



NASOLABIAL FLAP FOR ORAL CAVITY RECONSTRUCTION

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Designed as a true myocutaneous flap pedicled on the facial artery, the nasolabial flap is a robust and versatile flap that is well suited to single-stage reconstruction of oral cavity defects or to staged reconstructions of facial defects (*Figure 1*). This chapter will focus on oral cavity reconstruction. The redundant skin extending from the medial canthus of the eye to the inferior margin of the mandible (nasolabial sulcus and nasofacial groove) defines the donor site for the nasolabial flap. This area is relatively hairless except for the lower cheek in males, an important consideration in oral cavity reconstruction. The flap itself is comprised of skin, subcutaneous tissue and the underlying musculature.

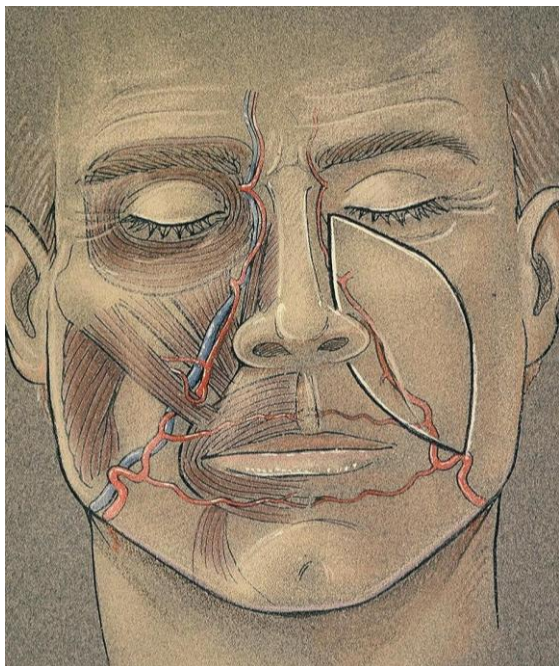


Figure 1: Relationship of the facial artery to the design of the nasolabial flap

Surgical Anatomy

Blood Supply

The subdermal plexus is supplied by feeder vessels from the branches of the facial

artery and provides the blood supply to the nasolabial muscle and skin. This allows for high viability and permits bold thinning and shaping. The facial artery has four main branches in the face: the inferior labial artery, superior labial artery, alar artery and lateral nasal artery, and terminates as the angular artery. In most dissections, the facial artery takes a medial course as shown in *Figures 1 & 2*, rather than a lateral course as shown in *Figure 3* (unpublished data). The artery resides in the dense fibrous tissue at the oral commissure and continues along the superior border of the upper lip to the nasal ala. It then continues in a medial course along the nasofacial groove toward the medial canthus of the eye. Arterial perforators are especially concentrated in the inferior two-thirds of the nasolabial groove.



Figure 2: The facial artery displayed in a cadaver dissection, showing the more common medial course



Figure 3: Cadaver dissection showing a less common lateral course of the artery

When raising a laterally-pedicled flap, as is often the case in single-stage oral cavity defect reconstructions, incorporation of the lower one-third of the nasolabial groove is essential to ensure a robust vascular musculocutaneous base.

Muscle

The relevant musculature is best understood as it relates to the facial artery. The facial artery is deep to the *platysma*, *risorius*, *zygomaticus major* and *minor*, *levator labii superioris*, and *levator labii superioris alaeque nasi* muscles. The artery is superficial to the mandible, buccinators muscle, and *levator anguli oris* muscle. The position of the artery deep to most facial mimetic muscles suggests that the nasolabial flap may incorporate this muscle layer and be developed as a true musculocutaneous flap.

Surgical Technique

Flap design

A fusiform flap is marked ensuring that the medial border of the flap is on the nasofacial groove (Figures 1, 4, 5). A pencil -

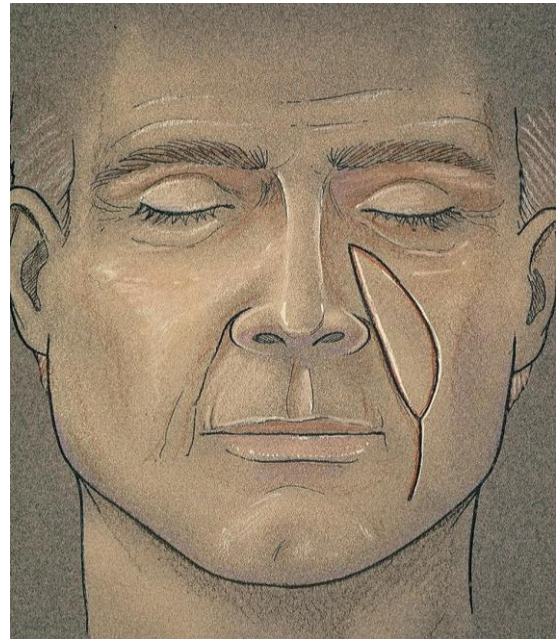


Figure 4: Approximate dimensions of the nasolabial flap

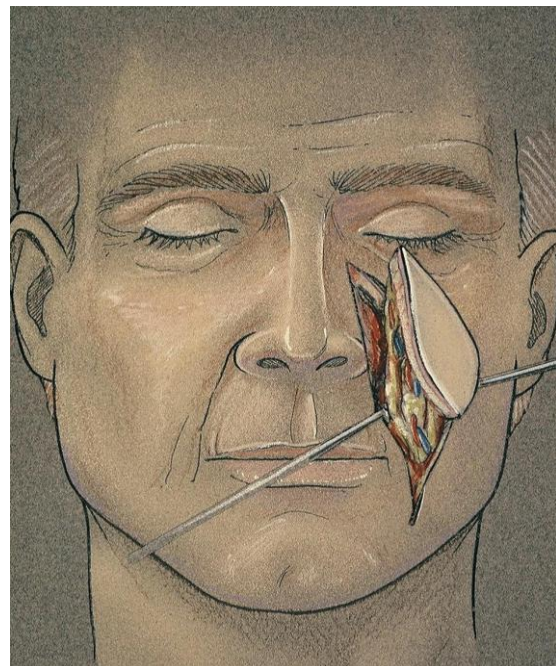


Figure 5: Illustration demonstrating the laterally based pedicle

Doppler probe may be useful to locate and delineate the course of the artery. Average flap dimensions are 2.5cm in width and 6cm in length. The width may be closer to 5cm when the facial skin is very redundant. The superior border of the flap is in-

ferior to the medial canthus along the nasofacial junction. Placement of the inferior border depends on the nature of the defect. For floor of mouth reconstruction, the inferior border of the flap should be at the superior border of the mandible; reconstruction of palatal defects, however, requires the inferior border to be approximately at the level of the oral commissure.

Flap harvest

The skin incision is carried through the dermis and subcutaneous fat to the level of the underlying musculature. As shown in the anatomic dissections above and below, the artery lies in a plane deep to the facial mimetic musculature and in a medial position along the nasofacial groove. The flap is elevated in a superior-to-inferior fashion in a plane deep to the facial musculature, artery and vein, with the artery identified carefully by blunt dissection. The parotid duct is identified and preserved. The superior labial artery may require ligation.

Inset

Thus, a musculocutaneous flap is developed and pedicled on the facial artery (*Figures 5, 6, Case #6*). The flap is then tunneled through the buccal space to repair the intraoral defect, as shown in *Figure 6* and in several cases below. If single-stage reconstruction is the goal, the tunneled segment of the flap must be de-epithelialised. Staged reconstruction with delayed division of the pedicle may be performed, with the delay necessary to ensure adequate neovascularisation.

Donor site closure

The donor site is irrigated prior to layered closure with 4-0 Vicryl providing deep dermal closure and 5-0 fast absorbing catgut sutures to approximate the skin edges. The closure should advance the lateral skin

flap in a superior and medial direction to avoid distortion of the lower eyelid.



Figure 6: The flap is narrowly pedicled on the facial artery, and then is tunneled via the buccal space into the oral cavity

Clinical Applications & Selected Cases

A nasolabial flap is suited to reconstructing small-to-medium oral cavity defects including, but not limited to alveolus (*Case #1*), floor of mouth (*Cases #2, #3*), buccal cavity (*Case #4*) and palate (*Cases #5, #6*).

Case #1: Superior alveolus reconstruction



Figure 7: Tumour of superior alveolus

This superior alveolus tumour was resected by superior alveolectomy. A lip-split approach was utilized for resection and to facilitate the reconstruction (*Figures 7, 8*).



Figure 8: Alveolectomy defect

A nasolabial flap was designed, raised and turned in to reconstruct the defect (*Figures 9-11*).

Figure 12 illustrates a Penrose drain left in a dependent portion of the donor site; and a postoperative image showing the donor site and accessory incisions to be well-healed.



Figure 9: Nasolabial flap being designed and raised



Figure 10: Flap turned in to reconstruct the defect



Figure 11: Nasolabial flap inset into the defect and donor site and lip-split closed



Figure 12: Wound closure and final result

Case #2: Mouth floor reconstruction

This floor of mouth cancer resection resulted in an alveolar ridge, gingiva, and floor of mouth defect; the inferior border of the defect is at the level of the superior border of the mandible (Figure 13). The defect was reconstructed with a nasolabial flap (Figures 14-16).

Though the flap is hairless in the image shown, the surgeon must anticipate the implications of transferring hair-bearing skin intraorally.

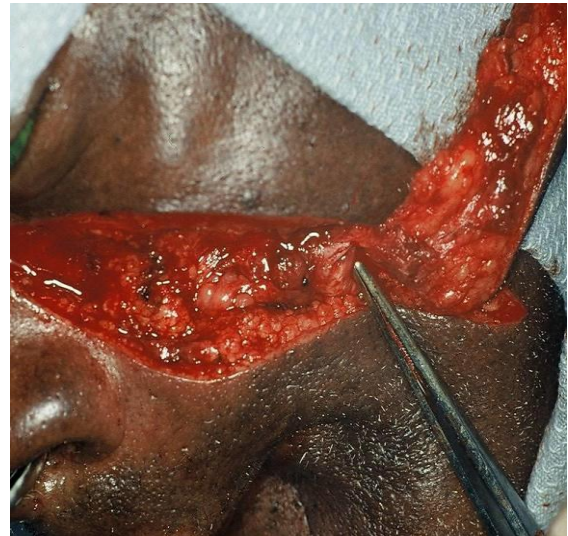


Figure 15: Facial artery is bluntly dissected

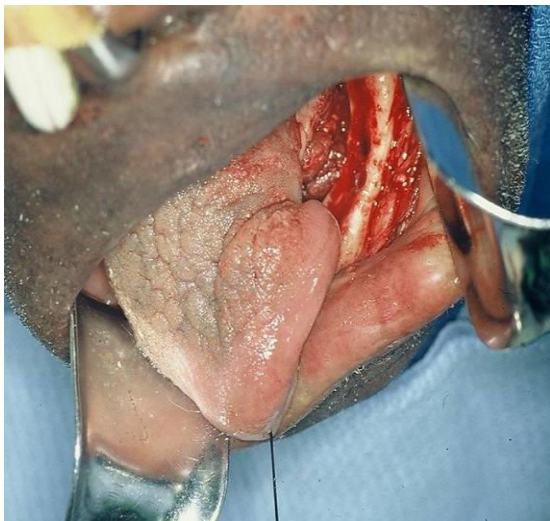


Figure 13: Defect following resection



Figure 16: Flap inset into floor of mouth



Figure 14: Outline of flap

Case #3: Mouth floor reconstruction

Figures 17-20 illustrate the postoperative results of reconstruction of an anterior floor of mouth defect crossing the midline.



Figure 17: The robust nasolabial flap minimises the risk of ankyloglossia.

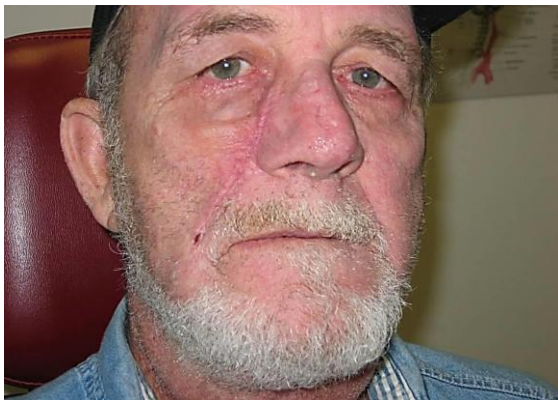


Figure 18: Early postoperative image shows aesthetically acceptable appearance of donor site



Figure 19: Later image shows a well-healed floor of mouth reconstruction

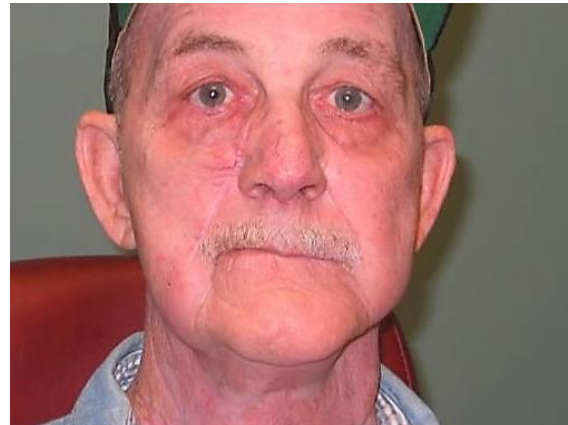


Figure 20: Though the right upper lip is paralysed, the concomitant lip lift provided by the harvest of nasolabial donor skin aids with symmetry at rest

Case #4: Buccal cavity reconstruction

The robust blood supply to the nasolabial flap permits shaping of the flap to precisely fill the defect (Figures 21-24).



Figure 21: Buccal defect



Figure 22: Flap inset into buccal defect



Figure 23: Healed flap in buccal defect

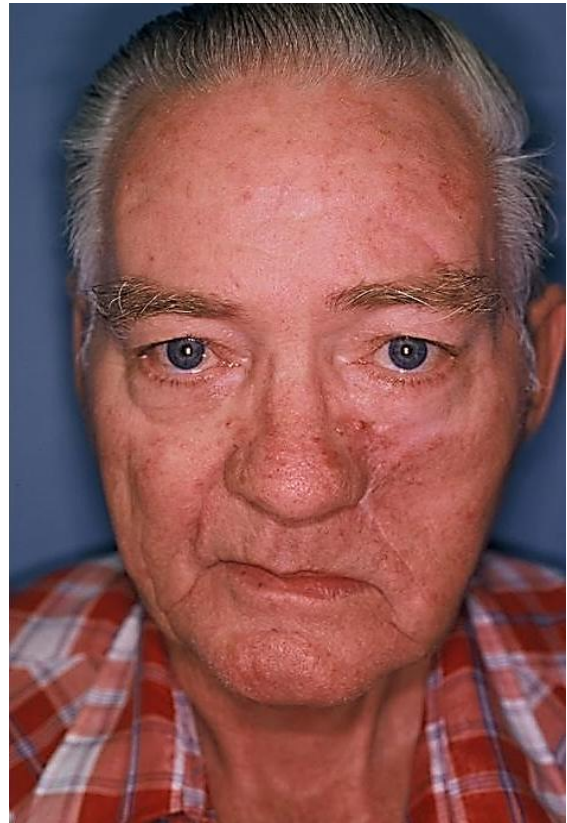


Figure 24: Final cosmetic result

Case #5: Palate reconstruction (post-operative)

Figure 25 demonstrates a healed palatal reconstruction, with an implant visible for a dental prosthesis.



Figure 25: Healed palatal defect

Reconstruction of palatal defects requires that the inferior border of the incision be approximately at the level of the oral commissure. Note the excellent camouflaging of the scar and the facial symmetry at rest (*Figure 26*). When smiling the patient demonstrates the expected paralysis of the ipsilateral upper lip which is generally well-tolerated (*Figure 27*); this adverse outcome is further discussed below.



Figure 26: Excellent camouflaging of scar and facial symmetry at rest



Figure 27: Asymmetry with smiling

Case 6: Bilateral nasolabial flaps

This patient has a large defect of the hard palate, alveolus and gingivobuccal sulcus (*Figure 28*). Bilateral nasolabial flaps were raised (*Figure 29*). In *Figure 30* the terminal branch of the facial artery *i.e.* the angular artery, is demonstrated.

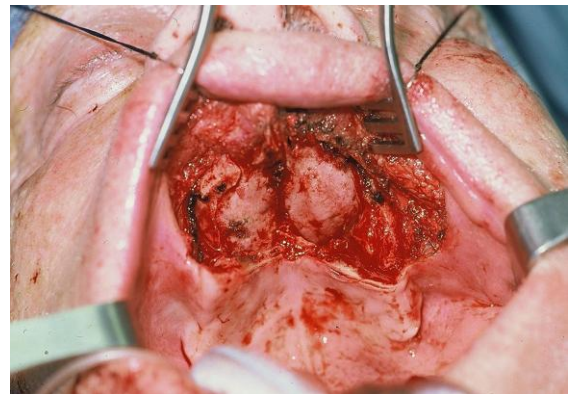


Figure 28: Defect of hard palate, alveolus and gingivobuccal sulcus



Figure 29: Bilateral nasolabial flaps

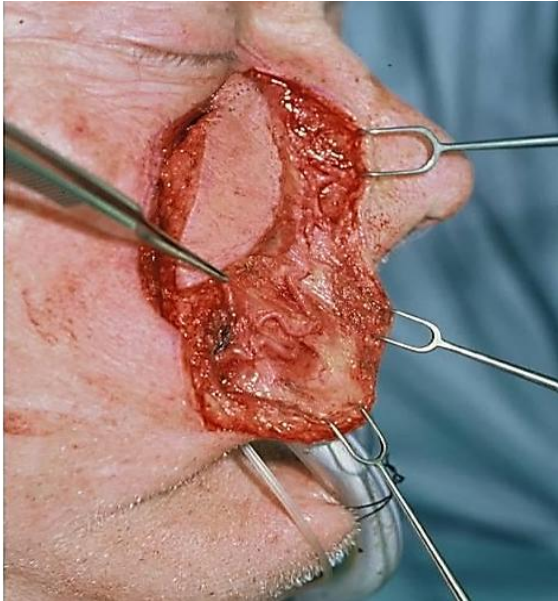


Figure 30: Angular artery visible

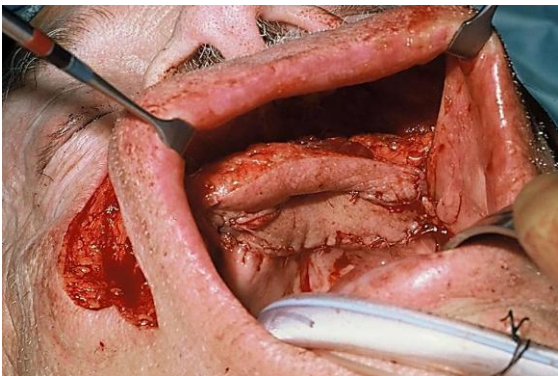


Figure 31: Flap being inset in a side-by-side configuration

Postoperative images show well-healed donor sites and intact and symmetric Elevation of the corners of the mouth *i.e.* intact cranial nerve VII (Figures 32, 33).

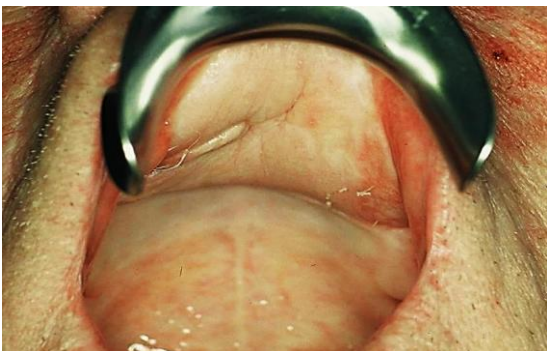


Figure 32: Healed palatal reconstruction



Figure 33: Healed facial scars

Case 7: Bilateral nasolabial flaps

This patient has a large defect of the superior alveolus and anterior hard palate and gingivobuccal sulcus following resection of squamous cell carcinoma (Figure 34). Bilateral nasolabial flaps were used to repair the defect (Figure 35).



Figure 34: SCC of superior alveolus and anterior hard palate



Figure 35: Bilateral nasolabial flaps (Courtesy Dr Jeff Otiti)

Adverse Outcomes

Upper lip weakness

Upper lip weakness may result if the terminal buccal branches of the facial nerve supplying lip elevators are lysed or if the principle lip elevators (*zygomaticus major/minor, levator labii alique nasi, levator anguli oris*) are completely divided. Muscle disruption may occur when extensive mobilisation and rotation of the flap is required.

A unilateral nasolabial flap typically does not result in any appreciable ipsilateral lip weakness. As a correlation, deinnervated Abbe flap reconstruction of the upper lip has been shown on electromyography (1 and 5 years postop) to regain 80 and 100% reinnervation of the transposed muscle segment.¹ However, extensive disruption of innervation and mimetic muscle integrity during harvesting of bilateral nasolabial flaps may result in clinically appreciable weakness of the upper lip. Though permanent, it is usually well tolerated. As shown in the selected cases above, the resulting upper lip weakness is mitigated by the mild lip lift provided by closure of the donor site.

Oral competence

Bilateral upper lip weakness and numbness could significantly impair oral competence, especially lip-pursing, and must be considered if bilateral nasolabial flaps are planned. Special care should be taken to avoid disruption of the distal facial nerve branches in such cases.

Summary

Nasolabial flap reconstruction of intraoral defects is a well-recognised technique. Because the flap is pedicled on the facial artery, single-stage closure with a smaller pe-

dicle may be achieved if the proximal portion of the flap is de-epithelialised. A robust blood supply helps to ensure flap viability and prevents flap breakdown and fistula formation even in adverse conditions of excess tension or mild compression of the transbuccal pedicle. The bulk provided by the facial musculature helps to fill larger defects. It does not impair speech and causes only minimal donor site morbidity. The flap is not overly time-consuming or technically difficult to master; however, knowledge of the relevant anatomy is essential.

References

Burget G, Menick F. Aesthetic restoration of one-half of the upper lip. *Plast Reconstr Surg.* 1986;78(5):583–93

Acknowledgements

- Illustrations by Paul Gross
- Cadaver dissections by David Haynes, MD FACS

How to cite this chapter

Wright HV, Stephan S, Netterville JL. (2025). Nasolabial flap for oral cavity reconstruction. In *The Open Access Atlas of Otolaryngology, Head & Neck Operative Surgery*. Retrieved from <https://vula.uct.ac.za/access/content/group/ba5fb1bd-be95-48e5-81be-586fbaeba29d/Nasolabial%20flap%20for%20oral%20cavity%20reconstruction.pdf>

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