

## Technical Note

# The sublingual gland flap: surgical technique and indications for the reconstruction of small oral defects

Mathilde Malinge<sup>1,\*</sup>, Benoit Piot<sup>1</sup>, Julie Longis<sup>1</sup>, Thanh Thuy Nham<sup>1</sup>, Marine Anquetil<sup>1</sup>, Hélios Bertin<sup>1,2</sup>

<sup>1</sup> Service de chirurgie Maxillo-faciale et stomatologie, CHU de Nantes, 1 place Alexis Ricordeau, 44093 Nantes Cedex 1, France

<sup>2</sup> Laboratoire des sarcomes osseux et remodelage des tissus calcifiés (PhyOs, UMR 1238), faculté de médecine, 1 rue Gaston Veil, 44035 Nantes cedex, France

(Received: 24 November 2020, accepted: 21 January 2021)

## Introduction

Resection and reconstruction of the oral cavity can be challenging for maxillofacial surgeons [1,2]. While large defects of the oral cavity require muscle or fascio-cutaneous flaps that are either free [3] or pedicled [4], more limited substance loss can be managed by direct closure or local flaps. There are many local procedures available for reconstruction of small defects of the oral cavity, including the facial artery musculomucosal (FAMM) flap and its variant the buccinator flap, the buccal fat pad, and the nasolabial flap [5–8]. The choice of the surgical technique is based on several anatomical parameters such as the size and the subsite of the defect, the nature of the tissues involved in the substance loss, and the experience of the surgeon.

Our aim was to showcase the sublingual gland flap surgical technique for reconstruction of small defects of the oral cavity, and to present our experience with this procedure.

## Innovation report

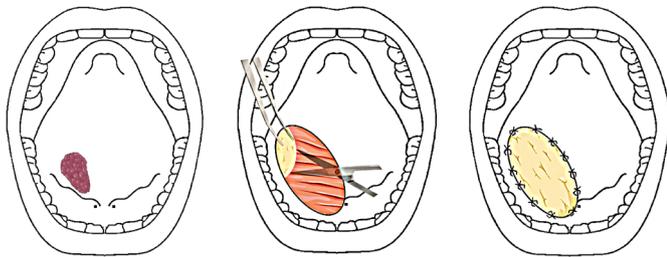
The sublingual glands are the smallest of the three paired salivary glands and the most superficially located alongside the oral mucosa. These glands are situated laterally under the tongue, bordered laterally by the mandible and medially by the genioglossus muscle. Medially, the sublingual gland is close to the submandibular duct and the lingual nerve. Each sublingual fold extends from a posterolateral position and traverses anteriorly to join the sublingual papillae at the midline bilateral to the lingual frenulum. Blood supply is provided via the sublingual and the submental arteries, which arise from the lingual and the facial arteries, respectively.

The SGF technique was usually performed under general anesthesia concomitantly with resection of small tumors classified as T1 of the anterior or lateral floor of the mouth, as well as on the mandibular gingiva. The sublingual gland was approached on its lateral side in case of a lateral defect or on its anterior part in case of an anterior defect. To ensure that the sublingual gland was not invaded by the tumor, a glandular cross-section was systematically performed for anatomopathological examination. The gland was then carefully isolated from the oral mucosa laterally, from the lingual nerve positioned medially, and from the submandibular artery in a deep position. Depending on the tumor resection and the substance loss, only a partial dissection of the gland was usually performed. When all the sublingual gland had to be harvested, we located and preserved the submandibular gland duct after catheterization, allowing a safe separation from the sublingual gland. Progressive release of the gland was carried out by progressive and continuous traction, which allowed it to be pulled forward and/or laterally to fill the defect. The sublingual gland was then stitched to the edges of the defect with resorbable thread (Fig. 1). Sublingual gland flaps can be performed alone for small defects or in combination with harvesting of the contralateral gland or in association with another local mucosal flap for larger defects. Priority is always given to carcinologic excision of the tumor with wide clear margins and the choice of the technique for reconstruction remains secondary, sometimes made during the procedure (Figs. 2 and 3).

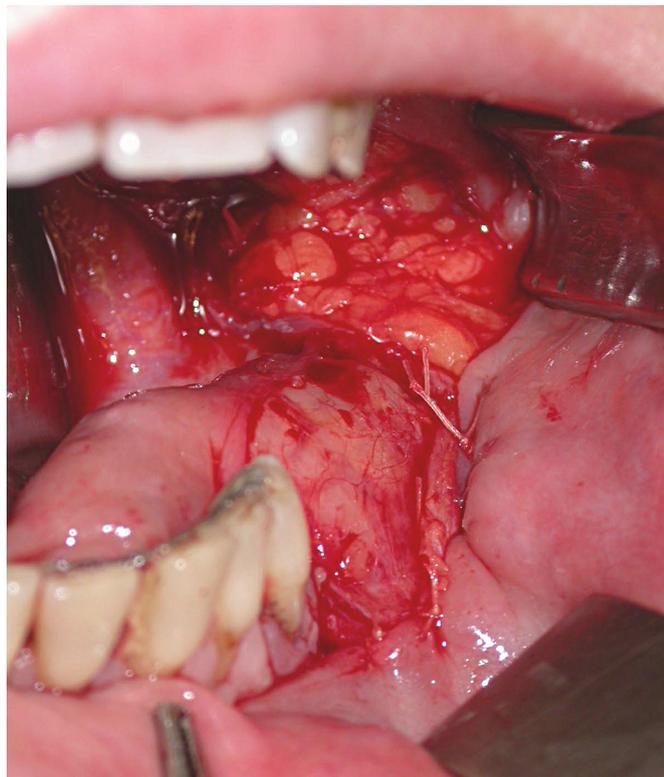
## Discussion

Oral tumors are common pathologies, and tumor removal represents the first step of the treatment plan. There are many techniques available for reconstruction of oral defects. We here present the procedure for repairing small defects of the floor of

\* Correspondence: [mathilde.malinge@chu-nantes.fr](mailto:mathilde.malinge@chu-nantes.fr)



**Fig. 1.** Schematic representation of the surgical technique for sublingual gland flap harvesting and reconstruction of an oral floor defect. Lesion of the right floor of the mouth (a), harvesting of the sublingual gland after removal of the lesion (b), outcome of the sublingual flap (c).

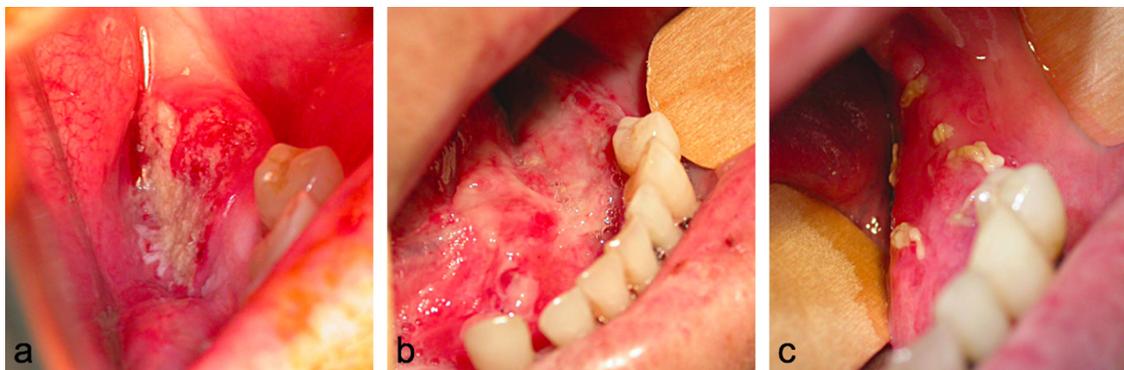


**Fig. 2.** Perioperative view of a sublingual gland flap associated with a buccal fat pad flap for reconstruction of a defect of the lateral floor of the mouth.

the mouth with an adjacent sublingual flap. One of the main advantages of this flap is the absence of donor site morbidity, as the sublingual gland is harvested from the area of tumor resection. Furthermore, it is an easy and quick procedure. This flap has been described for small defects (*i.e.*, less than 4 cm) of the anterior and anterolateral floor of the mouth, corresponding to ablative surgery of T1 and small T2 tumors (7th edition) [9,10]. The major drawback of the procedure is the risk of salivary duct injury or mucocele.

There are very few reports of the procedure in the literature; only three authors have described the technique in just 22 patients [9–11]. In our experience, 72 patients were operated using this technique between January 2006 and January 2016. All of the patients underwent the procedure after removal of a squamous cell carcinoma in the floor of the mouth (the lateral tongue border in 25 cases, the anterior floor in 22 cases, the lateral floor or the adjacent gum in 18 cases, and other localizations in 7 cases). Most of the defects were between 5 and 10 cm<sup>2</sup> in size, but they could be as large as 20 cm<sup>2</sup>. We noted fast healing, within 7 days in most of the patients, and a low rate of postoperative complications (4 patients). Two patients exhibited bone exposure at either 6 weeks or 2 months after the surgical procedure. One patient exhibited a mucocele 5 months after the sublingual flap with no need to a complementary procedure. One patient exhibited anterior ankyloglossia, requiring release of the tongue by skin grafting. Use of a sublingual flap was associated with harvesting of the contralateral sublingual gland in 18 patients to cover an anterior substance loss, and with the homolateral buccal fat pad in 8 other patients.

Large mucosal defects of the mouth are usually reconstructed with free and pedicled muscle or fasciocutaneous flaps. Fang *et al.* reported that it is possible to reconstruct a mean size of 53.6 cm<sup>2</sup> with a forearm flap [3]. A large variety of local mucosal flaps are available for small and medium-sized defects. The facial artery musculomucosal (FAMM) flap has been described as a reliable and versatile flap for repair of defects as large as 8 × 3 cm [12]. It allows repair of a variety of defects of the palate, the floor of the mouth, the alveolar ridges, and the lips thanks to the possibility of superior or inferior pivoting with a wide arch of rotation [5]. A bite blocker is, however,



**Fig. 3.** Intraoral photograph of an oral lesion of the left gingival mucosa before removal and reconstruction (a). The same patient the next day after reconstruction with a sublingual gland (b), and 3 weeks after the procedure (c).

**Table I.** Advantages and disadvantages of available flaps for the reconstruction of defects of the oral mucosa. SGF, sublingual gland flap; FAMM, facial artery musculomucosal.

Flap	Indications – Defect size – Localization	Advantages	Disadvantages, complications
SGF	– Small and medium-sized defects <4 cm – Floor of mouth, tongue, gum, vestibule	– Local flap – No donor site morbidity – Simple, quick	– Not suitable for large defects – Salivary duct injury, mucocele, ankyloglossia (5.5%)
FAMM flap	– Small and medium-sized defects <8 × 3 cm – Floor of mouth ++, alveolar ridges, lips, palate, tongue	– Local flap – Good esthetic outcomes – Dental rehabilitation (not a bulky or hairy flap) – No limitation of mouth opening	– Not suitable for large defects – Bite blocker to protect pedicle – Second surgery at 2–3 weeks to cut the pedicle – Possible venous congestion, partial flap necrosis, flap dehiscence
Buccinator flap	– Small and medium-sized defects <4 × 7 cm – Tongue, palate, retromolar triangle, floor of mouth	– Local flap – Quick harvesting – Good functional and esthetic outcomes – Buccal nerve inclusion allowing the flap to be sensate	– Not suitable for large defects – Bite blocker to protect pedicle – Second surgery at 2–3 weeks to cut pedicle – Partial flap necrosis (5.9%) and flap dehiscence (5%)
Buccal fat pad	– Small and medium-sized defects – Maxillary ++, retromolar triangle	– Local flap – Short operating time	– Not suitable for large defects – Possible cheek depression and limited mouth opening, partial flap necrosis (2.5%), and flap dehiscence (3.2%)
Nasolabial flap	– Small and medium-sized defects <4 × 5 cm – Floor of mouth, retromolar triangle, palate, tongue, alveolar ridges	– Ease of surgery – Possible under Local anesthesia	– Not suitable for large defects – Asymmetry of the nasolabial fold – Hairy flap – Cutaneous scar, dehiscence, and healing – Risk of orocutaneous fistula and iatrogenic dermoid cyst
Pedicled flap	– Large defects – Tongue, retromolar triangle, floor of mouth	– Cover large defects	– Two operative sites – Recipient site morbidity (congestion, bulky flap) – Length of hospitalization
Free flap (forearm flap)	– Large defect – All localizations	– Cover large defects – Reliable, versatile	– Two operative sites – Frequent surgical revision – Length of hospitalization

required in dentate patients to protect the pedicle from compression. Furthermore, when associated with a cervical dissection for node removal, care must be taken to preserve the facial artery, which provides its vascularization. The buccinator flap is the muscular counterpart of the FAMM flap, and it allows reconstruction of oral defects of up to 4 × 7 cm in size [13], thus allowing repair of a half-tongue [7]. This flap is versatile and it can be used for soft palate, floor of mouth, or retromolar triangle defects [8,13]. Its advantages are reduced donor site morbidity as well as the good functional and esthetic outcomes without cheek depression [14]. Moreover, cervical dissection with facial vessel sacrifice does not compromise this flap since it receives ample blood supply from the buccal artery [7]. The buccal fat pad is an interesting option for repair of the the

alveolar ridge, palate, inner cheek, and retromolar triangle [8]. The procedure is straightforward, it can be associated with other local flaps, and the buccal fat pad entails less donor site morbidity than FAMM and buccinator flaps [8]. The nasolabial flap has also been described for the closing of medium-sized oral defects (*i.e.*, 4 × 5 cm) [15]. In a series of 224 nasolabial flaps, Varguese *et al.* showed that it is possible to reach 8.5 × 3.5 cm by using a lax and supple skin with an acceptable degree of scarring at the donor site [6]. This flap is suitable for filling defects of the mouth floor, the alveolar ridges, the tongue, and the palate. Skin closure can readily be achieved as a result of the cutaneous laxity. The disadvantages include scarring from the cutaneous incision, even when discreet in the nasolabial groove; furthermore, the flap can be hairy and a

degree of asymmetry of the nasolabial fold may be noted in case of unilateral harvesting [15]. The advantages and the disadvantages of the various reconstruction techniques are presented in Table I.

## Conclusion

The use of sublingual gland flaps is a reliable technique for reconstruction of anterior and lateral defects of the floor of the mouth, as well as of the adjacent gum and the vestibule. This technique adds to the arsenal for the repair of small and medium-sized defects of the oral mucosa.

**Conflicts of interests:** The authors declare no conflicts of interest.

**Funding sources:** None.

## References

1. Squaquara R, Kim Evans KF, Spanio di Spilimbergo S, Mardini S. Intraoral reconstruction using local and regional flaps. *Semin Plast. Surg.* 2010;24:198–211.
2. Chim H, Salgado CJ, Seselgyte R, Wei F-C., Mardini S. Principles of head and neck reconstruction: an algorithm to guide flap selection. *Semin Plast. Surg.* 2010;24:148–154.
3. Fang Q-G, Li Z-N, Zhang X, Liu F-Y, Xu Z-F, Sun C-F. Clinical reliability of radial forearm free flap in repair of buccal defects. *World J. Surg. Oncol.* 2013;11:26.
4. Sen S, Gajagowni JG, Pandey JK, Dasgupta P, Sahni A, Gupta S, *et al.* Effectiveness of pectoralis major myocutaneous flap in the surgical management of oral cancer: a retrospective study. *J. Stomatol. Oral. Maxillofac. Surg.* 2019;120:21–27.
5. Sumarroca A, Rodríguez-Bauzá E, Vega C, Fernández M, Masià J, Quer M, *et al.* Reconstruction of oral cavity defects with FMM (facial artery musculomucosal) flaps. Our experience. *Acta Otorrinolaringol. Esp.* 2015;66:275–280.
6. Varghese BT, Sebastian P, Cherian T, Mohan PM, Ahmed I, Koshy CM, *et al.* Nasolabial flaps in oral reconstruction: an analysis of 224 cases. *Br. J. Plast. Surg.* 2001;54:499–503.
7. Woo SH, Jeong H-S., Kim JP, Park JJ, Ryu J, Baek C-H. Buccinator myomucosal flap for reconstruction of glossectomy defects. *Otolaryngol. Head Neck Surg.* 2013; 149: 226–231.
8. Comini LV, Spinelli G, Mannelli G. Algorithm for the treatment of oral and peri-oral defects through local flaps. *J. Cranio Maxillofac. Surg.* 2018;46:2127–2137.
9. Zhao B, Yu Y, Sun B. Use of the sublingual gland for reconstruction of a defect in the floor of the mouth after resection of early stage carcinoma. *Br. J. Oral Maxillofac. Surg.* 2020;58:715–716.
10. Bredell M, Grätz K. Sublingual gland flap for reconstruction of anterior and antero-lateral floor of mouth defects. *Head Neck Oncol.* 2013;5:38.
11. Eguchi T, Basugi A, Kanai I, Miyata Y, Hamada Y. Sublingual gland flap for soft tissue reconstruction of oral defects. *Br. J. Oral Maxillofac. Surg.* 2018;56:895–896.
12. Joshi A, Rajendraprasad JS, Shetty K. Reconstruction of intraoral defects using facial artery musculomucosal flap. *Br. J. Plast. Surg.* 2005;58:1061–1066.
13. Licameli GR, Dolan R. Buccinator musculomucosal flap: applications in intraoral reconstruction. *Arch. Otolaryngol. Head Neck Surg.* 1998;124:69–72.
14. Ferri A, Perlangeli G, Montalto N, Carrillo Lizarazo JL, Bianchi B, Ferrari S, *et al.* Transoral resection with buccinator flap reconstruction vs. pull-through resection and free flap reconstruction for the management of T1/T2 cancer of the tongue and floor of the mouth. *J. Cranio Maxillofac. Surg.* 2020;48:514–520.
15. Ducic Y, Burye M. Nasolabial flap reconstruction of oral cavity defects: a report of 18 cases. *J. Oral Maxillofac. Surg.* 2000;58:1104–1108; discussion 1108–1109.