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CLINICAL REPORT

# Infolding of Nasolabial Flap: An Excellent Surgical Technique for Full-Thickness Defect of the Lip

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**Abstract** To find out the usefulness of the infolding technique of nasolabial flap to reconstruct full-thickness defects of the lower lip. It is a retrospective analysis of 5 surgically operated cases. The infolding nasolabial flaps were utilized for the full thickness defect over the lower lip in carcinoma of the oral cavity from January 2018 to July 2019. The patients were followed up for a minimum period of 12 months, and the outcomes were evaluated. The mean age of the patients was 39.72 ± 7.58 years (range 30–52 years). The infolding nasolabial flap has used each case for the reconstruction of the lower lip. The average length and breadth of the flaps were 65 mm (range 60–75 mm) and 35 mm (range 30–40 mm), respectively. One patient presented with partial necrosis of the flap its tip. The functional and cosmetic outcomes were found satisfactory till 12 months of follow-up, and none of the patients had a recurrence of the disease. Infolding of the nasolabial flap can be a good surgical technique for the reconstruction of the full-thickness defect of the lower lip, ensuring satisfactory functional and cosmetic outcomes without causing major intraoperative/postoperative complications in patients with carcinoma of the lower lip.

**Keywords** Infolding technique · Nasolabial flap · Outcome

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## Introduction

Reconstruction of the lip remains a big challenge, especially for larger defects involving the full thickness of the lip [1, 2]. Various surgical techniques and flap designs have been previously described for the reconstruction of the lower lip, such as the Abbe–Estlander flap, Karapandzic flap, Bernard-Burow's procedure, Gillies fan flap, advanced/rotated regional flaps and free flap reconstruction associated with respective advantages and disadvantages [2–5]. Amongst them, the nasolabial flap is considered a unique flap for the reconstruction of the lower lip, providing adequate functional and aesthetic results. Nasolabial flap (NLF) is an arterialized flap that may be superiorly based, inferiorly based [6], or centrally based [7], depending upon the arterial pedicle, although many authors have claimed a random blood supply without any definitive arterial pedicle. First described by Sushruta in 600 BC, [7] this flap has been used in the reconstruction of the floor of mouth, palate, tongue, lips, and tip and ala of the nose [1–3, 6, 8]. As the flap is very thin, it can be suitably used for the reconstruction of the partial defect over the lip. In contrast, in the full-thickness defects of the lower lip, the aesthetic outcomes are not very encouraging as it does not provide the bulk to the lower lip leading to poor cosmoses in the postoperative period. Rather infolding of the nasolabial flap can be utilised, augmenting the bulk to the lower lip with a good cosmetic outcome. Although various studies have been documented in the past, showing different surgical techniques of reconstruction of the nasolabial flaps [6, 9], the infolding technique of the nasolabial flap is not well described in the literature. In the present study, we have shared our experience in using the infolding nasolabial flap for the reconstruction of full-thickness defects of the lower lip.

## Materials and Methods

It is a retrospective analysis of 5 surgically operated cases, where the ipsilateral nasolabial flap was utilized for the full thickness defect over the lower lip in carcinoma of the oral cavity.

### Surgical Technique

After the informed and written consent, the inferior based nasolabial flap was raised in all the patients to repair the primary defect of the lower lip. All the procedures were operated by a single surgeon assisted by a fixed group of the surgical team. After the selective neck dissection, the tumour was excised, keeping a wider margin (15 mm) of healthy tissue. The length and breadth of the flap were demarcated after the accurate measurement of the soft-tissue defect required for the reconstruction. The plane of dissection was deep to the subcutaneous tissue and superficial to the underlying muscles [10]. Special attention was given in preserving the integrity of the facial vessels during the neck dissection. After the flap was raised up to the desired length, it was rotated inwards to the oral cavity through a mucosal tunnel. The flap was then infolded by interrupted absorbable sutures to make it thick, approximating the size of the residual lip (Fig. 1). Attention was given during the infolding of the nasolabial flap, i.e., the knots which were placed were not too tight to prevent overstretching. The nasolabial flap was then sutured to the residual lip in a multilayered fashion from the inner mucosal layer to the outer skin with minimal tension

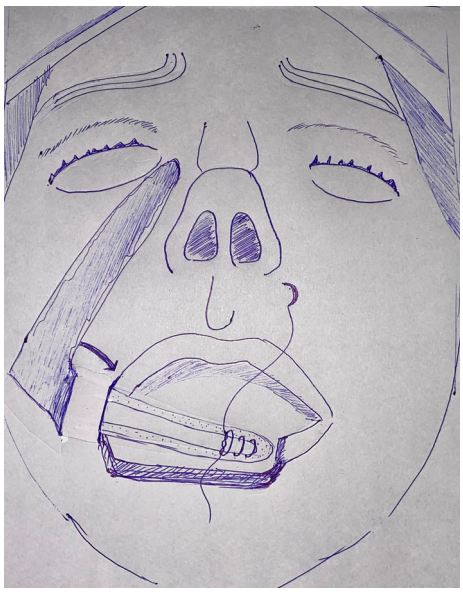

**Fig. 1** Sketch diagram showing the infolding technique of the inferior based nasolabial flap using absorbable interrupted sutures

**Fig. 2** The photograph shows a meticulous approximation of the nasolabial flap with the residual lip

(Fig. 2). The nasolabial flap was released three weeks after the primary reconstruction, and commmissuroplasty was performed whenever required. The patients were followed up for a minimum period of 12 months, and the outcomes were evaluated.

## Results

Of 05 patients, 4 (80%) were males, and 01 (20%) patient was a female. The mean age of the patients was 39.72 ± 7.58 years (range 30–52 years). The demographic data have been shown in Table 1. Of the 05 patients, a history of smoking was detected in 3 patients (60%), and all the patients were addicted to tobacco chewing. The average Karnofsky performance status score was 70 (range 60–90). Three patients were found to be associated with chronic morbidities (Diabetes/Chronic lung disease). Tumour was found to involve the full thickness lower lip in 3 cases, and it involved the commissure in 2 patients along with the primary lip. The mean duration of the disease was 3.6 months (range 01–05 months). The average follow-up period was 12 months (range 12–18 months). One patient had trismus in the preparative period and the pain was the universal complaint of all the patients. Selective neck dissection was performed in all cases. The ipsilateral inferior based nasolabial flap was harvested in each case. The average length of the flap was 65 mm (range 60–75 mm) and the breath of the flap was 35 mm (range 30–40 mm). The facial artery was preserved in all the cases, and the facial vein was preserved in 3 cases during the surgery. There was no significant intraoperative complication detected in any patients. In the postoperative

**Table 1** Shows the demographic profile of the patients

| Characteristics | Value/no of patients, N (%) | Range |
|---|---|---|
| Male | 4 (80%) | |
| Female | 01 (20%) | |
| Mean age of patients (years) | 39.72 ± 7.58 | 30–52 |
| Mean duration of the disease (months) | 3.6 months | 1–5 |
| Mean duration of follow-up (months) | 12 months | 12–18 |
| Addiction smoking | 03 (60%) | |
| Full thickness lip involvement | 3 (60%) | |
| Full thickness lip and commissure | 2 (40%) | |
| Staging | | |
| T1N0M0 | 4 (80%) | |
| T2N0M0 | 01 (20%) | |
| Pathological diagnosis (SCC) | 05 (100%) | |
| Neoadjuvant Chemotherapy | 06 (20.68%) | |
| Average operative time (minutes) | 180 | 150–300 |
| Selective neck dissection | 05 (100%) | |

*SCC* squamous cell carcinoma

period (48 h after surgery), one patient developed partial necrosis of the flap at the tip, which was later resutured after excision of the necrotic part. The average operative period was 180 min (range150–300 min). The mean duration of hospital stay was 5 days (range 3–7 days). The histopathological report was confirmed to be squamous cell carcinoma in each patient. Of 5 patients, 2 patients needed neoadjuvant chemotherapy due to the extranodal extension of the tumour. Till 12 months of follow-up, none of the developed recurrence of the disease.

## Discussion

Reconstruction of lip defects following the excision of malignant tumors remains a big challenge, particularly for larger defects involving the full thickness of the lip [1, 2]. The basic aim of reconstruction is to regain the functional outcome of the lip with acceptable facial cosmoses in the postoperative period [11]. Several surgical techniques have been described for the reconstruction of the full-thickness defect of the lower lip in the past [12–16]. All the described flaps have their own merits and demerits with variable degree morbidities in the postoperative period [1, 17, 18]. The authors have used the nasolabial flaps for the reconstruction of the lower lip defects because of their easy accessibility, reliability, ease of harvesting and reduced surgical time [1–3, 8]. The rich subdermal vascularity of the flap allows for a 3:1 length: base ratio, which is usually achieved during surgery [1, 8]. Besides the close proximity of the flap to the primary defect, it can be more reliable for T1 and T2 lesions of the lower lip. Being a thin and pliable flap, it is more suitable for the reconstruction of the partial defect of the lip involving the skin of the mucosal surface. But it is often a challenge to repair the defect involving the full thickness lip with or without the involvement of the commissure. Because it needs adequate soft tissue bulk for a better functional along with a good aesthesis of the face. In contrast, the flap can be infolded by interrupted absorbable sutures to make it thick, approximating the size of the residual lip providing adequate bulk and cosmesis to the lip. Although various flap designs have been described in the literature, the infolding flap technique has not been well described in the literature. In the present series, in all our patients, we have applied the technique which produced better functional and aesthetic outcomes without any significant intraoperative/postoperative complication.

The major disadvantage encountered in the clinical practice with these local flaps are the microstomia and distortion of the commissure [19, 20]. The mouth opening again further comprised in patients requiring adjuvant radiotherapy in advanced oral cavity tumours. Different modifications of the nasolabial flaps and various combinations with other regional flaps have been described in the past literature [21, 22] for better cosmetic and functional outcomes of the lower lip. Although the inclusion of the facial artery in the flap design is not essential for flap survival, ipsilateral facial artery preservation does increase flap reliability [6–8]. In all our cases, we have tried to preserve the facial vessels, although facial vain was ligated in 2 patients due to the intraoperative injury. Due to the increased thickness of the flap by the infolding technique, atrophy of the flap can be reduced even after neoadjuvant radiation therapy, as demonstrated in our patients (Fig. 3).


**Fig. 3** **a**, **b** Photograph of the patient 6 months after adjuvant radiotherapy, showing satisfactory cosmetic and functional outcomes

This flap also has the additional advantage of providing hairless skin to the defect site and also reduces donor site morbidity associated with other flaps [6].

## Conclusion

Infolding of the nasolabial flap can be an excellent surgical technique for reconstructing the full-thickness defect of the lower lip, ensuring good functional and cosmetic outcomes without causing any major intraoperative/postoperative complications in patients with carcinoma of the lower lip.

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**Compliance with Ethical Standards**

**Conflict of interest** All authors have declared that there is no conflict of interest among the author.

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

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