



Research Paper

Submental island flap reconstruction for carcinoma of the oral cavity: Experience in 30 cases



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KEYWORDS

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Abstract *Objective:* The submental flap can be utilized for soft tissue reconstruction in oral cavity malignancies because due to its close approximation to the surgical site, fewer donor site morbidity and the cost effectiveness of the procedure.

Methods: A total of 30 patients with squamous cell carcinoma of the oral cavity were included in the study from July 2012 to August 2015 in a tertiary care referral hospital. Patients with clinical staging I/II/III (T1/T2/T3, N0) oral malignancy were included in the study. Patients with nodal metastasis irrespective of the stage of disease and patients with chronic medical illness/revision cases were excluded from the study. Submental island flap was utilized for the reconstruction of the soft tissue defect in each patient. Patients were followed at monthly interval till 6 months in the postoperative period.

Results: The buccal mucosa (12 patients), tongue (10 patients) and floor of mouth (8 patients) were the subsites in the oral cavity. Partial and complete skin necrosis was found in 4 and 2 patients respectively. Postoperative chemoradiation was required in 5 patients. None of the patients had loco regional recurrence till 6 months of follow-up.

Conclusion: The submental island flap is considered to be the reliable option for the soft tissue reconstruction in oral cancer because of dependent vascular pedicle, less donor site morbidity and the lower cost compared to the free flaps, often preferred in patients with a lower socio-economic condition.

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Introduction

Oral cancer is the sixth most common cancer worldwide, occurring most commonly in the elderly individuals.¹ In India, it accounts for approximately 30% of all cancers involving the head-neck region. It is more common in males between sixth to eighth decades of life,² and the common subsites are the cheek, floor of the mouth, the tongue and the inner surface of the lip. Amongst all, tongue is the commonest site to be affected by the malignancy. The common etiology could be due to the chewing of tobacco in the form of pan/gutkha particularly in the Indian subcontinent.³ Reconstruction of the soft tissue defect is a vital step in the management of the malignancies of the oral cavity. Both the free flaps and the pedicled flaps have been used in the past decade for the above purpose, providing adequate mucosal coverage in the oral cavity. Free flap reconstruction is not always suitable for elderly patients because of the associated chronic comorbidities. Again, harvesting the free flap is tedious, lingering the surgical time and hospital stay of the patients. It also incurs an extra financial burden on patients with low socioeconomic status. Alternatively, the pedicled submental island flaps (SIF) can be utilized in the oral malignancies providing adequate bulk and mucosal lining, decreasing the operative time and the length of total hospital stays.⁴ Free flap reconstruction is expensive in contrast to the pedicle flaps, although both have comparable functional and cosmetic outcomes. In the current study, we have shared our experiences of the submental island flap reconstruction in squamous cell carcinoma of the oral cavity.

Patient selection

A total of 30 patients with squamous cell carcinoma of the oral cavity were included in the study from July 2012 to August 2015 in AIIMS, Bhubaneswar, a tertiary care referral hospital in Eastern India. Of them, 21 were males and 9 were females. Age ranged from 42 to 61 years. The clinical and radiological assessment was done in each patient prior to surgery to assess the extent of the lesion and to exclude the locoregional metastasis. Patients with clinical staging I/II/III (T1/T2/T3, N0) oral malignancy were included in the study. Ultrasound of the neck was performed in each patient prior to the surgery and the presence of nodal metastasis was confirmed after ultrasound-guided fine needle aspiration cytology (FNAC) whenever required. Patients with nodal metastasis irrespective of the stage of disease and patients with chronic medical illness/revision cases were excluded from the study. All the surgeries were performed by a single surgeon who had been trained with the surgical skill and expertise with soft tissue reconstruction.

Surgical procedure

Written and informed consent was taken from each patient prior to the surgery. All the surgeries were performed under general anesthesia with the nasotracheal intubation. Pinch test over the submental skin was performed before marking of the incision in the neck to assess the extent of the skin island. Upper and lower incisions were marked at 1.5 cm and 3.5 cm below the mentum and the angle of mandible respectively in the bilateral neck (Fig. 1). Before proceeding for the neck dissection, the submental flap was harvested approximating the size of the resected primary site. The flap was elevated pedicled upon the submental branch of the facial artery partially including ipsilateral anterior belly of digastric muscle in each case (Fig. 2). Intraoperative frozen section was performed in each case to confirm a tumor free margin. Primary closure of the donor site was achieved in all cases along with the neck dissection after the elevation of the submental island flap.

The flap was then advanced towards the site of the lesion in the oral cavity through a defect made medial to the mandible for the carcinoma of the tongue (Fig. 3). The defect was closed in two layers and a neck drain was placed (Fig. 4). Patients were discharged after removal of the drain, after 48 hrs of surgery. They were asked to visit the



Fig. 1 Upper and lower incisions are marked at 1.5 cm and 3.5 cm below the mentum and the angle of mandible respectively.



Fig. 2 Submental flap was elevated in the right side pedicled upon the branch of the facial artery including the ipsilateral anterior belly of the digastric muscle.

oncology clinic after 5 days for the stitch removal and again at the end of 1 month/ before the starting of radiation therapy as when required and monthly thereafter for 6 months.

Results

The age of the patients ranged from 30 to 63 years old and the mean age was (45 ± 10) years old (Table 1). History of

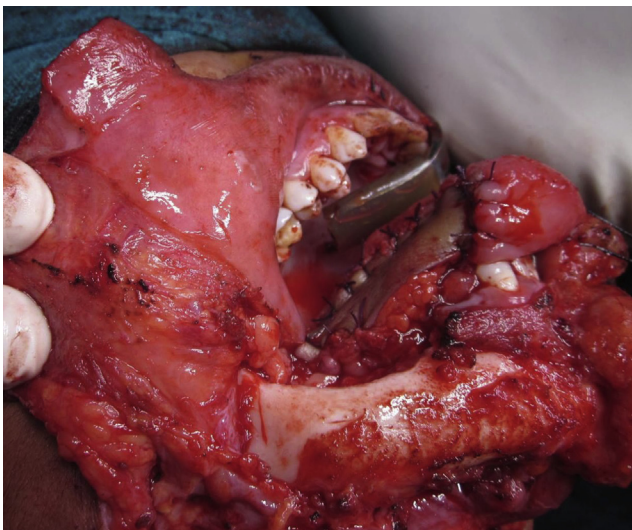


Fig. 3 The flap was then forwarded towards the floor of mouth medial to the mandible for the defect in right side of the tongue.



Fig. 4 The defect was closed and the neck drain was placed (Right side).

smoking was found in 18 patients (60.00%) and 16 (53.33%) were tobacco chewer. Buccal mucosa was found to be involved in 12 patients, followed by the tongue (10 patients) and floor of the mouth was found to be involved in 8 patients. The width of the lesion ranged from 1.8 cm to 5.0 cm and the average width was 3.0 cm. All the patients underwent single-stage resection of the primary tumor and selective neck dissection. The average operative time for the tumor resection, neck dissection, and the flap reconstruction was 4 h and 10 min (range 3.5–5.5 h). The hospital stays ranged from 2 to 15 days and the average duration of stay was 72 hrs. Of the 30 flaps, partial necrosis of the skin was noticed in 4 patients and in 2 patients, there was complete skin loss. Only 2 cases required a revision surgery, one patient was repaired with a nasolabial flap and the other with a rotational tongue flap. When compared with the alcohol addiction, it has been seen that the skin loss was predominant in the patients with smoking/tabaco chewing habits although later was not significant ($p > 0.05$). No relationship between the flap necrosis and the alcoholism has been correlated in the study. Again on correlating the skin rejection with the nodal status, it has been found that, although it was proportionately related to the nodal status, the value was statistically insignificant. Marginal mandibular palsy with the deviation of angle of mouth was detected in 5 patients immediately after the surgery, of which 2 patients recovered completely after 6 weeks and 3 patients had residual palsy till 6 months of follow-ups. None of the patients had any significant complications noted in the intraoperative and postoperative period.

Table 1 Description of the demographic data in the study population ($n = 30$).

	No of patients (%)	Range
Sex		
Male	22 (73.33)	—
Female	8 (26.67)	—
Mean age of patients (Year)	45	30–63
Mean duration of the disease (months)	2	1–5
Mean duration of follow-up (months)	6	5–11
Smoking		
Yes	18 (60.00)	
No	12 (40.00)	
Tabacco chewing		
Yes	16 (53.33)	
No	14 (46.67)	
Primary sites		
Buccal mucosa	12 (40.00)	
Tongue	10 (33.33)	
Floor of mouth	8 (26.67)	
Treatment		
Surgery + Observation	25 (83.33)	
Surgery + Radiotherapy	2 (6.67)	
Surgery + Chemoradiation	3 (10.00)	
Complications		
Partial skin loss	4 (13.33)	
Complete skin loss	2 (6.67)	
Duration of surgery	4 h and 10 min	3.5–5.5 h

In all 30 cases, final histopathology was confirmed to be squamous cell carcinoma. The clinical and pathological staging has been compared in the [Table 2](#). Although, no cervical metastasis had been detected in clinical and radiological examinations, still 2 patients presented with nodal metastasis (level Ia) with extracapsular invasion as shown in the histopathological report. Lymphovascular infiltration of the tumor was observed in 3 patients. Adjuvant chemoradiation was required in the above 5 cases for the regional metastasis. There was no recurrence of the tumor in the primary site till 6 months of follow-ups, although one patient had a cervical lymphadenopathy (right level II) after 4 months of surgery, which was managed with salvage neck dissection.

Table 2 TNM staging of the data in the study population ($n = 30$).

	Clinical staging	Pathological staging
I		
T1N0M0	19	15
II		
T2N0M0	9	11
III		
T3N0M0	2	4

Discussion

Although free flaps are considered as the gold standard for the soft tissue reconstruction in head neck malignancies, use of a pedicle flaps plays a major role in the oral malignancies. The submental island flap was first reported by Martin et al.⁵ in 1993 based upon the submental vessel, a branch of the facial artery. It can be used as a pedicled flap, free flap or perforator flap, depending upon the composition of the flap.⁶ It can be an inferior pedicled flap or orthograde or superior pedicled flap or reverse flow type according to the vascular anastomosis and the site of the reconstruction in the oral cavity. An orthograde flap is meant for the repair of the oral cavity, including the buccal mucosa, the floor of the mouth and the tongue. Although thin, the thickness of the submental island flap can be augmented by adding the muscle mass derived from the anterior belly of digastric or the mylohyoid muscle according to the requirement of the recipient site. With a dependent vascular supply and wide arch of rotation, the submental flap can be utilized for different subsites of oral malignancies. In a developing country like India, where a majority of the patients belongs to the low socioeconomic status, the cost of the surgery is the major limiting factor for deciding on the mode of the reconstruction.

In contrast to the submental island flap, free flap reconstruction is an expensive procedure because of the mandatory postoperative ICU care. As demonstrated in the present study, of the 30 patients, operated for oral cavity malignancies, only 2 patients needed postoperative ICU monitoring.

As documented by Miller et al.⁷ there is a substantial reduction of the cost (40%) in the pedicled flap reconstruction in comparison to free flaps. Submental island flap reconstruction is a quick procedure, as in our case where the average time of surgery was 4 h and 10 min. Harvesting is simple and can be performed without the assistance of a plastic surgeon or requiring special operative equipment.

With the increased patient load, quick surgical turnover of the patients is often required to overcome the healthcare burden of the society in a developing country like India. A common concern in the submental island flap reconstruction is probably the disease recurrence. There is always a debate about the oncological safety of the procedure because of the close proximity of the donor island to that of the recipient site, where a chance of occult metastasis is often anticipated, particularly in oral malignancies. Chow et al.⁸ had demonstrated the subplatysmal dissection of the skin island which not only decreased the recurrence of cancer but also ensured the adequacy of tumor clearance. As was evident in our study, only 2 (6.67%) patients had occult cervical metastasis which was diagnosed in the histopathology and were managed with adjuvant chemoradiation. One patient had the cervical recurrence after 4 months of surgery required salvage neck dissection. Revision cases and irradiated necks were excluded from the study anticipating a compromised vascular pedicle, although successful reconstruction of the submental island flap in the irradiated neck has been described in the irradiated neck which is also a relative contraindication for free flaps reconstruction.^{9,10}

Submental island flap is found to be associated with low mortality and morbidity as was evident in our study till 6 months of follow-up, also described in the past literature.^{8,11–13} Hair growth in the oral cavity can be a problem in the postoperative period, as mucosalization occurs with the course of time in the majority of the patients or else radiotherapy itself causes burning of the hair follicles. In the current study, no significant morbidity related to flap was detected and only 3 patients required depilation. Necrosis of the skin flap is a major concern in submental island flap reconstruction because of the delicate vascular submental pedicle. Of 30 patients, 6 presented with skin necrosis (2 patients with complete skin loss and 4 with partial skin loss). Only 2 cases required a revision surgery, one patient was repaired with a nasolabial flap and the other with a rotational tongue flap.

Marginal mandibular palsy was detected in 5 patients, of which 2 recovered completely with conservative management by 6 weeks in the postoperative period. Although preferred in older patients, the submental flap can be successfully harvested in middle-aged patients as was seen in our study, where there was no significant difference between the two ($p > 0.05$).

The pectoralis major myocutaneous flap can be used for soft tissue defects in oral cavity because of their definitive blood supply, but it is not often preferred because of its large volume and unsuitability in the female patients.^{14–17} Keeping in mind the advantages and the disadvantages, the submental island flap can be a definitive option for soft tissue reconstruction in oral malignancies with satisfactory clinical outcomes. Because of the thinness of the island flap and least donor site morbidity with a good tissue matching to the adjacent tissue, it is preferred in early oral cavity malignancy. The ease of harvesting the flap and the adequacy of the submental island skin makes it a suitable soft tissue option for oral cavity defect specifically in elder patient.¹⁸ There is very minimal morbidity and acceptable cosmesis to the donor site as later get obscured by the chin and the older patients with lax skin can benefit with a sharp cervicomenal angle after the surgery. Although the sample size is small, reconstruction of the submental island flap in oral cancer was associated with encouraging postoperative results, not only by obtaining adequate tumor clearance but also by providing a disease-free survival in the postoperative period. Both sample size and the duration of follow-up could have been increased to have a better understanding of the clinical outcomes in patients with submental island flap reconstruction in the oral cavity malignancy.

Conclusion

The submental island flap can be successfully used for soft tissue reconstruction in the malignancies of the oral cavity with satisfactory outcomes. Because of dependent vascular pedicle, wide arch of rotation and less donor site morbidities, it is equally effective to that of a free flap for the oral cavity defect. Being a quick and low cost of the surgical procedure due to the shorter hospital stay, submental island flap can be a suitable flap in patients with lower socioeconomic status reducing the extra financial burden. A

large population with long-term follow-up would be required to have a better understanding of the clinical outcomes in patients with submental island flap reconstruction in oral cavity malignancy.

Conflict of interest

The authors declare no conflict of interest relevant to this report.

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