

Single-stage Palatal Lengthening Using Modified Buccinator Myomucosal and Buccal Fat Flaps

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Summary: Surgical treatment of velopharyngeal insufficiency (VPI) after primary palatoplasty poses a difficult challenge in cleft care management. Traditional treatment options have shown improved speech outcomes but oftentimes lead to airway obstruction by constriction of the posterior pharynx. The buccinator myomucosal flap is an alternative flap used for VPI correction that re-establishes palatal length and velar sling anatomy by recruiting tissue from the buccal mucosa and buccinator muscle. We present innovative modifications to the original buccinator myomucosal flap by performing the procedure in one stage without a mucosal bridge, incorporating full-thickness buccinator muscle during flap elevation, and placement of bilateral buccal fat flaps. These refinements facilitate wound healing by providing a tension-free closure with both a well-vascularized myomucosal flap and interposed buccal fat flap to prevent scar contracture. Furthermore, no additional surgery is necessary for pedicle division. (*Plast Reconstr Surg Glob Open* 2023; 11:e5200; doi: [10.1097/GOX.0000000000005200](https://doi.org/10.1097/GOX.0000000000005200); Published online 15 August 2023.)

INNOVATION

The buccinator myomucosal flap is an intra-oral, pedicled flap that has been increasingly used for palatal lengthening to correct postpalatoplasty velopharyngeal insufficiency (VPI).¹⁻⁴ Advantages of the buccinator myomucosal flap include anatomic lengthening of the soft palate with minimal donor site morbidity and airway compromise.^{1,2,5-8} The majority of recent literature describes this flap in two stages, with a secondary procedure for pedicle division to avoid mastication issues near the pedicle.^{2,5,6,9-10} We describe multiple modifications of this technique to allow a one-stage procedure via full-thickness mucosal cuts at the pedicle of the buccinator flaps and coverage of the pedicle with adjacent buccal fat flaps. Buccal fat flaps can also be extended for placement between the nasal and oral myomucosal flaps to obliterate intervening dead space.

A full-thickness incision is made just posterior and parallel to the hard-soft palate junction, incising both oral and nasal palatal layers. A cuff of tissue is left along the hard palatal edge to facilitate flap inset. Upon releasing the tissues between oral and nasal mucosal layers,

the soft palate and velar sling are lengthened toward the posterior pharyngeal wall. Bilateral buccinator myomucosal flaps are then designed with a desired flap width of approximately 1.5 cm to fill the gap created at the hard-soft palate junction. The superior buccal incision is designed just inferior to the maxillary gingiva in the retromolar trigone and extended as a straight line toward the lateral commissure, taking care to avoid the Stenson duct. This incision is carried out into the full-thickness soft/hard palate incision. The inferior cheek incision is made beginning at the retromolar trigone just superior to the mandibular alveolus and extends in a curved fashion toward the lateral commissure, curving the incision further inferior in the cheek to achieve a flap width of at least 1.5 cm. This incision is carried out into the created defect similar to the superior incision but a few millimeters posteriorly to preserve the width of the flap. The final pattern resembles a scalpel blade shape with the base at the retromolar trigone and the tip just below the lateral commissure (Figs. 1 and 2). The buccinator myomucosal flaps are then raised similar to the technique implemented by Mann et al,² beginning at the lateral commissure and dissecting toward the retromolar trigone. However, this plane of dissection is immediately deep to the buccinator muscle and superficial to the buccopharyngeal fascia. This incorporates full-thickness buccinator muscle in the flap and avoids excessive herniation of the underlying buccal fat. The facial vessels remain deep to this dissection plane and should be left intact. Of note, the inferior mucosal incision in the cheek is also extended into the hard/soft palate defect, but the depth of the incision here is only just

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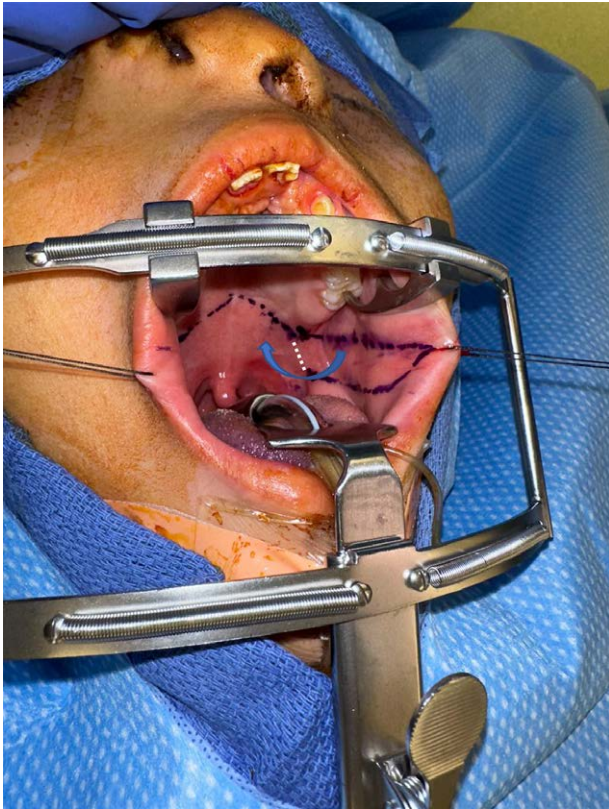


Fig. 1. Left buccinator myomucosal flap and hard/soft palate junction markings. The incision is made full thickness at the hard/soft palate junction and connected to the superior incision of the buccinator myomucosal flap, as seen by the purple markings. The inferior incision is carried posteriorly into the retromolar trigone, as also seen by the purple markings. The white dotted line depicts where the incision should be extended to a depth just past the mucosa to preserve underlying blood supply. The rotation of the flap once raised is depicted by the blue arrow, showing a hinge-like rotation into the defect created.

past the mucosa. This leaves the buccinator muscle at the flap pedicle intact, in essence, islanding the flap on random-pattern blood flow. These extensions allow one-stage inset of the flap with no intervening oral mucosa (Figs. 1 and 2). After flap elevation, inset is performed with the left buccinator myomucosal flap folded into the defect, placing the buccal mucosa in continuity with the nasal mucosa of the palate. This is sutured on all sides to complete nasal mucosal closure. Bilateral buccal fat flaps can then be elevated by opening the buccopharyngeal fascia just anterior to the buccinator myomucosal flap pedicle on either side. These vascularized buccal fat flaps can be advanced to the midline and sutured overlying the nasal myomucosal flap (Fig. 3).¹⁰ The contralateral buccinator myomucosal flap is then raised in a similar manner, rotated clockwise 180 degrees, and inset to lay over the buccal fat flaps to create the oral mucosal layer. The donor sites are partially closed, leaving the mucosa open adjacent to the buccinator myomucosal flap pedicle to avoid tension and potential vascular compromise. The base of the buccal fat flaps covers the pedicle of the buccinator myomucosal flaps on either side, with final

Takeaways

Question: How can the original buccinator myomucosal flap technique be modified to improve outcomes?

Findings: The senior author demonstrated surgical modifications to the original buccinator myomucosal flap in addition to incorporating buccal fat flaps for treatment of velopharyngeal insufficiency.

Meaning: Modifications to the buccinator myomucosal flap and additional buccal fat flaps obviate the need for a mucosal bridge, allow for single-stage palatal lengthening, and prevent scar contracture.

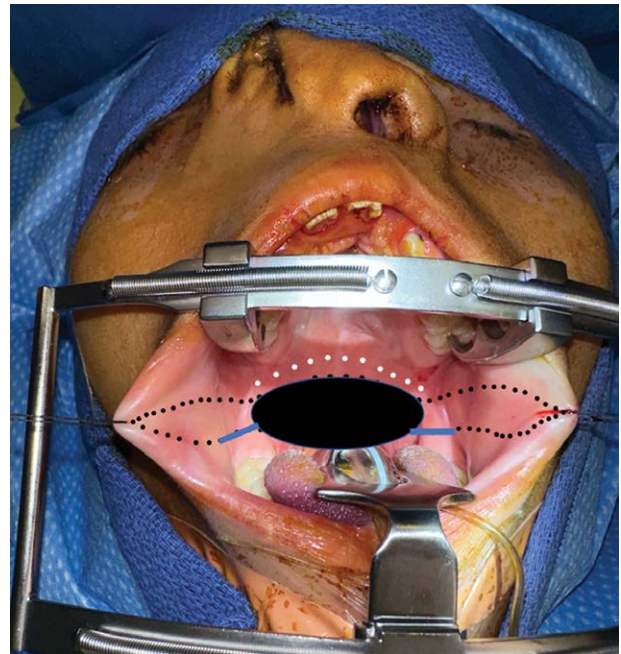


Fig. 2. Bilateral buccinator flap markings after creating palatal defect. The incision is made a few millimeters posterior to the hard and soft palate junction (white dotted line) and creates a defect in the palate (black oval) as the soft palate springs back posteriorly. Bilateral buccinator myomucosal flap designs are shown. The incision should be carried down to the buccopharyngeal fascia to include full-thickness buccinator muscle (dotted black line). In the retromolar trigone, the incision should be mucosa-only to island the flaps (solid blue line).

healing taking place by mucosal ingrowth over the vascularized buccal fat at the base of each buccinator myomucosal flap (Fig. 4). A spanning suture may be used to avoid buccal fat herniation.

DISCUSSION

We prefer buccinator myomucosal flaps for treatment of VPI in cleft palate patients who have previously undergone optimized levator muscle positioning and palatal lengthening with palatal tissue alone. Palatal motion is assessed preoperatively with nasoendoscopy to confirm adequate velar motion and a modest posterior velar gap. Rather than resorting to traditional VPI procedures that

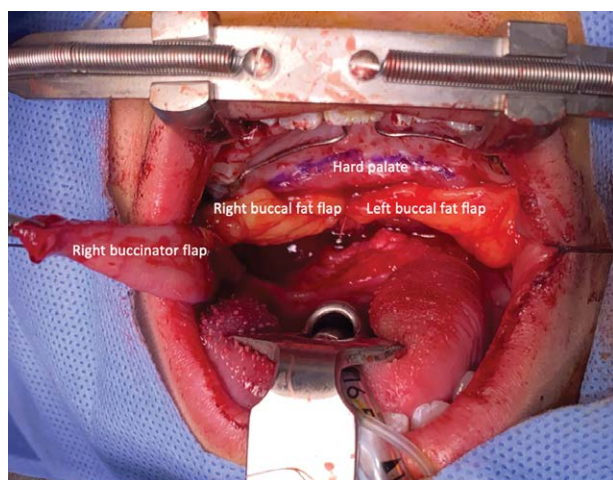


Fig. 3. Bilateral vascularized buccal fat flaps are advanced over the nasal mucosal closure and sutured at the midline; the right buccinator myomucosal flap is elevated in preparation for inset and will be rotated clockwise 180 degrees to sandwich the buccal fat flaps.

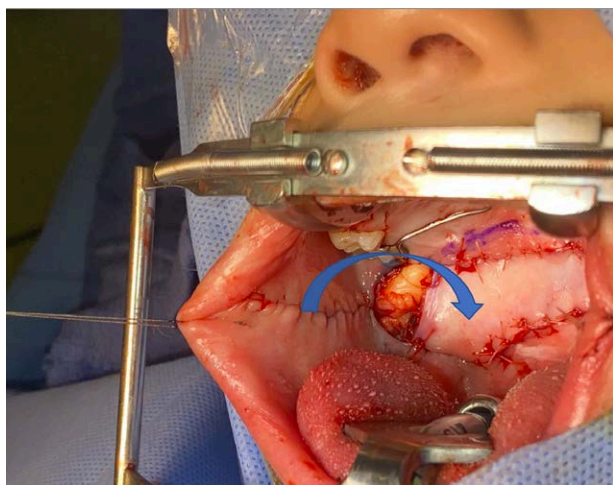


Fig. 4. Closure of the right buccinator myomucosal flap. The flap has been rotated clockwise 180 degrees and inset (blue arrow). The buccal donor site has been primarily closed. Buccal fat is seen overlying the pedicle of the right buccinator myomucosal flap, to heal by mucosal ingrowth over the vascularized buccal fat.

may result in constriction of the posterior pharynx via a pharyngeal flap or sphincter pharyngoplasty, recruitment of additional local tissue for further palatal lengthening should be considered. This procedure allows an attempt at palatal lengthening while mitigating the occurrence of obstructive sleep apnea.

The use of buccinator myomucosal flaps for VPI management is not a new concept; however, we have expanded on previous techniques with a few key additions. The first addition extends the mucosal incisions laterally at the base of the hard palate and the anterior aspect of the released soft palate, making a continuous mucosal incision between the palatal release and the pedicle of the buccinator myomucosal flaps on either side. This obviates the need for an

intermediate mucosal bridge and a secondary procedure for flap division. Mukherji⁹ reported on bilateral cheek flaps for additional lengthening, but they do not provide detail as to how the incisions are extended at the base of the flaps to allow one-stage palatal lengthening. The second addition is creation of bilateral vascularized buccal fat flaps, which has been described by the senior author in primary palatoplasty.¹⁰ Buccal fat flaps can be easily dissected and interposed between buccal myomucosal flaps to fill in dead space and provide a vascular scaffold to theoretically minimize secondary palatal contracture and possible mucosal flap compromise. Buccal fat flaps can also facilitate loose closure of the mucosa at the base of the buccinator myomucosal flaps and thereby minimize undue tension on the pedicle of the myomucosal flaps. In conclusion, modifications to the originally described buccinator myomucosal flap with additional buccal fat flaps is a novel approach that adds to the cleft surgeon's armamentarium for treating VPI.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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