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Facial mimetic, cosmetic, and functional standardized assessment of the facial artery musculomucosal (FAMM) flap☆

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ABSTRACT

Objective: To objectively assess donor site morbidity after harvesting the facial artery musculomucosal flap. Use of the FAMM-flap in oral cavity reconstruction remains sporadic. This case series describes our newly developed standardized assessment of this flap in a floor of mouth (FOM) reconstructive setting.
Methods: Standardized postoperative assessment of the FAMM flap for donor site wound complications, functional, facial mimetic and oncologic outcomes.
Results: There were no wound complications. Oral competence remained intact, tongue mobility was good to excellent, average word articulation score was 98%, and mimetic function excellent in all patients. Three patients experienced ipsilateral upper lip anesthesia, and five patients were noted to have slight dysfunction of the orbicularis oris resulting in a loss of lip height at rest.
Conclusion: The FAMM flap is a reliable option for reconstruction of ablative defects of the FOM, and should be considered a workhorse flap for oral cavity defects. Unlike the submental island flap, a complete level I dissection may be concurrently performed without compromising the vascular supply to the FAMM flap.

1. Introduction

Ablative defects of the oral cavity involving the floor of the mouth are optimally reconstructed using vascularized tissue to maximize post-operative tongue mobility and lessen the chance of post-operative fistula formation. For large defects in this region, free-flap reconstruction continues to increase in popularity, due to the large area of coverage they provide, high rate of success, and the increasing pool of surgeons trained in head and neck microvascular reconstruction. Despite the advantages of free tissue reconstruction in this region, many defects of the oral cavity are amenable to less resource-intensive regional means of reconstruction. Important advantages of regional flaps over free-flap reconstruction in this setting include shorter duration of general anesthesia and the allowance for earlier post-operative mobilization. Common regional island flaps of the head and neck, such as the pectoralis

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major, supraclavicular, and submental flaps, are also options for reconstruction of the floor of mouth. Known disadvantages of these island flaps include donor site weakness, excessive bulk, and non-ideal scar for the pectoralis major, elevated risk of partial flap necrosis for the supraclavicular and submental flaps, and elevated risk of incomplete resection of occult nodal disease along the vascular pedicle of the submental island flap. Additionally, in male patients, such regional flaps may result in bothersome post-operative intra-oral hair growth.

The facial artery musculomucosal (FAMM) flap – an axial pedicle intraoral flap of the cheek – circumvents many of the aforementioned disadvantages associated with regional flaps of the head and neck. Although first described by Pribaz more than two decades ago [1], the FAMM flap remains an unfamiliar reconstructive option within many centers. Several authors have confirmed the utility of this axial flap, noting its wide arc of rotation, relative ease of elevation and primary donor site closure, robust venous drainage, and low rates of necrosis [1–10]. However, sparse discussion in the literature exists on the use of this flap in the setting of a concurrent or previous neck dissection addressing the nodal basin of the oral cavity, nor on the functional and facial mimetic and cosmetic outcomes associated with this flap. Through an observational study of six patients with oral cavity defects, this paper reviews the technique of FAMM flap harvest, discusses the use of this flap in the setting of concurrent neck dissection, describes functional outcomes with regard to oral competence, speech, mastication, and swallowing, and identifies two facial complications not previously discussed in the literature.

2. Patients and methods

Over a 12-month period from 2013 to 2014, 6 patients necessitating oral cavity reconstruction were identified as ideal candidates for FAMM flap. All patients gave written informed consent, in accordance with internal review board requirements at the University Medical Center Hamburg – Eppendorf (UKE), Hamburg, Germany. At follow-up, patients were photographed to document tongue elevation, protrusion, and mobility, in addition to facial appearance at rest and dynamic movements. Facial symmetry was compared quantitatively using FaceGram software (v 1.0, Massachusetts Eye and Ear Infirmary, Boston, MA, USA). Patients were assessed for lip and cutaneous cheek anesthesia. Patients completed Likert scale questionnaires on post-operative articulation, intelligibility, and mastication. A standardized 23 word articulation score was assessed for each patient.

2.1. Anatomy and flap harvest

As originally described by Pribaz [1], the FAMM flap is an intraoral axial pedicle flap based on the facial artery (and its continuation as either the lateral nasal or angular artery [11]), as it courses between the facial notch and the nasal ala. Venous drainage to the flap is robust through the submucosal venous plexus, which drains anteroinferiorly to the facial vein, and posteriorly to the pterygoid plexus and internal maxillary vein. The flap may be pedicled superiorly through retrograde flow from the angular artery, or inferiorly through anterograde flow through the facial artery. An inferiorly based pedicle is typically required for reconstruction of the oral cavity floor.

To prevent injury to the superficial muscular aponeurotic system (SMAS) and skin, it is important that the surgeon clearly understands the surgical planes of the cheek. At the level of the facial artery, intra-orally outwards toward the skin of the cheek, these planes consist of mucosa, submucosa, buccinator muscle, buccopharyngeal fascia, facial vessels and facial nerve branches in loose areolar tissue, the deep facial fascia (also called the parotidomasseteric or buccomasseteric fascia), superficial facial fascia and the SMAS it encases, subcutaneous tissue, and skin (Fig. 1A and B).

Ablation of the primary tumor with intraoperative frozen section margins precedes elevation of the flap (Fig. 2A). In the majority of cases of T2 or greater squamous cell carcinoma

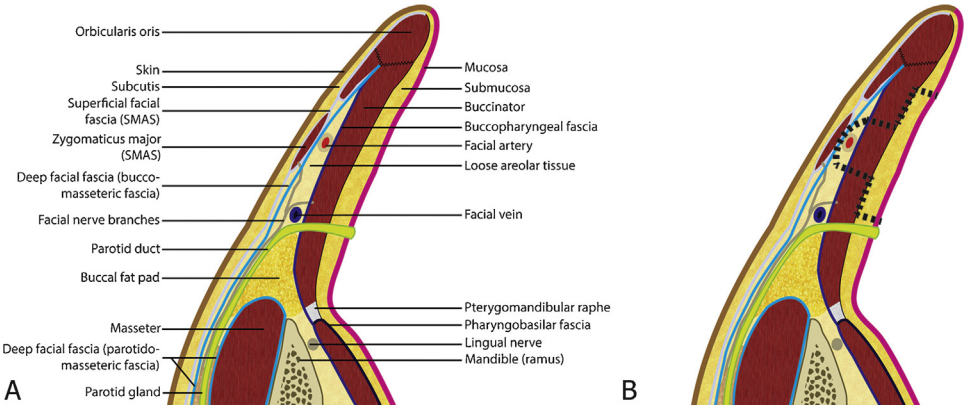

Fig. 1. The facial layers of the cheek in axial cross section (A). The plane of dissection for the FAMM flap is the space between the buccopharyngeal fascia overlying the lateral aspect of the buccinator muscle and the deep facial fascia, a continuation of the parotidomasseteric fascia (also called the buccomasseteric fascia), deep to the superficial musculo-aponeurotic system (SMAS) and the superficial facial fascia that envelops it. Care must be taken as the facial layers are quite thin and often adherent to each other in this region. Terminal branches of the facial nerve also travel in this plane, prior to piercing the buccopharyngeal fascia to supply the buccinator muscle from above, and the deep facial fascia to innervate the zygomaticus muscles from below. Significant branches of the facial nerve are typically not encountered in the region of dissection. The anterior extent of the flap is the region of inter-digitation of buccinator muscle fibers with those of the orbicularis oris; the posterior extent is immediately anterior to the papilla of the parotid duct (B).

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