

# Reconstruction of intraoral defects after resection of cancer with two types of submental artery perforator flaps<sup>☆</sup>

L. Huang<sup>1</sup>, W.-M. Wang<sup>1</sup>, X. Gao<sup>1</sup>, Y.-X. Yuan<sup>1</sup>, X.-Q. Chen<sup>1</sup>, X.-C. Jian<sup>\*</sup>

Department of Oral and Maxillofacial Surgery, Xiangya Hospital of Central South University, Changsha, Hunan, China

Accepted 1 November 2017

Available online 22 November 2017

## Abstract

The submental island flap is a common choice for reconstruction of intraoral defects. To obtain a thinner, more pliable flap and get a better oncological result, the submental artery perforator flap has been proposed, and to assess its feasibility for closure of defects after resection of cancers of the oral cavity we studied 20 patients, each of whom was treated in this way. All the flaps were classified into those with septocutaneous perforators ( $n = 16$ ) and those with musculocutaneous perforators ( $n = 4$ ), and the main veins that drained the flaps were two submental veins ( $n = 17$ ). There were two patterns of venous drainage: in pattern 1 ( $n = 9$ ) the external jugular vein provided the primary venous drainage, and in pattern 2, the submental veins drained mainly into the facial vein, the common facial vein, and the internal jugular ( $n = 10$ ). In one patient the submental veins bypassed the facial vein to drain into the internal jugular. Eighteen of the 20 patients had no postoperative complications. The remaining two developed mild venous congestion of the flaps, which was resolved with conservative management and no skin loss. No local or regional recurrence was detected after a mean (range) follow-up of 21 (4–35) months. This is a simple, reliable flap that can be used for the reconstruction of intraoral defects after resections for cancer, but its oncological outcome still requires proof in long-term, large-scale, clinical trials.

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**Keywords:** Submental; perforator flap; intraoral; reconstruction

## Introduction

Reconstruction for an intraoral defect after resection for cancer is an integral part of surgical treatment. Various techniques can be used including skin grafts, local or regional flaps, pedicled myocutaneous flaps, and vascularised free

flaps. In recent years free vascularised tissue transfers such as the radial forearm flap and the anterolateral thigh flap have gradually become the first choice of oncological surgeons for intraoral reconstruction. Despite this, the submental island flap still provides an excellent choice in reconstructions of the oral cavity because it is proximal to the recipient sites, it can easily be harvested with no extra operating time needed, it does not require a second donor site or microsurgical skills, and the donor site can be closed primarily.

The submental flap is an axial pattern flap that was first introduced by Martin et al<sup>1</sup> in 1993, and has gained widespread popularity in reconstructions of the head and neck. When the conventional submental island flap is harvested, the anterior belly of the digastric muscle and the level 1A nodal basin should be kept with the flap to ensure that it survives. However, this produces a thick flap that is not suit-

<sup>☆</sup> This study was funded by the National Natural Science Foundation of China (grant no. 81041052; 81260166; 30572044).

<sup>\*</sup> Corresponding author at: Department of Oral and Maxillofacial Surgery, Xiangya Hospital of Central South University, No.87 Xiangya Road, Changsha 410008, Hunan, China. Tel.: +86 731 89753046.

E-mail addresses: [huanglong0129@126.com](mailto:huanglong0129@126.com) (L. Huang), [wwmasly10@163.com](mailto:wwmasly10@163.com) (W.-M. Wang), [45210700@qq.com](mailto:45210700@qq.com) (X. Gao), [61473789@qq.com](mailto:61473789@qq.com) (Y.-X. Yuan), [cxq8316@sina.com](mailto:cxq8316@sina.com) (X.-Q. Chen), [drjianxinchun@gmail.com](mailto:drjianxinchun@gmail.com) (X.-C. Jian).

<sup>1</sup> Tel.: +86 731 89753046.

able for the reconstruction of small-medium-sized intraoral defects. It also puts the patients at high risk of local recurrence, which makes surgeons reluctant to use it in the patients with suspected invasion of the lymph nodes. With the spread of the concept of perforator flaps, the submental artery perforator flap (a new version of the submental island flap), emerged and has since been used for closure of defects in the oral cavity.<sup>2,3</sup>

The purpose of this paper is to evaluate the feasibility of the submental artery perforator flap, and to summarise its anatomical features and surgical technique.

## Patients and methods

We studied a retrospective case series (operated on at our hospital from March 2014 to October 2016) of 20 patients who had primary intraoral reconstruction after resections for cancer. All operations were done by doctors Long Huang and Xin-Chun Jian with other team members. There were 16 men and 4 women, mean (range) age 52 (34–67) years. The primary sites were buccal mucosa (n = 10), tongue (n = 7), and mandibular gingiva (n = 3). The clinical stages of the tumours were stage I (T1N0M0) (n = 9), stage II (T2N0M0) (n = 8), and stage III (T2N1M0) (n = 3). All the patients had had primary resection of the tumour combined with modified radical or supraomohyoid neck dissection, seven also had marginal mandibulectomy, and three postoperative radiotherapy. Histological analysis showed neck node metastases in four cases. Anatomical data were collected during the operation, including the number of submental artery perforators, the relation between the cutaneous perforators of the submental artery and the anterior belly of the digastric muscle, and the characteristics of the venous drainage. The oncological outcomes were assessed during follow up. The prerequisites were no previous operations on the neck that violated the facial vessels, and no level 1 lymphatic metastases.

### Surgical technique

A horizontal elliptic skin paddle is outlined in the submental region, and the size of the skin paddle established by the range of defects anticipated after resection of the cancer (Fig. 1). The vertical dimensions of the flap should not be more than 5 cm, estimated by the pinch test, otherwise there would be obvious cosmetic and functional concerns because of the amount of tension on the sutures. The horizontal dimensions of the flap reach the mandibular angle bilaterally. The lateral incision extends backwards to the mastoid process for the supraomohyoid neck dissection. If modified radical neck dissection is needed, the submandibular incision line is linked to that of the neck dissection.

To harvest the flap the superior limb of the skin paddle is raised and the lateral incision made through the platysma muscle. When the anterior platysma is divided, the surgeon should take care to protect the superficial submental artery



Fig. 1. The incision for the submental artery perforator flap (5 cm × 3 cm) in a patient with T1N0M0 squamous cell carcinoma of the lateral border of the tongue.

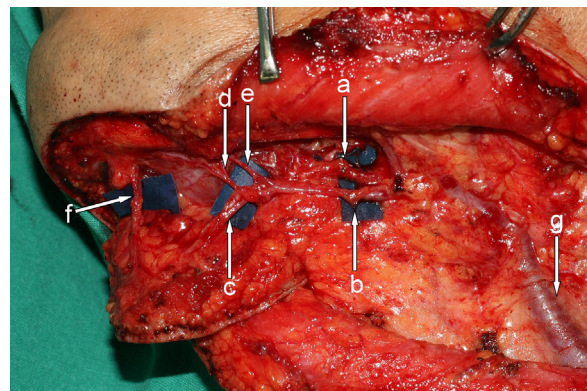


Fig. 2. Vessels encountered during harvest of the flap: a. submental artery and submental vena comitans. b. Submental vein. c. Septocutaneous perforator of the submental artery. d. Digastric branch of the submental artery. e. glandular branch of the submental artery to the sublingual salivary gland. f. Contralateral cutaneous perforator of the submental artery. g. external jugular vein.

perforators that are close to the overlying platysma. After the skeletonisation of the facial artery to find out where the submental artery rises, it is traced distally to the lateral border of the anterior belly of the digastric muscle.

One or two cutaneous perforators branch from the submental artery lateral to the anterior belly in most cases, and go between it and the overlying platysma before they penetrate the flap. They are therefore designated “septocutaneous perforators”, and the harvest is a simple procedure. The flap is raised from the contralateral side in the subplatysmal plane, and care taken to avoid the inclusion of level 1A lymph nodes and fat tissue. After the other branches of the submental artery have been cut and ligated with titanium clips, the flap with its pedicle is released retrogradely to the proximity of the facial vessels (Figs. 2 and 3). When there are no septocutaneous perforators, one major cutaneous perforator can be detected medial to the anterior belly of the digastric muscle after the anterior belly of the accessory muscle has been cut, and the route of the submental artery traced under the accessory muscle to the flap (Fig. 4). As this perforator is in close

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