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Nasolabial Flap Reconstruction for Orofacial Defects: A Case Series

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ABSTRACT

Objective: To describe our clinical experience with, and functional outcomes of the nasolabial flap for reconstruction of orofacial defects.

Methods:

Design: Retrospective Case Series

Setting: Tertiary National University Hospital

Participants: Records of 11 patients on whom a nasolabial flap was performed for reconstruction of head and neck defects between January 2013 and December 2018 were analyzed.

Results: All patients underwent wide excision with or without frozen section, with or without neck dissection, and nasolabial flap closure was performed by a single surgeon. There were no major complications. In two cases, the nasolabial flap was used as an adjunct for Abbé and deltopectoral flap reconstruction. One had poor oral competence due to the bulk of the deltopectoral flap. Acceptable aesthetics and functional outcomes were achieved.

Conclusion: The nasolabial flap is a viable alternative for reconstruction of orofacial defects following head and neck surgeries. Additional cases can help validate our initial experience.

Keywords: *Nasolabial flap; nasolabial fold; orofacial defects; oral and facial carcinoma; mouth; skin; surgical flaps*

With expanded applications of microvascular free tissue transfer techniques for oral cavity reconstruction, the routine need for a variety of local and regional flaps has decreased. However, several such flaps remain quite useful and should be considered as an option for the reconstructive surgeon.[1] Among these is the nasolabial flap (NLF), an arterialized local flap in the head and neck region with an axial blood supply provided either by the angular artery branch of the facial artery (inferiorly based) or by the superficial temporal artery through its transverse facial branch and the infraorbital artery (superiorly based). It is a reliable, versatile, and an easy to raise flap for a variety

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of small to intermediate defects in the orofacial region. The first NLF for intraoral reconstruction was reported at the end of the 19th century.[2] Superiorly-based nasolabial flaps can be used for reconstruction of nasal defects, lower eyelid, and the cheek, whereas the inferiorly based flaps are considered useful in reconstruction of defects of the lip, oral commissure, and the anterior oral cavity.[2]

A retrospective analysis of 26 cases of oral cancer treated with primary excision and NLF reconstruction concluded that the flap is versatile for covering or reconstructing small or medium-sized defects of the oral cavity in selected patients after excision of primary tumors and results in good overall cosmetic and functional outcome.[3] However, to the best of our knowledge, there is a dearth of local publications on reconstruction with this flap. Using the search terms "nasolabial flap" in combination with "facial reconstruction", "orofacial defects", "oral" and "facial" defects, a search on PubMed Medline yielded no studies of nasolabial flap from the Philippines. Similar search terms used at HERDIN Plus, the ASEAN Citation Index and the Global Index Medicus yielded four local studies.[4-7]

We present our five-year clinical experience with nasolabial flaps for orofacial reconstruction and the functional outcomes associated with the use of nasolabial flaps as a primary or an adjunct option for reconstruction of head and neck defects in our institution.

METHODS

With UPMREB exemption (RGAO-2019-0375), the records of all patients who had undergone NLF reconstruction of head and neck defects under the Department of Otolaryngology - Head and Neck Surgery of the Philippine General Hospital between January 2013 and December 2018 were retrieved for possible inclusion in this case series.

Included were records of patients that were staged using TNM classifications, who underwent wide excision with or with frozen section, with or without neck dissection and closure of the defect carried out by the same surgeon (ACAC) under general anesthesia. Incomplete records were excluded.

The following data was extracted from the charts and recorded by the first author (RZDD): age, sex, diagnosis, TNM classification, stage, tumor size, tumor location, surgical procedure performed, operative time, and complications.

Preoperative contrast enhanced computed tomography and a tissue biopsy were performed in all patients. Radiotherapy was administered for patients who had advanced-stage tumors or adverse features on final histopathology.

Surgical Technique

Standard inferiorly-based nasolabial flap reconstruction was performed in all cases as follows: following *en bloc* tumor resection with at least 1.5 cm. margins, a fusiform flap was designed and marked, ensuring that the medial border of the flap was in the nasofacial sulcus. The superior border of the flap was placed inferior to the medial canthus along the nasofacial junction. Placement of the inferior border depended on the nature of the defect. For floor of mouth reconstruction, the inferior border of the flap was at the superior border of the mandible.

The skin incision was carried through the dermis and subcutaneous fat up to the layer just above the underlying musculature. The facial artery lay in a plane deep to the facial mimetic musculature and in a medial position along the nasofacial sulcus. The flap was elevated in a superior-to-inferior fashion along a plane just above the facial musculature, and the artery with the facial muscles were preserved at the pedicle inferiorly. The flap was then tunneled through the buccal space to repair an intraoral defect primarily or as an adjunct flap, or placed on defects of the face and lips.

The donor site was closed with minimal tension as much as possible using 4-0 Vicryl sutures for the deep dermal closure and 5-0 fast absorbing catgut sutures to approximate the skin edges. The closure was done in a superomedial direction to avoid distortion of the lower eyelid.[8] *(Figure 1)*

Data Analysis

Data was presented in simple frequencies and percentages and measures of central tendency of sex (mean and standard deviation) were computed where applicable. Type of surgery, TNM staging, post-operative functional status as well as adjuvant treatment done and follow up period, and the means and standard deviations was presented for continuous data (age).

RESULTS

A total of 11 patients were included in this series, 7 males and 4 females with a 2:1 ratio of male to female. Their ages ranged from 41 to 75 years old (Mean age 57, SD = 9). The tumor sizes ranged from 8 x 7 mm to 130 x 25 mm. According to histological type and localization of the tumor, American Joint Committee on Cancer (AJCC) TNM classification, four patients were in stage IVa, three in stage III, two in stage II and two in stage I. Hospitalization ranged from 5 days to a maximum of 18 days with average hospital stay of 8.2 days. Final histopathology showed 8 squamous cell carcinomas (SCCA), 1 basal cell carcinoma, 1 adenocarcinoma and 1 leiomyosarcoma.

Wide excision of the tumors created defects ranging from the smallest at 18 x 24 mm to the largest at 55 x 65 mm. In 9 cases, a nasolabial flap was used as the primary reconstruction for the defects;

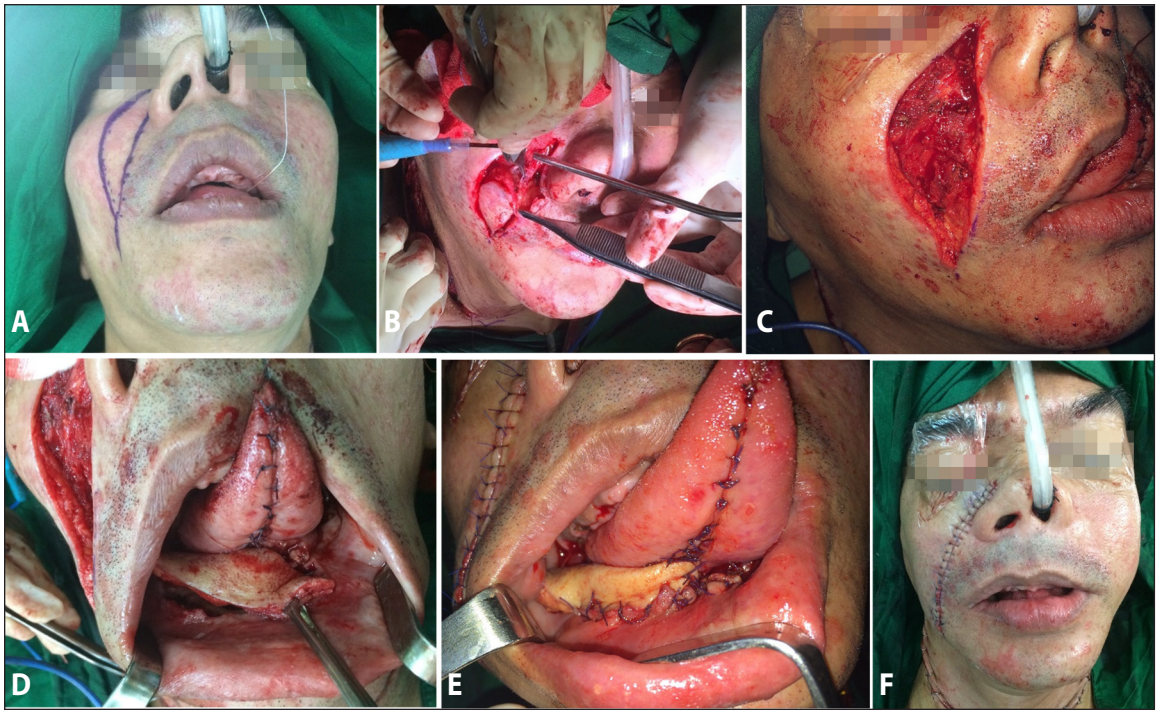

Figure 1. Surgical technique and development of nasolabial flap **A.** marking and design of the flap along the nasofacial sulcus; **B.** incision and development of the flap; **C.** donor site defect; **D.** tunneling and positioning on the floor of mouth defect; **E.** suturing and closing of the flap and defect; and **F.** skin closure.

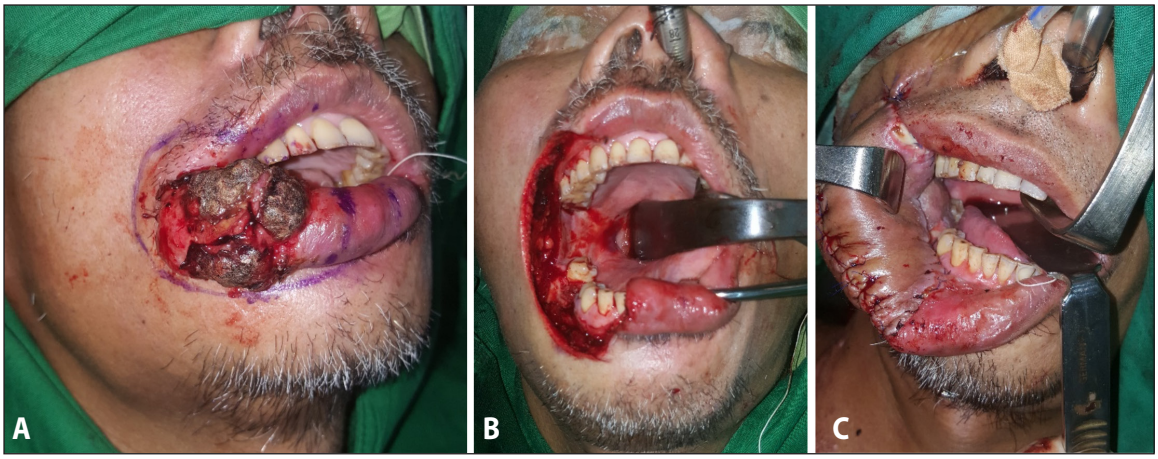

Figure 2. Intraoperative photos of buccal squamous carcinoma **A.** extent of the mass on the lip commissure with planned wide excision margin; **B.** lip and buccal defect; **C.** nasolabial flap after amputation of deltopectoral flap.

8 intraoral (3 buccal, 2 floor of mouth, 2 gingival, and 1 tongue) and 1 upper lip. In two cases, the nasolabial flap was used as an adjunct to another reconstruction flap: an Abbé flap for the lip SCCA and a deltopectoral flap for a through and through buccal SCCA. *(Figure 2)*

Lymphadenopathies were present in 4 of the 11 cases. All those with positive lymph nodes underwent elective neck dissection while 2 lymph node negative cases underwent prophylactic neck dissection. Four stage IVa and three stage III patients underwent radiotherapy as adjuvant treatment.

The mean operation time was 6.88 hours, with the fastest at 3 hours and longest at 13 hours. Follow up ranged from 4 to 8 weeks. The complication rate was 18% with 2 flap dehiscences, 1 flap discoloration, and 1 with poor oral competence. There were no other complications like flap loss, total or partial necrosis or infection. The 2 dehiscences

Figure 3. Post-operative clinical photograph of nasolabial flap donor site

developed after 1 week but these did not progress and resolved through secondary intention healing after around 4 weeks. None of the patients had any complaints about their scars, and were deemed aesthetically acceptable. *(Figure 3*). Facial movements such as smiling were not affected by the flap.

DISCUSSION

Our five-year clinical experience with nasolabial flaps for orofacial reconstruction involved 11 patients (eight squamous cell carcinomas and one each basal cell carcinoma, leiomyosarcoma, adenocarcinoma) with tumor sizes ranging 8 x 7 mm to 130 x 25 mm. Post excision defect sizes ranging from 18 x 24 mm to 55 x 65 mm were reconstructed with 9 NLF alone, and 2 NLF in combination with other flaps. The functional outcomes associated with the use of NLF as primary or adjunct option for reconstruction of head and neck defects was satisfactory, with an 18 % complication rate (2 flap dehiscences, 1 flap discoloration, and 1 oral incompetence as the most bothersome complication).

Head and neck cancer surgery is often complicated by location, anatomy, complex reconstructions, and long surgical procedures. Reconstruction of head and neck defects may be achieved in a variety of ways.[9] Reconstructive options for defects of the orofacial region include primary closure, secondary healing from mucosalization, covering the defect site with split thickness skin grafts, and various pedicled and free flaps.

Although reconstruction of orofacial defects using microvascular free flap improves functional and cosmetic outcomes,[10] it requires a dedicated team composed of a head and neck surgeon, microvascular surgeon, specialized anesthetist and dedicated nursing and allied medical staff. It also adds more hours to the operating time and even longer hospital stays.[11] In low resource areas, pedicled flaps can be the best option.

The versatility and usefulness of the nasolabial flap is well established, with good vascular supply that results in higher flap survival.[12–14] The vascular supply of the nasolabial flap may come from the anterior facial artery, the infra-orbital artery, the transverse facial artery and the infratrochlear artery (depending on whether it is superiorly or inferiorly based). The nasolabial flap can still be used following extensive neck dissection specially in levels I-III neck dissection. Even if the facial artery is ligated, the flap can be used as random based vascular supply.[15] In our present study, all 6 patients who underwent neck dissection did not have any complication of dehiscence or flap failure, supporting the reliability of the nasolabial flap even when neck dissection is performed.

The largest defect solely reconstructed with nasolabial flaps was a case of lower lip squamous carcinoma involving 90% of the lower lip for which bilateral nasolabial flaps were used.[6] Our current study found the nasolabial flap adequate to cover orofacial defects when used solely, although the extent of our defects was mostly intraoral and the largest defect covered was 60 mm x 60 mm in area.

Despite its good reliability and robust vascular supply, the NLF has its limitations. The size of the defect and redundancy of tissues from the defect as well as the possibility of primarily closing the donor site limits the use of the NLF.[16] Two cases used nasolabial flap as an adjunct to larger reconstructive option for better coverage.

Kallapa and Shah[17] reported 24 cases of oral cancers of which 18 were reconstructed with a unilateral nasolabial flap and 3 with a bilateral flap after radical resection. The largest defect size measured 5 x 2 cm and used a 7 x 3 cm unilateral NLF. Three lower lip malignancies were reconstructed with bilateral NLF with the largest defect 6 x 4 cm and reportedly good aesthetic and functional outcomes. Lazaridis *et al.*[18] reported nine patients that underwent reconstruction of intraoral defects with nasolabial flaps, five with an inferiorly based NLF. Speech and oral continence, including mastication, were preserved. Wound healing complications were reported in 18% of our patients, 2 of which were flap dehiscence that eventually resolved thru secondary intention and one with oral incontinence due to the bulk of the deltopectoral flap. Our complication rate is higher than previously reported rates which ranged from 4-11%.[15]

Our study has several limitations. First, our sample size only included 11 patients over five years. We also lack a comparator group. Expanding the use of NLF and comparing it to other reconstructive options based on similar indications (such as tumor stage and histopathology, and defect size) may yield more valuable insights. Moreover, as a single-surgeon experience involving a learning curve, the outcomes and complications may not apply to other surgeons. A more systematic documentation of variables may also provide better quality data for analysis that can be generalized to similar cases beyond the study.

Despite these limitations, our initial experience demonstrates that the nasolabial flap is a viable alternative for reconstruction of intraoral and lip defects. Even as other reconstructive options become available, the NLF is useful in resource-challenged settings where microvascular reconstruction is not as accessible.

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