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Submental island flap as an alternative to microvascular free flap in intraoral defect reconstruction after ablative oral cancer surgery at resource constraint setting environment

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Abstract

Background

Reconstruction of intraoral defects following ablative oral cancer surgery remains challenging in resource-constrained settings where microvascular free flap reconstruction may not be readily available. This study aimed to evaluate the clinical outcomes of the submental island flap (SIF) as an alternative reconstructive option for intraoral defects following oral cancer resection.

Methods

A retrospective cross-sectional study was conducted in the Department of Otorhinolaryngology and Head & Neck Surgery at Purbanchal Cancer Hospital/B&C Medical College Teaching Hospital, Birtamode, Jhapa, Nepal. Medical records of patients who underwent SIF reconstruction following ablative oral cancer surgery between July 2021 and December 2025 were reviewed. Demographic, clinicopathological, surgical, adjuvant treatment, and outcome variables were analyzed using descriptive statistics.

Results

A total of 45 patients were included, with a mean age of 57.67 ± 11.39 years; 75.56% were male. Tobacco chewing was the most common risk factor (91.11%). The gingivobuccal sulcus was the predominant tumor site (42.22%), and squamous cell carcinoma accounted for 82.22% of cases. Wide local excision with marginal mandibulectomy was the most frequently performed procedure (60.00%). Early-stage disease (Stage I–II) was observed in 64.44% of patients. WPOI-5, lymphovascular invasion, and perineural invasion were present in 17.78%, 17.78%, and 20.00% of patients, respectively. Postoperative radiotherapy and chemotherapy were administered to 35.56% and 26.67% of patients, respectively. During follow-up, tumor recurrence occurred in six patients (13.33%). Successful flap survival was achieved in 43 patients (95.56%).

Conclusions

The submental island flap demonstrated a high success rate and acceptable oncological outcomes. It represents a reliable and effective alternative to microvascular free flap reconstruction for intraoral defects, particularly in resource-constrained settings.

INTRODUCTION

Oral cancer is a major global health problem and represents a significant cause of morbidity and mortality worldwide. Cancers of the lip, oral cavity, and oropharynx collectively rank among the most

common malignancies globally. In 2022, an estimated 389,846 new cases and 188,438 deaths were attributed to cancers of the lip and oral cavity.[1] In Nepal, oral cancer was the sixth most common cancer in 2020.[2] The disease predominantly affects older individuals and males and is associated with substantial socioeconomic disparities. Tobacco use, alcohol consumption, and areca nut (betel quid) chewing are among the major risk factors for the development of oral cancer.[1] Oral squamous cell carcinoma (OSCC) is the most common malignancy of the head and neck region and continues to demonstrate high incidence and mortality rates in many parts of the world. [3]

Surgical resection remains the cornerstone of treatment for oral cancer, while adjuvant radiotherapy is commonly administered to patients at high risk of locoregional recurrence.[4] Ablative surgery for advanced oral cavity tumors frequently results in complex two-dimensional or three-dimensional soft tissue and composite defects. These defects may significantly impair speech, swallowing, mastication, and facial aesthetics, thereby adversely affecting patients' quality of life. Consequently, reconstruction constitutes an integral component of oral cancer management, aiming to restore both function and appearance.[5]

Various reconstructive techniques, including split-thickness skin grafts, locoregional flaps, pedicled flaps, and microvascular free flaps, have been employed for the reconstruction of intraoral defects. Microvascular free flap reconstruction is widely regarded as the gold standard for managing large and complex oral cavity defects because of its versatility and favorable functional outcomes. However, free flap surgery requires specialized microsurgical expertise, advanced infrastructure, prolonged operative time, intensive postoperative monitoring, and substantial financial resources.[4,6] These requirements may limit its availability and feasibility in many low- and middle-income countries, including Nepal. Consequently, pedicled flaps continue to play an important role in head and neck reconstruction, particularly in high-volume centers and resource-constrained settings.

The submental island flap (SIF) has emerged as a valuable reconstructive option for oral and maxillofacial defects. Based on the submental branch of the facial artery, the flap offers a reliable vascular pedicle, a wide arc of rotation, excellent skin color match, and the versatility to be harvested as a cutaneous, musculocutaneous, or osteocutaneous flap. The flap can provide cutaneous dimensions of up to 7 × 18 cm and allows primary closure of the donor site with minimal morbidity.[6,7] Owing to its thinness, pliability, and ease of harvest, the SIF shares several reconstructive advantages with the radial forearm free flap while reducing operative time, hospitalization, and overall treatment costs.[8] Furthermore, it is particularly advantageous in elderly patients, those with significant comorbidities, and situations where microvascular free flap reconstruction is unavailable or unsuitable.

Despite increasing evidence supporting the safety and effectiveness of the submental island flap, data regarding its clinical outcomes in intraoral defect reconstruction from resource-constrained settings remain limited. Evidence from individual institutions may provide valuable insights into surgical technique, flap reliability, perioperative complications, and functional outcomes, thereby guiding reconstructive decision-making in settings where access to microsurgical reconstruction is restricted.

Therefore, this study aimed to evaluate the clinical outcomes of the submental island flap as an alternative to microvascular free flap reconstruction for intraoral defects following ablative oral cancer surgery in a resource-constrained setting.

METHODS

Study design and setting: This was a retrospective cross-sectional quantitative study conducted in the Department of Otorhinolaryngology and Head & Neck Surgery at Purbanchal Cancer Hospital/ B&C medical college& Teaching Hospital, Birtamod, Jhapa Nepal, a tertiary care center where comprehensive head and neck oncologic services are available. The study site was selected due to the availability of relevant clinical records and surgical data by Electronic Medical Record (EMR) facility available at the Hospital.

Study population, inclusion and exclusion criteria: The study population comprised patients who underwent submental island flap (SIF) reconstruction for intraoral defects following ablative surgery for oral cancer at the study center during the study period.

Patients were included if they met the following criteria:

i. Aged ≥18 years of either gender
ii. Histologically confirmed oral cancer requiring ablative surgery
iii. Underwent intraoral defect reconstruction using a submental island flap following tumor resection.
iv. Treated at the study institution during the study period.

Patients were excluded if they:

i. Had incomplete or missing medical records.
ii. Underwent reconstruction using flaps other than the submental island flap.

Sample size and sampling technique: A census sampling method was employed. All consecutive patients meeting the eligibility criteria during the study period were included in the analysis. Therefore, no formal sample size calculation was performed.

Study Period: Medical records of eligible patients treated between July 2021 and December 2025 were retrospectively reviewed.

Data collection tool and ethical approval: Data were collected using a structured, self-designed proforma developed specifically for this study. The proforma was pretested in approximately 10% of the study population to assess feasibility, clarity, and completeness. Content validity was established through expert review by head and neck surgeons and researchers, and necessary modifications were incorporated before final data collection. Ethical approval was obtained from the Institutional Review Committee of B&C Medical college prior to commencement of the study. Patient confidentiality and

anonymity were maintained throughout the study by removing personal identifiers from the dataset. As this was a retrospective review of medical records, informed consent was waived by the ethics committee in accordance with institutional regulations.

Data collection methods: Data were collected retrospectively through review of electronic and paper-based medical records of patients who underwent submental island flap reconstruction following ablative oral cancer surgery. Relevant demographic, clinical, operative, and postoperative information was extracted using the structured data collection proforma.

The collected variables were categorized into sociodemographic (age, sex, occupation), behavioral risk factors (smoking history, tobacco chewing, alcohol consumption), clinical and tumor characteristics (primary tumor site, histopathological diagnosis, tumor stage, pathological TNM classification, depth of invasion, worst pattern of invasion-5, lymphovascular invasion, perineural invasion), surgical and pathological variables (type of ablative surgery performed, type of neck dissection, nearest surgical margin, farthest surgical margin, number of lymph nodes dissected), adjuvant treatment variables (external beam radiotherapy, chemotherapy), and outcome variables (duration of follow-up, tumor recurrence, flap status, flap-related complications).

Data analysis: Collected data were entered into Microsoft Excel and cross-checked for completeness and accuracy prior to analysis. Statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) version 11.0. Descriptive statistical methods were used to summarize the data. Continuous variables were expressed as mean ± standard deviation or median with range, as appropriate, whereas categorical variables were presented as frequencies and percentages.

RESULTS

Sociodemographic characteristics and risk factors

A total of 45 patients underwent submental island flap reconstruction following ablative oral cancer surgery during the study period. The mean age of the patients was 57.67 ± 11.39 years (range: 30–80 years). The majority were male (75.56%, n = 34), yielding a male-to-female ratio of 3.1:1. The most common age group was 61–70 years (31.11%, n = 14), followed by 41–50 years (26.67%, n = 12). Farmers constituted the largest occupational group (42.22%, n = 19), followed by housewives (24.44%, n = 11). Regarding behavioral risk factors, tobacco chewing was reported by 41 patients (91.11%), while 25 (55.56%) patients were smokers and 23 (51.11%) patients consumed alcohol (Table 1).

Table 1
Sociodemographic characteristics and behavioral risk factors of the study participants (n = 45)

Variables		n	%
Gender	Female	11	24.44
	Male	34	75.56
Age groups (years)	30–40	3	6.67
	41–50	12	26.67
	51–60	11	24.44
	61–70	14	31.11
	71–80	5	11.11
Occupation	Farmer	19	42.22
	Housewife	11	24.44
	Retired army	3	6.67
	Teacher	5	11.11
	Labor	2	4.44
	Officer	1	2.22
	Politician	1	2.22
	Businessman	3	6.67
Smoker	Yes	25	55.56
	No	20	44.44
Tobacco chewing	Yes	41	91.11
	No	4	8.89
Alcoholic	Yes	23	51.11
	No	22	48.89

Tumor characteristics

The gingivobuccal sulcus was the most common primary tumor site, accounting for 42.22% (n = 19) of cases, predominantly involving the left lower gingivobuccal sulcus (24.44%, n = 11). The alveolus and buccal mucosa each accounted for 17.78% (n = 8) of cases, while tongue tumors were observed in

13.33% (n = 6). Tumors of the floor of the mouth, gingiva, and labial mucosa were less common (Table 2).

Table 2
Distribution of primary tumor sites among patients with oral cancer (n = 45)

Sites of tumors		**n**	**%**
Alveolus (n = 8, 17.78%)	Central lower	4	8.89
	Left lower	2	4.44
	Right lower	2	4.44
Buccal mucosa (n = 8, 17.78%)	Left	3	6.67
	Right	5	11.11
Gingivo-buccal sulcus (n = 19, 42.42%)	Left lower	11	24.44
	Lower central	2	4.44
	Right lower	6	13.33
Tongue (n = 6, 13.33%)	Left lateral	4	8.89
	Right lateral	1	2.22
	Right posterolateral	1	2.22
Floor of mouth		2	4.44
Gingiva		1	2.22
Labial mucosa		1	2.22

Histopathological examination revealed squamous cell carcinoma as the predominant diagnosis, observed in 37 patients (82.22%). Among these, 33 (73.33%) were well-differentiated and four (8.89%) were moderately differentiated squamous cell carcinomas. Verrucous carcinoma was diagnosed in seven patients (15.56%), whereas adenoid cystic carcinoma was identified in one patient (2.22%) (Table 3).

Table 3
Histopathological diagnoses of oral cancer lesions (n = 45)

Biopsy diagnosis	n	%
Adenoid cystic carcinoma	1	2.22
Moderately-differentiated squamous cell carcinoma	4	8.89
Verrucous Carcinoma	7	15.56
Well-differentiated squamous cell carcinoma	33	73.33

Surgical management

Wide local excision with marginal mandibulectomy was the most frequently performed surgical procedure, accounting for 60.00% (n = 27) of cases. This was followed by wide local excision alone in 20.00% (n = 9) and glossectomy in 13.33% (n = 6). Segmental mandibulectomy was performed in three patients (6.67%). Regarding neck management, left selective neck dissection was performed in 22 patients (48.89%), right selective neck dissection in 16 (35.56%), and bilateral selective neck dissection in seven patients (15.56%) (Table 4).

Table 4
Surgical procedures and neck dissection patterns performed among the study participants (n = 45)

Variables		n	%
Surgery	Wide local excision + Marginal Mandibulectomy	27	60.00
	Adequate glossectomy	6	13.33
	Wide local Excision	9	20.00
	Wide local excision + Segmental mandibulectomy	3	6.67
Neck dissection	Bilateral selective neck dissection	7	15.56
	Left selective neck dissection	22	48.89
	Right selective neck dissection	16	35.56

Pathological characteristics

Stage II disease was the most common stage, observed in 19 patients (42.22%), followed by Stage IV disease in 11 patients (24.44%). Stage I and Stage III disease accounted for 22.22% (n = 10) and 11.11% (n = 5) of cases, respectively. Overall, early-stage disease (Stages I and II) was more common than advanced-stage disease (Stages III and IV) (Table 5).

Table 5
Pathological stage and pTNM classification of oral cancer (n = 45)

Staging	pTNM	n	%
Stage I (n = 10, 22.22%)	T1N0M0	2	4.44
	T1N0Mx	8	17.78
Stage II (n = 19, 42.22%)	T2N0Mx	19	42.22
Stage III (n = 5, 11.11%)	T2N1Mx	1	2.22
	T3N0Mx	3	6.67
	T3N1Mx	1	2.22
Stage IV (n = 11, 24.44%)	T4aN0Mx	2	4.44
	T2N2aMx	2	4.44
	T2N2bMx	2	4.44
	T3N2bMx	2	4.44
	T4aN0Mx	1	2.22
	T4aN2bMx	2	4.44

Worst Pattern of Invasion-5 (WPOI-5) was present in eight patients (17.78%), while lymphovascular invasion and perineural invasion were identified in 17.78% (n = 8) and 20.00% (n = 9) of patients, respectively (Table 6).

Table 6
Histopathological prognostic characteristics of tumors, including WPOI-5, lymphovascular invasion, and perineural invasion (n = 45)

Variables		n	%
Worst Pattern of Invasion-5	Absent	37	82.22
	Present	8	17.78
Lymphovascular invasion	Present	8	17.78
	Absent	37	82.22
Perineural Invasion	Present	9	20.00
	Absent	36	80.00

Most patients had a nearest surgical margin between 5 and 10 mm (77.78%, n = 35), whereas only one patient (2.22%) had a margin less than 5 mm. The farthest margin was between 10 and 19 mm in

68.89% (n = 31) of cases (Table 7).

Table 7
Distribution of nearest and farthest surgical resection margins (n = 45)

Variables		n	%
Nearest Margin (mm)	< 5	1	2.22
	5–10	35	77.78
	11–13	9	20.00
Far Margin (mm)	6–9	5	11.11
	10–19	31	68.89
	20–26	9	20.00

The number of lymph nodes dissected ranged from 12 to 50. The majority of patients had 20–30 lymph nodes dissected (40.00%, n = 18), followed by 12–19 lymph nodes in 37.78% (n = 17) (Table 8).

Table 8
Number of lymph nodes harvested during neck dissection (n = 45)

Numbers	n	%
12–19	17	37.78
20–30	18	40.00
31–40	6	13.33
41–50	4	8.89

Depth of invasion ranged from less than 5 mm to greater than 10 mm. Most tumors demonstrated a depth of invasion between 5 and 10 mm (48.89%, n = 22), while 31.11% (n = 14) showed invasion greater than 10 mm (Table 9).

Table 9
Depth of tumor invasion among patients with oral cancer (n = 45)

Depth of invasion (mm)	n	%
< 5	9	20.00
5–10	22	48.89
> 10	14	31.11

Adjuvant treatment

Postoperative external beam radiotherapy was administered to 16 patients (35.56%), whereas 29 patients (64.44%) did not receive radiotherapy. Chemotherapy was administered to 12 patients (26.67%), while the remaining 33 patients (73.33%) did not receive chemotherapy (Table 10).

Table 10
Adjuvant treatment modalities administered following surgery (n = 45)

Adjuvant treatment		n	%
External beam radiotherapy	Yes	16	35.56
	No	29	64.44
Chemotherapy	Yes	12	26.67
	No	33	73.33

Follow-up and oncological outcomes

The majority of patients were followed up for 6–12 months (44.44%, n = 20) **[**Fig. 1**]**, followed by 12–24 months (40.00%, n = 18) **[**Fig. 2**]**. Six patients (13.33%) were followed for 25–32 months **[**Fig. 3&4**]**, while one patient (2.22%) had a follow-up duration of less than 6 months (Table 11).

Table 11
Duration of postoperative follow-up (n = 45)

Follow up (months)	n	%
< 6	1	2.22
6–12	20	44.44
12–24	18	40.00
25–32	6	13.33

Tumor recurrence was observed in six patients (13.33%), whereas 39 patients (86.67%) remained disease-free during the follow-up period. Submental island flap reconstruction demonstrated a high success rate. Successful flap survival was achieved in 43 patients (95.56%), while flap loss occurred in only two patients (4.44%) (Table 12).

Table 12
Oncological and reconstructive outcomes following submental island flap reconstruction (n = 45)

Variables		n	%
Flap status	Flap loss	2	4.44
	Flap success	43	95.56
Recurrence	Yes	6	13.33
	No	39	86.67

DISCUSSION

The present study evaluated the clinical outcomes of submental island flap reconstruction following ablative oral cancer surgery in a resource-constrained setting. The findings demonstrated a high flap survival rate of 95.56% which was higher than Shaikh et al (93.21%).[9] Recurrence was observed in 13.33% patients during the follow-up period which was comparable to Shaikh et al.[9] These findings suggest that the submental island flap is a reliable and effective reconstructive option for intraoral defects, particularly in settings where microvascular free flap reconstruction may not be readily available.

The demographic profile of the study population was consistent with the established epidemiology of oral cancer. Most patients were male, with a mean age of 57.67 years, reflecting the higher prevalence of oral cancer among older males.[10] Furthermore, tobacco chewing, smoking, and alcohol consumption were highly prevalent among the study participants. These findings are in agreement with previous studies from South Asia, where tobacco and areca nut consumption remain major risk factors for oral carcinogenesis.[11] The predominance of farmers in the study population may also reflect the socioeconomic and occupational characteristics of the regional population served by the institution.

In the present study, the gingivobuccal sulcus was the most common tumor site, followed by the alveolus and buccal mucosa. Similar distributions have been reported in studies from the Indian subcontinent, where smokeless tobacco and betel quid chewing are common etiological factors.[12] The predominance of well-differentiated squamous cell carcinoma observed in this study is also consistent with the histopathological patterns reported in the literature.

Most patients presented with early-stage disease (Stages I and II), accounting for nearly two-thirds of the study population. Histopathological evaluation revealed relatively favorable tumor characteristics, with low frequencies of lymphovascular invasion, perineural invasion, and Worst Pattern of Invasion-5 (WPOI-5). Adequate surgical margins were achieved in the majority of patients, with nearest margins ranging from 5 to 10 mm. These findings indicate satisfactory oncological clearance and may have contributed to the relatively low recurrence rate observed during follow-up.

Reconstruction of intraoral defects remains a major challenge following ablative surgery for oral cancer. Although microvascular free flaps are considered the gold standard for reconstruction of extensive defects, their use requires specialized microsurgical expertise, prolonged operative time, intensive postoperative monitoring, and significant institutional resources. These requirements may limit their widespread application in many low- and middle-income countries. In such circumstances, pedicled flaps continue to play an important role in reconstructive surgery.

The submental island flap offers several advantages that make it particularly suitable for oral cavity reconstruction. The flap is based on a reliable vascular pedicle, provides a wide arc of rotation, and possesses thin, pliable tissue that adapts well to intraoral defects.[13] In addition, flap harvest is technically less demanding than free tissue transfers and can be performed within a shorter operative time. The donor site can usually be closed primarily, resulting in minimal donor-site morbidity and acceptable cosmetic outcomes. These characteristics have led many authors to advocate the use of the submental island flap as an alternative reconstructive option for selected oral cavity defects.

The flap survival rate observed in the present study compares favorably with previously published reports, which have generally documented success rates exceeding 90%.[11,13] The low incidence of flap loss observed in our study further supports the reliability of the flap and demonstrates that satisfactory reconstructive outcomes can be achieved even in resource-limited environments when appropriate patient selection and meticulous surgical technique are employed.

Another important concern regarding the use of the submental island flap in oral cancer reconstruction is oncological safety, particularly because the flap is harvested from the level I neck region. Previous studies have demonstrated that careful patient selection and adherence to oncological principles during neck dissection can minimize the risk of compromising oncological outcomes.[14] In the present study, recurrence was observed in only a small proportion of patients during the follow-up period, suggesting that the use of the submental island flap did not adversely affect short- to intermediate-term oncological outcomes.

The findings of this study have important implications for clinical practice in Nepal and other resource-constrained settings. Given the increasing burden of oral cancer and the limited availability of microsurgical services in many centers, the submental island flap represents a practical, cost-effective, and dependable reconstructive option. Its high success rate, favorable oncological outcomes, and relative technical simplicity make it an attractive alternative when free flap reconstruction is unavailable, contraindicated, or financially prohibitive.

Overall, the present study adds to the growing body of evidence supporting the use of the submental island flap in oral cavity reconstruction. The favorable flap survival rate and low recurrence rate observed in this series highlight its value as a reconstructive modality in appropriately selected patients undergoing ablative oral cancer surgery.

This study has several limitations. The study was conducted at a single tertiary care center with a relatively small sample size, which may limit the generalizability of the findings to other institutions and populations. The duration of follow-up varied among patients and may not have been sufficient to fully evaluate long-term oncological outcomes, functional recovery, and late flap-related complications. Functional outcomes such as speech, swallowing, donor-site morbidity, quality of life, and patient satisfaction were not systematically assessed. Despite these limitations, the study provides valuable evidence regarding the feasibility and clinical outcomes of submental island flap reconstruction in a resource-constrained setting and contributes to the limited literature from low- and middle-income countries.

CONCLUSIONS

The submental island flap is a reliable and effective reconstructive option for intraoral defects following ablative oral cancer surgery. In this study, the flap demonstrated a high success rate with minimal flap loss, providing satisfactory reconstructive outcomes in a predominantly early-stage oral cancer population. Its versatility, dependable vascularity, ease of harvest, and favorable donor-site characteristics make it a valuable alternative to microvascular free flap reconstruction. The submental island flap is particularly advantageous in resource-constrained settings, where limitations in microsurgical expertise, infrastructure, and financial resources may restrict the routine use of free tissue transfer. The findings of this study support the use of the submental island flap as a safe and feasible reconstructive option for selected patients undergoing oral cancer surgery. Further prospective multicenter studies with larger sample sizes and longer follow-up periods are recommended to evaluate long-term oncological outcomes, functional outcomes, quality of life, and flap-related complications.

Declarations

Ethics approval: This study was approved by Institutional Review Committee of B&C Medical college and teaching Hospital, Birtamode, Jhapa, Nepal.

Consent to participate: As this was a retrospective review of medical records, informed consent was waived by the ethics committee in accordance with institutional regulations.

Consent for publication: patients have given the written informed consent for their personal or clinical details along with any identifying images to be published in this study

Data availability: The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare no competing interests.

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Author Contribution

1. Bajarang P Sah: Conceptualization, study design, surgical procedures, data acquisition, manuscript drafting, and overall supervision2. Subash C Mahaseth: Data collection, Surgical assistance, patient follow-up, literature review.3. Ujwal Rai: statistical analysis, and manuscript editing4. Deependra P Sarraf: Data interpretation, critical revision of the manuscript, and methodological input.1-4 : All authors reviewed the manuscript

References

1. Ferlay J, Ervik M, Lam F, Laversanne M, Colombet M, Mery L et al. Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer, 2024. Available from: https://gco.iarc.who.int/today [Accessed February 2, 2023].
2. Global cancer observatory. 2020. International Agency for Research on Cancer, World Health Organization, Geneva, 2023. Available at https://gco.iarc.fr/today/data/factsheets/populations/524-nepal-fact-sheets.pdf. [Accessed February 2, 2023].
3. Caruntu A, Caruntu C. Recent advances in oral squamous cell carcinoma. J Clin Med. 2022;11(21):6406.
4. Amin AA, Sakkary MA, Khalil AA, Rifaat MA, Zayed SB. The submental flap for oral cavity reconstruction: extended indications and technical refinements. Head Neck Oncol. 2011;3:51.
5. Sebastian P, Thomas S, Varghese BT, Iype EM, Balagopal PG, Mathew PC. The submental island flap for reconstruction of intraoral defects in oral cancer patients. Oral Oncol. 2008;44(11):1014–8.
6. Martin D, Pascal JF, Baudet J, Mondie JM, Farhat JB, Athoum A, et al. The submental island flap: a new donor site. anatomy and clinical applications as a free or pedicled flap. Plast Reconstr Surg. 1993;92:867–73.
7. Faisal M, Adeel M, Riaz S, Anwar A, Rashid A, Usman S, et al. The submental island flap in head and neck cancer. Ann Maxillofac Surg. 2018;8(2):287–91.
8. Schonauer F, Di Martino A, Nele G, Santoro M, Dell'Aversana Orabona G, Califano L. Submental flap as an alternative to microsurgical flap in intraoral post-oncological reconstruction in the elderly. Int J Surg. 2016;33(Suppl 1):S51–6.
9. Shaikh M, Kumar K, Kannan R, Doctor A, Singh A, Pradhan SA. The submental flap for reconstruction of tongue defects- surgical outcome and quality of life assessment. Indian J Otolaryngol Head Neck Surg. 2023;75(4):2895–900.
10. Noggle B, Cheng H, Sarkar M. Oral cancer incidence among adult males with current or former use of cigarettes or smokeless tobacco: population-based study. JMIR Cancer. 2024;10:e51936.
11. Chang CP, Siwakoti B, Sapkota A, Gautam DK, Lee YA, Monroe M, et al. Tobacco smoking, chewing habits, alcohol drinking and the risk of head and neck cancer in Nepal. Int J Cancer. 2020;147(3):866–75.

12. Mandlik DS, Nair SS, Patel KD, Gupta K, Patel P, Patel P, et al. Patel M. Squamous cell carcinoma of gingivobuccal complex: literature, evidences and practice. J Head Neck Physicians Surg. 2018;6(1):18–28.
13. Ramirez AT, Chiesa-Estomba CM, González-García JÁ. Submental artery island flap in oral cavity reconstruction. an observational, retrospective two-centre study. Int Arch Otorhinolaryngol. 2021;25(1):e71–6. 10.1055/s-0040-1709115.
14. Dedivitis RA, Guimarães AV, Pfuetzenreiter EG Jr, Castro MA. Neck dissection complications. Braz J Otorhinolaryngol 2011 Jan-Feb;77(1):65–9.

Figures



Figure 1

Reconstruction of Floor of mouth defect



Figure 2

Reconstruction of lower alveolar defect



Figure 3

Reconstruction of Buccal Mucosa defect



Figure 4

Reconstruction of tongue defect defect