

Original article

Comparison of short-term postoperative complications between free flap and locoregional flap reconstruction in stage III–IV oral cavity cancer

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Abstract

Background: Optimal reconstruction for advanced oral cavity cancer requires balancing functional restoration against surgical morbidity. Free tissue transfer is the standard, yet locoregional flaps remain crucial in resource-limited settings. Their comparative short-term complication rates remain contested.

Objective: To compare short-term postoperative complications between free flap and locoregional flap reconstruction in stage III–IV oral cavity cancer.

Methods: A retrospective cohort study included 92 patients with stage III–IV oral squamous cell carcinoma who underwent immediate reconstruction at Buriram Hospital between August 2012 and August 2025. Patients were grouped into free flap ($n = 40$) and locoregional flap ($n = 52$) groups. The primary outcome was the 30-day overall complication rate. Multivariable logistic regression identified independent predictors of postoperative complications.

Results: Overall complication rates were similar between free flap and locoregional flap groups (47.5% vs. 44.2%; $P = 0.755$). Operative time was longer for free flaps ($P < 0.001$), but hospital stay and mortality were comparable. Positive surgical margins were more common with locoregional flaps (46.2% vs. 15.0%; $P = 0.002$). Advanced disease stage was associated with increased complication risk; T4 stage was an independent predictor of postoperative complications, while node-positive disease showed a similar trend.

Conclusion: Free flap and locoregional flap reconstruction demonstrated comparable short-term complication rates in advanced oral cavity cancer. Complication risk appeared to be more strongly associated with advanced tumor burden than reconstruction technique. Flap selection should be individualized based on defect characteristics, patient factors, and available resources.

Keywords: Free tissue flaps, mouth neoplasms, oral surgical procedures, surgical flaps.

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Oral cavity cancer represents a significant global health burden, ranking as the 16th most common cancer worldwide, with squamous cell carcinoma accounting for more than 90.0% of cases.⁽¹⁻³⁾ The incidence is particularly elevated in developing countries, where male-to-female ratios reach 2.5:1 and mortality rates are nearly twice as high in men.⁽³⁾ Survival outcomes remain suboptimal; five-year survival rates decline markedly with advancing tumor stage, underscoring the importance of timely diagnosis and effective treatment strategies.⁽⁴⁾

For patients with stage III–IV oral cavity cancer, multimodal management—typically involving surgical resection combined with adjuvant radiotherapy and/or chemotherapy—remains the standard of care.⁽⁵⁾ Ablative surgery for advanced disease frequently results in extensive composite defects involving mucosa, muscle, skin, or bone. These defects necessitate complex reconstruction to restore essential functions such as speech, mastication, and swallowing, while also preserving acceptable aesthetic outcomes.⁽⁶⁾

The two principal reconstructive approaches—free tissue transfer and locoregional flaps—offer distinct advantages and limitations. Free flap reconstruction has gained widespread acceptance due to its versatility, capacity to provide substantial tissue volume, and ability to match defect characteristics with high precision.^(7,8) Nevertheless, free flap surgery requires advanced microsurgical expertise, longer operative times, and greater perioperative resource allocation, and it carries inherent risks such as anastomotic thrombosis, partial flap loss, and donor-site morbidity.^(6,9)

In contrast, locoregional flaps (e.g., pectoralis major, submental, and infrahyoid flaps) continue to play an important role, particularly in resource-limited settings. Their advantages include technical simplicity, shorter operative time, and avoidance of microsurgical procedures, making them suitable for patients with significant comorbidities or limited physiological reserve.^(10,11) However, locoregional flaps may provide insufficient tissue volume for large or complex defects and may lack the design flexibility offered by free flaps.^(10–13)

The choice between free and locoregional flap reconstruction remains a subject of debate. While free flaps may offer superior functional and aesthetic outcomes in selected cases, locoregional flaps remain appropriate and effective alternatives in many clinical contexts, including institutions with constrained resources or in patients unable to tolerate prolonged surgery.^(8,10,14) Therefore, a comparative evaluation

of postoperative complication rates between these two major reconstructive strategies is essential for optimizing treatment planning and individualized patient care.

To date, no study has examined this comparison within Buri Ram province or at Buriram Hospital. Addressing this gap, the present study aimed to compare short-term postoperative complication rates between free flap and locoregional flap reconstruction in patients with stage III–IV oral cavity cancer. We hypothesize that the overall postoperative complication rate does not differ significantly between the two reconstructive approaches.

Materials and methods

Study design

This study was designed as a retrospective cohort analysis comparing short-term postoperative complications between free flap and locoregional flap reconstruction in patients with stage III–IV oral cavity cancer. All eligible cases treated between August 2012 and August 2025 were reviewed.

Setting and participants

The study was conducted at Buriram Hospital, a tertiary care hospital providing head and neck oncologic surgery services. All patients aged 18 years or older who underwent ablative surgery with immediate reconstruction during the study period were screened for eligibility. Clinical data were retrieved from the institutional electronic medical record system, operative notes, and hospital cancer registry using a standardized data collection form. All data were de-identified prior to analysis.

Inclusion and exclusion criteria

Patients with histologically confirmed stage III–IV oral squamous cell carcinoma according to the American Joint Committee on Cancer (AJCC) 8th edition⁽¹⁵⁾ who underwent surgical resection with immediate free flap or locoregional flap reconstruction were included—eligibility required documented 30-day postoperative outcomes, including mortality. Exclusion criteria were preoperative radiotherapy or incomplete medical records.

Variables and definitions

Baseline variables included age, sex, body mass index (BMI), comorbidities (such as diabetes mellitus, hypertension, and chronic kidney disease), and lifestyle factors. Tumors were staged according to the AJCC 8th edition and included both primary and recurrent

stage III–IV cases; recurrent tumors underwent preoperative restaging.⁽¹⁶⁾ Operative variables included flap type, neck dissection, operative time, and length of hospital stay. Postoperative complications were defined as events occurring within 30 days and categorized as wound, flap-related, or donor-site complications. Thirty-day mortality was also recorded.

Surgical procedures

All tumor resections were performed by experienced head and neck surgeons according to standard oncologic principles and NCCN guidelines.⁽¹⁷⁾ A surgical margin of 1.0–1.5 cm from the gross tumor boundary was maintained. Immediate reconstruction was performed using either free flaps—including radial forearm free flap (RFFF), anterolateral thigh (ALT) free flap, and fibula free flap (FFF)—or locoregional flaps, such as pectoralis major myocutaneous flap, infrahyoid flap, and nasolabial flap. Flap selection was individualized based on defect characteristics, patient factors, and surgeon judgment.

Outcome measures

The primary outcome was to compare the overall postoperative complication rate between free-flap and locoregional-flap techniques. This composite outcome included flap-related complications (e.g., necrosis, dehiscence) and donor site complications. Secondary outcomes included the specific rates of flap-related and donor-site complications, the mortality rate, operative time, and length of hospital stay.

Sample size estimation

Sample size estimation was based on reported complication rates of 68.0% for free flaps and 36.4% for locoregional flaps.⁽¹⁴⁾ Using a two-sample proportion formula ($\alpha = 0.05$, 80.0% power), the minimum required sample size was 38 patients per group. All eligible patients during the study period were included, yielding 40 in the free flap group and 52 in the locoregional flap group.

Statistical analysis

Data were analyzed using Stata MP version 18 (StataCorp LLC, College Station, TX, USA). Continuous variables were assessed for normality using the Shapiro-Wilk test and compared using Student's t-test or the Mann-Whitney U test, as appropriate. Categorical variables were analyzed using Pearson's chi-square or Fisher's exact test, while ordinal variables (T-stage and N-stage) were evaluated using the Mantel-Haenszel linear-by-linear association test.

Factors associated with postoperative complications were identified using univariable logistic regression, and variables with $P < 0.20$ in univariable analysis were considered for inclusion in the multivariable model based on clinical and statistical appropriateness. Risk ratios (RRs) with 95% confidence intervals (CIs) were calculated. Sensitivity analysis was performed by restricting the analysis to primary cases only. A two-sided $P < 0.05$ was considered statistically significant.

Ethical considerations

The study was approved by the Institutional Review Board of Buriram Hospital (No. BR 0033.102.1/73). Informed consent was waived due to the retrospective nature of the study. All patient data were anonymized to ensure confidentiality.

Results

Patient selection and baseline characteristics

A total of 101 patients with stage III–IV oral cavity cancer who underwent reconstructive surgery between August 2012 and August 2025 were screened for eligibility. After exclusions, 92 patients were included in the final analysis (**Figure 1**), comprising 40 patients in the free flap group and 52 in the locoregional flap group. Baseline demographic and clinical characteristics are summarized in **Table 1**. The median age was 69 years (IQR 63–75), and most patients were female (79.3%). No significant differences were observed between groups regarding age, sex, BMI, comorbidities, smoking, or alcohol use.

Tumor subsite distribution did not differ significantly between groups ($P = 0.082$; **Table 2**), although free flaps were more commonly used for buccal mucosa defects (57.5% vs. 32.7%) and locoregional flaps for alveolar ridge defects (38.5% vs. 15.0%). Positive surgical margins were significantly more frequent in the locoregional flap group (46.2% vs. 15.0%, $P = 0.002$). Although neck dissection rates were comparable between groups ($P = 0.117$), operative time was significantly longer in the free flap group (635 vs. 480 minutes, $P < 0.001$; **Figure 2A**).

The distribution of flap types is summarized in **Table 3**. RFFF was the most commonly used free flap, whereas pectoralis major myocutaneous flap was the predominant locoregional flap. Flap selection was based on defect characteristics, patient factors, and surgeon preference.

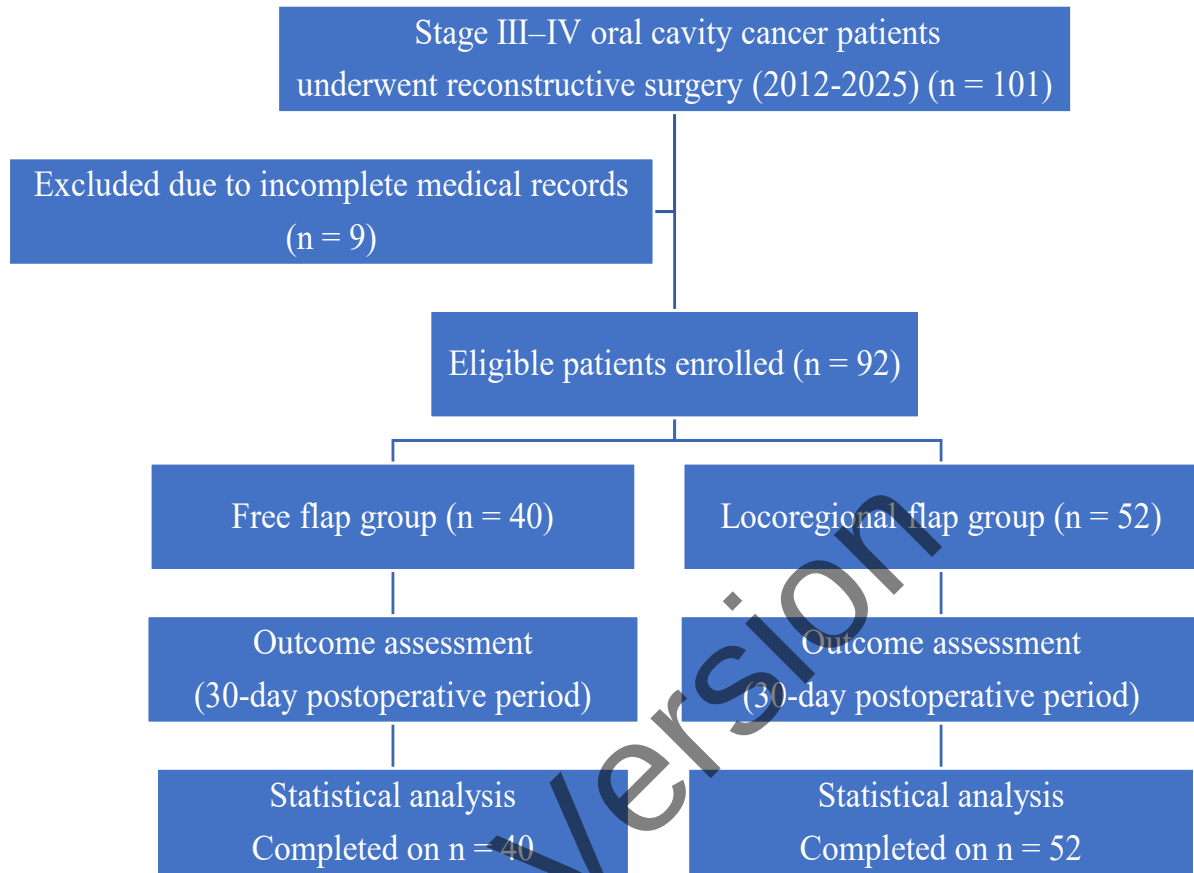


Figure 1. Study flow diagram.

Table 1. Patient demographics.

Variable	Free flap (n = 40)	Locoregional flap (n = 52)	P - value
Age, years (median, IQR)	68 (62.5–71)	70 (64.0–77.5)	0.120
Sex, (male/ female) (%)	8/32 (20.0/80.0)	11/41 (21.2/78.8)	0.892
BMI, kg/m ² (median, IQR)	21.5 (18.8–24.6)	20.9 (18.2–23.1)	0.231
Diabetes mellitus (%)	6 (15.0)	12 (23.1)	0.333
Other comorbidities* (%)	11 (27.5)	21 (40.4)	0.198
Smoking (%)	8 (20.0)	7 (13.5)	0.400
Alcohol use (%)	8 (20.0)	7 (13.5)	0.400

IQR, interquartile range; BMI, body mass index; *Includes hypertension, chronic kidney disease, and cerebrovascular disease.

Table 2. Tumor and treatment characteristics

Variable		Free flap (n = 40)	Locoregional flap (n = 52)	P - value
Tumor status				0.542
Primary tumor (%)		30 (75.0)	36 (69.2)	
Recurrent tumor (%)		10 (25.0)	16 (30.8)	
Location (%)				0.082 ^a
Tongue		6 (15)	6 (11.5)	
Buccal mucosa		23 (57.5)	17 (32.7)	
Alveolar ridge		6 (15)	20 (38.5)	
Floor of mouth		2 (5)	4 (7.7)	
Hard palate		1 (2.5)	2 (3.8)	
Retromolar trigone		1 (2.5)	3 (5.8)	
Soft palate		1 (2.5)	0 (0)	
T-stage (%)				0.976 ^b
Limited invasion	T1	0 (0)	1 (1.9)	
	T2	3 (7.5)	1 (1.9)	
	T3	8 (20.0)	13 (25)	
Extensive invasion	T4	29 (72.5)	37 (71.2)	
N-stage (%)				0.780 ^b
Node negative (N0)	N0	16 (40.0)	26 (50.0)	
	N1	13 (32.5)	10 (19.2)	
Node positive (N+)	N2	10 (25)	14 (26.9)	
	N3	1 (2.5)	2 (3.9)	
Staging				0.661
Stage III		7 (17.5)	11 (21.1)	
Stage IV		33 (82.5)	41 (78.9)	
Pathological involvement (%)		6 (15.0)	24 (46.2)	0.002
Neck dissection (%)		34 (85.0)	37 (71.2)	0.117
Tracheostomy (%)		12 (30.0)	14 (26.9)	0.745
Operative time (median, IQR)		635 (525–720)	480 (300–600)	< 0.001

IQR, interquartile range; BMI, body mass index. ^aFisher's exact test. ^bChi-square test for trend. Bold indicates statistical significance ($P < 0.05$).

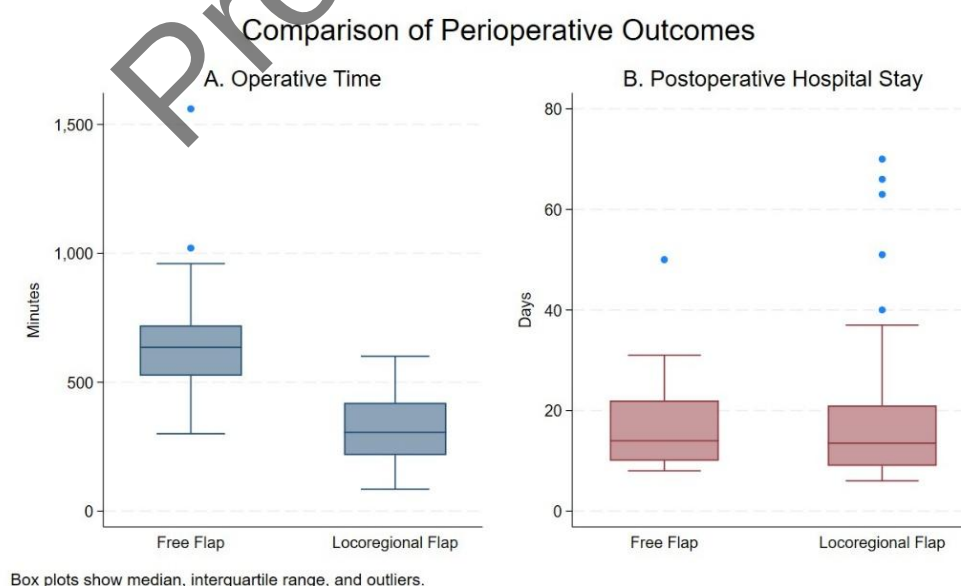


Figure 2. Comparison of perioperative parameters: (A) operative time shows a significant difference; while (B) length of hospital stay shows no significant difference.

Table 3. Distribution of flap types

Flap type	Free flap (n = 40)	Locoregional flap (n = 52)
RFFF	29	-
ALT free flap	4	-
FFF	4	-
Multiple free flaps		
RFFF + ALT free flap	1	-
ALT free flap + FFF	1	-
RFFF + ALT free flap + FFF	1	-
Pectoralis major myocutaneous flap	-	24
Infrahyoid flap	-	14
Nasolabial flap or cheek flap	-	5
Submental flap	-	1
Tongue flap	-	1
Temporalis flap	-	1
Sternocleidomastoid flap	-	1
Platysma flap	-	1
Multiple locoregional flaps	-	
Pectoralis major myocutaneous flap + cheek flap	-	2
Infrahyoid flap + tongue flap	-	1
Nasolabial flap + tongue flap	-	1

RFFF, radial forearm free flap; ALT, anterolateral thigh; FFF, fibula free flap.

Table 4. Postoperative outcomes and complications

Variable	Free flap (n = 40)	Locoregional Flap (n = 52)	RR (95% CI)	P - value
Primary outcome				
Overall complications (%)	19 (47.5%)	23 (44.2%)	1.07 (0.69–1.68)	0.755
Secondary outcomes				
Donor site complications (%)	3 (7.5%)	8 (15.4%)	0.49 (0.14–1.72)	0.248 ^a
Surgical site infection	3	7		
Partial loss of skin graft	0	1		
Flap complications (%)	19 (47.5%)	21 (40.4%)	1.18 (0.74–1.87)	0.495
Surgical site infection	7	8		
Wound dehiscence	1	2		
Partial flap necrosis	3	7		
Total flap necrosis	4	4		
Hematoma	1	1		
Vascular compromise	3	0		
30-day mortality	3 (7.5%)	4 (7.7%)	0.98 (0.23–4.11)	0.973 ^a
Length of postoperative hospital stay (median, IQR)	14 (10–22)	13.5 (9–21)	-	0.419

IQR, interquartile range; RR, risk ratio; CI, confidence interval^aFisher's exact test.

Table 5. Univariable analysis of factors associated with overall complications.

Variable	OR	95% CI	P-value
Flap type (free flap vs. locoregional flap)	1.14	0.50–2.61	0.755
Age (per year increase)	0.96	0.93–0.99	0.042
Gender (male vs. female)	1.42	0.52–3.92	0.494
BMI (per unit increase)	1.03	0.91–1.16	0.655
Diabetes mellitus	1.24	0.44–3.48	0.680
Other comorbidities*	1.31	0.55–3.09	0.541
Smoking	1.45	0.48–4.38	0.515
Alcohol use	0.76	0.25–2.34	0.632
T4 stage (vs. T1-3)	2.39	0.91–6.26	0.076
N+ stage (vs. N0)	2.55	1.09–5.96	0.031
Staging (stage IV vs. stage III)	2.60	0.84–8.03	0.097
Primary vs Recurrent	0.66	0.26–1.68	0.386
Tumor Site (Tongue/ floor of mouth vs. Others)	1.24	0.44–3.48	0.680
Pathological involvement	1.06	0.44–2.55	0.892

OR, odds ratio; CI, confidence interval; BMI, body mass index; *Includes hypertension, chronic kidney disease, and cerebrovascular disease; Bold indicates $P < 0.20$ (threshold for multivariable inclusion).

Table 6. Multivariable logistic regression analysis of overall complications: full cohort and sensitivity analysis.

Variable	Full cohort (n = 92) aOR (95% CI)	P-value	Sensitivity analysis* (n = 66) aOR (95% CI)	P-value
Free flap (vs. locoregional)	0.96 (0.39–2.34)	0.924	0.98 (0.33–2.88)	0.973
Age (per year)	0.96 (0.92–1.00)	0.079	0.97 (0.92–1.02)	0.198
T4 stage (vs. T1-3)	3.11 (1.11–8.73)	0.031	3.89 (1.08–14.04)	0.038
N+ stage (vs. N0)	2.42 (0.97–6.04)	0.058	4.01 (1.28–12.55)	0.017

aOR, adjusted odds ratio; CI, confidence interval; *Primary tumors only, excluding recurrent cases; Bold indicates $P < 0.05$

Primary outcome: overall complications

Postoperative outcomes are summarized in Table 4. The overall 30-day complication rate was comparable between the free flap and locoregional flap groups (47.5% vs. 44.2%; RR 1.07; 95% CI 0.69–1.68; $P = 0.755$). No significant differences were observed in individual complications, including surgical site infection, wound dehiscence, or flap necrosis.

Secondary outcomes

Secondary outcomes were also comparable between groups (Table 4). Flap-related complications did not differ significantly between the free flap and locoregional flap groups (47.5% vs. 40.4%; $P = 0.495$). Donor-site complications were less frequent in the free flap group, although the difference was not statistically significant (7.5% vs. 15.4%; $P = 0.248$). Thirty-day mortality and postoperative hospital stay were similar between groups (Figure 2B).

Univariate and multivariate regression analysis

Table 5 summarizes the univariable logistic regression analysis of factors associated with postoperative complications. Increasing age was

associated with a lower risk of complications (OR 0.96; 95% CI 0.93–0.99; $P = 0.042$), whereas T4 disease (OR 2.39; 95% CI 0.91–6.26; $P = 0.076$) and node-positive disease (OR 2.55; 95% CI 1.09–5.96; $P = 0.031$) were associated with higher complication rates. Overall, stage IV disease also showed a trend toward increased complications (OR 2.60; 95% CI 0.84–8.03; $P = 0.097$), but was excluded from the multivariable model because of multicollinearity with T-stage and N-stage. The reconstruction method was not associated with postoperative complications (OR 1.14; 95% CI 0.49–2.68; $P = 0.755$).

In the multivariable analysis (Table 6), reconstruction type, age, T-stage, and N-stage were included based on clinical and statistical appropriateness. After adjustment for potential confounders, T4 stage was independently associated with postoperative complications (aOR 3.11; 95% CI 1.11–8.73; $P = 0.031$) (Figure 3). Node-positive disease also showed a trend toward increased complication risk (aOR 2.42; 95% CI 0.97–6.04; $P = 0.058$), whereas reconstruction method and age were not significantly associated with complications.

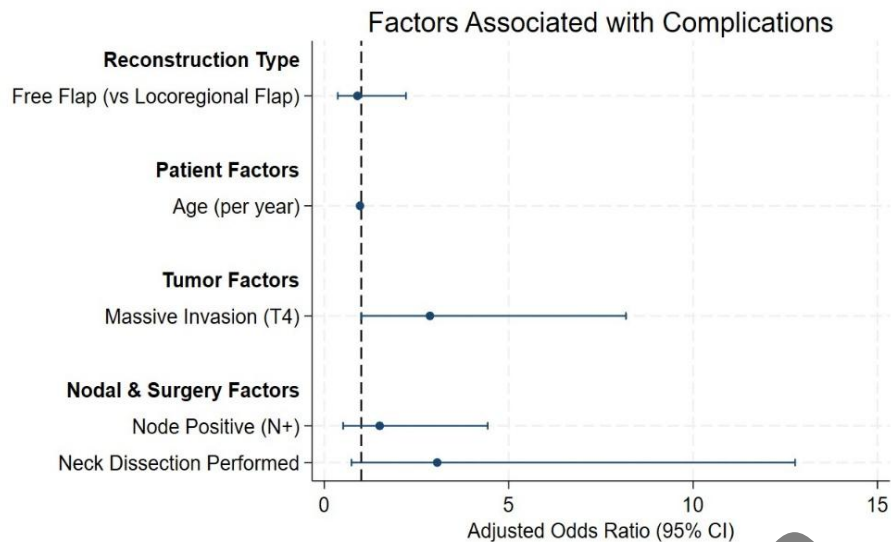


Figure 3. Forest plot of the multivariable logistic regression analysis identifying independent predictors for overall postoperative complications.

Sensitivity analysis restricted to patients with primary tumors only ($n = 66$) yielded consistent, more pronounced findings. Both T4 stage (aOR 3.89; 95% CI 1.08–14.04; $P = 0.038$) and node-positive disease (aOR 4.01; 95% CI 1.28–12.55; $P = 0.017$) were significantly associated with postoperative complications, whereas reconstruction method remained nonsignificant.

Discussion

In this retrospective cohort study of 92 patients with stage III–IV oral cavity squamous cell carcinoma, we found that the overall 30-day postoperative complication rate did not differ significantly between free-flap and locoregional-flap reconstruction. After adjustment for potential confounders, the reconstruction technique was not independently associated with postoperative complications. Instead, advanced disease stage—particularly T4 tumor stage—was more strongly associated with postoperative complications, while node-positive disease showed a similar trend toward increased complication risk.

Our findings are consistent with the growing body of literature suggesting comparable safety profiles between free and locoregional flaps. The systematic review by Gabrysz-Forget F, *et al.* concluded that aggregate complication rates are often similar when patient factors are controlled for.⁽¹⁴⁾ These findings are further supported by Aslam-Pervez N, *et al.*⁽¹⁸⁾, who performed a volume-matched analysis of submental island flaps versus forearm free flaps and found no statistically significant difference in recipient site complication rates. Similarly, recent regional data

from Sittitrai P, *et al.* in Thailand⁽¹³⁾ and Hossan A, *et al.* in Bangladesh⁽¹⁹⁾ reported no significant differences in raw rates of flap necrosis or wound infection between techniques. These parallel findings across diverse settings suggest that free tissue transfer does not inherently compromise recipient-site healing compared with locoregional options.

An important difference exists regarding risk prediction. While Hossan A, *et al.* identified free flap reconstruction itself as an independent risk factor (OR = 2.3) in their multivariable analysis⁽¹⁹⁾, our study suggested that advanced pathological stage was more strongly associated with complication risk. In our refined model, the T4 stage was significantly associated with increased complication risk. At the same time, node-positive disease approached statistical significance in the full cohort and became statistically significant in the sensitivity analysis. This discrepancy likely reflects differences in case mix; the Bangladesh cohort included substantial heterogeneity in tumor sites, which may have introduced selection bias.⁽¹⁹⁾ Our findings align more closely with the multivariable analysis by Sittitrai P, *et al.*, who found that advanced T-stage (T3–4), rather than flap type, was the dominant predictor of poor functional outcomes.⁽¹³⁾ Biologically and technically, this is intuitive; extensive composite resections for T4 disease and the management of nodal metastasis compromise vascularized tissue beds, increase dead space, and create larger, more complex defects. This increased complexity places higher demands on surgical judgment and technical execution, thereby increasing the risk of postoperative complications regardless of flap type.^(20,21)

A notable divergence in donor-site morbidity underscores the impact of flap selection. Both Sittitrai P, *et al.* and Aslam-Pervez N, *et al.* reported significantly higher donor site complications in their free flap groups.^(13, 18) Aslam-Pervez N, *et al.* attributed this to skin graft requirements and sensory deficits associated with the radial forearm flap, whereas their pedicled donor sites were closed primarily.⁽¹⁸⁾ In contrast, donor-site morbidity in our cohort was not greater among free flap patients. This difference may stem from our use of a variety of free flaps, including the ALT flap, which enables primary closure, in contrast to the higher morbidity associated with harvesting larger locoregional flaps, such as the pectoralis major flap, in our cohort.

We observed a significantly higher rate of positive surgical margins in the locoregional group. This contrasts with the findings of Sittitrai P, *et al.*, who reported no significant difference in margin status between the two surgical techniques.⁽¹³⁾ Although margin status is an independent prognostic factor⁽²²⁾, this discrepancy in our setting likely reflects selection bias, where locoregional flaps were preferentially selected for cases with greater anticipated surgical complexity and in which achieving negative margins was considered more challenging. Selection bias should also be considered when interpreting the overall findings. In routine clinical practice, patients with more extensive disease, poorer prognosis, or technically challenging defects were more likely to undergo locoregional flap reconstruction. In contrast, patients with more favorable surgical conditions were often selected for free flap reconstruction. This may have contributed to differences in surgical margin status and perioperative outcomes between groups.

As expected, free flap reconstruction required significantly longer operative times, consistent with previous comparative studies.^(13, 19) However, regarding the length of hospital stay, our findings differ from those of Sittitrai P, *et al.* and Hossan A, *et al.*, both of whom reported significantly longer hospital stays among free flap patients. Interestingly, our finding of comparable hospital stays aligns with Aslam-Pervez N, *et al.*, who also found no significant difference in stay duration between free and pedicled flap cohorts.⁽¹⁸⁾ This suggests that, in certain centers, discharge trajectories may be influenced more by standardized perioperative care pathways than by flap physiology alone. Nevertheless, the economic implications highlighted by Hossan A, *et al.* — where free flaps cost more than twice as much as regional

flaps⁽¹⁹⁾—remain an important consideration for policy planning in resource-constrained environments.

The convergence of findings across multiple Asian centers—including Buriram, Chiang Mai⁽¹³⁾, and Bangladesh⁽¹⁹⁾—strengthens the evidence that both reconstruction approaches can achieve comparable short-term safety outcomes when performed with appropriate expertise. This regional consistency is particularly relevant for healthcare policy in Southeast and South Asia, where microsurgical resources and institutional capabilities vary substantially.

Our results emphasize that preoperative planning should prioritize comprehensive evaluation of tumor extent and nodal status rather than focusing solely on flap type. The identification of advanced tumor burden as a major determinant of complications suggests that high-risk patients may benefit from intensified perioperative optimization, such as aggressive nutritional support and meticulous wound care, regardless of reconstruction method. Furthermore, given the substantial cost disparity highlighted by Hossan A, *et al.*⁽¹⁹⁾, locoregional flaps remain an important and cost-effective option for resource-constrained institutions or patients facing high out-of-pocket expenses, without compromising surgical safety.

A key strength of this study is its setting in a regional tertiary hospital. While excellent research exists from Thai university hospitals⁽¹³⁾, data from provincial centers—where most of the population receives care—remain limited. Our findings demonstrate that comparable reconstructive outcomes can be achieved outside major academic institutions, supporting the feasibility of decentralizing complex head and neck reconstruction services.

However, several limitations should be acknowledged. First, the retrospective, single-center design introduces inherent selection bias because flap selection was based on surgeon judgment rather than randomization. In addition, differences in baseline disease severity and surgical complexity between groups may have influenced the choice of reconstructive procedure and postoperative outcomes. Second, unlike Sittitrai P, *et al.*⁽¹³⁾, we did not assess long-term functional outcomes or quality of life, which are essential for holistic comparison. Third, the sample size limited detailed subgroup analyses for specific flap type. Finally, important perioperative variables—including intraoperative blood loss and nutritional parameters—were unavailable and may have served as residual confounders.

Future multicenter studies across different hospital tiers in Thailand are needed to better characterize variations in reconstructive practice and perioperative outcomes. Incorporating patient-reported outcomes and long-term functional assessments will be essential to capture the impact of reconstruction fully. In addition, cost-effectiveness analyses specific to the Thai healthcare system—building on the findings from Bangladesh⁽¹⁹⁾—are needed to guide resource allocation. Finally, the development of decision-making algorithms integrating tumor stage, nodal involvement, and institutional capabilities may help standardize reconstructive care across diverse healthcare settings. Ultimately, interpretation of these findings should consider the inherent selection bias associated with reconstructive decision-making in this retrospective cohort.

Conclusion

In summary, free flap and locoregional flap reconstructions demonstrated comparable short-term postoperative complication rates in patients with stage III–IV oral cavity cancer. Reconstruction type was not independently associated with postoperative complications; instead, advanced disease burden—particularly T4 tumor stage, with a similar trend observed for nodal involvement—was more strongly associated with increased complication risk. These findings support individualized reconstructive planning based on tumor extent, patient factors, and institutional resources rather than flap type alone.

Author contributions

Premsak Sakarinpanichakul contributed substantially to the concept and design of this study, data acquisition, literature review, data analysis, interpretation of data, and drafting of the manuscript.

Watchara Burapholkul contributed substantially to data acquisition and critical revision of the manuscript. All authors approved the final version submitted for publication and take responsibility for statements made in the published article.

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Conflict of interest statement

All authors have completed and submitted the International Committee of Medical Journal Editors Uniform Disclosure Form for Potential Conflicts of Interest. All authors declare that they have no conflicts of interest.

Data sharing statement

All data generated or analyzed in the present study are included in the published article. Further details are available for non-commercial purposes from the corresponding author upon reasonable request.

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