

## EVALUATION OF SUBMENTAL ISLAND FLAP FOR RECONSTRUCTION OF INTRAORAL DEFECTS

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### **Abstract**

**Background and Objectives:** Diverse flaps are used for the reconstruction of various intraoral lining defects in patients with oral cancer. If flaps are properly selected according to each patient's need, it gives satisfactory functional and cosmetic results with minimal or no morbidity. Here we are to evaluate the usefulness of submental island flap for the reconstruction of tongue and other intraoral soft tissue defects.

**Methods:** Patients who underwent intraoral reconstruction using submental island flaps were selected. Postoperatively the patients were assessed for the functional status in terms of Ryle's tube feeding, speech intelligibility, swallowing and tongue mobility. They were also assessed for flap loss and donor site scars. Usefulness of submental island flap was assessed with these criteria.

**Results:** Over two years submental flaps were used for 17 oral cancer patients in the departments. Except for one case of partial flap loss, and one case of epithelial loss, all flaps survived. Venous congestion of the flap was observed in 4 cases for a few days. All patients had good functional and cosmetic results.

**Conclusion:** Submental island flap is a simple and reliable reconstructive option for intraoral lining defects after resection for oral cancers. It leaves a well-hidden donor site without much morbidity. It is ideal for reconstruction of moderate defects of tongue, buccal mucosa, lip, and after marginal mandibulectomy. It is less time consuming, less tedious, and more cost effective than microsurgical reconstruction.

**Key words:** Submental island flap; reconstruction; tongue; head and neck; pedicled flap.

### **Introduction**

Various techniques, including skin grafts, local or regional flaps, and free vascularised tissue transfer, can be used in the reconstruction of the defects to restore function and/or cosmesis after ablative surgery in the head and neck region. The size, location, and function of the defective site are the determining factors in choosing the most appropriate reconstruction modality.

Ideally, the tissue used in the reconstruction of a particular defect should be reliable; have sufficient size and minimal donor site morbidity; and match with the recipient site in terms of colour, texture, and thickness.[1]

A variety of flaps are available that utilize the skin of the anterior neck in facial reconstruction. These include random pattern flaps, platysma flaps and supraclavicular neurovascular flaps. All of these flaps provide a good colour match for facial skin, but each has inherent disadvantages, including limited mobility, unacceptable donor site scars and unpredictable outcomes.[2] Random flaps exhibit limited mobility, and often the resulting scar at the donor site is unacceptable. Platysmal flaps have unpredictable results.[3-6] The supraclavicular neurovascular flap is a pedicled flap which can reach only the lower third of the face, and it requires wide undermining for transposition.[2] Skin grafts have limitations particularly with regard to more extensive defects. They contract over time, especially after postoperative radiation. Pectoralis major flap is bulky, may dehisce due to gravity pull and create donor site morbidity. Free flaps may provide thin, pliable tissue but require harvesting with consequent donor site morbidity, extended operating room time and, occasionally, a second team for harvesting.[4]

The submental island flap first introduced by Martin et al. in 1993, is relatively free from these limitations and as such provides a reliable source of flap. It is a variation of the random submental flap described earlier by Jellouli et.al. Unlike Jellouli's random cervical flap, the submental island flap is based on an axial patterned blood supply; the submental artery and vein, thereby improving the reliability and mobility of the submental skin paddle.[7] The submental island flap is another cervical flap which has been used for the reconstruction of the floor of mouth, cervical esophagus, hemilarynx, glottic larynx, palate, cheek, forehead, auricular region, lips and regional cutaneous defects. Although this flap may be harvested as a free flap or a pedicled flap, when pedicled, the arc of rotation extends from the medial canthus to the zygomatic arch. It can be used as a free flap owing to size of the vascular pedicle.[7-10]

The submental island flap has a reliable source of skin of excellent colour, contour and texture match for facial resurfacing and leaves a well hidden donor site. The flap is safe, rapid and simple to raise and complications are few.[1,2] It has a long pedicle, which allows for wider range and applicability, based on the submental branch of facial artery.

The flap has a long, reliable pedicle, and cutaneous dimensions can reach upto 7 X 18 cm. It can be used as a cutaneous, musculofascial or osteocutaneous flap. It has an excellent skin colour match and a wide arc of rotation, and can extend to the whole of homolateral face, except for a part of the forehead and the whole oral cavity.[2-3]

The submental island donor site is in many ways ideal for reconstruction, and the scar is camouflaged in the submental angle. In addition, it can be used in a single-staged fashion and does not require extensive anaesthesia, as the harvest is technically straightforward. It can be used in patients after radiation therapy.[1,8-9]

## **Objective**

To evaluate the usefulness of submental flap for the reconstruction of tongue and intraoral soft tissue defects.

## Materials and Methods

The subjects for the study were selected from those who were clinically diagnosed to have intraoral lesion which require resection followed by reconstruction of intraoral defect using submental island flap. The study was conducted at Regional Cancer Centre, Trivandrum and the Dept. of Oral and Maxillofacial Surgery, A.B. Shetty Memorial Institute of Dental Sciences, Mangalore.

Informed consent was taken from the selected patients regarding the procedure. Patient's demographic features, clinical stage, co-morbid factors and details of previous treatment were recorded on a proforma. Size of the flap, post operative complications, duration of hospital stay, tongue mobility and the time taken for resumption of normal swallowing and intelligible speech were recorded. (Table I and Table II)

### Inclusion Criteria:

- Patients were selected from those with carcinoma tongue (T2-T3) and other intraoral soft tissue lesions.

### Exclusion Criteria:

- Lesions close to the mandible which warrants segmental mandibulectomy as part of clearance for tumour.
- Clinically neck node positive patients.

## Results

Post operative evaluation was done in 17 patients who had undergone reconstruction using submental island flap following resection of tumour. Seven of these patients were male and 10 were female, in the age range of 30 – 78 years with a mean age of  $57.1 \pm 11.7$  years. 16 patients were histopathologically diagnosed to have squamous cell carcinoma and the other one had verrucous carcinoma. 13 of these patients had tumours confined to the tongue, whereas the tumour was in tongue and floor of mouth in one case. In one patient, the buccal mucosa was affected. Tumour was affected in the floor of the mouth and lower alveolus in one case, and only lower alveolus in one case.

No neck dissection was done in three patients. Ipsilateral SND was done in 12 patients, ipsilateral MRND - vein and nerve preserving; was done in a case and ipsilateral RND along with contralateral SND was done in another case, and ipsilateral SND and contralateral SND was done in the other case. Pedicled flap was used in all the cases for the reconstruction. The minimum flap size used was 2.5 X 2 cm and maximum size of the flap used was 6.5 X 4cm, with an average flap size of 4.5 X 3.5 cm. All the donor sites were closed primarily.

Postoperatively, the patients were hospitalized for a period of minimum three days and a maximum of 14 days (mean of  $6.71 \pm 3.35$  days). Active or passive drains were placed at the donor site to avoid hematoma formation. Mini vac suction drains were placed in 13 patients, corrugated rubber drains were placed in two patients and no drain was placed in two patients. There was no oedema noted in any of the cases.

Ryle's tube feeding was given for only 14 patients with a minimum of two days and a maximum of 13 days; mean of  $7 \pm 3.53$  days. Three patients were given oral sips from the first operative day itself.

Few complications were encountered. One patient had epithelial loss of the flap. Another patient had a partial flap loss. All the other flaps survived. Venous congestion of the flap was noted in four of the cases for a few days. Two patients had marginal mandibular nerve paraesthesia from which they finally recovered. Intractable hair growth was observed in two of the patients.

Two patients had positive nodes in level II on histopathological examination. One patient had a local recurrence.

#### Functional assessment

The day at which the speech became intelligible ranged from 4<sup>th</sup> postoperative day to 20<sup>th</sup> postoperative day, with a mean of  $10.88 \pm 4.59^{\text{th}}$  postoperative day.

Tongue motility: Four patients had good motility at discharge, 23.4%; whereas nine patients had fair motility and only the remaining four had bad tongue motility. At one month, the number of patients with good tongue motility increased to 10 and showed only five patients with fair motility and two with bad motility. At third month, good motility was noticed in 14 patients, and two had fair motility and only one had bad motility.

Swallowing status: At discharge, eight patients were on liquid diet, nine patients on semisolid diet and none of the patients took normal diet. At one month, only one patient was on liquid diet, and the patients who were taking semisolid diet were only six and 10 patients could take normal diet. It was observed that at the end of the third month, 16 patients were able to take normal diet and only one continued with semisolid diet.

Scarring was observed in the patients at the end of third month also, but it was well concealed in the submental region. Scarring became less prominent in the subsequent follow-ups.

## Discussion

In our study of 17 patients, 10 patients were females showing an increased prevalence of oral cancer in females. Gupta PC and Nandakumar A stated that cancers of the mouth are predominantly seen in females in Bangalore population.[11] The prevalence of cancer of the tongue in male: female showed a 50:50 ratio, which shows a minor correlation that the cancers of tongue in males are slightly more than in females as in the study of Gupta PC.[11]

In 4 of the cases venous congestion was manifested after a few days as a blue dusky flap.[12] Congestion got relieved after a few days and the flap survived. Baur DA[6] and Pistre V[13] from their studies stated that venous congestion is usually self-limiting,[3,6,8,13] and long term survival of the flap can be expected.

Speech intelligibility was achieved by the patients in a mean of 10.8 days. In this study the patients achieved a good speech outcome by the third month which again improved in the subsequent months; which correlates with the study of Bressmann[14] that patients with flap reconstruction had a tendency for higher scores in the total number of correctly identified consonants.

Ability to swallow showed a marked improvement with 58.8% returning to normal diet by the first month and 94% by the third month. Tongue motility assessment was significant. 58.8 % of the patients achieved good tongue motility at the end of one month and 82.4 % of the patients got good tongue motility at third month. Hence the results can be interpreted as support for the assumption that better tongue motility precipitates better articulation.[14]

Alan Sabri[15] has stated that the functional outcomes and quality of life is a concept that is difficult to measure, and comparison of results between patients, flaps, reconstruction, institutions and surgeons is a challenge.

### Conclusion

When considering the reported experiences of other surgeons, this study shows that the submental island flap is an excellent alternative in the reconstruction of head and neck defects because of its reliability, versatility, relative ease of application and good functional outcome. The results should be interpreted with caution due to the small sample size.

### Summary

The submental island flap is a reliable source of skin of excellent colour; contour and texture match for facial resurfacing and leaves a well-hidden donor site. The flap is safe, rapid and simple to raise. This study reports the use in 17 cases of intraoral reconstruction following ablative surgery. Complications were few. The functional outcome was also good. Taking these into consideration, it could be believed that this flap can be used as an addition to the surgical armamentarium for facial and intraoral soft tissue the reconstruction.

More studies need to be done with larger sample size to analyse the statistical significance related to various functional assessment.

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Patient	Sex	Age	Diagnosis	Receipient Site	Neck Dissection	Surgical Procedure	Flap size (cm)	Complications	Post operative stay (days)
1	F	74	WDSCC	Tongue	Ipsilateral SND I-IV	Pedicled flap	3 X 2	Nil	6
2	M	65	WDSCC	Tongue	Ipsilateral SND I-IV	Pedicled flap	4.5 X 2.5	Nil	7
3	F	55	PDSCC	Alveolus	Ipsilateral SND I-IV	Pedicled flap	4.5 X 2.5	Nil	14
4	M	52	MDSCC	Tongue	Ipsilateral MRND v and n preserving	Pedicled flap	3.5 X 2.5	Epithelial loss	5
5	F	58	WDSCC	Tongue	Ipsilateral SND I-II	Pedicled flap	4.5 X 4.5	Nil	5
6	M	54	MDSCC	Tongue	Ipsilateral SND I-II	Pedicled flap	4.5 X 3.5	Nil	6
7	M	55	MDSCC	Tongue	Ipsilateral SND I-III	Pedicled flap	4.5 X 3.5	Nil	3
8	F	50	WDSCC	Tongue	Ipsilateral SND I-III	Pedicled flap	2.5 X 2	Partial loss	3
9	F	70	WDSCC	Tongue	IpsilateralSND I-III	Pedicled flap	4.5 X 3.5	Nil	4
10	F	78	WDSCC	Tongue + Floor of mouth	Ipsilateral SND I-III	Pedicled flap	5.5 X 2.5	Nil	3
11	F	61	Verrucous carcinoma	Buccal mucosa	-	Pedicled flap	4.5 X 3.5	Nil	12
12	F	55	WDSCC	Tongue	-	Pedicled flap	6.5 X 2	Nil	8
13	M	30	WDSCC	Tongue	Ipsilateral RND + Contralateral SND I-IV	Pedicled flap	6.5 X 4	Nil	6
14	M	41	WDSCC	Tongue	Ipsilateral SND I-III	Pedicled flap	4.5 X 4.5	Nil	13
15	F	65	WDSCC	Lower alveolus + floor of mouth	-	Pedicled flap	6.0 X 4.0	Nil	7
16	M	58	MDSCC	Tongue	Ipsilateral SND I-IV	Pedicled flap	4.0 X 3.5	Nil	6
17	F	75	WDSCC	Tongue	Ipsilateal SND I-IV	Pedicled flap	3.5 X 2.5	Nil	6

Table 1: Patient Data

Table 2: Functional Assessment

Patient	Sex	Age	Receptient Site	RT feed (days)	Tongue mobility			Speech legible (day)	Swallowing		
					Discharge	1 mth	3 mth		Discharge	1 mth	3 mth
1	F	74	Tongue	5	G	G	G	7	L	S	N
2	M	65	Tongue	5	F	G	G	15	L	N	N
3	F	55	Alveolus	0	G	G	G	4	S	N	N
4	M	52	Tongue	4	G	G	G	6	S	N	N
5	F	58	Tongue	9	B	F	G	12	L	S	N
6	M	54	Tongue	2	F	G	G	8	L	S	N
7	M	55	Tongue	0	F	G	G	12	L	N	N
8	F	50	Tongue	12	B	B	B	20	L	L	S
9	F	70	Tongue	10	B	F	F	14	L	S	N
10	F	78	Tongue + Floor of mouth	12	B	B	F	20	L	S	N
11	F	61	Buccal mucosa	0	G	G	G	8	S	N	N
12	F	55	Tongue	4	F	G	G	6	S	N	N
13	M	30	Tongue	6	F	F	G	10	S	N	N
14	M	41	Tongue	13	F	F	G	14	S	S	N
15	F	65	Lower alveolus + floor of mouth	4	F	G	G	9	S	N	N
16	M	58	Tongue	6	F	G	G	10	S	N	N
17	F	75	Tongue	6	F	F	G	10	S	N	N

G - Good

L - Liquid diet

F - Fair

S - Semi solid diet

B - Bad

N - Normal diet

