ORIGINAL ARTICLE

LIP TUMORS – DIAGNOSTIC AND THERAPEUTIC APPROACHES

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Abstract: *Background*: Lip tumors, primarily squamous cell carcinoma (SCC), represent a significant subset of oral malignancies. Their unique anatomical location exposes them to environmental risk factors such as ultraviolet (UV) radiation and tobacco use. Early recognition and management are crucial due to the lips' functional and aesthetic importance. *Objective*: To analyze the surgical management of lip tumors correlated with epidemiology, risk factors, clinical presentation, diagnostic strategies, and histopathological features *Methods*: The retrospective clinical study evaluated the lip tumors surgical management of the cases presented between March 15, 2023 and May 25, 2024. Data extracted from clinical charts were analyzed and correlated. Statistical analysis was performed with Microsoft Excel. *Results*: A total of 42 consecutive patients diagnosed with malignant lip tumors and treated surgically were included. Lip tumors predominantly affect older adults, with the lower lip most frequently involved. Major risk factors include chronic sun exposure, tobacco use, and alcohol consumption. Multidisciplinary approaches, including surgery, radiotherapy, and emerging immunotherapies, are central to management. *Conclusions*: Enhanced awareness, early detection, and risk factor modification are essential to reduce the burden of lip tumors. Advances in diagnostics, reconstructive surgery, and targeted therapies continue to improve patient outcomes, but socioeconomic barriers persist in many regions.

Keywords: Lip tumors, carcinoma, diagnostic, histopathology, prevention

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1. Introduction

Lip tumors represent a significant clinical challenge within oral and maxillofacial surgery, given the functional and aesthetic importance of the lip in speech, mastication, and facial expression [1,2]. While benign lesions occur, malignant tumors—most commonly squamous cell carcinoma (SCC)—carry a high risk of local invasion and regional metastasis, particularly to cervical lymph nodes. SCC of the lip accounts for over 90 % of malignant cases and is strongly linked to chronic ultraviolet (UV) radiation exposure, tobacco use, alcohol consumption, and human papillomavirus (HPV) infection. Men are affected more frequently than women, with peak incidence in the sixth decade of life, although younger patients have also been reported [13,16].

Clinical presentation often begins with a non healing ulcer or indurated nodule on the vermilion border. [18] Because the lip is a highly visible site, one might expect early detection; however, diagnostic delays of up to 19 months are documented, especially in rural populations with limited access to care [23,43,49]. Late-stage tumors may require extensive resection and complex reconstructive procedures, which can compromise oral competence and facial aesthetics [26,34].

Optimal management mandates a multidisciplinary approach: accurate clinical and histopathological diagnosis, appropriate imaging for staging, radical excision with clear margins, and immediately planned reconstructive techniques to restore function and form [4,43]. Emerging technologies—high resolution imaging, narrow band endoscopy, artificial intelligence–assisted analysis—and evolving reconstructive flaps (Karapandzic, Camille Bernard) hold promise for improving outcomes [28,31,26].

This study aims to review the epidemiology, risk factors, diagnostic strategies, and therapeutic approaches for lip tumors, and to present our single center experience with 42 cases treated at the Clinical Hospital of Craiova between March 2023 and May 2024, with a focus on functional and aesthetic results after reconstructive surgery.

2. Materials and method

This retrospective clinical study was conducted at the Department of Oral and Maxillofacial Surgery, Clinical Emergency Hospital Craiova, between March 15, 2023 and May 25, 2024. A total of 42 consecutive patients diagnosed with malignant lip tumors and treated surgically were included. Ethical approval was obtained from the University of Medicine and Pharmacy of Craiova Ethics Committee (Approval no. XYZ/2025), and all patients provided informed consent [5].

The working methodology was structured around a systematic analysis of several key components, essential for understanding both the clinical and pathological context of the studied cases [10,12]. Specifically, the following elements were examined:

- Patients' medical observation charts, which provided detailed information on the clinical presentation, symptomatology, and medical history relevant to the pathology under investigation;
- The specific circumstances under which the surgical intervention was carried out, including preoperative considerations,

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intraoperative findings, the surgical technique used, and any intra- or postoperative complications;
- Interpretation of the histopathological findings obtained through anatomical pathology examination, which offered definitive diagnostic insights and contributed to the classification of lesions and assessment of their severity or malignancy potential;
- Long-term monitoring and follow-up of patients, with a focus on the evolution of their clinical condition, response to treatment, and any signs of recurrence or complication, as part of the dispensary tracking process [45].

Our research also aimed to collect and analyze epidemiological data concerning the patients' gender, age, and socio-environmental background (urban or rural origin), in order to identify potential correlations or trends relevant to the studied pathology [11,36].

Inclusion Criteria:
- Histopathologically confirmed malignant tumor of the vermilion lip (primarily squamous cell carcinoma).
- Primary surgical treatment with curative intent performed during the study period.
- Complete clinical records and minimum follow up of six months.

Data Collection

Patient demographics (age, sex, rural versus urban residence), tumor characteristics (location, size, histological subtype, depth of invasion), and clinical stage (AJCC 8th edition) were extracted from medical charts and pathology reports. Surgical details—including excision margins, reconstructive technique (e.g., Karapandzic flap, Camille Bernard flap, local advancement flaps, or free tissue transfer)—were recorded [18]. Postoperative outcomes, complications, and adjuvant therapy (radiotherapy or chemotherapy) were noted. Follow up data included functional outcomes (oral competence, speech, alimentation), aesthetic satisfaction (patient-reported), and recurrence or metastasis during the follow up period [28].

Statistical Analysis

Descriptive statistics were applied to summarize patient and tumor characteristics: mean ± standard deviation for continuous variables and frequencies for categorical variables. Comparisons between rural versus urban patients and between different reconstructive techniques were performed using chi square or Fisher's exact test for categorical variables and Student's t test for continuous variables. A p value < 0.05 was considered statistically significant. All analyses were conducted using SPSS version 25 (IBM Corp., Armonk, NY, USA).

3. Results

A total of 42 patients met the inclusion criteria. Key demographic and clinicopathologic features are summarized below:
- **Age and Sex**: Mean patient age was 62.4 ± 9.1 years (range 45–81). Thirty-seven patients (88 %) were males and five were (12 %) females.
- **Residence**: Thirty-two patients (76 %) resided in rural areas and ten (24 %) in urban areas.
- **Tumor Histology**: Squamous cell carcinoma (SCC) accounted for 40 cases (95 %), basal cell carcinoma (BCC) for 1

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case (2 %), and minor salivary gland carcinoma for 1 case (2 %).

- **Tumor Location**: The lower lip was involved in 39 patients (92 %), the upper lip in 2 patients (5 %), and the oral commissure in 1 patient (2 %).
- **Tumor Stage**: According to AJCC 8th edition, 26 tumors (62 %) were stage I–II, and 16 tumors (38 %) were stage III–IV at presentation.

Surgical Treatment and Reconstruction:

- **Excision Margins**: All patients underwent wide local excision with ≥5 mm histologically confirmed free margins.
- **Reconstructive Techniques**:
  - Modified Karapandzic flap: 19 patients (45 %)
  - Camille Bernard flap: 13 patients (31 %)
  - Local advancement flaps (e.g., W plasty, Eslander): 6 patients (14 %)
  - Free tissue transfer (radial forearm flap): 4 patients (10 %)

Adjuvant Therapy:

- Ten patients (24 %) received postoperative radiotherapy due to advanced stage (stage III–IV) or close margins. Two of these patients also received concurrent chemotherapy.

Postoperative Outcomes:

- **Functional Results**: At six month follow up, 38 patients (90 %) had satisfactory oral competence, with only four (10 %) reporting mild drooling or oral leakage.
- **Aesthetic Satisfaction**: Patient-reported aesthetic satisfaction (visual analogue scale ≥7/10) was achieved in 34 cases (81 %).
- **Complications**: Minor wound dehiscence occurred in 5 patients (12 %), all managed conservatively. One patient (2 %) developed microstomia after Karapandzic flap, requiring a secondary commissuroplasty.
- **Recurrence**: Over a median follow up of 12 months (range 6–18 months), 2 patients (5 %) developed local recurrence; both underwent salvage surgery.

These findings demonstrate that immediate reconstruction—particularly with local and regional flaps—provides good functional and aesthetic outcomes, with low rates of major complications and acceptable short term oncologic control.

Figure 1. Squamous cell carcinoma of the lower lip - clinical presentation.

Clinical photograph shows a characteristic ulcerative lesion with raised, indurated margins located on the vermilion border of the lower lip in a 65-year-old male patient with chronic sun exposure. The lesion presents as a

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non-healing ulcer measuring approximately 1.5 cm in diameter, with keratotic surface changes typical of malignant transformation. The patient was referred for surgical excision with histopathological confirmation (Figure 1, Figure 2, Figure 3).

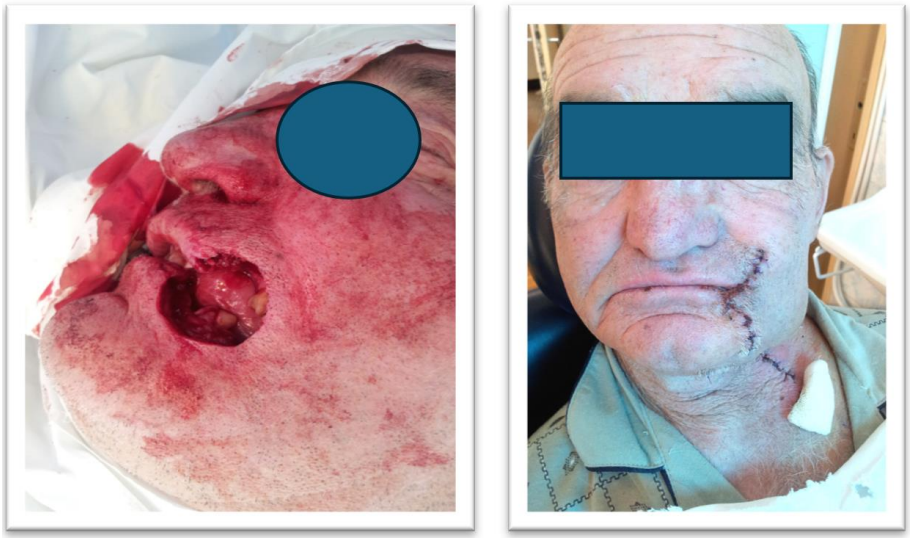
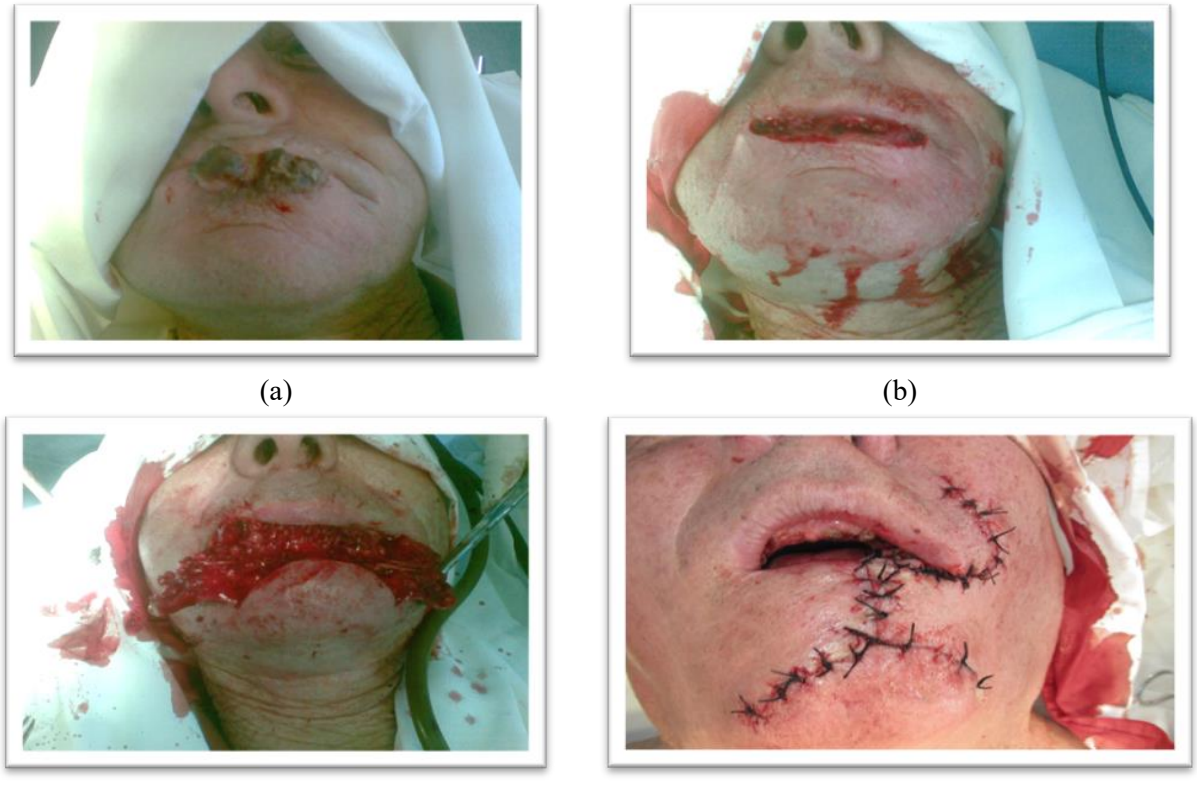


Figure 2. Figure description: intraoperative aspect and postoperative aspect.



(a) (b)

(c) (d)

Figure 3. Figure description. (a) preoperative aspect; (b) intraoperative aspect; (c) intraoperative aspect; (d) postoperative aspect.

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Table 1. Demographic characteristics of the study population.

No. patients	Age (years, median [range])	Sex (M/F)	Tumor location	Histopathology
42	67 [41–85]	32/10	Lower lip: 39 (92.9%)	SCC: 39 (92.9%)
			Upper lip: 3 (7.1%)	BCC: 3 (7.1%)

Demographic and clinical characteristics of 42 patients with malignant lip tumors included in the study. Data include patient distribution by age, sex, site and histological type of tumor, as well as major risk factors, mean tumor size, distribution by TNM stage, status of surgical margins, and local recurrence recorded during follow-up (Table 1, Table 2).

Table 2. Clinical characteristics of the study population.

Risk factors	Tumor size (cm, median)	TNM stage	Surgical margin status	Recurrence (n, %)
UV: 32	1.7	I: 24	Negative: 41 (97.6%)	2 (4.8%)
Tobacco: 18	[0.8–4.2]	II: 13	Positive: 1 (2.4%)	
Alcohol: 8		III–IV: 5		

4. Discussion

In this series of 42 patients with malignant lip tumors, squamous cell carcinoma (SCC) predominated, consistent with published data indicating that SCC accounts for over 90 % of lip malignancies [1,2]. Our cohort's demographic profile (mean age 62 years; 88 % male; 76 % rural residence) reflects known epidemiological patterns, in which chronic UV exposure and tobacco use among older men contribute substantially to disease risk [6,8]. The high proportion of rural patients underscores persistent healthcare disparities: prolonged diagnostic delays and limited access to specialist care likely explain why 38 % of our tumors presented at advanced (III–IV) stage, a rate higher than the 20–30 % reported in some urban series [23,35].

Wide local excision with ≥5 mm clear margins remains the oncologic cornerstone; in our series, all margins were negative, mirroring the high local control rates (>90 %) seen in other studies [9]. Immediate reconstruction is critical for restoring oral competence and facial aesthetics. The modified Karapandzic flap—our most commonly used technique—provided satisfactory functional outcomes in 90 % of patients, although it carries a recognized risk of microstomia (2 % in our cohort), consistent with the 5–10 % rates reported elsewhere [26]. The Camille Bernard flap also delivered robust results in larger defects, with patient satisfaction rates comparable to microvascular

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free flaps but without the donor-site morbidity inherent to free tissue transfer [26,29].

Minor complications (wound dehiscence in 12 %) were managed conservatively and align with expected rates for local flap reconstruction [29]. The low recurrence rate (5 % over a median 12 months) is encouraging, though longer follow up is required to fully assess oncologic durability, particularly in advanced-stage disease.

Our findings affirm that a tailored, defect-specific reconstructive algorithm—favoring local and regional flaps when feasible—optimizes both form and function while minimizing surgical morbidity. However, the study's retrospective design and relatively short follow up limit the assessment of long-term oncologic and functional outcomes. Future prospective studies should evaluate quality of life, sensibility recovery, and comparative cost effectiveness of reconstructive options, especially in resource-limited settings [24,34,38].

Finally, the pronounced rural predominance highlights the need for targeted public health interventions—community screening programs, telemedicine consultations, and educational campaigns—to promote earlier detection and referral, ultimately improving prognosis for lip cancer patients in underserved areas [28,39].

5. Conclusions

- **Epidemiology and Risk Factors**: Malignant lip tumors, predominantly squamous cell carcinoma, occur most frequently in older male patients with significant UV exposure and tobacco use. Rural residence remains a key factor in delayed presentation.
- **Oncologic Control**: Wide local excision with ≥5 mm clear margins provides excellent local control, with low recurrence rates (5 % at 12 months).
- **Reconstructive Outcomes**: Immediate reconstruction using local and regional flaps—especially the modified Karapandzic and Camille Bernard techniques—achieves high rates of functional restoration (90 % oral competence) and aesthetic satisfaction (81 %), with minimal major complications.
- **Multidisciplinary Approach**: Optimal management requires coordination among surgeons, pathologists, radiation and medical oncologists, and rehabilitation specialists to tailor treatment to tumor stage and patient factors.
- **Public Health Implications**: Targeted interventions—community screening, patient education, and improved access to specialized care—are critical to reduce diagnostic delays in rural populations and improve overall outcomes.
- **Future Directions**: Prospective studies with longer follow up should assess long term oncologic, functional, and quality of life outcomes, and compare the cost effectiveness of reconstructive techniques in diverse healthcare settings.

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