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Inferiorly based buccinator myomucosal island flap in oral and pharyngeal reconstruction. Four techniques to increase its application



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ABSTRACT

INTRODUCTION: Reconstruction of oral and pharyngeal defects after pathologic resections with the same tissue is an optimal and ideal target. Isolated variety of inferiorly pedicled facial artery musculomucosal flap, in which facial artery and vein are skeletonized (referred to as inferiorly based BUMIF), is suitable for reconstruction of medium-sized mucosal defects.

PRESENTATION OF CASES: In this article, with four cases, modifications of this flap are demonstrated in reconstruction of large intraoral and oropharyngeal defects and coverage of alveolar ridge in the mandible. **DISCUSSION:** In some situations, there is a need for more mucosal paddle, longer vascular pedicle and more adaptation to the recipient bed.

CONCLUSION: Relocating Stensen's duct increases the mucosal paddle with cranial extension of superior limit while differential incision of the mucosa and buccinator muscle in mandibular vestibule extend the lower limit of this flap. Bone suture is a good complementary technique when this flap is used for coverage of mandibular alveolar ridge. Inferiorly based BUMIF with added length is indicated for oropharyngeal and contralateral mouth floor reconstructions.

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1. Introduction

Reconstruction of medium-sized oral and pharyngeal defects after pathologic resections or traumatic avulsions with the same tissue is an optimal and ideal reconstruction. Inferiorly based buccinator myomucosal island flap (inferiorly based BUMIF) was introduced by Zhao in 2003 [1]. It is an axial-pattern flap and includes some fibers of orbicularis oris muscle and part of buccinator muscle, covered with the buccal mucosa [2]. It is a vascular island variant of inferiorly pedicled facial artery musculomucosal flap (FAMM), in which the facial artery and vein are skeletonized [3]. This flap has been reported for reconstruction of the mouth floor, tongue and pharynx [4,5]. In this article, four situations for these applications are explained and the articles on this topic are reviewed.

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2. Surgical technique

With a 5-cm extraoral incision in submandibular region, the facial artery and vein are identified; then subplatysmal dissection continues toward the zygoma and midface with great caution to avoid injury to the marginal mandibular branch of the facial nerve. A vertical 3-cm intraoral incision, one centimeter behind the oral commissure, is designed and dissection in the plane under the buccinator muscle, continues posteriorly toward the previously created pocket until these two dissections meet each other. The buccopharyngeal fascia covers the external surface of the buccinator muscle. Limiting dissection medial to this fascia but lateral to the facial artery and vein inhibits iatrogenic injury to the facial nerve and guarantees the flap blood perfusion. At this level, facial artery and vein are apart from each other with variable distances.

The superior limit of the flap is designed 5 mm below the Stensen's duct, continuing posteriorly toward the pterygo-mandibular raphe. In cases requiring more mucosa, Stensen's duct should be transpositioned. The superior extension of facial artery/vein should be ligated at the superior boundary of the flap. In a small percentage of patients where the facial artery terminates at the superior labial artery, this step is spontaneously omitted. The posterior limit of the flap is cut parallel with the anterior boundary of the flap. Now it is time to convert the three-sided flap which is



Fig. 1. Cadaveric dissection shows inferior limit of the flap that has been cut in two planes, buccal mucosal is incised at higher levels (thick arrow) than buccinator muscle (thin arrow).

inferiorly pedicled to vascular islands. The following steps should be performed:

- 1) Submucosal dissection and incision of mucosa; changing the pedicle flap to mucosal island flap, pedicled inferiorly to the buccinator muscle.
- 2) Identification of the facial artery/vein at the flap base and skeletonizing them; then cutting the buccinator muscle at the flap base. This step converts the flap pedicled on the muscle to the vascular island flap.

Inferiorly, the muscle part of the flap can end at the mandibular vestibular depth but the mucosal part of the flap should end slightly higher for better management of donor site to prevent obliteration of the vestibule to provide sufficient space for oral hygiene maintenance (Fig. 1).

Bringing this flap out, from the oral cavity through submandibular incision and turning it around, the inferior mandibular border makes it available for reconstruction of the mouth floor and the ventral or lateral border of the tongue (Fig. 2). This maneuver is nec-

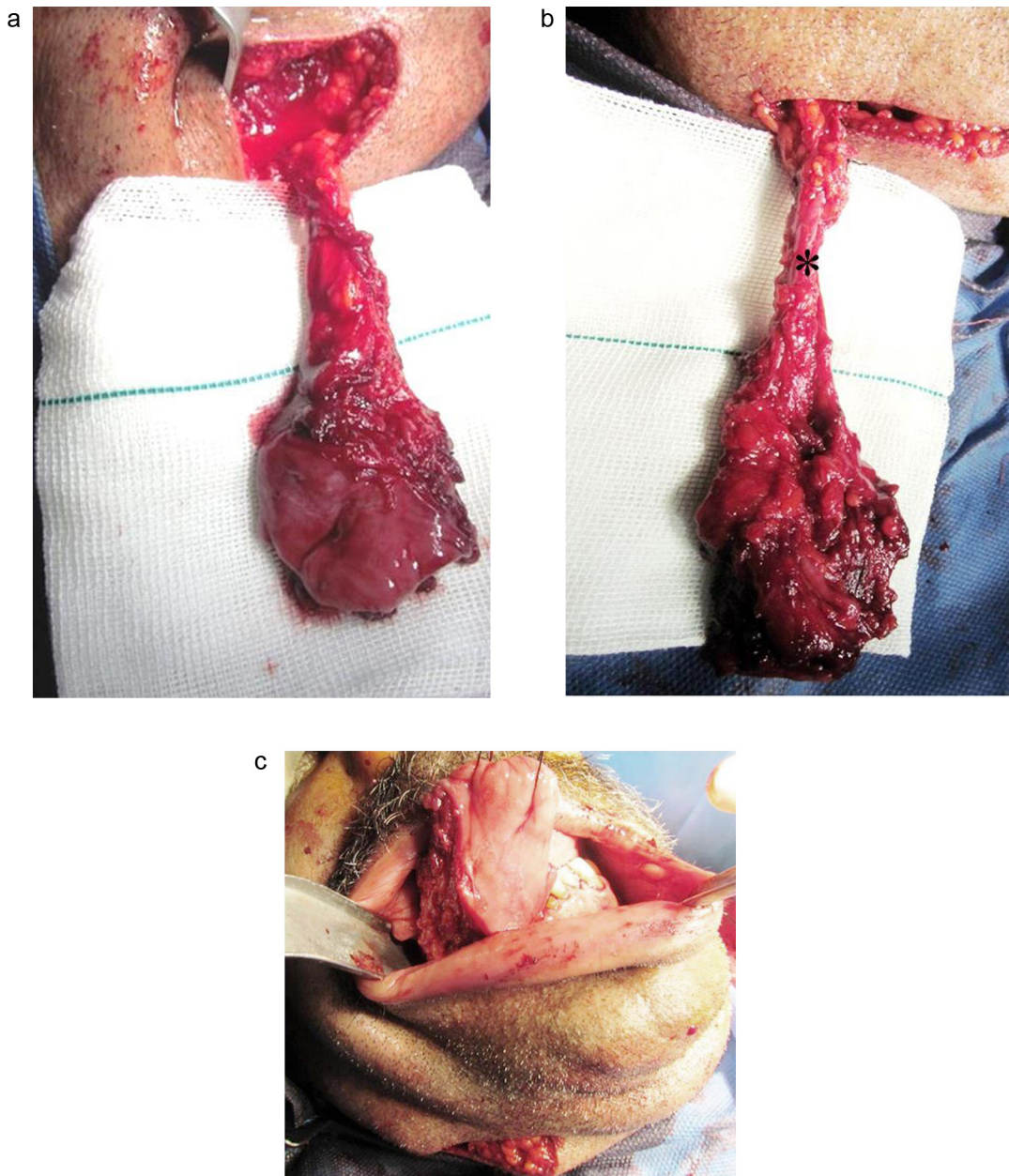


Fig. 2. (a) Bringing out inferiorly based BUMIF through a 5-cm submandibular incision (mucosal side), (b) Buccinator muscle side. Note the facial artery (*). (c) Turning the flap around the inferior mandibular border and reentry into the oral cavity medial to mandibular bone and intact dental arch.

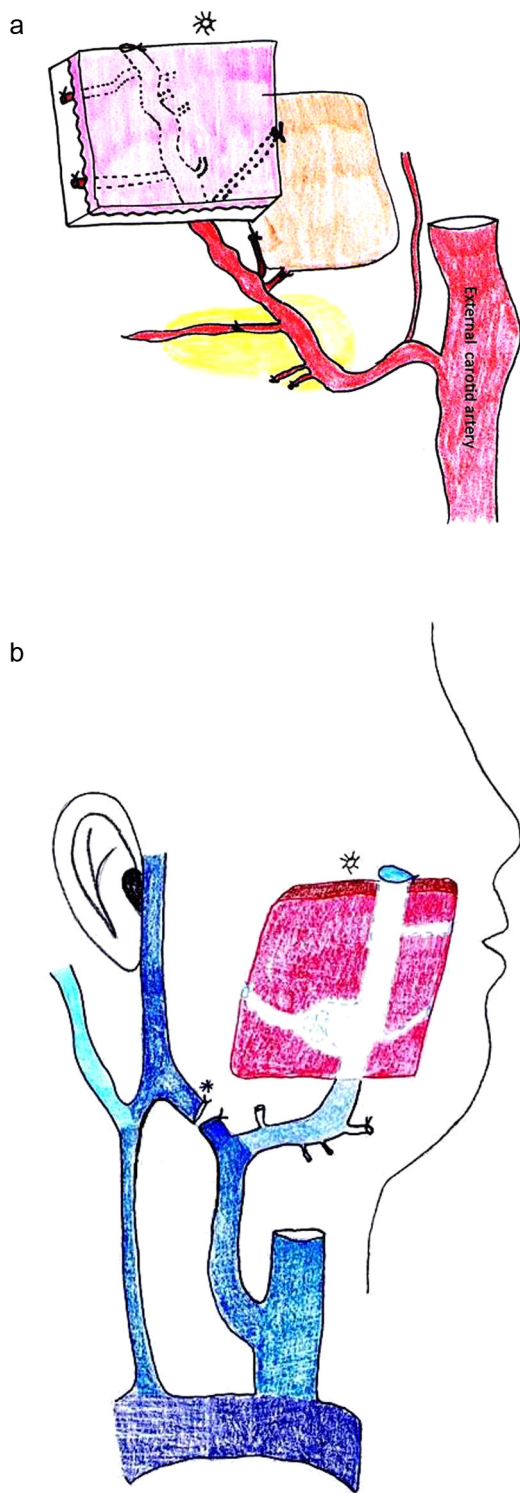


Fig. 3. (a,b) Schematic representations of inferiorly based BUMIF. The facial vein and artery are not shown together in a picture, for simplicity. The vessels that should be cut/ligated have shown. Special attention should be paid to connection of anterior branch of retromandibular vein (*) with anterior facial vein.

essary in patients with intact posterior dentition but still is useful in edentulous patients.

If extra pedicle length is required, then more dissection of facial vessels through submandibular salivary gland should be performed or this gland should be removed (flap with added pedicle length). There are clinical situations in which maximum pedicle length is needed. In such situations, the dissection should be extended to



Fig. 4. Relocated Stensen duct with perimucosal cuff.

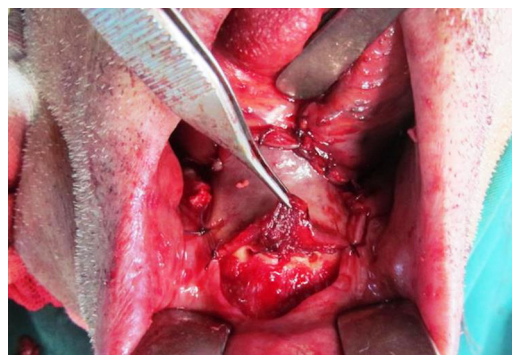


Fig. 5. Bone suture secured the flap to the mandibular alveolar ridge.

the origin of the facial artery from the external carotid artery and facial vein to internal jugular vein. The anterior branch of retromandibular vein that connects to the anterior facial vein to form the common facial vein can be ligated/cut for increasing the pedicle length (Fig. 3). Variations in mucosal paddle design are recommended, including trilobed flap with superior extension of the flap anterior to the Stensen's duct, when there is need for three-dimensional reconstruction of the anterior mouth floor and ventral tongue or relocating the opening of the parotid duct when there is need for more mucosa.

After flap harvest through the horizontal incision into the buccopharyngeal fascia and meticulous manipulation of the buccal fat pad with the tissue forceps, it is draped into the donor site and sutured to the edges. Great care is necessary not to disrupt the integrity of buccal fat pad capsule. If the harvested mucosa is small, then the direct closure of donor site is possible.

3. Modifications in inferiorly based BUMIF

3.1. Case 1, need for large mucosal paddle

A 52-year-old female with squamous cell carcinoma (SCC) on the right lateral border of the tongue was referred to the authors. There was no clinical and radiographic sign of neck or lung metastasis. Inferiorly based BUMIF with large mucosal paddle was used for reconstruction. Stensen's duct was relocated with retaining small mucosal cuff around the orifice (Fig. 4).

3.2. Case 2, complementary bone suture

An 82-year-old male with SCC of the mouth floor was admitted into Ghaem Hospital, Mashhad, Iran. The cervical lymph nodes were not involved. The lesion was resected with safety margins. Classic inferiorly based BUMIF was used for mucosal replacement that

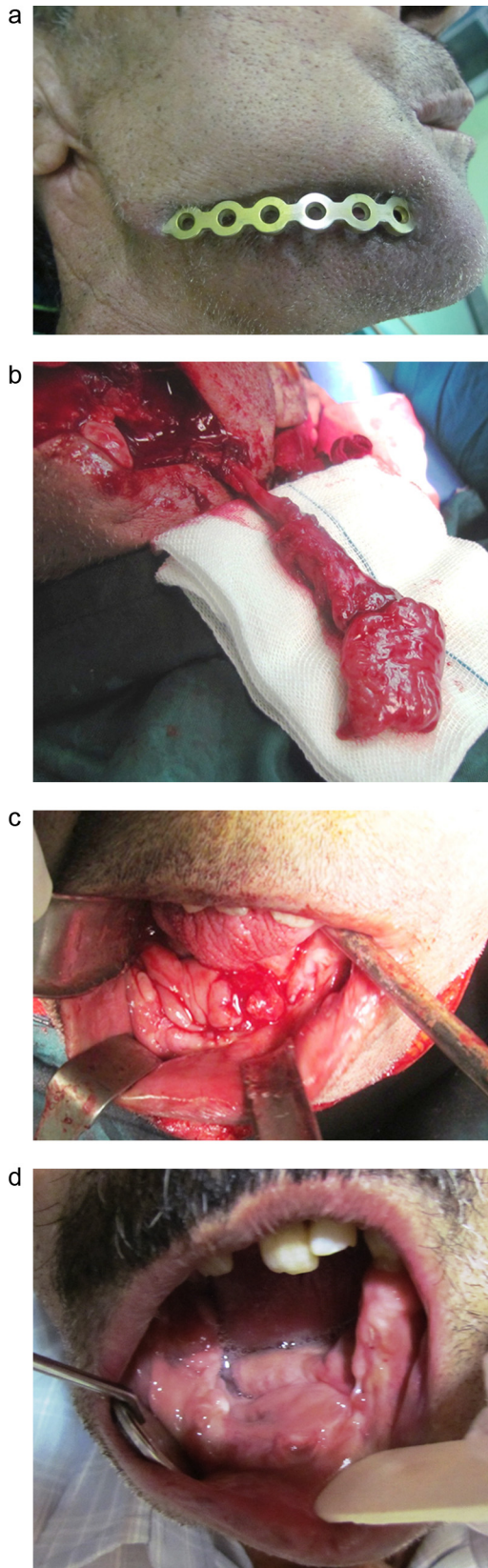


Fig. 6. (a) Extruded reconstruction plate. (b) Inferiorly based BUMIF with added length from the contralateral side. (c) Reconstructed floor of the mouth and left submandibular incision. (d) Three month after operation.

extends over the mandibular bone. For securing the flap over the alveolar ridge, two bone sutures were used. The neck was managed with supraomohyoid neck dissection (SOHND) with preservation of the facial artery/vein (Fig. 5).

3.3. Case 3, extended length flap

A 53-year-old man with extruded mandibular reconstruction plate on the right side of the face through the skin concomitant with oro-cutaneous fistula was referred to the authors. The facial artery and vein on the left side were ligated during a previous surgical operation. Intraoral lining was obtained from the contralateral cheek mucosa through extended length, inferiorly based BUMIF. The reconstruction plate was removed and replaced with low profile reconstruction plate (Fig. 6).

4. Discussion

Buccal mucosa is thin and pliable with the capacity of saliva production [6]. It is supported by the buccinator muscle. This muscle is nourished by branches from the facial and maxillary arteries.

Two or three perforating branches from the facial artery penetrate the buccinator muscle and nourish it. The posterior part of this muscle is supplied by the buccal branch of maxillary artery [7].

Inferiorly based BUMIF is an axial-pattern flap. The muscle part is mainly composed of the buccinator muscle and a small part of orbicularis muscle in the anterior region accompanies it. The shape of the muscle paddle may be rectangular, trapezoid or trilobed.

Dental state has paramount importance in selecting the appropriate type of buccinator myomucosal flap. If the posterior teeth are present in the dental arch, then inferiorly based FAMM flap cannot be used for reconstruction of mouth floor/lateral border of the tongue; otherwise, these teeth should be extracted or a bite block should be used to separate the occluding teeth. In this situation, inferiorly based BUMIF is the flap of choice. Even in edentulous patients, this flap is more appropriate than FAMM flap because nourishing vessels are passed under the inferior mandibular border without the need for pedicle division for further prosthetic reconstruction.

The donor site is managed by direct suturing or mobilization of the buccal fat pad [8]. Morbidity of the donor site is low by this technique [9]. However, in some patients with small volume of buccal fat pad, previous local radiotherapy, malar hypoplasia or thin cheeks, other techniques should be considered for the management of the donor site. Based on the experience of the authors, superiorly based masseter flap is a good alternative for reconstruction of the buccal donor site in such situations.

The thin nature of this flap makes it suitable for reconstruction of the tongue, mouth floor and pharynx [10,11]. However, if the buccal mucosa suffers from special conditions such as lichen planus or white spongy nevus, buccinator-based myomucosal flaps should not be considered.

Bulky flaps like pectoralis major and deltopectoral with added volume result in difficulty in functions such as speaking, eating and deglutition as well as the need for preventive tracheostomy when they are planned to be used for reconstruction of the posterior oral cavity or pharynx [12,13].

Inferiorly based BUMIF needs an extraoral submandibular incision [14]. In the surgical management of the lesions with planned neck dissection (with preservation of facial artery and vein), it is not a concern and the flap is transferred through the neck dissection incision [15].

The flap with added pedicle length is indicated when there is need for more length of the pedicle [16]. This extra length is needed when this flap is planned to be used for pharyngeal reconstruction

Table 1
Historical review of inferiorly based buccinator myomucosal island flap.

Pioneer author/year	Presented work	Reference
Sasaki/1983	Introduced the axial island cheek flap. ^a	20
Carstnes/1991	Introduced the buccinatorymyomucosal island pedicle flap with nasolabial and submandibular incisions.	21
Zhao/2003	Introduced the buccinator musculomucosal island flap with intraoral and submandibular skin incisions.	1
Massarelli/2013	Introduced the free variant of this flap.	22
Rahpeyma/2014	Determined the pedicle length of inferiorly based BUMIF.	23

^a That is full thickness cheek flap consists of inner lining of muscle and outer covering of skin.

or when facial vessels on the same side have been cut/ligated. In the latter case, the elevated flap from the contralateral side can be used [1,17].

Other than oral and pharyngeal applications, this flap has been reported for the treatment of cervical esophagus strictures and laryngeal reconstruction [18,19]. Table 1 summarizes the historical review of inferiorly based BUMIF [1,20–23].

5. Conclusion

Relocating Stensen’s duct increases the mucosal paddle with cranial extension of the superior limit while differential incision of the mucosa and buccinator muscle in mandibular vestibule extends the lower limit of this flap. Bone suture is a good complementary technique when this flap is used for coverage of the mandibular alveolar ridge. Inferiorly based BUMIF with added length is indicated for oropharyngeal and contralateral mouth floor reconstructions.

Conflict of interests

No conflict of interests.

Ethical approval

Research studies has ethical approval.

Consent

Studies on patients has ethics committee approval.

Author’s contribution

Study concept or design: Amin Rahpeyma.
Data collection: Amin Rahpeyma.
Data analysis or interpretation: Saeedeh khajehahmadi.
Writing the paper: Saeedeh khajehahmadi.

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