

## SUBMENTAL FLAP

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### ABSTRACT

*We present a case series of two patients, in whom surgical defects were repaired using submental flap. This flap can be raised as a pedicled or a free flap. It is based on submental artery, which is the largest branch of facial artery in the neck. This flap can be used in covering small intraoral defects, particularly in patients who are medically compromised, and a shorter operating time is desirable.*

*Submental flaps are comparable in their outcome with radial forearm free flap. They carry a good colour match with facial tissue. They are thin and have a reliable vascular morphology.*

**Key words:** *Submental flap, submental artery*

### INTRODUCTION

Reconstructing head and neck defects following ablative oncological surgery is a major surgical challenge. While free flaps remain the gold standard for reconstruction of the head and neck region, they carry with them inherent risk of flap failure and donor site morbidity.

Recently there has been renewed interest in local and regional flaps for reconstruction of these defects. One of the flap that has steadily become popular over the past decade is Submental flap.

Martin et al has described the qualities of ideal flap. They are thin, reliable and have a good colour match<sup>1</sup>. They should be easy to dissect<sup>2</sup>, carry a long arc of rotation<sup>3</sup> with minimum donor site morbidity<sup>4</sup>. While Radial forearm free flap fulfils most of these qualities, submental flaps have also been found to have thin skin paddle and have a good colour match<sup>5</sup>.

For intraoral reconstruction, submental flap is particularly a good choice in female patients, as the skin paddle does not carry hair follicles. In male patients, where the defect involves hair bearing area, this flap can be used to reconstruct the defect.

Here we present a case study of two patients,

who had their defect in the head and neck region reconstructed using submental flap.

### CASE1

A 45 year old lady, presented with verrucous carcinoma of the mandibular alveolar margin. The lesion was 4 by 3 cm wide. Clinically there was no neck node palpable. Marginal mandibulectomy was performed under general anaesthesia and a submental flap was used to reconstruct the surgical defect.

### SURGICAL TECHNIQUE FOR HARVESTING SUBMENTAL FLAP

The intraoral defect was measured, which was 5 by 4 cm. A pinch test was performed on the submental skin to identify the skin paddle which could be harvested. Then a Doppler was used to identify the submental branch of the facial artery and its course from the origin. Markings were made for the skin paddle and the vascular pedicle of the flap. Incision was made and dissection was started from medial to lateral direction. Subdermal bleeding was stopped using bipolar diathermy. The incision was deepened to include the anterior belly of digastric, which was separated from its attachment to the mandible. The anterior belly was lifted along with connective tissue just superior to the mylohyoid muscle. Submental artery was identified and traced posteriorly up to its origin from the facial artery, taking along with it a sleeve of mylohyoid muscle. The anterior belly of digastric was disconnected from its attachment to the hyoid bone. A tunnel was made medial to the mandible and the skin paddle of the flap was transported through it

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Case I

intraorally. The defect was covered using the flap. The site of neck defect was primarily closed, undermining the tissue around the area. The flap was kept under hourly review for the first six hours, followed by three hourly reviews for next eighteen hours. On the third post-operative day, the patient was discharged from the hospital. She was allowed liquid and semiliquid food, with instruction to clean oral cavity after every meal. Patient was reviewed every week for three weeks in the out-patients department.

## CASE2

A 52years old lady was referred to Rehman Medical Institute with a discharging fistula in the submental

region. On the ultrasound, a residual cystic lesion was identified in the floor of the mouth. The FNAC result indicated cyst of benign origin. The cyst was excised along with fistula under general anaesthesia through extra-oral approach while left 3 by 4 cm defect in the midline of the neck. A submental flap was raised, using the technique already described above. Flap was advanced and the defect was covered with the tissue. The patient was discharged on second postoperative day. Patient was regularly reviewed in the out-patient for three weeks.

## RESULTS

Both patients made excellent recovery and both flaps were viable at the point of final review. The first case had achieved good tissue seal, without any sign of oro-cutaneous communication. In second case, there was excellent skin colour match and the defect was well covered with good contours.

## DISCUSSION

Submental artery flap was first described by Martin et al in 1993<sup>6</sup>. The earliest reported use of this flap for the reconstruction of oral cavity defect was by Sterne and Hall in 1996<sup>7</sup>.



Case II

Submental flap is based on Submental artery, which is a major branch of facial artery in the neck. It originates at the posterior or superior edge of submandibular gland, with an average diameter of  $1.84 \pm 0.47$  mm. It runs below or just medial to the lower border of Mandible on the surface of Mylohyoid muscle in anterior direction. In majority of cases, a large perforating branch originates from the proximal part of the submental artery that runs deep to mylohyoid muscle and communicates with the arterial supply of tongue and floor of mouth. Further down the course, it usually gives 4 to 6 branches to submandibular gland and 2 to 3 branches to submandibular lymph nodes. It also gives perforating vessels to platysma and mylohyoid muscle. Anteriorly, it runs deep to the anterior belly of digastric in majority of cases, before giving terminal branches which generally communicate with the vessels of the lower lip and the arterioles of the contralateral side. The total length of submental artery is approximately 6cm and the average size of the territory supplied by this artery is found to be  $45 \pm 10.2$ cm. In 2% cases, submental arteries do not reach as far anterior as the anterior belly of digastric and curve during its course inferiorly toward the hyoid bone<sup>8,9,10</sup>.

In a multi-centre retrospective study, Paydarfar et al<sup>11</sup> compared the outcome of 27 submental flaps with 33 Radial forearm free flaps. While the donor site morbidity, flap related and other surgical complication were comparable in both groups, submental flap had in general, shorter operating and hospitalization time. Functional outcomes related to speech and swallowing in both flaps were similar. Radial forearm free flap, however, has the advantage of carrying a bigger skin paddle, if required.

One of the debated aspects of submental flap is its oncological safety. A cohort of 55 patients with squamous cell carcinoma of oral cavity, in which, submental flap was used for reconstruction, was studied retrospectively by Howard et al<sup>12</sup>. No recurrence was found intraorally at the site of reconstruction, even though 10% of the cases had occult metastases found at level 1.

Various modification techniques have been devised in harvesting a submental flap. Hayden et al<sup>13</sup> described a hybrid submental flap for covering defects that were remote from the neck. They increased the superior arc of rotation of the flap by reversing the

facial artery, while anastomosing the submental vein superiorly.

Ramkumar et al<sup>14</sup> described a bi-paddled submental flap, where they used one paddle for providing the lining of the oral cavity and the other for covering the full thickness defect.

Buric et al<sup>15</sup> described a submental flap, in which, they removed the skin from part of the paddle and prelaminated it with oral mucosa. They then used this part to reconstruct the defect involving nasal mucosa. A similar reverse facial artery-submental artery deepithelialized flap was used to reconstruct maxillary defects following cancer ablation<sup>16</sup>.

A multi-parameter evaluation of morbidity associated with submental flap by Lee et al<sup>17</sup> in 22 patients showed that there was minimal effect on smiling, whistling, beard shape and neck extension. They also found that primary closure of the skin had good aesthetic outcome.

**REFERENCES**

1. Martin D, Baudet J, Mondie JM, Peri G. A prosp du lambeau cutane sous-mental en ilot. Protocole operatoire perspectives D'utililisation Ann Chir Plat Esthet. 1990; 35:480-4.
2. Brue E, Bey E, Cariou JL. L'artere Faciale. Rappel embryologique, anatomie descriptive et fonctionnelle d'apres une revue de la litterature. Ann Chir Plast Esthet 2000;45:461-84
3. Hurwitz DJ, Rabson JA, Futrell JW. The anatomic basis for the platysma skin flap. Plast Reconstr surg 1983; 72: 302-14
4. Merten SL, Jiang RP, Caminer D. The submental artery island flap for head and neck reconstruction. ANZ J surg 2002; 72: 121-4
5. Potter S, De Blacam C, Kosutic D. True submental artery perforator flap for total soft tissue chin reconstruction. Microsurgery, 2012; 32: 502-4

6. Martin D, Pascal JF, Baudet J, Mondie JM, Farhat JB 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. Sterene GD, Januszkiewicz JS, Hall PN, Bardsley AF. The submental flap. 1996; 49(2): 85-9.
8. Pinar YA, Govsa F, Bilge O. The anatomical features and surgical usage of the submental artery. Surg Radiol Anat 2005; 27:201-5
9. Magden O, Edizer M, Tayfur V, Atabey A. Anatomic study of the vasculature of the submental artery flap. Plast Reconstr Surg 2004; 114(7):1719-23
10. Tang M, Ding M, Almutairi K, Morris SF. Three-dimensional angiography of the submental artery perforator flap. J Plast Reconstr Aesthet Surg. 2011;64(5):608-13.
11. Paydarfar JA, Patel UA. Submental island pedicled flap vs radial forearm free flap for oral reconstruction: comparison of outcomes. Arch Otolaryngol Head Neck Surg. 2011; 137(1): 82-7
12. Howard BE, Nagel TH, Donald CB, Hinni ML, Hayden RE. Oncological safety of the submental flap for reconstruction in oral cavity malignancies. Otolaryngol Head Neck Surg. 2014;150(4):558-62
13. Hayden RE, Nagel TH, Donald CB. Hybrid submental flaps for reconstruction in the head and neck: part pedicled, part free. Laryngoscope. 2014;124(3):637-41
14. Ramkumar A, Francis NJ, Senthil Kumar R, Dinesh Kumar S. Bipaddled submental artery flap. Int J Oral Maxillofac Surg 2012; 41(4):458-60
15. Buric N, Krasic D, Pesic Z, Jovanovic G. Microvascular submental island flap prelaminated with oral mucosa in reconstruction of the lateral defect of nose. Med Pregl. 2010;63(9-10):723-7
16. Wang JG, Chen WL, Ye HS, Yang ZH, Chai Q. Reverse facial artery-submental artery deepithelialised submental island flap to reconstruct maxillary defects following cancer ablation. J Craniomaxillofac Surg. 2011; 39(7):499-502
17. Lee JC, Lai WS, Kao CH, Hsu CH, Chu YH, Lin YS. Multiple-parameter evaluation demonstrates low donor-site morbidity after submental flap harvesting. J Oral maxillofac Surg. 2013; 71(10):1800-8.