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REVIEW ARTICLE

Buccinator Myo-Mucosal Flap (BMMF), Vascular Basis and Technique

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ABSTRACT

Background: Surgeons have long been concerned with the optimal tissue replacement of resected or damaged oral mucosa. Managing the intraoral soft tissue defects can be achieved with specially constructed fasciocutaneous, myocutaneous, and muscle flaps. It is physiologically ideal to replace mucosa with the same type of tissue. Buccinator-based myomucosal flaps are ideal for fixing medium-sized mucosal defects inside the mouth because they are well-supplied with blood, sufficiently thick, have a large mucosal paddle, and release saliva. We intended to outline an overview about Buccinator Myo-mucosal flap (BMMF), vascular basis and technique.

Conclusions: The BMMF can be created using a variety of methods. A posterior, anterior, or superior base for the BMMF is possible. An island flap is generated by isolating the pedicle; this allows for better rotation; and a "buccinator myomucosal neurovascular island pedicle flap" is formed using the buccal venous plexus, the buccal artery, as well as the nerves that innervate the muscle; these are modifications to the original operation. Buccinator myomucosal flap had minimal donor site morbidity and short hospital stays. The BMMF has many benefits, such as a large supply of tissue, the ability to use the same tissue to replace damaged or missing mucosa, a decreased risk of infection at the donor site, and the best possible cosmetic and functional outcomes.

Keywords: Buccinator Myo-mucosal flap;Intraoral lesions; Technique

INTRODUCTION

The Buccinator muscle originates from the outer surfaces of the alveolar processes of the maxilla (opposite to the three maxillary molar teeth), and mandible (opposite to the three mandibular molar teeth). Posteriorly, it arises from the pterygomandibular raphe. Anteriorly, it inserts into the orbicularis oris muscle. At its highest point is the maxillary vestibule, and at its lowest point are the mandibular vestibule and the external oblique ridges. Laterally, it is related to the ramus of the mandible, the masseter and medial pterygoid muscles, the buccal fat pad, and the buccopharyngeal fascia. Medially, it is covered by the submucosa and mucosa of the cheek. Motor innervation is carried out via a network of nerves that originate from the facial nerve, known as the buccal branch. The buccal nerve, a branch of the mandibular nerve, receives sensations from the mouth and feeds them into the buccinator muscle through the back of the neck of mandible. Additionally, this area contains a small number of salivary glands and buccal lymph nodes. Just above the muscle's midline, the Stenson duct emerges into the mouth **(Fig 1).** [1].

It is an important matter to treat pathologic lesions, reconstruct intraoral soft tissue deformities caused by trauma, or repair congenital broad palatal clefts with the use of similar tissue. Surgeons have long been concerned with the optimal tissue replacement for resected or damaged oral mucosa [1].

For the purpose of covering intraoral soft tissue defects, specialized fasciocutaneous, myocutaneous, and muscular flaps have been developed. The physiological ideal is to use the same type of tissue to replace the mucosa [2]. When soft tissue defects

are too large to allow for direct closure, free mucosal grafting, or secondary epithelialization, the pediculated mucosal flaps like myomucosal tongue, labial, or palatal rotation flaps can be used to harvest mucosa [3]. Buccinator-based myomucosal flaps are ideal for fixing small to medium-sized mucosal defects inside the mouth because they are well-supplied with blood, sufficiently thick, have a large mucosal paddle, and release saliva [4].

Vascular anatomy and methods of harvesting: The BMMF can be harvested using a variety of methods. There are three possible bases for the BMMF: posterior, anterior, or superior [7]. Boundaries of the BMMF being: the parotid duct is located on top of the flap, whereas the oral commissure is on the front and the pterygomandibular raphe is on the back. Unfortunately, the amount of the tissue needed and the anticipated manner of donor site closure determine the limit, however a flap as large as 7 × 5 cm can be raised. **(Fig. 2)** [5].

A) ***Posteriorly based flaps:*** In 1989, **Bozola** was the first to describe a buccal artery-based axial musculomucosal flap. The bucco-pharyngeal fascia is reached by making incisions in the buccal mucosa and buccinator muscle after the buccal artery has been found using Doppler ultrasonography. The next step is to elevate the flap in an anterior to posterior manner in the loose areolar plane between the buccinator muscle and the bucco-pharyngeal fascia **(Fig.,3)** [6].

To avoid any potential issues with chewing, the pedicle is carefully positioned such that it does not bridge the space between the molar teeth. After a few weeks, the vascular pedicle can be separated, or the necessary molars can be excised or an island flap made [6].

Creating a "buccinator myomucosal neurovascular island pedicle flap" dependant on the buccal artery, buccal venous plexus, and nerves that supply the muscle, requires a modified method to isolate the pedicle, allowing for rotation. [7].

B) ***Anteriorly based flap :*** This type depends on the blood supply from the inferior buccal branches of the facial artery, from an anterio-inferior direction. [6]. Incision is made through the muscle and mucosa just behind oral commissure (approx..1cm), then the facial artery is identified along with the ligation of the nasolabial artery. Plane of dissection lies lateral to the vessels and the flap is harvested in a posterior to anterior, superior to inferior fashion. **(Fig.,4)** [8].

To be able to harvest a tunnelized form of the anteriorly based flap, which is then named the tunnelized facial artery myo-mucosal island flap (t-FAMMIF), dissecting the facial veins and arteries to their origin in the neck, the advancement of the flap to the neck region is made possible by creating a small paramandibular tunnel on the inferior fornix, which follows the route of the blood vessels [9].

After that, a new medial tunnel is made medial to the mandible, and the flap is redirected through either the oral floor or the anterior tonsillar pillar. Thanks to its exceptionally lengthy arc of rotation, the t-FAMMIF can reconstruct defects nearly at all sites of oropharynx and oral cavity, even if it's on the opposite side. [9].

C) ***Superiorly based flap*** :The buccinator myomucosal reversed-flow arterial island flap, which was described in 1999, by **Zhao et al.** [10]. It relies on the facial artery's anterior buccal branches and its distal end in its vascular supply. The incision in the buccinator muscle and mucosa is made at the flap's inferior margin to begin dissection **(Fig.,5)** [2]. Ligation of the facial artery at its inferior end, and a superiorly-directed flap elevation is performed. The oral commissure and medial canthus form the center of the rotation arc between them. [2].

D*) BMMF as a free flap*: This variation provides an advantageous option for reconstruction of many defects lying in the oral cavity or the oropharynx. Flap harvesting and in-setting can take from 45 minutes up to 60 minutes which is significantly less time than that consumed in the cases of free or distant axial flaps. A shorter hospital stay and lower donor site morbidity are additional benefits of buccinator myo-mucosal flap. [2].

Advantages of Buccinator My-omucosal Flap: The BMMF has many benefits, such as the available supply of tissue, the ability to reconstruct the missing or damaged mucosal defects according to the principle of 'like with like', a decreased risk of infection at the donor site, and the best possible cosmetic and functional outcomes. [8]. The BMMF does not necessitate microvascular knowledge (except if used as a free flap) and is technically straightforward. Patients with vascular disease, who are at a higher risk of free flap failure, can also benefit greatly from it. This method is highly effective for coverage of oral cavity and oropharyngeal defects after excision of T1, T2, and smaller T3 lesions. [11]. Primary closure of all

donor sites can be done. Even when harvesting a big flap, primary closure is usually possible because the remaining buccal mucosa and muscle are supple and mobile. Scarring is negligible even in cases in which wound dehiscence and healing by secondary intention occurs. [11].

Compared to sphincter pharyngoplasty and pharyngeal flap, BMMF is more "anatomical and physiological" since it can enlarge a naturally short palate without a permanent pharyngeal cushion or bridge. [12]. The BMMF is well-suited for N0 to N1 neck dissection due to its dual blood supply through different vascular pedicles. Because of this, it can withstand the risks of upper neck node dissection, a surgery that commonly sacrifice the facial vessels to adequately remove metastatic nodes from the submandibular area. [13]. One major benefit of the buccinator myomucosal flap is the low risk of donor-site morbidity. The flap could be sealed using direct suturing or by advancing the buccal fat pad [13].

Confirming the significant importance of this flap in the restoration of moderate-size intra-oral lesions, this enables for good functional and cosmetic recovery. None of the patients had unsightly scars or cheek depressions as a consequence of the procedure [14]. Although 71% of patients reported diminished sensation, their light touch perception and two-point discrimination remained intact. Nevertheless, as contrasted with insensate flaps, even a diminished sensation is beneficial for oral function [2].

Early post-operative sensation recovery has been documented in certain patients (following creation of both posteriorly or anteriorly based buccinator flaps for tongue reconstruction). Since posteriorly based flaps contain the buccal nerve, which is linked with this recovery of sensation [2].

***Limitations & disadvantages of Buccinator Myo-mucosal Flap*:** Before considering a posteriorly based pedicled BMMF, it has to be ensured that the buccinator muscle, buccal artery, or any of its branches can be safely inferred and that there is easily available non-scarred myomucosal tissue (as in cases who had a prior intraoral cheek scar, bimaxillary orthognathic surgery). [15]. In large defects that need more tissue, distant axial or free flaps are better alternatives to BMMF which cannot be used in this scenario. [16].

In cases where there is a greater than 4 cm gap between the flap's upper and lower edges, skin grafting can be necessary. The parotid duct can be replanted if additional tissue is required. Finally, two to four weeks following surgery, under local anesthesia, the flap pedicle is typically sectioned to enhance tongue mobility and mouth opening ; nevertheless, this procedure is not without its restrictions [13]. Capillary regeneration is challenging for people with severe diabetes mellitus, and for patients with impaired wounds who typically have inadequately vascularized tissue. Infection and flap failure rates following surgery are significantly greater in these patients [17]. Wound healing complications are common in patients undergoing radiation therapy or chemotherapy. In addition, avascular jaw bone necrosis is a common complication of oral surgery in patients given high bisphosphonate dosages [18].

Complications of Buccinator Myo-mucosal flap: Partial flap necrosis, however, the need for surgical correction is quite uncommon. [14]. Mild postoperative bleeding from donor-site suture breakdown is typically manageable with local packing [15]. The donor site may develop a retractile jugal flange as a consequence of healing. By implementing early mechanotherapy while healing is being monitored, the restriction of oral opening by the retractile flange can be prevented. [15]. It seems that the usage of this flap is unaffected by prior radiation therapy at the tumour location, but the risk of postoperative problems is increased [15].

CONCLUSIONS

The BMMF can be created using a variety of methods. A posterior, anterior, or superior base for the BMMF is possible. An island flap is generated by isolating the pedicle; this allows for better rotation; and a "buccinator myomucosal neurovascular island pedicle flap" is formed using the buccal venous plexus, the buccal artery, as well as the nerves that innervate the muscle; these are modifications to the original operation. Buccinator myomucosal flap (BMMF) has minimal donor site morbidity and short hospital stay. The BMMF has many benefits, such as a good supply of tissue, the ability to use the same tissue to replace damaged or missing oral mucosa, a decreased risk of infection at the donor site, and the best possible cosmetic and functional outcomes.

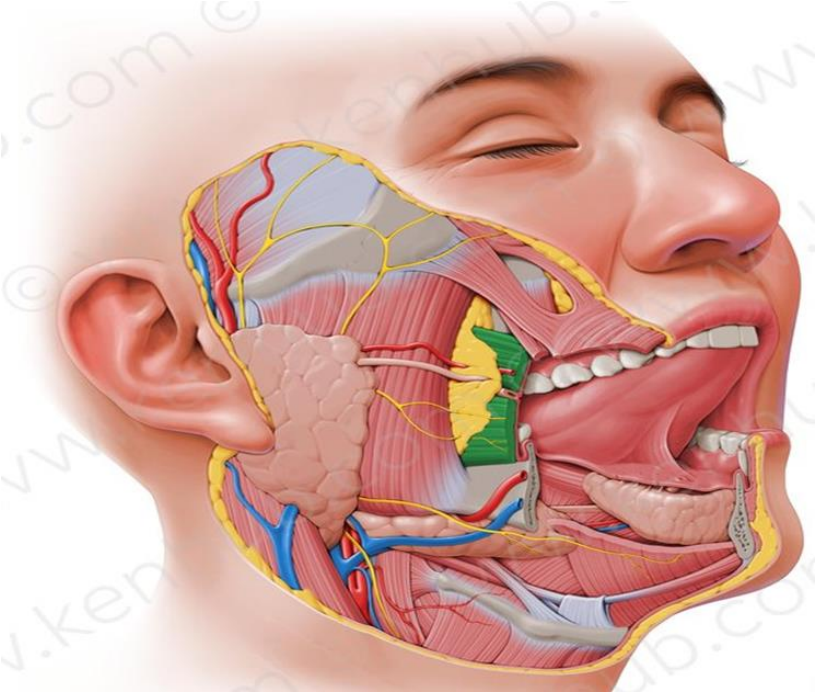

Figure (1): Buccinator muscle (highlighted in green), its anatomy and relations. **[1].**

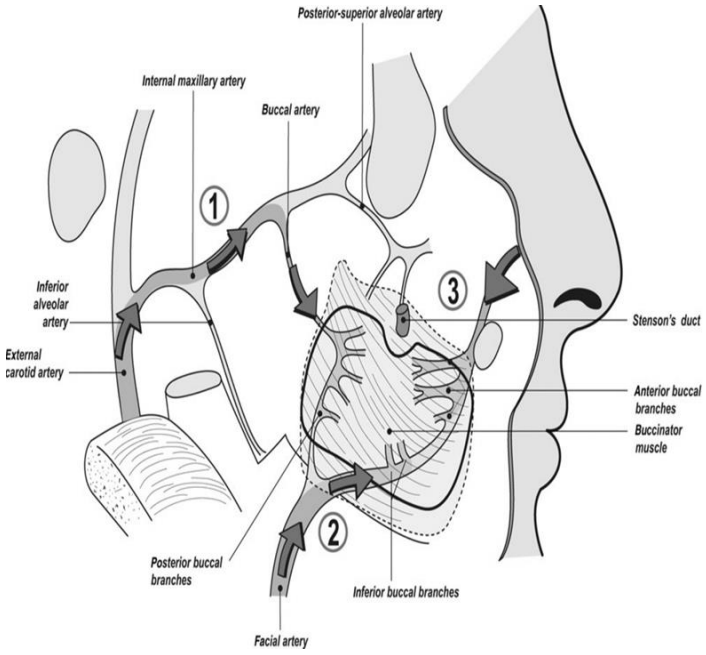

Figure (2): Diagrammatic illustration of arterial blood supply of BMMF and the relation of parotid duct to the flap. [1].

1. Blood supply of the posteriorly-based BMMF (based on buccal artery, a branch of internal maxillary artery)
2. Blood supply of the anteriorly-based BMMF (based on the inferior buccal branches of the facial artery).
3. Blood supply of the superiorly-based BMMF (based on the anterior buccal branches of the facial artery).

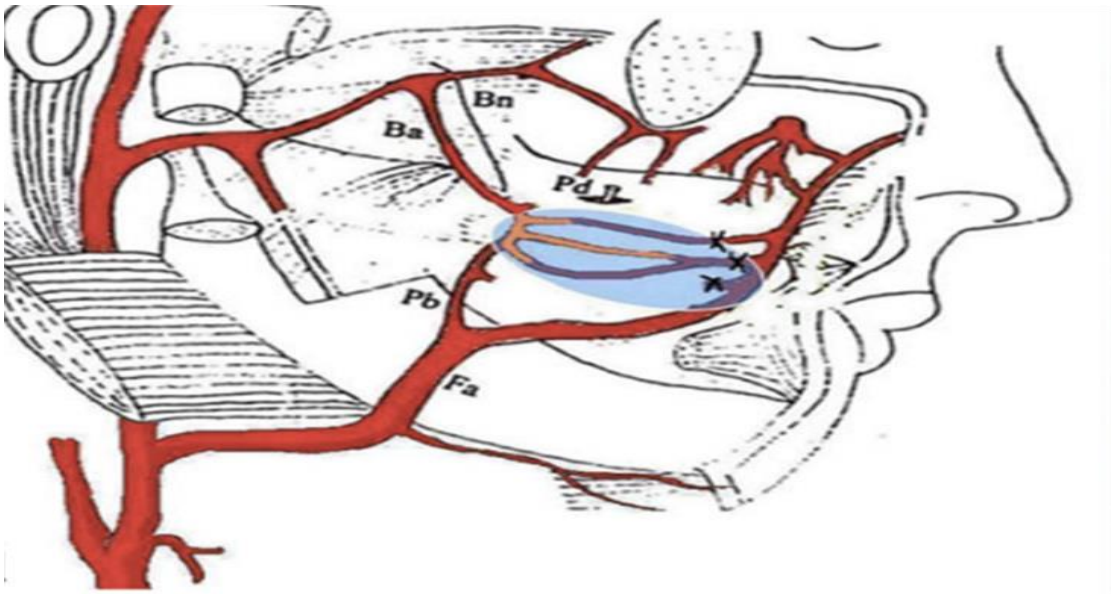

Fig. (3): vascular pattern of posteriorly-based BMMF **[1].**
Ba: Buccal artery **Bn**: Buccal nerve **Pd**: Parotid duct
Fa: Facial artery **Pb**: Posterior branch of facial artery

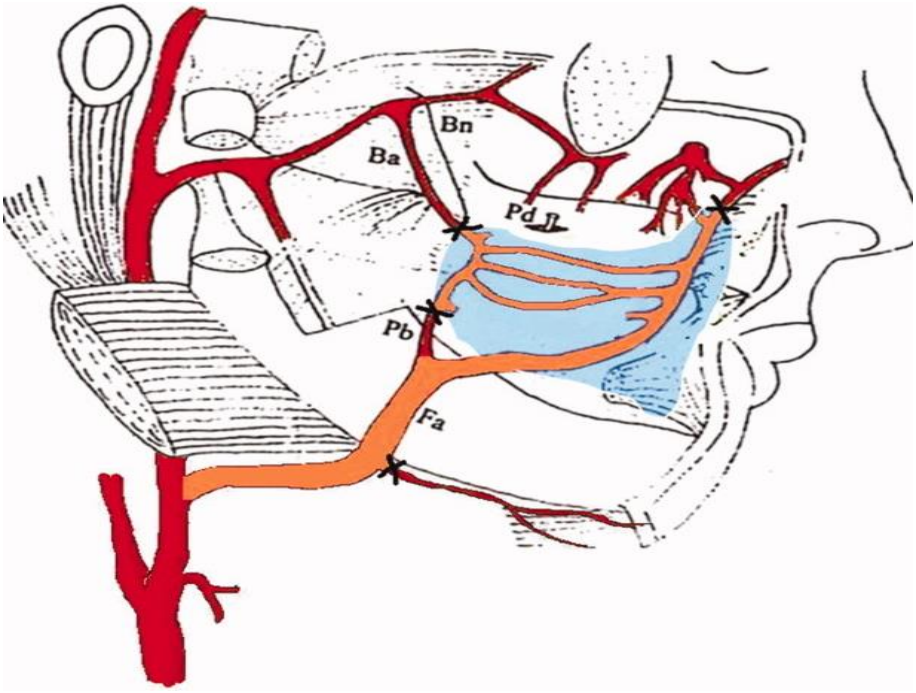

Fig. (4): Vascular pattern of anteriorly-based BMMF

Fa, facial artery; **Ba**, buccal artery; **Bn**, buccal nerve; **Pd**, parotid duct; **Pb**, Posterior branch of facial artery. **[1].**

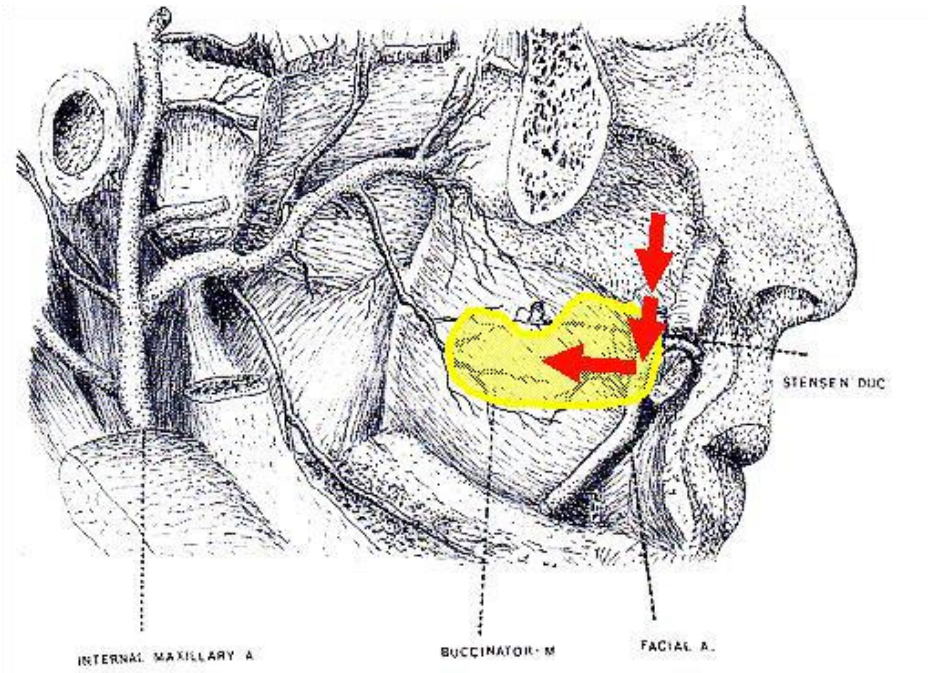

Fig (5): vascular pattern of superiorly-based BMMF, red arrows denotes the anterior branches of the facial artery, which is the vascular pedicle in this type. **[1].**

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FIGURE INDEX

Citation

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