

# Revisit of Nasolabial Flap in the Reconstruction of Defects Involving the Oral Floor

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## ABSTRACT

**Aim:** The aim of this article is to present the usefulness of the nasolabial flap (NL flap) along with a detailed review of the factors that lead to its selection for the reconstruction of post-ablative oral floor defects. **Materials and Methods:** The records of patients who underwent the procedure between June 2009 and June 2011 were retrospectively analyzed. A total of 16 reconstructive procedures were performed. NL flap was selected for reconstruction in all the cases due patient related factors mainly associated medical comorbidities, resource constraints, and the relatively small size of defects, which precluded the use of free flaps. **Results:** None of the flaps were lost, 26% of patients had flap related complications. Most of the complications were minor and managed conservatively. **Conclusion:** Data from this study suggest that NL flap is a reliable option for reconstruction of the oral floor, in form as well as function, without esthetic compromise and has a major role even in this era of free flaps.

**KEYWORDS:** Floor of mouth defects, local flaps, nasolabial flap, oral cavity defects, reconstruction, regional flaps

## INTRODUCTION

The nasolabial flap (NL flap) is a pedicle skin flap that is often used for extraoral as well as intraoral regional repairs. It is most commonly raised as a random pattern flap supplied by the subcutaneous vessels.<sup>[1]</sup>

In this era of microsurgical free flap transfers, intraoral reconstruction has entered into an age of sophistication and expertise in which defects of any size, shape, and complexity can be efficiently managed.

Extensive lesions of the oral floor often require reconstruction with a free radial forearm flap; this adapts very well to the defects, preserves tongue mobility and remains soft and mobile postoperatively. Another appealing feature of the radial forearm flap is the fact that the flap can be harvested simultaneously with the resection. It has been well-established in the recent past that with the increasingly widespread application of reliable microvascular free radial forearm flap techniques for oral floor reconstruction, the routine need for local and regional flaps has decreased.<sup>[2]</sup>

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However, sometimes these techniques are uncalled for because either the defect is too small and/or the patient's age and medical status do not permit a lengthy anesthetic and surgical procedure, not to mention the training and expertise it takes to learn and apply these techniques in practice.<sup>[2]</sup>

The nasolabial skin flap represents a reconstructive option that, in the right circumstances, represents an excellent solution to circumvent these problems for repair of small to moderate-sized local intraoral defects.<sup>[3-5]</sup> We have made frequent use of inferiorly based nasolabial cheek flaps and have been very impressed with their versatility in older patients for the repair of the oral floor defects after ablative tumor surgery.

In this article, a detailed and comprehensive view of our favorable experience with the use of the NL flap for oral floor reconstruction is presented, which makes it clear and arguably the best choice for small to moderate oral floor defects, with particular regard patient related factors.

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## MATERIALS AND METHODS

Institutional Ethical Committee approval was obtained prior to starting this study. The study was undertaken with the understanding and written consent of each subject and according to Ethical Principles of Helsinki's Declaration. A total of 16 patients were studied, of which 13 were male and 3 were female, between June 2009 and June 2011, all of who reported to the authors department for treatment, formed the study group. The records of these patients were analyzed retrospectively [Tables 1-3]. The sizes of the primary tumors ranged from 2 to 4 cm. Ten patients were classified as n1 and 5 as n2. All patients underwent bilateral supraomohyoid neck dissections, wide excision of the primary tumor, and mandibular resection with preservation of lower border for clearance, and soft tissue reconstruction with a single NL flap. The facial artery was ligated bilaterally, as a part of the neck dissection. All patients received 1.2 g amoxicillin and clavulanic acid 1 h before the procedure, which was continued for 48 h twice a day, after which the oral equivalent was continued for 3 more days. All the procedures were done under hypotensive anesthesia and no patient required a postoperative blood transfusion.

### Nasolabial flap harvest technique

A unilateral, inferiorly based flap comprising of skin and subcutaneous tissue was harvested without thinning the flap or deepthelizing the lowermost 2 cm, to facilitate one stage primary closure, from the nondominant side of the patient's face. The skin was carefully selected to avoid hair growth on the flap. Care was taken to prevent constricting the pedicle during the 2 layer closure of the donor site, and during tunneling and pull through into the oral cavity. The flap was not divided and inset in a second procedure. After pull through, a few quilting sutures were taken on the base of the flap to prevent hematoma after which the flap margins were sutured to the defect margins as feasible with 3-0 vicryl sutures in an interrupted fashion [Figures 1-5].

## RESULTS

The mean age of the patients was 65 years. The mean size of the tumors was 3.5 cm. One female patient was excluded from the



Figure 1: Marking of inferiorly based nasolabial flap

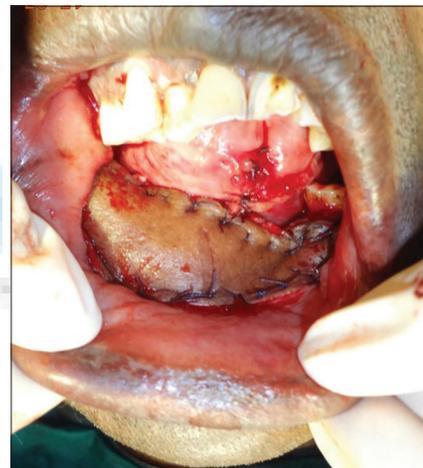


Figure 2: Nasolabial flap over ablative surgical defect

Table 1: Demographic data

| Patient no. | Age | Sex | Co-morbidity | Tumour size | Stage  | Postop radiation | Follow up |
|-------------|-----|-----|--------------|-------------|--------|------------------|-----------|
| 1           | 67  | M   | HTN, DM      | 3.5 cm      | T2N2M0 | -                | 4 yrs     |
| 2           | 70  | M   | ICH          | 3.0 cm      | T2N1M0 | -                | 3 y, 11 m |
| 3           | 63  | F   | HTN          | 1.5 cm      | T1N1M0 | -                | 3 y, 9 m  |
| 4           | 69  | M   | -            | 3.5 cm      | T2N1M0 | -                | 3 y, 6 m  |
| 5           | 64  | M   | DM           | 3.5 cm      | T2N2M0 | -                | 3 y, 6 m  |
| 6           | 62  | M   | IHD          | 3.0 cm      | T2N2M0 | -                | 3 y, 4 m  |
| 7           | 65  | M   | HTN, DM      | 1.5 cm      | T1N1M0 | -                | 3 y, 2 m  |
| 8           | 65  | F   | HTN, DM      | 3.5 cm      | T2N1M0 | -                | 3 y, 2 m  |
| 9           | 66  | M   | CRF          | 1.5 cm      | T1N1M0 | -                | 3 y, 1 m  |
| 10          | 62  | M   | -            | 3.0 cm      | T2N2M0 | -                | 3 y, 1 m  |
| 11          | 61  | M   | HTN, DM      | 3.5 cm      | T2N2M0 | -                | 2 y, 8 m  |
| 12          | 68  | M   | MI           | 1.5 cm      | T1N1M0 | -                | 2 y, 5 m  |
| 13          | 66  | F   | DM           | 3.0 cm      | T2N1M0 | -                | 2 y, 5 m  |
| 14          | 64  | M   | -            | 3.5 cm      | T2N1M0 | -                | 2 y, 2 m  |
| 15          | 68  | M   | MI           | 3.5 cm      | T2N1M0 | -                | 2 yrs     |

HTN: Hypertension, DM: Diabetic Mellitus, ICH: Intra Cranial Hemorrhage, IHD: Ischemic heart disease, CFR: Chronic Renal Failure, MI: Myocardial Infarction

study as she had sublingual mucoepidermoid carcinoma. None of the flaps underwent total necrosis. Two patients were given postoperative radiation, as indicated by internationally accepted norms immediately after surgery, as multiple nodes were involved by metastasis. Four patients reported with a local recurrence during the follow-up period, of which, one had a non-Hodgkin lymphoma of small intestine, who succumbed to his disease after 6 months of chemotherapy. One patient had the uncontrollable local disease and died shortly after his palliative therapy finished. Ten patients remained disease free throughout the follow-up period. The patients who returned with the local recurrence were offered concurrent chemo-radiation, after which they were lost to follow-up. The minimum follow-up period was 2 years.

## DISCUSSION

The purpose of this article is to clearly define the role of NL flaps in reconstruction of intermediate defects of the floor of

the mouth, along with an analysis of the expected complications and the effect of these reconstructions on the patient's quality of life thereafter.



Figure 3: Primary closure of extra-oral flap harvested site

Table 2: Complications

| Patient no. | OCF | SSI | Recurrence | Disease free | Partial flap loss | Hair growth |
|-------------|-----|-----|------------|--------------|-------------------|-------------|
| 1           | -   | -   | -          | 4 y          | -                 | -           |
| 2           | -   | -   | -          | 3 y, 11 m    | +                 | -           |
| 3           | -   | -   | -          | 3 y, 9 m     | -                 | +           |
| 4           | +   | -   | +4 m       | -            | -                 | -           |
| 5           | -   | -   | -          | 3 y, 6 m     | -                 | -           |
| 6           | -   | -   | +7 m       | -            | -                 | -           |
| 7           | -   | -   | -          | 3 y, 2 m     | -                 | -           |
| 8           | -   | -   | -          | 3 y, 2m      | -                 | -           |
| 9           | -   | +   | +1 y, 9 m  | -            | +                 | -           |
| 10          | +   | -   | -          | 3 y, 1 m     | -                 | +           |
| 11          | -   | -   | +8 m       | -            | -                 | -           |
| 12          | -   | -   | +1 y, 1 m  | -            | -                 | -           |
| 13          | -   | -   | -          | 2 y, 5 m     | -                 | -           |
| 14          | +   | -   | -          | 2 y, 2 m     | -                 | -           |
| 15          | -   | -   | -          | 2 y          | -                 | -           |

OCF: Orocutaneous fistula, SSI: Surgical site infection



Figure 4: After a year nasolabial flap

Table 3: Factors affecting the quality of life

| Patient no. | Prosthetic rehab | Mouth opening | Tongue mobility | Speech  | Mastication | Deglutination | Esthetics  |
|-------------|------------------|---------------|-----------------|---------|-------------|---------------|------------|
| 1           | Not possible     | No change     | No change       | Altered | Altered     | No change     | Acceptable |
| 2           | Not possible     | No change     | No change       | Altered | Altered     | No change     | Acceptable |
| 3           | Not possible     | No change     | No change       | Altered | Altered     | No change     | Acceptable |
| 4           | Not possible     | No change     | Reduced         | Altered | Altered     | No change     | Acceptable |
| 5           | Not possible     | No change     | No change       | Altered | Altered     | No change     | Acceptable |
| 6           | Not possible     | No change     | No change       | Altered | Altered     | No change     | Acceptable |
| 7           | Not possible     | No change     | No change       | Altered | Altered     | No change     | Acceptable |
| 8           | Not possible     | No change     | No change       | Altered | Altered     | No change     | Acceptable |
| 9           | Not possible     | No change     | Reduced         | Altered | Altered     | No change     | Acceptable |
| 10          | Not possible     | No change     | No change       | Altered | Altered     | No change     | Acceptable |
| 11          | Not possible     | No change     | Reduced         | Altered | Altered     | No change     | Acceptable |
| 12          | Not possible     | No change     | No change       | Altered | Altered     | No change     | Acceptable |
| 13          | Not possible     | No change     | No change       | Altered | Altered     | No change     | Acceptable |
| 14          | Not possible     | No change     | No change       | Altered | Altered     | No change     | Acceptable |
| 15          | Not possible     | No change     | No change       | Altered | Altered     | No change     | Acceptable |



**Figure 5:** After a year extraoral flap harvested site. Esthetically acceptable

Since the size of the primary tumors ranged from 2 to 4 cm, a 1 cm margin would make the largest resection about 5 cm in maximum diameter. It is the experience of this author and another<sup>[6]</sup> that a single, inferiorly based pedicle flap is sufficient to reconstruct the resultant defect adequately, while most feel that 2 flaps are required to accomplish this task adequately.<sup>[7-9]</sup>

All the patients underwent bilateral facial artery ligation, as a part of the neck dissection, and a total of 7 patients were given postoperative radiation without compromising the flap, as expected from other studies.<sup>[7,10,11]</sup>

The reason this flap has proven itself so dependable is that there is an abundant dermosubdermal plexus supplying the flap. Furthermore, this vascular plexus is not haphazard but may exhibit a degree of axiality ensuring good perfusion to the most distal parts of the flap.<sup>[12]</sup> The vessels that contribute most to the subcutaneous arterial network include the facial and the transverse facial arteries.<sup>[9,13]</sup> The above factors enable surgeons to alter the usual 3:1 length:breadth ratio of plastic surgery customarily applied to random pattern flaps<sup>[14]</sup> to about 5:1 for the inferiorly based NL flap.<sup>[3]</sup> Another important reason for the reliability of the flap is the fact that it generally lies outside the radiation therapy portals used in combined therapy for oral cancer.<sup>[15]</sup>

The author recommends that the temptation to thin the flap or de-epithelize the lowermost 2 cm, to facilitate one stage primary closure, should be resisted as it could compromise the vascularity of the flap, an observation made by others as well.<sup>[3,8]</sup> Furthermore, maintaining a sufficient subcutaneous (and cutaneous) pedicle helps prevent a trapdoor deformity by allowing good lymphovenous drainage.<sup>[3]</sup> On a technical note, intraoral hair growth on the inferiorly based NL flap can be prevented in men by taking a beardless superior section of the NL flap.<sup>[8]</sup>

Hagan and Walder suggested that the inferiorly based NL flap should be converted to a musculocutaneous island flap,

because the incorporation of the mimetic musculature of the face, intimately attached to the overlying skin and subcutaneous tissue of the nasolabial groove, gives a reliable flap for immediate closure of defects of the mouth.<sup>[16]</sup> However, this author does not think this is necessary. The previously mentioned inherent properties of the dermosubdermal plexus ensure flap reliability. Moreover, the inclusion of facial muscles of expression into the flap would potentially increase morbidity by decreasing the facial expression of the patient and adversely affecting oral continence.

Orocutaneous fistula occurred in 3 cases, probably because the skin edges could not be brought close together sufficiently while closure. One case got infected due to the poor oral hygiene of the patient resulting in partial flap loss. This was managed conservatively, by local wound irrigation and allowance for healing by secondary intention. Partial flap loss occurred in one more case, probably due to increased tension in the tip of the flap. It was also managed conservatively. The incidence of partial flap loss is about 13% in this study, which is similar to the findings in another study.<sup>[9]</sup> Hair growth was observed on one flap but did not bother the patient enough so that he would have to seek help for it. Prosthetic rehabilitation was not possible as all the patients were dentulous and had a deficit of hard tissue to support any kind of prosthesis but managed to eat satisfactorily on account of their remaining posterior teeth without interference from the pedicle of the flap as it was taken from the nondominant side of the patient's face. Prosthetic rehabilitation has also been difficult in other studies in edentulous patients due to the bulk of these flaps that tend to prevent the seating of denture bases.<sup>[3,9]</sup> However, incising food, an act that requires both upper and lower anterior teeth, was no longer possible. Mouth opening was not affected in any of the patients. Three patients who received postoperative radiation had reduced the mobility of the tongue on completion of therapy owing to radiation-induced fibrosis. The speech of all patients was initially altered, but all of them slowly returned to an almost normal speech during the follow-up. Since the reconstruction was too far anterior in the oral floor, deglutition generally remained unaffected. As were the observations of other clinicians<sup>[1,6]</sup> none of the patients complained about their appearance postoperatively. The above said factors have not been adequately assessed in previous studies, and long-term prospective studies are required to analyze the effect of this reconstruction as it will influence the quality of life of these patients postprocedure.

Like other developing countries, most of the oral cancer patients in India, come from the lower socioeconomic strata. These patients are limited in their resources and commonly without insurance support. A few studies have demonstrated that the costs associated with free flap and regional flap reconstructions are comparable, but in most centers' across developing nations, the cost of free flap reconstruction is significantly higher. Furthermore, extensive preoperative evaluation required to reduce the incidence of complications adds to the cost of free flap surgery.<sup>[17]</sup>

These complex reconstructions come with a high rate of minor and major complications such as acute respiratory distress syndrome,

sepsis, deep vein thrombosis, pulmonary embolism, myocardial infarction, death and several others,<sup>[18]</sup> which can easily be avoided if a simple reconstruction is undertaken. Free flap failure is estimated at about 5–10%, which is devastating for the patient because of enduring the lengthy procedure and convalescence period, not to mention the resources involved in getting this kind of treatment.<sup>[17]</sup>

Many recognized centers in developing countries do not have facilities for free flap reconstructions. Due to the high cost, the possibility of further expenditure can be involved if salvage surgery is required, and nonavailability of expertise in surgery and nursing, NL flap may be the only feasible option for reconstruction for small to moderate defects of the oral floor. Therefore, in the basic tertiary setting, the NL flap remains a time-tested option for reconstruction of a small to moderate defects of the oral floor.

In this era of microvascular reconstruction, resource constraints remain the primary indication for selecting NL flap in a developing country. The other indications for the NL flap are: Small to moderate defects, medically compromised patients; free flap salvage surgery and reconstruction in the vessel-depleted neck.

## CONCLUSION

Proximity to the donor site, simplicity and rapidity of the procedure, minimal expertise required and simple nature of minor complications encountered, along with the above said factors make the NL flap the clear and arguably the best choice for reconstruction of small to moderate oral floor defects, with particular regard to patient-related factors.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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