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ORIGINAL ARTICLE

Postoperative Complications Following Surgery for Oral Cavity Cancer: A Retrospective Analysis from a Tertiary Care Centre

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Abstract

Background: Treatment for oral cavity cancer typically involves surgical resection, neck dissection, and reconstructive procedures. Postoperative complications can significantly affect surgical outcomes, increase healthcare costs, and prolong hospital stay. This study presents a retrospective analysis of postoperative complications following surgery for oral cavity cancer at a tertiary care center. **Methods:** A retrospective review was conducted on all patients who underwent surgery for oral cavity cancer at the Cancer Institute (WIA), Chennai, between January 1 and December 31, 2024. Data regarding the subsite of the oral cavity, reconstructive procedures, and postoperative morbidity were retrieved from the hospital database. **Results:** A total of 321 patients underwent surgery for oral cavity cancer in 2024, with the tongue (39.6%) and buccal mucosa (37.1%) being the most commonly involved subsites. Among 213 reconstructive procedures, the pectoralis major flap was the most frequently used (54.9%). Postoperative complications were observed in 42 patients (13.1%), with re-exploration (7.2%) and major orocutaneous fistula (4.7%) being the most common. Based on the Clavien–Dindo classification, Grade IIIA complications were most frequent (8.4%), while Grade V mortality occurred in 0.6% of cases. **Conclusion:** Surgical management of oral cavity cancer demonstrates low mortality and manageable morbidity. Early identification and prompt management of postoperative complications are crucial in achieving optimal surgical outcomes.

Keywords: Postoperative Morbidity, Reconstruction Flap, Surgical Outcomes, Wound Dehiscence

1. Introduction

Oral cavity cancer constitutes approximately 30–40% of all malignant tumors in India[1]. The common subsites include the lip, oral tongue, floor of the mouth, buccal mucosa, alveolus, retromolar trigone, and hard palate. The standard treatment protocol involves primary surgical resection, followed by adjuvant therapy based on postoperative histopathological findings[2].

Advancements in surgical techniques, improved perioperative care, and multidisciplinary management have significantly enhanced postoperative outcomes, resulting in reduced morbidity and better quality of life for patients. However, postoperative complications remain a critical concern, as they may occur in the immediate, delayed, or prolonged postoperative period. Short-term complications can directly affect recovery and delay the initiation of adjuvant therapy, while long-term complications can adversely impact functional outcomes and overall quality of life[3]. Several studies have documented postoperative morbidity associated with oral cavity cancer surgery[4-6]. The present study provides a retrospective analysis of postoperative complications following surgery for

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oral cavity cancer, based on data from a high-volume tertiary cancer care center.

2. Aim and Objectives

The aim of this study was to carry out a retrospective analysis of postoperative complications following surgery for oral cavity cancer.

2.1 Objectives

- Retrospective analysis of postoperative complications following surgery for oral cavity cancer.
- To analyse the subsites of cancer distribution and reconstructive procedures performed.

3. Review of Literature

Postoperative complications are a common challenge in oral oncologic surgery, with their incidence varying widely across studies depending on factors such as surgical technique, tumor characteristics, reconstruction methods, and perioperative care. Reported overall complication rates range from 15% to 62.12%. The lowest rate was observed by Divya *et al.* (15%), whereas Belusic-Gobic *et al.,* (62.12%) reported the highest incidence, primarily due to flap-related complications[4-7]. The rate documented by Katta *et al.,* (45%) is comparable to that of Penel *et al.*, (45%) and McGurk *et al.,* (47%), suggesting a similar range of postoperative morbidity among these studies[3,5,6].

Among specific complications, wound dehiscence was one of the most frequently reported. The incidence varied from 2.4% to 30.71%[6,8]. Wound infection rates also showed significant variation, ranging from 1.2% to 22.7%[5,9]. The infection rate in Katta *et al.* (4.20%) was relatively low and aligned with findings by Sakai *et al.,* (4.2%) and Divya *et al.,* (5.2%), which can be attributed to effective intraoperative aseptic protocols and meticulous postoperative wound care[4,6,10].

Partial flap loss was reported in 1.2% to 14.9% of cases, whereas total flap loss showed a broader range—from 1.4% to 37.03%[5,10,11]. The 20.71% total flap loss observed in Katta et al. was higher than that reported by Divya *et al.,* and McGurk *et al.,* (2.5%), but lower than that of Devendra *et al.*, possibly reflecting differences in surgical complexity, patient comorbidities, and flap selection techniques[4,5,11].

The incidence of Orocutaneous Fistula (OCF) ranged between 3.7% and 17.14%[6,11]. Fistula formation continues to be a significant postoperative concern, particularly in patients with advanced-stage tumors undergoing composite resections. Wound bleeding was relatively uncommon, with rates ranging from 1.2% to 2.80%[4,6], indicating generally effective intraoperative hemostasis and postoperative monitoring across studies.

4. Materials and Methods

4.1 Study Design and Setting

This retrospective study was conducted in the Department of Surgical Oncology at the Cancer Institute (WIA), Chennai. The analysis included all patients who underwent surgical treatment for oral cavity cancer between January 1, 2024, and December 31, 2024. The study was approved by the Institute Ethics Committee.

4.2 Patient Population

All patients who underwent surgery for histologically confirmed oral cavity cancer during the study period were included in the analysis.

4.3 Data Collection

Patient data were retrieved from the hospital's electronic medical record system. Information collected included details on tumor subsite, type of reconstructive procedure performed, and postoperative morbidity.

4.4 Definitions

Clavien–Dindo Classification of Surgical Complications[12]
Grade Description

I Any deviation from the normal postoperative course without the need for pharmacological treatment or surgical, endoscopic, or radiologic intervention.

II Complications requiring pharmacological treatment (e.g., antibiotics, blood transfusion, or total parenteral nutrition).

IIIa Complications requiring surgical, endoscopic, or radiologic intervention without general anesthesia.

IIIb Complications requiring surgical, endoscopic, or radiologic intervention under general anesthesia.

IVa Life-threatening complications requiring intensive care management with single-organ dysfunction.

IVb Life-threatening complications requiring intensive care management with multi-organ dysfunction.

V Death of a patient due to a postoperative complication.

4.5 Statistical Analysis

Descriptive statistics were used to analyze patient characteristics, reconstructive procedures, and postoperative morbidity. Results were expressed as frequencies and percentages.

5. Results (Including Observations)

Total number of operated cases, ASA class (American Society of Anesthesiologists physical status classification system) and subsite distribution. A total of 321 patients underwent surgery for oral cavity cancer in 2024. Based on the ASA classification, 40 patients (12.5%) were categorized as ASA I, 129 (40.1%) as ASA II, and 152 (47.4%) as ASA III. Comorbidities were present in 270 patients (84.1%). Risk factors, including tobacco use, areca nut consumption, and alcohol use, were identified in 230 patients (71.7%). Histopathological examination revealed close margins (<5 mm) in 7 patients (2.1%) and positive margins in 4 patients (1.3%). Postoperative adjuvant treatment, comprising radiotherapy and/or chemoradiotherapy, was administered to 220 patients (68.5%) (Table 1).

The tongue was the most common subsite involved (127 patients; 39.6%), followed by the buccal mucosa (119 patients; 37.1%). Other subsites included the gingivo-buccal complex (28; 8.7%), maxilla and upper alveolus (17; 5.3%), retromolar

Table 1. Baseline clinicopathological characteristics of patients undergoing surgery for oral cavity cancer

Variable	Number (n)	Percentage (%)
Total patients undergoing surgery	321	100
ASA I	40	12.5
ASA II	129	40.1
ASA III	152	47.4
Patients with co-morbid illness	270	84.1
Risk factors (Tobacco, areca nut use and alcohol consumption)	230	71.7
Histopathological close margins (<5 mm)	7	2.1
Positive Margins	4	1.3
Received postoperative adjuvant treatment (radiotherapy and/or chemoradiotherapy)	220	68.5

Table 2. Subsite of cancer distribution

Subsite	Number of patients (n=321)	Percentage (%)
Tongue	127	39.6
Buccal Mucosa	119	37.1
Gingivo Buccal Complex	28	8.7
Maxilla and Upper Alveolus	17	5.3
Retromolar Trigone	17	5.3
Floor of Mouth	11	3.4
Lip	2	0.6

trigone (17; 5.3%), floor of the mouth (11; 3.4%), and lip (2; 0.6%) (Table 2).

5.1 Reconstructive Procedure

Among the 213 patients who required reconstruction, the Pectoralis Major Myocutaneous (PMMC) flap was the most frequently used (117 patients; 54.9%), followed by free flaps (55; 25.8%), and local flaps (41; 19.3%) (Figure 1A).

5.2 Postoperative complications

Postoperative complications occurred in 42 patients (13.1%). The most frequent complications included re-exploration under general anesthesia (23; 7.2%) and major oro-cutaneous fistula (OCF) (15; 4.7%). Other complications observed were minor OCF (10; 3.1%), parotid fistula (9; 2.8%), hematoma (7; 2.2%), and surgical site infection (5; 1.6%). Notably, no cases of chyle leak were reported.

Flap-related complications comprised partial flap loss (<50%) in 17 cases (7.9%), total flap loss (>50%) in 7 cases (3.2%), and redo flap surgeries in 8 cases (3.8%). (Table 3) Complication rates were broadly comparable across reconstruction modalities, occurring in 14.5% of patients undergoing PMMC reconstruction, 18.2% of those undergoing free-flap reconstruction, and 17.1% of patients reconstructed with local flaps (Figure 1B).

Table 3. Postoperative complications- surgical site and flap related

Type of Complications	Number of Cases; n=321	Percentage (%)
Surgical site infection	5	1.6
Major OCF	15	4.7
Minor OCF	10	3.1
Hematoma	7	2.2
Exploration under GA	23	7.2
Parotid fistula	9	2.8
Chyle leak	0	0
Partial flap loss < 50%	17 (n=213)	7.9
Total flap loss >50%	7 (n=213)	3.2
Redo flaps	8 (n=213)	3.8

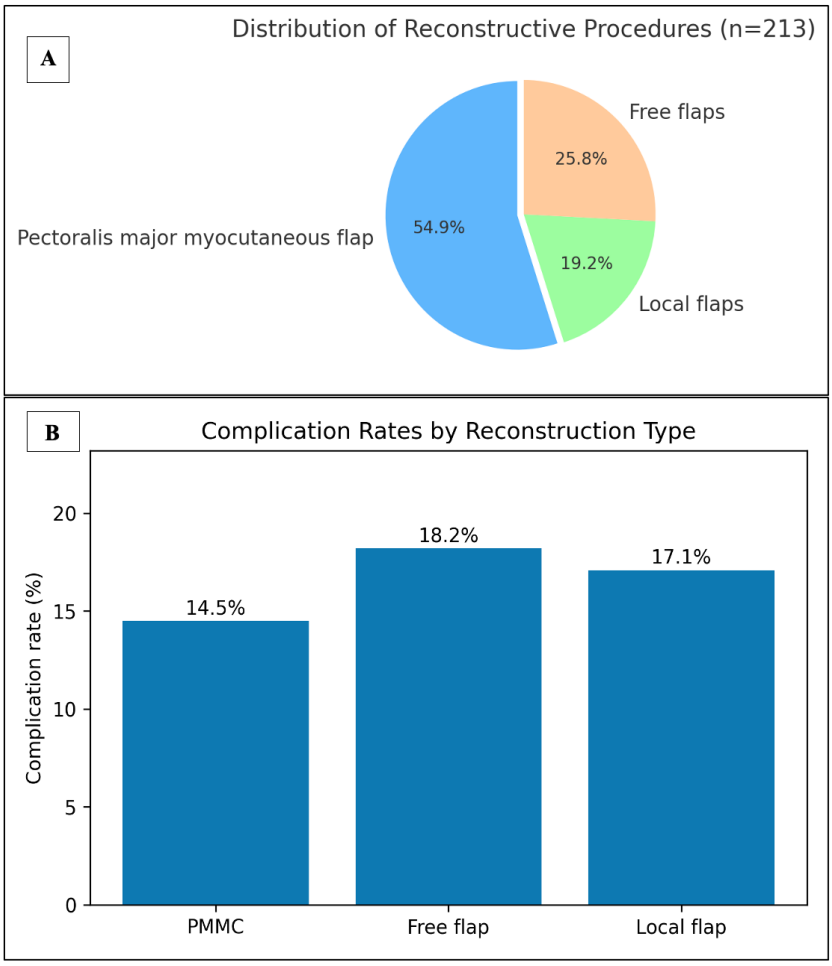

Figure 1. Distribution of reconstructive procedures performed in the study cohort and their complication rates.

5.3 Postoperative Complications as per Clavien Dindo Grade

According to the Clavien–Dindo classification, Grade IIIA complications were the most frequent (27 patients; 8.4%), followed by Grade IIIB (12; 3.7%), Grade IV (1; 0.3%), and Grade V (2; 0.6%) mortality cases (Table 4).

Table 4. Clavien Dindo grade of postoperative complications

Clavien Dindo Grade	Number of Patients; n=321	Percentage (%)
Grade 3A	27	8.4
Grade 3B	12	3.7
Grade 4	1	0.3
Grade 5	2	0.6

6. Discussion

Surgical complications are an inevitable aspect of operative procedures and are defined as any unfavorable, unintended, and direct outcome of surgery that adversely affects the patient[10]. Another definition describes them as detrimental developments that occur either intraoperatively or during the postoperative period[9].

In recent years, substantial advancements in surgical techniques, the availability of newer antibiotics, early involvement of multidisciplinary teams, meticulous perioperative planning, and improvements in critical care have significantly enhanced the safety of oral oncologic surgery. However, postoperative complications following major oral cancer procedures continue to pose important challenges, as they can increase treatment costs, delay the initiation of adjuvant therapies, worsen long-term outcomes, and, in severe cases, result in mortality. Hence, identifying high-risk patients preoperatively and counseling them thoroughly regarding potential surgical and comorbidity-related risks remain essential components of care.

The majority of patients in our cohort were medically complex, with 47.4% classified as ASA III and 84.1% having at least one comorbidity. Established risk factors, including tobacco, areca nut, and alcohol use, were present in 71.7% of patients, reflecting the typical epidemiological profile of oral cavity cancer. Despite the challenges associated with salvage surgery, close margins (<5 mm) and positive margins were observed in only 2.1% and 1.3% of patients, respectively. This favorable margin status may be partly attributable to the routine use of intraoperative frozen-section assessment, which facilitated real-time margin evaluation and guided additional resection when necessary. Furthermore, 68.5% of patients received adjuvant radiotherapy and/or chemoradiotherapy, underscoring the importance of a multidisciplinary approach in the management of recurrent or persistent disease.

In the present study, the overall complication rate was 13.1%, which is notably lower compared to previous reports — Katta *et al.,* (45%), Sakai *et al.,* (39.4%), *and* Divya *et al.,* (15%)[4,6,10]. The reported complication categories were not mutually exclusive, as some patients experienced multiple complications.

Wound infections contribute substantially to postoperative morbidity and prolonged hospital stays. They may lead to complications such as oro-cutaneous fistula, wound dehiscence, or flap loss, often resulting from inadequate aseptic precautions or suboptimal postoperative wound care. In this study, the surgical site infection rate was 1.6%, which is lower than that reported by Katta *et al.,* (4.2%), Sakai *et al.,* (14.1%), and Divya *et al.,* (5.2%)[4,6,11].

Chyle leak, though a dreaded postoperative complication, was not observed in any of our patients. This favorable outcome may be attributed to the routine intraoperative assessment for chyle leakage using the Valsalva maneuver, which enables prompt detection and management of potential leaks during surgery[4].

The hematoma rate (2.2%) in our series was lower than that reported by Devendra *et al.* (3.7%) and Katta et al. (2.8%), though slightly higher than Divya *et al.,* (1.2%)[4,6,11].

Flap-related complications included both partial and total flap loss. The partial flap loss rate (7.9%) was higher than those reported by Katta *et al.,* (2.28%) and Dhivya *et al.,* (2.1%), while the overall flap failure rate (3.2%) in our study was substantially lower than the 20.7% reported by Katta *et al.,*[4,6]. The re-exploration rate was 7.2%, most commonly due to free flap–related vascular thrombosis or bleeding. Although free-flap reconstruction demonstrated a numerically higher complication rate, the differences were modest and likely reflect variations in defect complexity and patient selection. These findings suggest that reconstructive modality alone may not be the primary determinant of postoperative morbidity in the salvage setting. Careful patient selection, meticulous surgical technique, and multidisciplinary perioperative management remain critical factors influencing outcomes irrespective of the reconstructive approach employed.

Studies by Girod *et al.* and Sakai *et al.,* identified free flap reconstruction as a significant predictor of

postoperative complications (p = 0.01 and p = 0.03, respectively)[10,13]. However, Sakai *et al*. emphasized that surgical factors such as reconstruction type cannot be viewed as independent risk factors, as they are influenced by multiple variables including disease severity, surgical technique, and surgeon experience[10]. Moreover, shorter operative duration and reduced intraoperative blood loss are associated with fewer complications. Given that free flap procedures inherently involve longer operating times and greater blood loss, they indirectly elevate the risk of postoperative morbidity.

The Clavien–Dindo classification system has been used by Vallur *et al.,* and Divya *et al.,* to standardize the grading of postoperative complications[4,14]. Across most studies, the majority of patients fall into Grade III, representing complications that require surgical or procedural intervention. Similarly, in our study, the higher proportion of Grade III complications can be attributed to wound dehiscence cases necessitating intervention. Early surgical management—including debridement of necrotic tissue, re-suturing of dehisced wounds, and control of wound bleeding—is critical to prevent progression to more severe or higher-grade complications[15].

6.1 Limitations

Limitations of this study include its retrospective design and reliance on hospital records, which may underreport minor complications or long-term outcomes. Additionally, detailed analysis of factors influencing complications, such as comorbidities, tumor stage, and adjuvant therapy, was beyond the scope of this study but would be valuable for future research.

7. Summary and Conclusion

Surgical management of oral cavity cancer remains effective, with acceptable morbidity and low mortality rates. The tongue and buccal mucosa were the predominant tumor subsites, and the pectoralis major myocutaneous flap was the most commonly used reconstructive option. Although postoperative complications occurred in a minority of patients, most were manageable with appropriate intervention. These findings highlight the importance of meticulous surgical technique, careful patient selection, and early identification of complications to optimize outcomes.

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