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Original Research Article

Versatility of the inferiorly based nasolabial flap for reconstruction in early oral cancer patients: our experience in a tertiary cancer centre

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ABSTRACT

Background: The nasolabial flap is a simple, yet efficient method of soft tissue reconstruction with a very reliable blood supply which can be used to reconstruct soft tissue defects of various parts of the oral cavity. Aim of the study was to study the effectiveness of the inferiorly based nasolabial flaps for reconstruction in early oral cancer patients.
Methods: 28 patients with T1 or T2 malignant lesions of the oral cavity were studied retrospectively who underwent reconstructions using the inferiorly based nasolabial flap. Flap viability, wound problems, infections, function, scar and recurrence were noted post-operatively for all the patients included in the study. All patients were followed up for a minimum of 6 months after the surgery.
Results: The nasolabial flap was used to reconstruct defects of buccal mucosa, oral commissure, lower lip, lateral border of the tongue, hard palate and the floor of the mouth. The flap was viable in all patients with no recurrences. Cosmetic and functional outcomes were good. However few patients developed minor complications like post-operative trismus, severe wound contracture, ectropion and infection and wound dehiscence. Intra oral hair growth over the flap used were one of the main problems in the majority of male patients.
Conclusions: If proper attention is given to flap designing, operative technique and post-operative management, the NLF is a viable and versatile option for reconstruction of small to intermediate defects of the oral cavity created post ablation of early tumors of the oral cavity.

Keywords: Loco-regional flaps Nasolabial flap, Oral cancer, Reconstruction

INTRODUCTION

Reconstruction plays a very important role in post operative quality of life for cancer patients. Post operative function and esthetics forms the two corner stones when it comes to planning for reconstructing the surgical defect formed post tumor ablation. Advancements in the field of reconstruction has ensured that post ablative defects of any complexity and size can be corrected using fasciocutaneous, musculocutaneos or microvascular flaps.[1] But there are a plethora of confounding factors which influence the method of reconstruction like the age of the patient, comorbidities, size of defect, post-operative quality of life, infrastructure of the operating set up etc.[1,2] When it comes to early cancers of the oral cavity, a small to medium size defect results after tumor ablation, for such cases the pectoralis major myocutaneous flaps (PMMC) at times, becomes too bulky. On the other hand the microvascular flaps like the radial artery forearm free flap provide a thin surface

of pliable skin but bears the disadvantage of having high donor site morbidity, prolonged surgical time, higher chances of failures in old patients and smokers and the need for microsurgical expertise.[1,2] Thus, the nasolabial flap (NLF) becomes one of the preferred reconstruction techniques when it comes to correcting small to medium size defects after resection of early cancers of the oral cavity. The skin reservoir lateral to the naso-labial fold is used for reconstruction purpose.[3] It is a very simple, easy to harvest flap, with a rich blood supply which can be used for reconstruction of buccal mucosa, floor of mouth, tongue, lips, commissure etc.[4-6] Depending on the location of the pedicle, the NLF can be superiorly based, inferiorly based and centrally based.[3] This article reviews our experience in studying the effectiveness of the nasolabial flaps in reconstruction of post ablative defects in early oral cancer patients.

METHODS

This study included patients who had histopathologically proven squamous cell carcinoma of the oral cavity, who got operated in our institute between January 2018 and February 2020. 28 Patients with T1 and T2 lesions of the oral cavity who were treated by surgery first approach were included in the study. All tumors were surgically removed with safe margins and reconstruction of the surgical defect was done using the inferiorly based nasolabial flap. Neck was addressed in the same stage as the primary tumor in some cases while in others neck dissection was carried out in a second stage along with flap division. Patients unfit to undergo surgery under GA, with inadequate nasolabial fold, with scars of previous injury or burns in the nasolabial area, patients who are immunocompromised and patients whose pre-operative, intra-operative and follow up data were incomplete were excluded from our study. Data were collected from the patients operating records and were retrospectively analyzed. Flap viability, wound problems, infections, function, scar and recurrence were noted post-operatively for all the patients included in the study. All patients were followed up for a minimum of 6 months after the surgery. Each patient gave written informed consent to use their photographs and data for publication purpose. This being a retrospective study, was exempted of the ethical clearance from the Institutional Review Board. Statistical analysis was done using IBM SPSS Statistics (ver. 22.0; IBM, Armonk, NY, USA).

Surgical technique

After the tumor was removed, the size of the post ablative defect was measured; the design of the flap to be raised was marked on the skin of the naso-labial fold area using gentian violet solution (Figure 1A).

The flap was inferiorly based near the angle of the mouth and superiorly extended till 5 to 10 mm below the medial canthus of the eye. The flap width and length were decided as per the post-ablative defect. The width of the base of the flap varied from 1.5 to 2.5 cm depending on the tissue availability in the nasolabial fold and cheek area. The length of the flap varied between 6 to 9 cm. The flap was planned in such a manner that the donor site scar was located in the natural nasolabial fold.

The flap was raised superficial to the facial muscles from superior to inferior point as planned. The inferior limit of flap elevation was maintained above the commissure in cases where tunnelling was done for flap inset while for cases where the flap was rotated extra-orally to reconstruct the lower lip, the extent of dissection went below the level of the commissure (Figure 1B).

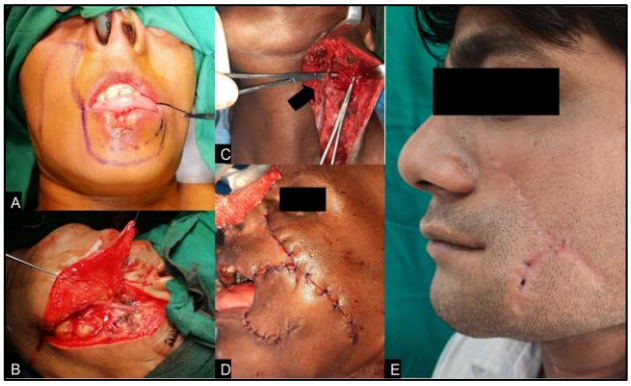

Figure 1: Clinical photographs showing different stages of reconstruction using NLF; A) The design of the flap to be raised is marked on the skin of the naso-labial fold area using gentian violet solution.; B) The flap is raised superficial to the facial muscles from superior to inferior point as planned.; C) Facial artery (arrow) is dissected and saved in single staged reconstructions.; D) Primary closure of the donor site.; E) Donor site scar 6 months after flap division.

In cases where the flap was to be delivered trans-orally to reconstruct the surgical defect, a tunnel was made by blunt dissection through the cheek which was wide enough (1.5-2 cm) to accommodate the NLF. The insetting of the flap over the surgical defect was done using 3-0 vicryl sutures, while the donor site was primarily closed in 2 layers. Vicryl 3-0 sutures were used to approximate the deeper soft tissues while prolene 4-0 was used to close the skin (Figure 1D). In cases where tunnelling was done a second procedure was done 3 weeks later where the NLF was divided and the defect was closed (Figure 1E).

RESULTS

28 patients were included in the study, out of which 18 were males and 10 were females. The age of our patients ranged from 29 years to 75 years. The site of the primary tumor was only buccal mucosa in 12 cases, buccal mucosa and commissure of the mouth in 3 cases, buccal mucosa and lower lip in 1 case, lower lip only in 8 cases, lateral border of the tongue in 2 cases and hard palate in 1 case and floor of the mouth in 1 case (Table 1) (Figure 2).

Table 1: Outcome of surgery for 28 patients of early cancer of the oral cavity who underwent reconstruction using inferiorly based nasolabial flap.

Age/sex	Site of reconstruction	Infection/ wound dehiscence	I/o hair growth	Tip dehiscence	Other complications	Viability	Recurrence
34/M	BM	N	Y	N	N	Y	N
43/M	BM	N	Y	N	N	Y	N
29/M	BM	N	Y	N	Y (bulky flap)	Y	N
52/F	LL	N	N	N	N	Y	N
75/F	BM+LL	Y	N	Y	N	Y	N
43/M	BM+CM	N	Y	N	Y (trismus)	Y	N
56/M	LL	N	Y	N	N	RY	N
44/F	LL	N	N	N	Y (bulky flap)	Y	N
36/F	LL	N	N	N	N	Y	N
62/F	HP	N	N	N	N	Y	N
44/M	T	N	Y	N	N	Y	N
41/M	BM	N	Y	N	N	Y	N
62/M	BM+CM	N	Y	N	Y (bulky flap)	Y	N
60/F	BM	Y	N	N	N	Y	N
34/M	LL	N	Y	Y	N	Y	N
35/F	FOM	N	N	N	N	Y	N
48/M	BM	N	Y	N	N	Y	N
55/M	BM	N	Y	N	N	Y	N
38/M	BM	N	Y	N	Y (scar +ectropion + trismus)	Y	N
43/F	BM+CM	N	N	N	N	Y	N
55/M	LL	Y	N	N	Y (oro-cutaneous fistula)	Y	N
61/M	T	N	Y	N	N	Y	N
60/F	BM	Y	N	N	N	Y	N
35/F	BM	N	N	N	N	Y	N
31/M	LL	N	Y	N	N	Y	N
40/M	LL	N	N	N	Y (scar +bulky flap)	Y	N
52/M	BM	N	N	Y	N	Y	N
36/M	BM	N	N	N	N	Y	N

I/O- Intra Oral, M- Male, F- Female, BM- Buccal mucosa, CM- Oral Commissure, T- Tongue, LL- Lower Lip, HP- Hard Palate, FOM- Floor of the mouth, Y- Yes, N- No.

In 18 out of 28 patients, the surgery was carried out in 2 stages where resection of the primary and reconstruction using the NLF was done in the first stage while neck dissection and flap division was done in the second stage. In the rest 10 patients resection of the primary tumor, reconstruction using NLF and neck dissection all were done in one stage, facial artery was dissected and preserved in all the patients (Figure 1C). 12 out of 28 patients received adjuvant radiotherapy. The follow-up ranged from 6 months to 14 months, and no patient was lost to follow-up. In all the patients the flap was viable, however in 3 patients necrosis of the tip of NLF was seen. In 4 patients there was infection and wound dehiscence who required extended antibiotic coverage and repeated dressings and in 1 patient an oro-cutaneous fistula developed in the donor site which needed a secondary minor surgical procedure for closure.

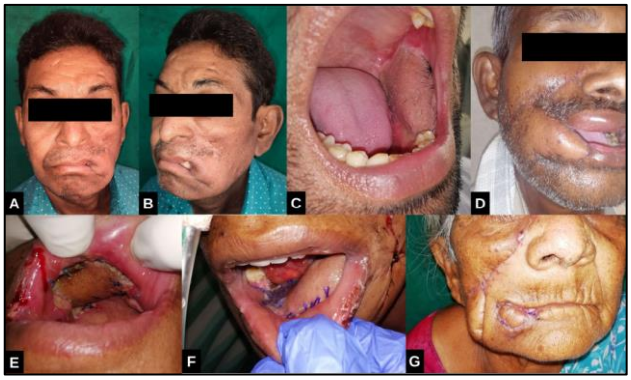

Figure 2: Clinical photographs showing versatility of NLF: NLF used in reconstruction of A, B) Buccal mucosa and commissure; C) Only buccal mucosa; D) only lower lip; E) Hard palate; F) Anterior floor of mouth; G) Buccal mucosa and lower lip.

Donor site scar when evaluated at 6 months post op was mild to moderate in 26/28 patients however 2 of our patients had severe wound contracture and one of the, developed ectropion also. Both these patients had undergone adjuvant radiotherapy. Cosmetic and functional outcomes were good in all our patients, however 2/28 patients developed post-operative trismus. Growth of hair in the NLF was seen in 16/28 patients and they were all males. Bulky appearance of the flap was noted in 4/28 patients. None of our patients had any recurrence in the flaps used for reconstruction (Table 1).

DISCUSSION

The nasolabial flap has its first mention by Sushruta in 600 BC.[7] It was originally described by Dupuytren and popularised by Diffenbach in 1833.[8] In 1868 Thiersch used a superiorly based NLF tunnelled through cheek to reconstruct a palatal fistula and Esser designed the inferiorly based NLF.[8-10] Wallace in 1966 devised the first de-epithelised NLF for one-stage reconstruction of the palatal defect.[11] Later in 1981, Rose designed the arterialised island flap in order to avoid the bulk of the de-epithelised pedicle in the tunnel and to provide more mobility.[11]

The nasolabial flap is a versatile and useful flap for oro-facial reconstruction.[12] The flap has a very high survival rate because of its excellent blood supply. The blood supply of the NLF is mainly by the facial artery and its branches; the base of the inferiorly based NLF is supplied by the inferior labial artery along with a rich anastomosis between the facial vessels and the deep perforators of the infra-orbital and transverse facial vessels. However, there are evidences in the literature where even after the artery was ligated, the viability of the flap has not been affected.[2,13,14] This may be because of the rich subdermal plexus supplying the skin of the flap. This flap has proved its worth for reconstruction of small to intermediate defects of the oral cavity.

This study, like many others done previously revealed minimal difficulty in speech, mastication and deglutition post-operatively.[15-17] The competence of the lips were satisfactory for all the patients and none of our patients developed post-operative microstomia (Figure 2D, 2G). However, two of our patients developed post-operative trismus. In both the cases the mouth opening reduced post adjuvant radiotherapy. Another common finding for both these patients were that they had bilateral oral submucous fibrosis and had undergone fibrotomy and simultaneous reconstruction with buccal fat pad and artificial collagen membrane. There might be a possibility of excessive post operative scarring in these patients pertaining to the pre-existing submucous fibrosis which got even worsened post radiotherapy.

In this study there were 9 cases where the nasolabial flap was used to reconstruct the lower lip. In 7 of them it was done by rotating the NLF extra-orally by raising the flap inferiorly beyond the oral commissure. This procedure however, was single staged as no buccal tunnelling was done (Figure 2D). In all these cases we dissected and saved the facial artery during neck dissection (Figure 1C). Compared to other options of reconstruction, the advantages of NLF in reconstructing the lower lip is that oral competence is preserved, microstomia is avoided and the use of the other lip in reconstruction can be avoided giving a cosmetically pleasing result.

When NLF was used to reconstruct the hard palate area, it did not hamper the functions of swallowing and speech (no nasal tone in the voice) and formed a viable barrier between oral and nasal cavities (Figure 2E). However, it only replaces the soft tissue lost and does not replace the alveolus ridge which was resected. In such cases alveolar bone grafting and vestibuloplasties are to be considered at a later stage if the patient wishes for prosthetic replacement of the teeth.[3] One of the disadvantages of NLF reconstruction is the need for a second stage for flap division, where a buccal tunnelling is used for insetting of the flap. But as this procedure is a minor one, it can be done under local anesthesia.[2,18] In our cases we had planned tumor ablation and reconstruction using NLF in the first stage while we did the neck dissection and flap division 3 weeks later in order to preserve the facial artery during uptake of the flap. 3 of our patients had necrosis of the tip of the flap that required prolonged dressing and debridement, but all the cases healed with conservative treatment only. There was one patient who had an oro-cutaneous fistula which had to be closed primarily under local anesthesia. 4/28 (14.28%) of our patients had post-operative infection which needed prolonged antibiotic coverage and meticulous dressings to be controlled. The post-operative wound infection complicating flap healing is 2.8% for facial surgery with local flaps accounting for even higher percentages (5-17%) and our study also had similar values.[2,13,19,20] As these flaps are de-sensate flaps, their use may interfere with normal sensory functions and afferent neurological controls that provide guidance to several functions like speech and swallowing. One of the main disadvantages of the NLF is encountered mainly in men when the flap is taken from a hair bearing area. In such cases there is growth of hair intra-orally post reconstruction, which might be of considerable discomfort to the patient, can produce gag reflex when used to reconstruct tongue and can make the maintenance of oral hygiene even more challenging for the patient, compromising the post-operative quality of life. In our study a total of 16 patients (57.14% of total patients) had this problem, all of them were males (88.89% of all male patients). These patients were kept on periodic follow up and intra-oral hair was trimmed from time to time. Another observation we had in our patients was that there was significant reduction in hair growth on the flaps post radio therapy; this observation has been appreciated by earlier studies also.[2] Reconstruction using NLF often results in the elimination of the naso-labial fold. Periosteal suspension sutures and

minimal eversion of the skin during closure of the donor site can prevent a flat cheek formation.[21] In one of our cases the patient had ectropion of the lower eyelid. This happens when the superior extent of the NLF is too close to the lower eyelid, placement of tight sutures near the medial canthus and due to severe scar contracture. A minimum of 5 to 10 mm gap should be left between the medial canthus and the apex of the flap in order to avoid this complication.[22] None of our cases had any recurrences. Pre-operative examination of CT scans (done within one month prior to surgery) has to be done to rule out proximity of the tumor to the area of harvest of the flap; this becomes even more important while dealing with patients with carcinoma of the buccal mucosa. Buccal mucosa has a peculiarity of having a large surface area, but comparatively lesser thickness, due to which any tumors of this site of the oral cavity can easily involve the extra oral skin or be in its proximity, ruling out the use of NLF for reconstruction. Thus, a thorough examination and a proper case selection plays a pivotal role in the success of NLF.

This study had a few short comings of being a retrospective, single centre analysis but from the outcomes noted we can infer that reconstruction with the NLF gives superior functional and aesthetic results and proves to be a reliable option for reconstructing oral defects due to tumor ablation that are too large for primary closure and too small for conventional musculo-cutaneous and micro vascular free tissue transfer.

CONCLUSION

The nasolabial flap proved to be a reliable flap with very low chances of flap failure due to its rich blood supply. It has minimal post-operative complications which can be easily and conservatively managed. For some cases, a 2nd surgery is required for flap division but as it is a minor surgery it can be done under local anesthesia also. If proper attention is given to flap designing, operative technique and post-operative management, the NLF is a viable and versatile option for reconstruction of small to intermediate defects of the oral cavity created post ablation of early tumors of the oral cavity.

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