patients. (Fig 4) Asymmetric mouth opening was noted in 6 patients. No cases of oral incontinence, peripheral facial palsy, or hypertrophic plaque/lip retraction were reported.

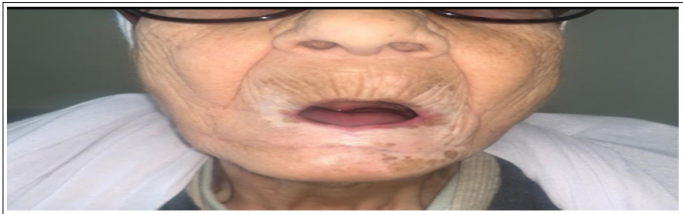


Figure 4: Illustrates the Postoperative Microstomia Observed after Karapandzic Flap Reconstruction

Discussion

Epidemiological Profile

The lips are occasionally the site of numerous tumors, benign or malignant, with a malignant predominance [1]. The exact incidence of lip carcinoma is difficult to establish, as it is generally reported together with cancers of the oral cavity, pharynx, larynx, and esophagus in global epidemiological surveys. Amazzal et al. reported an incidence of lip cancer of 6.5% among head and neck cancers. Beauvillain et al. reported a frequency of 1.7% relative to oral cancers, and Perrinaud et al. reported 12% relative to head and neck tumors overall [6-8]. In Morocco, according to the Greater Casablanca Region Cancer Registry (2013-2017), cancers of the lip and oral cavity rank second (26.6%) among upper aerodigestive tract tumors, after cancers of the nasopharynx (52.7%) [9].

The mean age of our patients was 64.71 years, comparable to figures reported by many publications [10-12].

Poor Oral and Dental Hygiene

Poor oral and dental hygiene is a well-recognized risk factor for

oral cavity cancers and is typically associated with tobacco use. Indeed, the dense bacterial flora present in poor oral hygiene facilitates the degradation of ethanol into acetaldehyde and the penetration of these carcinogens through diseased oral mucosa [13].

Precancerous Lesions

Precancerous lesions are chronic mucosal lesions that may regress but require regular long-term surveillance. An initial biopsy is recommended to confirm the diagnosis, and should be repeated in case of recent change or any suspicion of malignant transformation (4). They present as whitish plaques (leukoplakia) or erythematous lesions (erythroplakia), and more rarely as pigmented lesions. These lesions are common and can pose diagnostic difficulty [1].

In the series of Zaraa et al., 26.6% of patients had labial leukoplakia, 10% had chronic cheilitis, and 3.3% had erosive lichen planus [14].

Delay to Diagnosis

Time to consultation is a recognized prognostic factor in advanced lip tumors, and diagnostic delay remains common. Patients tend to present after several months of symptoms, which may reflect trivialization of persistent symptoms, patient neglect, recourse to traditional medicine, and limited access to healthcare facilities.

Diagnosis and Staging

Surgery is recognized as the treatment of choice for lip tumors. It provides a resection specimen that allows histological confirmation of the diagnosis and assessment of resection quality, and achieves a very high rate of local control with cure in the large majority of patients.

Surgical excision was the first-line treatment in all our patients, consistent with different series [1, 15, 16].

Surgical Margins

Resection must be oncologically complete from the outset to limit the risk of locoregional and distant recurrence. Malignant tumors are excised with lateral and deep safety margins because of the frequency of microscopic extension, a recognized source of local recurrence.

Surgical treatment of lip tumors can result in extensive tissue loss requiring repair with local, regional, or distant flaps. In our practice, as in most published series, reconstruction is performed in the same operative sitting as tumor resection and neck dissection. Reconstruction should respect the aesthetic subunits of the lip so as to reposition the new lip within its surrounding anatomical environment, after correcting any associated deformity of adjacent regions [5, 17].

Reconstructive Techniques

Vermilion Mucosal Advancement Flap

The vermilion can be reconstructed using mucosa from the underlying muscular plane, which is elevated to the vestibule and advanced by gentle traction to the mucocutaneous junction, where it is sutured. This is a myomucosal flap centered on the labial (coronary) artery that recruits the remaining red lip. The external incision follows the mucocutaneous junction and passes deep through the orbicularis oris muscle, continuing as a parallel internal incision. The elasticity of this flap allows reconstruction of up to half the length of the vermilion [4].

Perialar Crescentic Cheek-Advancement Flap

This technique involves excision of a perialar skin crescent together with a juxta-commissural excision. Wide cheek undermining allows the cheek to be rotated along the alar rim and sutured without tension, resulting in minimal residual scarring [1].

Karapandzic Flap

The Karapandzic technique is simple, quick to perform, and provides acceptable functional and aesthetic results. Tumor excision typically leaves a quadrangular defect; the reconstructive principle is a cheek advancement flap. A concave, arciform skin incision is made, beginning at the base of the defect and curving toward the nasal base while remaining at a distance from the oral commissure. This incision involves all tissue planes, with careful dissection preserving the facial artery, the labial (coronary) arteries, and the sensorimotor innervation. The buccal mucosa is preserved except over the first 2 cm, to allow further advancement of the flap, which is then advanced and sutured to close the defect. This technique may be performed unilaterally or bilaterally. It allows reconstruction of a continent, sensate lip, but is associated with microstomia in the majority of cases [1].

Full-Thickness Peri-Commissural Flap

The full-thickness peri-commissural flap, including mucosa, with preservation of the vascular pedicle. The incision follows natural skin creases: the superior limb lies in the peri-alar region, and the inferior limb is arciform with internal concavity, passing lateral to the nasolabial fold toward the mentum. The flaps are advanced medially and sutured in layers; a Z-plasty is performed at the lateral end of each limb.

Nasolabial Transposition Flap

This flap is designed within the nasolabial fold, incorporating the full thickness of the nasolabial skin, with an inferiorly based pedicle. When the width of the defect is substantial, the distal portion of the required flap may lack a mucosal lining.

Surgical excision must be wide, creating a rectangular defect measuring approximately 50-60 mm horizontally by 25-30 mm vertically. The flap is designed according to the principles described above. It allows reconstruction of the entire lip but does not restore the vermilion. On the lower lip, it results in retro-cheilitis and relatively poor continence [4,18].

Abbe-Estlander (Lip-Switch) Flap

This is a full-thickness triangular flap, pedicled on the labial (coronary) artery located in a submucosal position near the mucocutaneous junction. It transfers, in a single stage, the vermilion, cutaneous lip, muscle, and mucosa, while preserving sphincteric function.

Conclusion

Advanced malignant lip tumors remain a major clinical problem in our setting.

Diagnosis relies primarily on clinical examination and histological confirmation by biopsy. Imaging - ultrasound, CT, or MRI - is used to assess extension to adjacent structures and to screen for distant metastasis.

Management can be demanding in elderly patients with comorbidities and low socioeconomic status who present at an advanced tumor stage.

Multidisciplinary tumor board discussion remains essential for these tumors, favoring more conservative treatment and improved overall patient care.

Numerous reconstructive procedures exist, ranging from simple to complex. The choice of technique depends on both the tumor characteristics and the resulting tissue defect. The ultimate goal is oncologic cure combined with a lip that is satisfactory from both a functional and an aesthetic standpoint.

Regular post-therapeutic follow-up is essential to detect and treat, in a timely manner, any complication or tumor recurrence.

Prevention remains the best treatment, reducing both the occurrence of lesions and the incidence of tumor recurrence.

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