SUBMENTAL FLAP IN HEAD AND NECK RECONSTRUCTION: AN ALTERNATIVE TO MICROSURGICAL FLAP

INTRODUCTION

Oral and oropharyngeal squamous cell carcinoma (SCC) represents the sixth most common cancer worldwide and occurs most commonly in middle-aged and elderly individuals. In India, it accounts for approximately 30% of all tumors involving head & neck cancer [1]. Surgery has been the mainstay for primary management of oral cavity cancer. The excision entails removal of the tumor with a margin of at least 1-1.5 cm. Simultaneously neck dissection is performed for clinically evident nodal disease, for large primary tumors or for tumors with a depth of invasion greater than 4 mm. The prognosis for early lesions (T1 and T2) of the oral cavity is good, with a 5-year survival of 80% to 90%. Survival for advanced lesions (T3 and T4) can only range from 30% to 60% [2].

Out of 12 patients, 8 were males and 4 were females, age ranged from 35 to 65 years. Primary sites involved the floor of mouth (FOM) in 6 patients, the gingivobuccal sulcus (GBS) in 2 patients, and the buccal mucosa (BM) in 4 patients. At 1 month follow-up, the flap was successful in all patients (except one patient). At the 6-month follow-up, 8 patients (MALE) complained of hair growth over the flap. During follow-up, no patients had complained of restricted mouth opening.

The submenta artery flap is a valid option for reconstruction of composite oral cavity defects. It represents an excellent alternative to free flaps, particularly in elderly patients, in high-volume and low-resource centers.

KEYWORDS

submental flap, head & neck cancer, microsurgery

PATIENTS AND METHODS

The present retrospective study was done from June 2018 to June 2019 at department of surgical oncology, All India Institute of Medical Sciences, Patna, Bihar. Out of 12 patients, 8 were males and 4 were females, age ranged from 35 to 65 years. Primary tumor sites involved were buccal mucosa, GB sulcus, & the floor of the mouth. In this study, we adopted 'flap-first' harvest followed by completing the neck dissection & primary tumor resection and reconstruction with ortho-grade submental island flap. Follow-up period was 6 months.

Inclusion criteria

Patients of different age group and sex with diagnosis of oral cancer with different sub site selected.

Exclusion criteria

Those patients having gross 1a and 1b nodal neck metastasis, skin involvement over submental region and distant metastasis were excluded.

Surgical anatomy and technique

The submental artery is a constant vascular branch that arises from the facial artery. It courses forward and medially between the facial artery. It courses forward and medially between the

Submental artery island flap was first described by Martin et al. in 1993 in their attempt to search for an alternative to free flap while matching color, shape, and tissue texture. The submental flap is gaining popularity as a simple technique for reconstruction of small to moderate size defects of the oral cavity [3].

The purpose of this paper is to present a series of 12 patients, age between 35 to 65 years, affected by intra-oral SCC in whom reconstruction has been performed with submental flap. Surgical technique with its advantages and disadvantages are discussed.

MATERIALS AND METHODS

The present retrospective study was done from June 2018 to June 2019 at department of surgical oncology, All India Institute of Medical Sciences, Patna, Bihar. Out of 12 patients, 8 were males and 4 were females, age ranged from 35 to 65 years. Primary tumor sites involved were buccal mucosa, GB sulcus, & the floor of the mouth. In this study, we adopted 'flap-first' harvest followed by completing the neck dissection & primary tumor resection and reconstruction with ortho-grade submental island flap. Follow-up period was 6 months.

Inclusion criteria

Patients of different age group and sex with diagnosis of oral cancer with different sub site selected.

Exclusion criteria

Those patients having gross 1a and 1b nodal neck metastasis, skin involvement over submental region and distant metastasis were excluded.

Surgical anatomy and technique

The submental artery is a constant vascular branch that arises from the facial artery. It courses forward and medially between the submandibular gland and the mylohyoid muscle, travels either deep (70%) or superficial (30%) to the anterior belly of the digastric muscle, and terminates behind the mandibular symphysis [4]. Along its course, cutaneous perforators pierce the platysma and anterior belly of the digastric muscle to constitute the subdermal plexus forming extensive anastomoses with the contralateral artery. The submental vein drains into the facial vein, communicating with both the internal and external jugular veins.

Surgical technique

A pinch test was performed to delineate the maximum width of the flap. An elliptical island was designed in the submental area. Hence neck dissection started, taking care to preserve both the facial artery and vein on that side [fig 1].

Fig 1. Steps of submental flap raising.

The vascular tributaries to the submandibular gland were ligated as close as possible to the gland and dissected away from it, preserving...
the submental vessels. In case bilateral neck dissection was needed, the flap was harvested on the less involved side of the neck. Flap dissection began from the contralateral side of the pedicle, in the subplatysmal plane. On the opposite side, the anterior belly of the digastric muscle was sectioned from its common tendon and it was elevated with the skin paddle. The mandible insertion of the anterior belly of the digastric muscle was then sectioned. Occasionally a strip of the mylohyoid muscle was included in the flap. The flap was always moved toward the oral cavity passing medially to the mandible either if the defect involved the floor of the mouth, the base of the tongue, the tonsillar fossa, the retro- molar trigone or the buccal mucosa. Lastly the flap was inset and sutured in place and neck drains were placed.

RESULTS
Patients' ASA risk score ranged from 2 to 4. All patients underwent one-stage submental flap harvesting, surgical resection of primary tumor, neck lymph node dissection and immediate reconstruction with the orthograde submental flap.

Out of 12 patients, 8 were males and 4 were female, age ranged from 35 to 65 years (table 1).

Primary sites involved-
- the floor of mouth (FOM) in 6 patients,
- the gingiobuccal sulcus (GBS) in 2 patient,
- the buccal mucosa (BM) in 4 patients,
- the tonsil (T3) in 2 patients,
- the anterior belly of the digastric muscle was included in the flap.

In all patients' reconstruction was performed with orthograde submental flap.

One patient complained of hair growth over the pedicle. At 6 months in all patient was observed absence of recurrence; 8 patients (MALE) complained of hair growth over the flap.

Table 1. SEX vs AGE

<table>
<thead>
<tr>
<th>SEX</th>
<th>MALE</th>
<th>FEMALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE (YEARS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35-50</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>51-65</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 2. SITE vs FOM vs GBS vs BM

<table>
<thead>
<tr>
<th>SITE</th>
<th>FOM</th>
<th>GBS</th>
<th>BM</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPERATIVE COMPLICATION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HAEMATOMA (NECK)</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>VENOUS CONGESTION</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>SUPERFICIAL NECROSIS (Partial flap loss)</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>FLAP LOSS (complete)</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

In all the patients' reconstruction was performed with orthograde submental island flap. The average operative time for resection, neck dissection and reconstruction was 3 h and 12 min.

Post-operative hospital stay ranged from 7 to 10 days. The flaps were successful in all patients (fig 2). Venous congestion was observed in 2 patients and resolved spontaneously (fig 3). Superficial (skin) necrosis (Partial flap loss) was observed in 1 patient but the flap recovered gradually with subsequent skin grafting. One patient experienced neck hematoma, which was subsequently drained in OT. Complete flap loss occurred in one patient and later reconstruction with nasolabial flap (table 2).

Fig 2.
The width of the defects ranged from 2.6 cm to 6.4 cm, the length from 1.9 cm to 4.1 cm. Neck dissection was bilateral in 3 patients, unilateral right in 5 patients and unilateral left in 4 patients.

Table 3. HPR vs SITES

<table>
<thead>
<tr>
<th>SITE</th>
<th>HPE</th>
<th>DEGREE</th>
<th>NODE</th>
<th>LVI/PNI</th>
<th>T- STAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOM</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>T2N0-4, T3N1-2</td>
</tr>
<tr>
<td>GBS</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>T3N0-2</td>
</tr>
<tr>
<td>BM</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>T2N0-1, T3N0-2, T3N1-1</td>
</tr>
</tbody>
</table>

At 1 month follow-up the flap was successful in all patients (except one patient). At 6 months in all patient was observed absence of recurrence; 8 patients (MALE) complained of hair growth over the flap.

All patients had adequate mouth opening in follow up (M1 & M2 as per Chandramani More et al classification).

DISCUSSION
The submental island flap was first reported in 1993 by Martin et al. for soft-tissue head and neck reconstruction. It is based on the submental artery, a constant branch of the facial artery, which originates 27.5 mm distal from the origin of the facial artery from the external carotid artery [1-3].

The submental artery island flap could be classified according to blood supply, as pedicled flap, free flap or perforator flap and according to the composition of the flap paddle, as myo-cutaneous or osteo-cutaneous flap [4]. A pedicled submental flap with orthograde blood supply is used for reconstruction of the retro- molar pad, the tongue, the floor of mouth and buccal mucosa.

The major mobility of the retrograde variant allows reconstruction of the palate and the maxillary alveolar ridge, such as facial skin in midface, the periorbital area, the inferior temple area, auricle and oropharynx. The submental island pedicled myo-cutaneous flap has a wide arc of rotation, a constant axial vessel, appropriate pedicle length, large skin paddle and wide pivotal movement [5-6].

There has been some concerns in the literature about the oncological safety of this flap. Chow et al. recommended that dissection in the subplatysmal plane would minimize the chances of tumor spread and inadequate clearance [7]. Amin et al. prescribed the complete lymph node dissection before flap harvesting and recommend that this flap should be avoided in those patients with clinically advanced nodal disease in the neck [8]. Patel et al have suggested raising the submental flap before the lymphadenectomy [9]. There have another modified method about harvesting Submental flap, which is “sandwich-the-vessel” method [8, 9, 10]. In this method, the mylohyoid is included with the flap. At The use of this flap is contraindicated in patients with metastasis and in patients with a history of neck dissection, & level IA & IB lymph node involvement. Because for the success of this technique the integrity of the facial artery/vein is necessary. Ultrasound colour Doppler with facial artery/vein and skin perforators' localization dramatically reduce the failure rate. Free flap technique is not recommended in patients with vessel-depleted irradiated neck and in patients with a high ASA risk score. Operative surgery time is longer compared with the submental flap and consequently hospital stay, costs and medical post-operative complications are superior [11].

Possible complications of submental flap include facial palsy, in the range of 0-17%, caused by the damage to the facial nerve ( marginal mandibular nerve) during surgery [12]. The hair bearing nature of this flap causes inconvenience for intraoral re- constructions. This problem has been managed using different techniques, such as laser ablation, mechanical depilation and electrolysis. A de-epithelized variant of the submental flap was introduced to solve this problem in intraoral, oropharyngeal and laryngeal reconstruction in male patients[13,14].

developed Functional staging M1: Interincisal mouth opening up to or greater than 35 mm. M2: Interincisal mouth opening between 25 and 35 mm. M3: Interincisal mouth opening between 15 and 25 mm. M4: Interincisal mouth opening less than 15 mm [15].

The submental artery flap showed many potential advantages. It is an ideal flap for soft-tissue head and neck reconstruction for its thinness, pliability and versatility in design. It also presents an excellent colour match for the head and neck region and it can be easily raised.

CONCLUSION

The submental artery flap is a valid option for reconstruction of composite oral cavity defects. It represents an excellent alternative to free flaps, particularly in elderly patients, in high-volume and low-resource centers, or in high-ASA risk patients where the reduced operative time and the easily concealable donor-site incision make it a really neat solution. However the oncological safety & step learning curve are major concern of the flap.

REFERENCES