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# Understanding Loco-Regional Failure in Oral Cancers : A prospective study in post operated oral cavity cancer with adjuvant therapy

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**ABSTRACT**

**Background:** Oral cavity squamous cell carcinoma (OCSCC) remains a major oncological challenge with significant loco-regional recurrence rates despite multimodal treatment. Identifying risk factors and treatment outcomes can enhance therapeutic strategies.

**Methods:** This observational, descriptive longitudinal study analyzed 42 histopathologically proven cases of non-metastatic recurrent OCSCC who had undergone primary surgery and adjuvant radiation therapy with or without chemotherapy. Patients were assessed for clinical, pathological, and treatment-related risk factors contributing to loco-regional recurrence.

**Results:** The median age was 51 years, with a male predominance (75%). The buccal mucosa (40.4%) and lateral border of the tongue (31%) were the most common primary tumor sites. High-risk histopathological features included perineural invasion (PNI) (38%), lymphovascular invasion (LVI) (12%), and extracapsular spread (70%). Recurrence predominantly affected the surgical flap or scar (38.9%) and buccal mucosa (30.9%). The median disease-free survival was 7 months. Most recurrences presented at an advanced stage (III-IV), and 35.7% of patients succumbed to the disease. Salvage treatments, including surgery, re-irradiation, and palliative chemotherapy, showed limited survival benefits.

**Conclusion:** High-risk pathological features and treatment delays significantly influence recurrence rates. Strict follow-up, early intervention, and novel therapeutic approaches are essential to improving patient outcomes.

**Keywords:** Oral cavity cancer, loco-regional recurrence, risk factors, adjuvant therapy, salvage treatment

## I. INTRODUCTION:

Cancer is characterized by uncontrolled cell growth with the potential to invade and destroy normal tissue, ranking as a leading cause of death. Head and neck cancers (HNCs) include malignancies in the oral cavity, pharynx, larynx, nasal cavity, paranasal sinuses, and salivary glands. Among these, oral cavity squamous cell carcinoma (OCSCC) is the most common, with over 90% of cases arising from squamous cells. Non-squamous malignancies, including minor salivary gland carcinomas, are rare.[1]

Globally, oral cancer ranks 15th in incidence and 16th in mortality. GLOBOCAN 2022 reported 3,89,846 new cases and 1,88,438 deaths due to lip and oral cavity cancers worldwide, with India contributing 1,43,759 cases and 79,979 deaths. The male-to-female ratio is 3:1. Major risk factors include tobacco, alcohol, HPV, betel quid, poor oral hygiene, and nutritional deficiencies. Premalignant lesions and genetic conditions such as Fanconi anemia also increase susceptibility.[2]

OCSCC staging depends on tumor size and invasion depth. Early-stage (I/II) cancers are treated with single-modality therapy, while advanced-stage (III/IV) cases require multimodal treatment, including surgery, radiation, chemotherapy, or immunotherapy[1]. Despite advancements, OCSCC has a high loco-regional recurrence (ReOCSCC) rate, accounting for 90% of treatment failures, with recurrence rates ranging from 18% to 76%.[3]

Recurrence is influenced by tumor-related (stage, nodal involvement, differentiation, site, perineural, and lymphovascular invasion), patient-related (age, comorbidities, smoking, alcohol use, HPV status), and treatment-related factors (surgical margins, depth of invasion, adjuvant therapy compliance, radiation dose, and delays in treatment)[3,4]. Treatment options for ReOCSCC include salvage surgery (SS), palliative radiotherapy, and chemotherapy, with immune checkpoint inhibitors reserved for palliative settings. Re-irradiation must be carefully considered due to potential adverse effects.[5]

The five-year survival rate is 92% for non-recurrent cases and 30% for recurrent cases. This study aims to evaluate tumor-, patient-, and treatment-related risk factors and outcomes in loco-regional recurrence in post-surgery and post-radiotherapy OCSCC patients.[6]

## II. MATERIALS AND METHODS:

The study was conducted as a descriptive longitudinal observational study in the Department of Radiation Oncology, DBVP Rural Medical College and Hospital, Pravara Institute of Medical Sciences – DU, over duration of two years from March 2023 to February 2025, following approval from the Institutional Ethics Committee (IEC).

A total of 42 histo-pathologically proven, non-metastatic, recurrent oral cavity squamous cell carcinoma cases who had previously undergone surgery for the primary tumor and received adjuvant radiation therapy to the head and neck region, with or without concurrent chemotherapy, chemotherapy but experienced loco-regional disease failure, were included after obtaining written informed consent. Patients with distant metastasis and those with recurrence after primary radiotherapy (with or without chemotherapy) without prior surgery were excluded.

All patients included in the study underwent surgical resection of the primary tumor and neck nodes. The surgical procedures varied based on the extent of the disease and included wide local excision, composite resection, glossectomy, or partial glossectomy, with or without marginal, segmental, or hemi-mandibulectomy. Neck dissection was performed as either supra-omohyoid or modified radical neck dissection. Following surgery, radiotherapy was administered using 6-MV photons through either Intensity-Modulated Radiotherapy (IMRT) or Three-Dimensional Conformal Radiotherapy (3DCRT) techniques. The total dose ranged from 60 to 66 Gy, delivered at 1.8–2 Gy per fraction, with one fraction per day, five days a week, using a linear accelerator.

**Methods**

Patients who met the inclusion criteria were enrolled in the study. A comprehensive history was obtained from each patient using a structured questionnaire, which included details such as age, sex, comorbidities, addiction status (before and after treatment), occupation, primary tumor site, treatment received, and the duration of symptoms before recurrence. Information on primary disease staging and stage grouping was also documented.

Details of prior treatment were carefully reviewed, including the type of surgery performed and histopathological findings such as tumor histology, primary tumor size, depth of invasion, surgical margin status, presence of lymphovascular and perineural invasion, number of involved lymph nodes, extracapsular extension, and bone involvement. The time interval between surgery and the start of adjuvant therapy was noted. Radiotherapy details such as the total dose received, method of delivery, last date of treatment, and total duration were also recorded. Information on concurrent chemotherapy, including the number of cycles received, was documented. Disease-free survival was defined as the time from the completion of treatment (surgery and radiation therapy, with or without chemotherapy) to the date of recurrence.

A thorough clinical examination was performed to assess the site and extent of recurrence, lymph node involvement, and other clinical features. Staging was done based on the AJCC 8th edition TNM system. Possible risk factors contributing to recurrence were studied, including patient-related factors such as continued addiction, tumor-related factors such as initial disease stage, histology, lateralization, and nodal involvement, surgery-related factors such as resection margin status and depth of invasion, and treatment-related factors such as adequacy of adjuvant therapy and under-dosage. Patients underwent biopsy and radiological investigations to evaluate the extent of disease recurrence, nodal metastasis, and restaging.

Treatment intent was categorized as curative or palliative based on patient-specific factors, including general health and ECOG/KPS scores. Surgery was considered for fit patients, while unfit cases were offered alternatives like re-irradiation (ReRT) or palliative care. ReRT was planned based on disease extent, prior dose, organ constraints, and elapsed time (≥6–12 months),

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delivered via IMRT (curative) or 3DCRT (palliative) with doses of 50–66 Gy or 20–30 Gy, respectively. Chemotherapy was used in adjuvant or palliative settings, with regimens like Paclitaxel, Cisplatin, and 5-FU (weekly, 3–9 cycles), alternatives like Paclitaxel-Carboplatin, and second-line options like 5-FU with Methotrexate. Patients unfit for injectables received Oral Metronomic Chemotherapy (Gefitinib, Leucovorin, Methotrexate, Celecoxib).

Follow-up-Patients were monitored on follow-up visits and assessed based on RECIST CRITERIA 1.1 to evaluate treatment response and disease progression. Regular clinical and radiological assessments were performed to track outcomes, detect recurrence, and modify treatment plans as necessary.

## III. RESULTS:

Among the 42 cases studied to evaluate the risk factors and outcomes associated with loco-regional recurrence following post-surgical adjuvant radiation therapy, with or without concurrent chemotherapy, in patients with oral cavity squamous cell carcinoma (OCSCC). The following key findings were observed:

**Demographic Data** The age of the patients ranged from a minimum of 28 years to a maximum of 75 years, with a median age of 51 years. 12(28.5%) patients were within 46-52 years age group. The study included 32 males (75%) and 10 females (25%), resulting in a male-to-female ratio of 3.2:1.(table-1)

**Comorbidities and Addictions** Among the 42 patients, 5 had hypertension, 3 had type II diabetes mellitus, and 34 had no comorbidities. The data highlights that smokeless tobacco, either alone or in combination with other substances, is the predominant addiction, impacting over 90% of individuals surveyed**.** The addiction duration varied from 3 to 50 years**.** Smokeless tobacco (SLT) addiction was the most common, affecting 16 (36.4%) individuals**,** followed by SLT + Alcohol (AL) in 13 (29.5%) individuals**.** A smaller proportion had SLT + Smoking Tobacco (ST) + AL addiction 6 (13.6%) individuals, and ST + SLT addiction 5, (11.4%) individuals**.** The least frequent addictions were ST + AL 1,( 2.3%)patient and having no addiction 1(2.3%)patient**. (Table-1)**

**Table-1 showing patient cahrecteristics**

| variable | Number of patients (%) |
|---|---|
| Age (yr) | |
| <50 | 19 (45) |
| ≥50 | 23 (55) |
| Sex | |
| Male | 32(76) |
| Female | 10(24) |
| Addictions | |
| SLT | 16(32%) |
| SLT+AL | 13(31%) |
| SLT+ST+AL | 6(14%) |
| ST+AL | 1(2%) |
| NO | 1(2%) |
| Overall TNM stage | |
| II | 5 |
| III | 11 |
| IV A | 8 |
| IV B | 18 |
| Lateralization | |
| Left | 24(57) |

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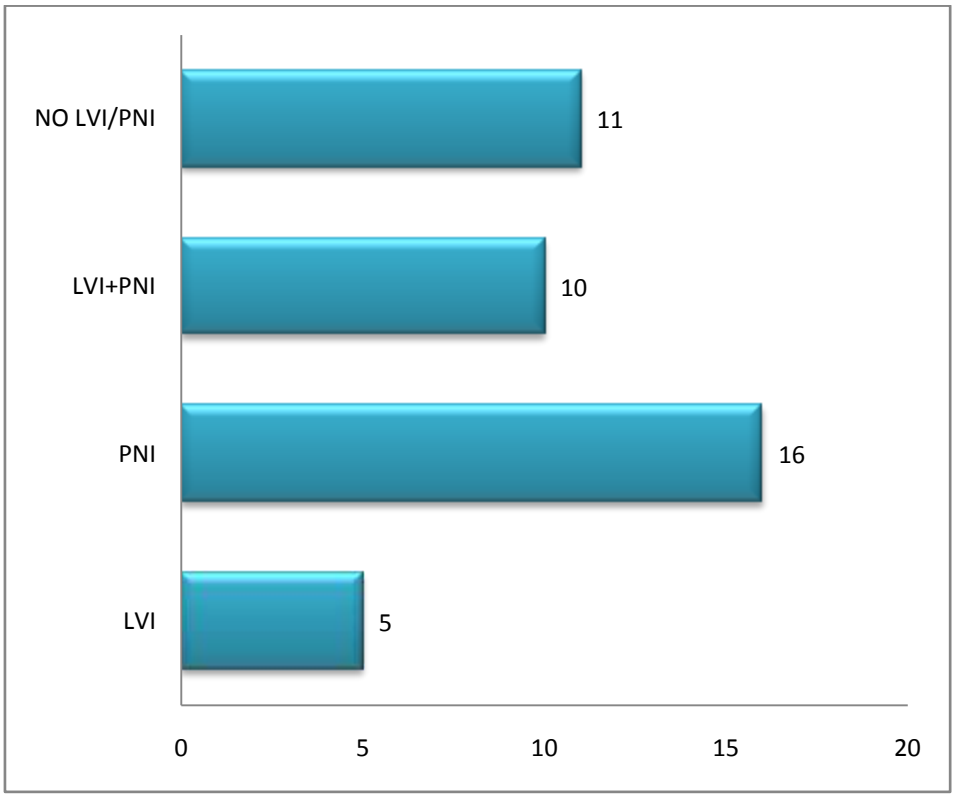
| | |
|---|---|
| Right | 18(43) |
| Grading | |
| WD | 17 (40.5) |
| MD | 25 (59.5) |
| PD | 0 |
| DOI (mm) | |
| <10 | 16(38%) |
| ≥10 | 22(52.4%) |

**Clinicopathological Features** Among the identified primary tumor subsites, buccal mucosa was the most common (40.4%), followed by the lateral border of the tongue (31%), gingivo-buccal sulcus (16.6%), right lower alveolus (7.14%), left upper gingivo-buccal sulcus (2.38%), right lower lip (2.38%), and left retromolar trigone (2.38%). The left side was more frequently affected (57.1%) compared to the right (42.9%).

**Histology and Tumor Invasion** Moderately differentiated squamous cell carcinoma (MDSCC) was the most frequent histopathological subtype (54.76%), followed by well-differentiated squamous cell carcinoma (WDSCC) (38.10%). The depth of invasion ranged from 3 mm to 24 mm, with a median of 10 mm; 38% of cases had a depth of invasion <10 mm, while 52.4% had >10 mm. Perineural invasion (PNI) was present in 38% of cases, lymphovascular invasion (LVI) in 12%, and both in 10 cases (24%). Bone involvement was observed in 8 patients (19%).(Graph-1)




Graph-1 Showing tumor invasion

**Surgical Margins and Nodal Involvement** Close surgical margins (<5 mm) were found in 28.5% of cases, while 40.5% had margins between 3-5 mm. Resection margins were involved in 12% of cases. Nodal involvement was present in 71.4% of patients, with a range of 1 to 19 positive nodes, and 70% of these cases showed extracapsular extension. Most patients (70%) had 1-2 positive lymph nodes,

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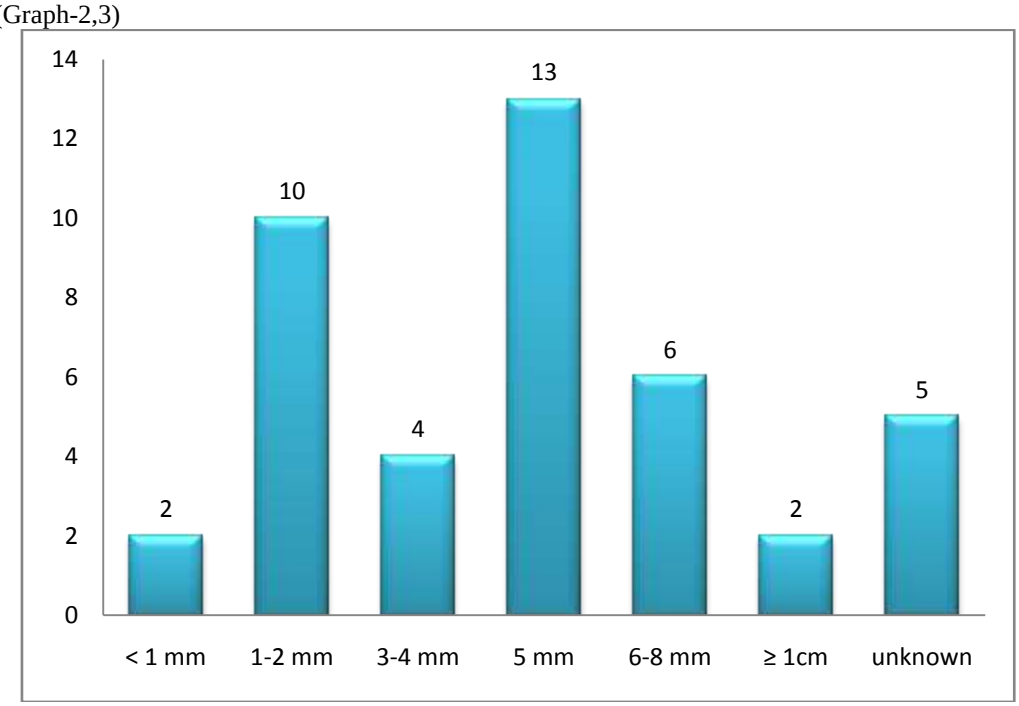
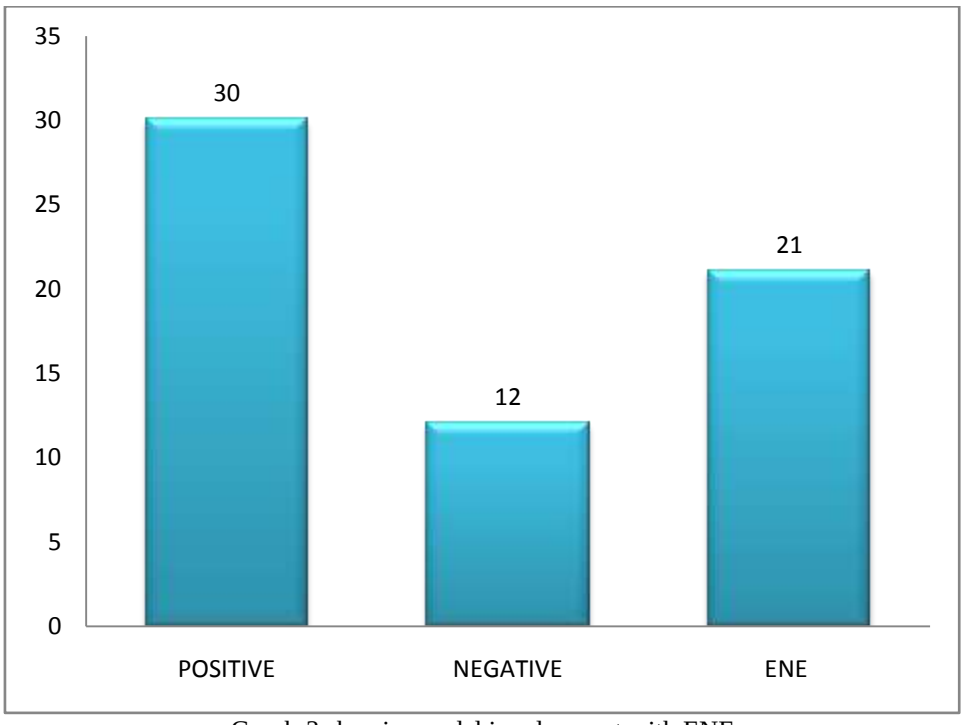
while one case had extensive nodal metastasis (>10 nodes).(Graph-2,3)




Graph -2- showing closest surgical margins




Graph-3 showing nodal involvement with ENE

**Stage Grouping** Most patients had loco-regionally advanced disease, with 61.9% in stage IV (30.7% stage IVA and 69.3% stage IVB), 26.1% in stage III, and 12% in stage II.(Table-1)

**Treatment** The interval between surgery and radiation therapy varied, with most patients (40.5%) starting radiation within 4-5 weeks post-surgery, while 28.6% began at 6-7 weeks, and 19% at 8-10 weeks. The median gap was 5 weeks (35

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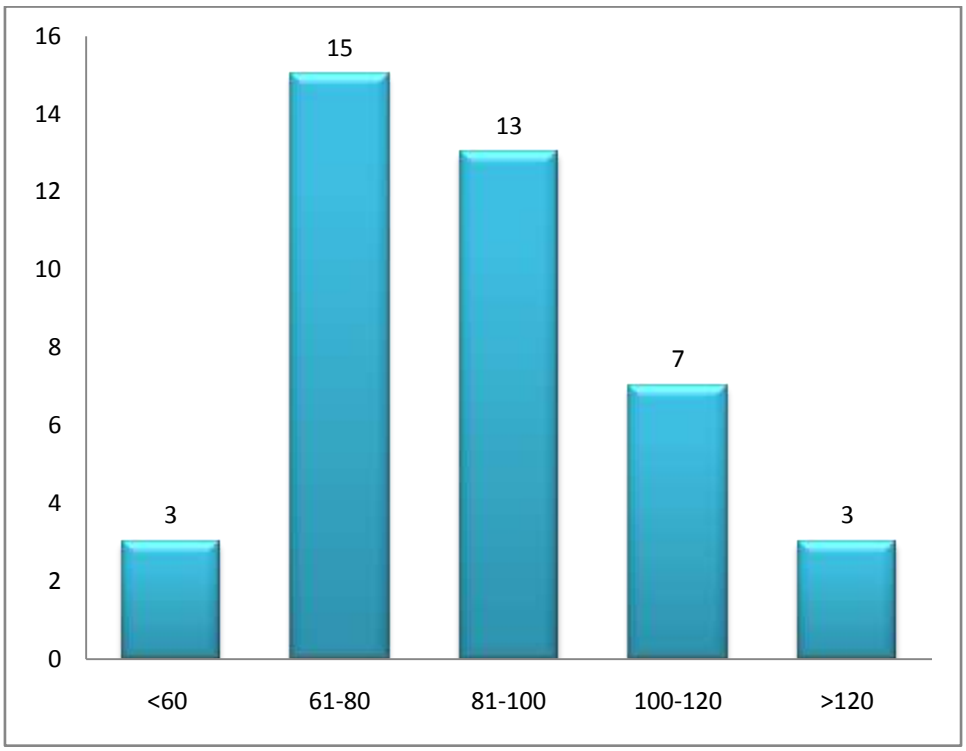
days). All 42 patients received adjuvant radiation, with 88% undergoing concurrent chemoradiotherapy. The majority (78.5%) received 60-66 Gy, while others received doses ranging from 40 Gy to >66 Gy. IMRT was the most commonly used radiation technique (76%), followed by 3DCRT (22%), and IGRT in one case. Concurrent chemotherapy was administered to 37 patients, with most receiving 4-5 cycles of Cisplatin.

**Overall Treatment Time** The treatment duration ranged from 49 to 134 days, with the highest proportion of patients (35.7%) completing treatment within 61-80 days. 30.9% took 81-100 days, and 23.8% exceeded 100 days.(graph-4)




Graph-4 Over all treatment time in days

**Disease-Free Survival (DFS)** The DFS duration ranged from 3 to 18 months, with a median of 7 months. Most patients achieved DFS between 8-12 months, while 18-month DFS was noted in 4 cases. Short-term DFS (≤6 months) was observed in 7 patients, with the shortest survival recorded at 3 months. The mean time to recurrence was 16.26 months.

**Recurrence and Continued Addiction** Among the 42 patients, the most common recurrence sites were the flap/scar (38.9%) and Buccal mucosa (30.9%), followed by the lateral border of the tongue (21.42%) and Gingivo-Buccal Sulcus (7.14%). Recurrence was staged as II in 9.5% of cases, while 93% recurred as locally advanced stage III-IV disease. Post-treatment addiction resumption was observed in 10 patients, with 3 returning to tobacco chewing, 2 to alcohol, 2 to mishri, 2 to supari, and 1 to gutka.

**Salvage Treatment** Salvage surgery was performed in 26% of patients, involving wide local excision (WLE) with or without modified radical neck dissection (MRND), mandibulectomy (segmental or hemimandibulectomy), and various reconstructive techniques such as nasolabial flap, free fibula flap (FFF), pectoralis major myocutaneous (PMMC) flap, free radial forearm flap (FRFF), or anterolateral thigh (ALT) flap. Four post-surgery patients were undergoing or had completed palliative chemotherapy and were on OMCT.

## IV. DISCUSSION:

Head and neck cancers (HNCs), particularly oral cavity squamous cell carcinoma (OCSCC), continue to pose a significant public health challenge, especially in regions like South Asia, where lifestyle-related risk factors such as tobacco and alcohol use are highly prevalent.

In our study, the median patient age was 51 years, aligning with findings from Rath et al. (2020) [7], who reported a median age of 46 years

for oral cavity cancer recurrence. The male-to-female ratio was 3.2:1, consistent with studies by Ganbat et al. (2024) [8] and Lee et al. (2023) [9], both of which highlighted a significantly higher recurrence risk in males. Furthermore, Lee et al. (2023) [9] reported a lower recurrence rate in females (6.3%) compared to males (20.2%), a trend that aligns with our findings.

Comorbid conditions such as hypertension (11.9%) and diabetes mellitus (7.1%) were present in our cohort, with diabetes having a complex relationship with recurrence. Salehi et al. (2024) [10] suggested that while hyperglycemia increases cancer risk, diabetes itself may reduce recurrence likelihood, a finding requiring further exploration. Among lifestyle factors, tobacco use was overwhelmingly high (90%), with smokeless forms like chewing tobacco (71.4%), mishri (38%), and gutka (35%) being the most prevalent. This aligns with Znaor et al. [11], who identified smokeless tobacco as the strongest risk factor for oral cancer. Smoking prevalence (26%) was comparable to Alim et al. (2024) [12], who reported 27.1% smokers among OCSCC patients. Alcohol consumption (47.6%) was also substantial, reinforcing findings from Sood et al. (2022) [13], who observed similar rates, emphasizing the compounded risk of concurrent tobacco and alcohol use in poorer treatment outcomes.

The most commonly affected subsite in our study was the buccal mucosa (40.4%), followed by the lateral border of the tongue (31%). While many studies, including Noble et al. (2016) [14], report the oral tongue as the most affected site, our findings align with Rath et al. (2020) [36], who observed a similar trend of buccal mucosa predominance. Additionally, gingivo-buccal sulcus (16.6%) and alveolar ridge involvement were noted, with tumors in these locations demonstrating worse local control, consistent with findings by Deshmukh et al. and Suresh et al. [15]. A notable lateralization pattern was observed, with left-side predominance (57.1%), a trend also highlighted by Petti et al. (2009) [16], who linked site-specific recurrence risks to lateralized tobacco usage patterns.

Advanced-stage disease (Stage III/IV) was predominant in our cohort (88%), similar to findings by Ghoshal et al. (2016) [17], who reported that 80% of oral cancers present at late stages. Additionally, Sharma et al. (2016) [18] observed that the majority of recurrences occur in Stage III/IV patients, mirroring our findings and reinforcing the need for early detection and aggressive treatment approaches. Understanding these demographic, clinical, and pathological factors is crucial for refining treatment strategies, improving follow-up protocols, and ultimately enhancing patient survival outcomes.

Histopathological differentiation plays a crucial role in recurrence patterns of oral cavity squamous cell carcinoma (OSCC). In our study, moderately differentiated squamous cell carcinoma (MDSCC) was the most common subtype (59.52%), aligning with Patel et al. (2006) [19], followed by well-differentiated SCC (WDSCC) at 40.48%. Poorly differentiated tumors, known for their aggressive nature, have been associated with higher recurrence rates, as noted by Eldeeb et al. (2012) [20], whereas Priya et al. (2012) [21] found no correlation between differentiation and recurrence. Several histopathological features impact prognosis, including perineural invasion (PNI), lymphovascular invasion (LVI), depth of invasion (DOI), bone invasion, and extranodal extension (ENE). Our study reported DOI ranging from 3 mm to 24 mm, with most cases (52.3%) exceeding 10 mm, mirroring findings by Liao et al. [22] and Dolens et al. [23], who linked increased DOI with worse disease-free survival. PNI was observed in 83.8% of cases, and LVI in 16.2%, with 10 patients exhibiting both, reinforcing their role as adverse prognostic factors, as highlighted by Brandwein-Gensler et al. (2005) [24] and Jerjes et al. [25], who reported a strong association between LVI and nodal metastasis. Bone invasion was noted in 19% of cases, similar to Jerjes et al. [25], indicating that bone involvement alone may not be an independent prognostic factor, a conclusion supported by Ash, Mücke, and Petrovik [23], as well as Harper et al. [26]. These findings emphasize the significance of histopathological factors in recurrence risk assessment, guiding treatment planning and postoperative surveillance strategies.

In this study, nodal involvement was observed in 30 cases, with affected lymph nodes ranging from 1 to 19, and extracapsular extension (ECE) present in 21 cases. Most patients (70%) had 1-2 positive nodes, while 26.7% had 3-10 nodes, and only one patient (3.3%) had extensive nodal metastasis (>10 nodes). Worse prognosis is expected in nodal disease, particularly with extracapsular spread, which is linked to poor survival and increased recurrence risk, necessitating adjuvant therapy. Dolens et al. [23] confirmed ENE significantly increases mortality and relapse risk. The risk of nodal metastasis varies by tumor site, with buccal cancers showing better neck control than tongue cancers, as reported by Liao et al. [22].

Margin status is a key prognostic factor, with the UK Royal College of Pathologists defining margins ≥5 mm as clear, 1-5 mm as close, and <1 mm as involved. In this study, 4.7% had involved margins, 64.3% had close margins, and 19% had clear margins, comparable to Guerra et al. (2003)[27], who reported 21% clear margins. Our findings contrast with Bulbul et al. [28], who found a higher recurrence likelihood with positive margins, as most of our patients had no involved margins. Traditional histopathological factors such as DOI, ENE, PNI, LVI, and margin involvement significantly influenced overall survival (OS), disease-specific survival (DSS), and disease-free survival (DFS) in OSCC patients.

All patients underwent surgery with neck dissection, followed by adjuvant radiotherapy (RT) with or without chemotherapy, targeting the tumor bed and bilateral neck fields, unlike other studies considering ipsilateral or bilateral nodal irradiation. Most patients (33/42) received 60-66 Gy over 30-33 fractions, with variations including hypofractionation (25 Gy/10#) and dose escalation (73.5 Gy/35#), while three patients defaulted before completing RT. IMRT or 3DCRT was predominantly used, except for one patient who received IGRT.

Postoperative RT initiation varied from 3 to >10 weeks, with most patients starting within 28-42 days, and a median of 35 days, aligning with Chakraborty et al. (2015) [29]. While NCCN recommends starting RT within 42 days and the Dutch Head and Neck Society within 30 days, delays in RT initiation are linked to poorer outcomes , often due to patient- or physician-related factors. However, Sun et al. (2023) [30] found no significant prognostic difference between starting at 4 vs. 6 weeks. PORT should commence no later than six weeks for optimal survival and locoregional control .

Overall treatment time (OTT) ranged from 49 to 134 days, with a median of 83 days, mirroring Chakraborty et al. (2015) [29]. Most patients (35.7%) completed treatment within 61-80 days, 30.9% within 81-100 days, and 23.8% exceeded 100 days, aligning with Chakraborty et al. [29]. The primary causes of delays were mucosal toxicities and patient-related issues. Prolonged RT duration impacts survival more than delays in initiation, emphasizing the need for adherence and minimizing treatment breaks to improve clinical outcomes.

Disease-free survival (DFS), defined as the time from completion of primary treatment to recurrence, ranged from 3 to 18 months in our cohort, with a median DFS of 7 months, aligning with Waldram et al. (2019) [31], who reported 6 months. Consistent with Diaz et al. [32] and Pop et al. [33], who observed locoregional failure within 12–24 months, all recurrences (100%) in our study occurred within this timeframe. Recurrences (n=42) were exclusively in high-dose radiation areas, predominantly in flap or scar regions (38.9%) and buccal mucosa (30.9%), followed by the lateral tongue (11.9%), gingivobuccal sulcus (7.14%), and lip (2.38%). Flap/scar recurrences (38%) highlighted a significant tendency for tumor relapse at surgical reconstruction sites, while buccal mucosa recurrences exhibited laterality differences, with 53.8% occurring in the left buccal mucosa. The lateral tongue, vulnerable due to complex lymphatic drainage and surgical margin challenges, also showed significant recurrence rates. Similar to Waldram et al. (2020) [32], the majority (90.5%) of recurrences were advanced-stage (III–IV), with only 9.5% occurring at stage II, supporting findings by Liu SA et al. (2007) [34], who emphasized that late-stage recurrences are associated with poorer prognoses and limited curative options.

While 76.2% of patients successfully discontinued addictions, 23.8% relapsed, primarily resuming tobacco chewing and alcohol consumption, increasing their risk for recurrence due to mucosal field cancerization. Treatment modalities included salvage surgery (n=11), re-irradiation (n=8, with doses of 50–66 Gy, six receiving concurrent chemotherapy), and systemic chemotherapy (two-drug and three-drug regimens based on performance status). Some patients were shifted to oral metronomic chemotherapy due to poor performance or treatment toxicity. Follow-up and compliance remained a challenge, with only 4.8% maintaining regular post-treatment follow-ups, 26.2% undergoing active treatment, and 69% discontinuing care. Among those lost to follow-up, 33.3% defaulted at various stages, while 35.7% succumbed to the disease, underscoring the aggressive nature of recurrent OCSCC and the need for improved patient adherence. Locoregional relapse remains the predominant failure pattern in head-and-neck SCC, with most failures occurring in-field within high-dose volumes, consistent with existing literature.

This study highlights the intricate interplay of risk factors in loco-regional recurrence post-surgery and radiotherapy in oral cavity SCC. Optimizing outcomes requires timely surgical planning, strict adherence to radiation timelines, and continuous post-treatment surveillance. While our findings provide valuable insights, further prospective research is needed to refine prognostic models and enhance clinical decision-making.

## V. CONCLUSION:

This study underscores the significant impact of patient- and tumor-related factors on loco-regional recurrence (LRR) in oral cavity squamous cell carcinoma (OCSCC) following surgery and adjuvant radiation therapy. Despite multimodal treatment approaches, recurrence rates remained high, with most failures occurring in previously irradiated high-dose areas, particularly at surgical flaps and the buccal mucosa. The findings highlight the aggressive nature of recurrent OCSCC, with most recurrences presenting at advanced stages and demonstrating poor overall outcomes. Salvage treatment options, including re-surgery, re-radiation, and palliative chemotherapy, provided limited survival benefits, emphasizing the need for individualized treatment strategies.

Early identification of high-risk patients, meticulous surgical margin clearance, and strict post-treatment surveillance are essential to mitigating recurrence. Additionally, addressing modifiable risk factors such as tobacco and alcohol use through sustained de-addiction programs could further improve long-term outcomes. A multidisciplinary approach incorporating precision oncology, molecular profiling, and emerging targeted therapies may enhance treatment efficacy. Future research should focus on optimizing risk stratification and exploring novel therapeutic modalities to improve survival and quality of life for patients with recurrent OCSCC.

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