

The Buccal Mask: Safe Positive Airway Pressure Delivery for Patients with a Paramedian Forehead Flap

Aref Nassar, MD
Fadi Sleilati, MD

Summary: The paramedian forehead flap is commonly performed for the reconstruction of complex nasal defects. It typically requires two separate procedures: flap elevation and inset, and then, 2–3 weeks later, pedicle division. In patients with obesity hypoventilation syndrome, the use of positive airway pressure is often mandatory, especially in the postoperative period. However, the face mask used for positive airway pressure has to apply pressure over the bridge of the nose and may compromise the vascularity of a paramedian forehead flap. We report a case where a buccal mask was used successfully in the postoperative period in a patient who needed positive airway pressure after nasal reconstruction with a paramedian forehead flap. (*Plast Reconstr Surg Glob Open* 2024; 12:e6046; doi: [10.1097/GOX.0000000000006046](https://doi.org/10.1097/GOX.0000000000006046); Published online 8 August 2024.)

INTRODUCTION

The paramedian forehead flap is commonly performed for the reconstruction of complex nasal defects.¹ It typically requires two separate procedures: flap elevation and inset, and then, 2–3 weeks later, pedicle division.

Obesity hypoventilation syndrome is a condition associated with increased levels of carbon dioxide during the day which cannot be attributed to other conditions. Identification of this syndrome in patients undergoing surgery is important to avoid desaturation perioperatively.² The postoperative management of such patients requires the use of positive airway pressure with a face mask. If the patient is operated on with a paramedian forehead flap, the face mask will apply pressure over the bridge of the nose and the pedicle of the flap. It may jeopardize the flap's vascularity.

We report a case where a buccal mask was used successfully in the postoperative period in a patient who needed positive airway pressure following nasal reconstruction with a paramedian forehead flap.

CASE PRESENTATION

A 68-year-old male patient with obesity hypoventilation syndrome presented for the treatment of a 3-cm squamous cell carcinoma of the nasal tip and left ala. Complete excision and an immediate reconstruction with a paramedian forehead flap were planned. Presurgical pulmonary assessment with an arterial blood gas revealed a CO₂ partial pressure of 70 mm Hg, an O₂ partial pressure of 41 mm Hg, and an O₂ saturation of 85%. Surgery was delayed for pulmonary preparation with biphasic positive airway pressure (BiPAP) treatment, 8 hours per day. Additionally, the pulmonologist ordered placement of BiPAP immediately in the postoperative period. As a buccal mask was planned to be used postoperatively, it was tested on the patient preoperatively for efficiency, and the patient was properly trained for the use of the device.

After 1 month of preparation, the patient was admitted for surgery. Excision of the lesion was performed with 5 mm margins with a defect inclusive of the left nasal ala, nasal tip, sidewall, and dorsum. Frozen sections came negative.

Intranasal lining was reconstructed with an ipsilateral septal mucoperichondrial flap based on the septal branch of the superior labial artery as described by Burget and Menick.³ A septal cartilage graft was used to reconstruct the lateral crus of the ala. A left paramedian forehead flap was used to complete the reconstruction (Fig. 1).

Immediately after extubation, and given the high risk of postoperative hypercapnia, the patient was placed on BiPAP. Because the traditional face mask exerted pressure

From the Plastic Surgery Department, Hotel Dieu de France University Hospital, Saint Joseph University, Beirut, Lebanon.

Received for publication April 15, 2024; accepted June 17, 2024.

Copyright © 2024 The Authors. Published by Wolters Kluwer Health, Inc. on behalf of The American Society of Plastic Surgeons. This is an open-access article distributed under the terms of the [Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 \(CCBY-NC-ND\)](https://creativecommons.org/licenses/by-nc-nd/4.0/), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

DOI: [10.1097/GOX.0000000000006046](https://doi.org/10.1097/GOX.0000000000006046)

Disclosure statements are at the end of this article, following the correspondence information.

on the flap pedicle, it was replaced with a buccal mask that did not apply any pressure over the nose (Fig. 2).

Both nasal cavities were filled and closed with tampon gauze to promote optimal healing and decrease bleeding. Additionally, placing tampon gauze decreases risk of leaks and optimizes the effects of buccal masks.

The patient was admitted to the intensive care unit (ICU) for monitoring. BiPAP was used 2 hours on, 2 hours off, day and night. The patient stayed one night in the ICU and one additional night on the surgical floor for postoperative surveillance. He was discharged on day 2 postoperatively. The follow-up was uneventful with complete survival of the flap.

The pedicle was divided 2 weeks later under local anesthesia. Figure 3 shows the results after 3 weeks after division of the pedicle.

DISCUSSION

The paramedian forehead flap is an excellent method for reconstruction of large nasal defects. It is an efficient, reliable, and effective flap, based mainly on the supra-trochlear artery located 1.7–2.2 cm from the midline. Postoperative care includes avoidance of external pressure over the pedicle that crosses the nasal bridge and that could compromise the flap's blood supply.

Obesity hypoventilation is a respiratory condition consisting of chronic daytime hypercapnia, sleep-disordered breathing, and obesity with a body mass index greater than 30 kg/m².

Takeaways

Question: What are postoperative instructions in patients with obesity hypoventilation syndrome undergoing paramedian forehead flap reconstruction of nasal defects?

Findings: Extubation in sitting position, complete reversal of muscle relaxant effects, tracheal extubation after a patient is fully conscious, and use of positive airway pressure postextubation are common for all surgical procedures in patients with obesity hypoventilation syndrome. Facial masks cannot be used because of compression on the vascular pedicle.

Meaning: Buccal masks can be used effectively in patients with obesity hypoventilation syndrome undergoing paramedian forehead flap reconstruction of nasal defects.

Patients with obesity hypoventilation syndrome have higher odds of heart failures, angina pectoris, cor pulmonale, pulmonary hypertension, and higher mortality.^{2,4}

Several postoperative instructions are considered in patients with obesity hypoventilation syndrome to reduce the risk of complications: extubation in sitting position, complete reversal of muscle relaxant effects, and tracheal extubation after a patient is fully conscious.²

Among these recommendations, the use of positive airway pressure postextubation reduced postextubation



Fig. 1. A 68-year-old male patient with squamous cell carcinoma of the ala of the nose. A, Excision of the lesion was performed with 5 mm margins with a defect inclusive of left nasal ala, nasal tip, sidewall, and dorsum. B, A left paramedian forehead flap was used to reconstruct the full-thickness defect.



Fig. 2. Buccal mask used postoperatively.



Fig. 3. Results 3 weeks after division of the pedicle. The patient declined a defatting procedure of the flap.

failure in ICU patients with obesity.⁵ Positive airway pressure therapy prevents airway collapse and avoids postoperative atelectasis and the use of high FiO_2 .

Facial masks are the most commonly used masks for noninvasive ventilation. However, in certain circumstances, such as the presence of pressure ulcers on the nose⁶ and intolerance to a face masks,⁷ they cannot be used. Buccal masks can be used effectively

and can improve respiratory parameters in these patients.⁷ They are effective in eliminating carbon dioxide but require good patient cooperation.⁸ The drawbacks of buccal masks are higher risks of air leaks and asynchronies. They require good cooperation from the patient.

The paramedian forehead flap relatively contraindicates the use of a face mask in the immediate postoperative period to avoid compression on the vascular pedicle. A buccal mask can therefore be used in the postoperative care of patients with obesity hypoventilation syndrome undergoing nasal reconstruction with the paramedian forehead flap. It may be indicated that postextubation in any situation where there is upper face or nasal pressure, such as nasal fracture or nasal ulcer, is not advisable.

CONCLUSIONS

Patients with obesity hypoventilation syndrome undergoing nasal reconstruction with a paramedian forehead flap need immediate positive airway pressure in the postoperative period to reduce respiratory complications. Buccal masks can be used effectively without exerting pressure on the nose and without compromising flap vascularity.

Aref Nassar, MD

Plastic Surgery Department
Hotel Dieu de France University Hospital
Saint Joseph University
Beirut, Lebanon

E-mail: arefnassar@hotmail.com

DISCLOSURES

The authors have no financial interest to declare in relation to the content of this article. The authors confirm that all data generated or analyzed during this study are included in this published article.

PATIENT CONSENT

The patient provided written consent for the use of his image.

REFERENCES

1. Shokri T, Kadakia S, Saman M, et al. The paramedian forehead flap for nasal reconstruction: from antiquity to present. *J Craniofac Surg.* 2019;30:330–333.
2. Kaw R, Argalious M, Aboussouan LS, et al. Chapter 20—perioperative considerations and management in patients with obesity hypoventilation syndrome. In Tulaimat A., ed. *Obesity Hypoventilation Syndrome.* Cambridge, MA: Academic Press, 2020: 269–278.
3. Burget GC, Menick FJ. Nasal support and lining: the marriage of beauty and blood supply. *Plast Reconstr Surg.* 1989;84:189–202.
4. Nowbar S, Burkart KM, Gonzales R, et al. Obesity-associated hypoventilation in hospitalized patients: prevalence, effects, and outcome. *Am J Med.* 2004;116:1–7.
5. Solh AAE, Aquilina A, Pineda L, et al. Noninvasive ventilation for prevention of post-extubation respiratory failure in obese patients. *Eur Respir J.* 2006;28:588–595.
6. Sleilati FH, Stephan HA, Nasr MW, et al. An unusual pressure sore of the nasal bridge. *Br J Oral Maxillofac Surg.* 2008;46:411–412.
7. Lherm T. Ventilation postopératoire noninvasive par masque buccal. *Ann Fr Anesth Reanim.* 1998;17:344–347.
8. Glerant JC, Rose D, Oltean V, et al. Noninvasive ventilation using a mouthpiece in patients with chronic obstructive pulmonary disease and acute respiratory failure. *Respiration.* 2007;74:632–639.