



Outcome of Nasolabial Flap in the Reconstruction of Head and Neck Defects

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Abstract

Nasolabial flaps have been recognized as versatile flaps for a variety of defects in the face, nose, lip and the oral cavity and intraoral defects created after the excision of benign and malignant tumours. Nasolabial flaps have been utilized for covering small-to-medium size defects and usually require a second-stage procedure to divide the flap. To study the outcome of nasolabial flap in the reconstruction of head and neck defects. A prospective analysis of 25 cases was done. Of this, 24 cases were oral cancers, and one case was post-traumatic left ala loss. Oral cancers from stage I to IVa were treated with primary wide local excision, nasolabial flap reconstruction and neck dissection. Of this, 3 cases underwent bilateral nasolabial flap reconstruction. Flap release was done as a second-stage procedure after 3 weeks. Good cosmetic and functional results were obtained in almost all cases. Flap tip necrosis was noted in 2 cases, ectropion in 1 case, orocutaneous fistula in 1 case and disease recurrence in 2 cases. Pedicled nasolabial flap is a reliable flap for the reconstruction of small- and medium-sized defects in the oral cavity after excision of primary tumours and results in good overall cosmetic and functional outcome.

Keywords Nasolabial flap · Local head and neck flaps · Reconstructive techniques

Introduction

Most cancerous tumours of the head and neck cannot be adequately treated without surgical excision. Although tumour extirpation often results in better disease control and prolonged survival, patients may be left with devastating functional and cosmetic defects. Traumatic facial injuries can be similarly disfiguring and may also limit speaking and swallowing function. In the last century, the aim of reconstructive techniques in the head and neck has evolved from the mere filling of a defect to the reestablishment of the patient's original appearance and function. Although the goal of modern surgical reconstruction is to obtain normal oromotor and other facial functions, as well as a personally and socially acceptable cosmetic result, the complex anatomy of the face and mouth presents unique technical challenges [1].

Head and neck defects may be caused by many etiologies like benign and malignant lesions, traumatic injuries and infections like osteomyelitis. Head and neck cancer resection leads to complex defects that are difficult to reconstruct. In addition to the anatomical defect, the functional loss, cosmetic disfigurement and the accompanying psychosocial effects can be devastating to the patient [2].

The various reconstructive options range from simple primary closure, skin grafts, locoregional flaps and pedicled flaps to more complex microvascular free flaps. Microvascular free flaps are the standard of care in the reconstruction of these complex composite resection defects. Microvascular free flap needs a significant surgical expertise, increases the operative time, makes hospital stay longer and consequently increases the cost of the overall treatment.

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.

Pectoralis major myocutaneous flap is rather a bulky flap that makes it difficult to insert inside the defect and adds an extra soft tissue bulk in the neck. It cannot be used for small-to-medium-size intraoral surgical defects [3].

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Nasolabial flap is technically a simple flap to harvest and provides pliable skin for small-to-medium-size intraoral defects and facial defects. In such cases, nasolabial flap is an ideal reconstructive option. The use of nasolabial flaps facilitates a fast and simple procedure, coupled with a very high success rate [4].

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. 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 of the flap. The donor site can be closed primarily due to soft elastic nature of facial skin, and the scar is barely visible over a period of time [5].

Materials and Methods

Twenty-five cases in Oncosurgery wards of the Karnataka Institute of Medical Sciences, Hubli, were included in the study during the period from December 2016 to December 2017. Out of the 25 cases, 21 patients had oral cancer; of them, 3 underwent bilateral nasolabial flap reconstruction. One case was post-traumatic left ala loss.

Demographic data, including age, sex, tobacco and alcohol use; prior treatment; tumour site and stage; and any adjuvant treatment received were collected.

Surgical information including defect location, size of defect, flap size, time to harvest the flap and levels of neck dissection were noted. Success of flap reconstruction and complications was also noted. Follow-up was every 2 weeks for 2 months, then monthly, for a period of 6 months.

Surgical Technique

Pre-operatively, broad spectrum antibiotic coverage was given. Under general anaesthesia, first neck dissection was done depending on the level of neck nodes followed by wide local excision of primary tumour. Tooth extraction done on corresponding side for tongue and floor of mouth defects. A fusiform-shaped flap is marked, ensuring that the medial border of the flap is on the nasofacial groove on the same side of the defect. Flap dimensions were determined based on the size and location of defect. Average flap dimensions are 2.5 cm in width and 6 cm in length. The superior border of the flap is inferior 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 was placed at the superior border of the mandible. The skin incision is carried through the dermis and subcutaneous fat to the level of the underlying musculature. The artery lies in a plane deep to the facial 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 superior labial artery may require ligation. Thus, a musculocutaneous flap is developed, pedicled on the facial artery. The flap is then tunnelled through the buccal space and repositioned over the intraoral defect; the same suture process was done to the defect using 4-0 PDS. The donor site is irrigated with povidone iodine solution and normal saline. Donor site closure was done in layers with 4-0 Vicryl providing deep dermal closure and 4-0 Ethilon 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. Flap release is done as a second-stage procedure after 3 weeks.

Results

In the study, patients were in the age group of 30–80 years, majority between 50 and 60 years. Of the 25 cases, 20 were males and 5 were females. Twenty-four cases were oral cancers, and one case was post-traumatic left ala loss. Of the 24 cases of oral cancer, 18 patients underwent unilateral nasolabial flap reconstruction and 3 patients underwent bilateral nasolabial flap reconstruction; thus, in total, there are 25 cases. For 2 cases, location of defect was in floor of mouth; for 8 cases, lesion was in the lower lip, 9 cases had tongue lesion, buccal mucosa lesion in 5 cases and 1 case had ala defect. One case was stage I disease, 8 cases were stage II disease, another 8 cases were stage III disease and 7 cases were stage IVa.

In the study, the smallest defect size reconstructed with unilateral nasolabial flap was one × 0.5 cm, which was a case of post-traumatic left ala loss, and the flap size harvested for reconstruction was two × one cm; thus, the smallest flap size was used in the study. Among oral cancers, the smallest defect size reconstructed with unilateral nasolabial flap was three × one cm for a case of malignancy floor of mouth. The same was reconstructed with a flap size of five × two cm. The same flap size was used to reconstruct a defect size of three × two cm located in the tongue, lower lip, buccal mucosa and floor of mouth and also a defect size of four × two cm located in buccal mucosa. The largest defect size reconstructed with unilateral nasolabial flap was a defect of five × two cm located in right lateral aspect of the tongue following right hemiglossectomy and was closed with a nasolabial flap of size seven × three cm. Three patients underwent bilateral nasolabial flap reconstruction and all were malignancy lower lip. The smallest defect size reconstructed was five × two cm

with a bilateral flap of size five × one cm each. The largest defect size reconstructed was six × four cm with a bilateral flap of size five × two cm each.

Flap viability and functional outcome were good for all cases irrespective of size and location of the defect and the size of flap harvested for reconstruction. In malignancy tongue, after reconstruction, functions like swallowing and speech were fairly maintained. In all lip reconstruction cases, oral competence was maintained.

Follow-up was done every 2 weeks for 2 months, then monthly, for a period of 6 months, and various complications assessed were donor-site infection, bleeding, wound dehiscence, scar, ectropion, orocutaneous fistula, flap necrosis and transfer of beard in male patients.

Of the 25 cases, 2 cases developed flap tip necrosis by 15 days post-operatively. It was managed conservatively with regular cleaning and intravenous antibiotics. One case developed ectropion and another case developed orocutaneous fistula; both were managed conservatively. Two patients had transient hair growth at the reconstructed site which resolved by itself with post-operative radiotherapy. For the remaining cases, no complications were noted during the entire follow-up period of 6 months. Recurrence was noted in 2 cases at the same site of previous lesion even though histopathology report came as margin free of tumour cells for both cases (Figs. 1, 2, 3, and 4).

Discussion

Even relatively small defects of the oral cavity and face often require reconstruction to avoid anatomic distortion and subsequent limitation of function. This is especially important in reconstruction of combined defects of the anterolateral tongue and floor of mouth. Although simple to perform, split-thickness graft reconstruction of these defects or the use of a single cutaneous paddle from a microvascular-free tissue transfer frequently will not provide optimal functional restoration after oncologic resection. Skin graft can undergo contraction and abnormal pigmentation, and there is higher risk of



Fig. 1 Carcinoma tongue—T3N0M0 (stage III)



Fig. 2 Post-op flap in situ

graft rejection. Microvascular free flap needs a significant surgical expertise, increases the operative time, makes hospital stay longer and consequently increases cost of the overall treatment.

The nasolabial flap is widely used in oral and facial reconstruction, due to its accessibility, reliability and lesser operative time and because it is easy to master.

Pectoralis major myocutaneous flap is rather a bulky flap that makes it difficult to insert inside the defect and adds an



Fig. 3 Pre-op lesion: malignancy right buccal mucosa—T1N0M0 (stage I)



Fig. 4 Post-op flap in situ

extra soft tissue bulk in the neck. It cannot be used for small-to-medium-size intraoral surgical defects.

In a study by Rodriguez et al., between 2004 and 2012, out of 15 patients, 9 were male and 6 were female, with a mean age of 73 years (range 60–85 years) [4]. In the present study, patients were in the age group of 30–80 years. Of this, majority of the patients belonged to the age group of 51–80 years, almost similar to the reference study. Mean age in our study was 56.48 years. Twenty were male and 5 were female, i.e. majority of the patients are male like that of the reference study.

Use of nasolabial flap is well-known for reconstruction of nasal, cheek, lower eyelid, tongue and buccal mucosa, floor of mouth, maxillary gingiva and lip defects. In a study by Singh et al., 26 patients with oral cancer underwent reconstruction of oral defects using nasolabial flaps. The site of the primary tumour was the buccal mucosa in 11 patients, the tongue in four patients, the lip with commissure involvement in seven patients and the lower alveolus in four patients; 5 cases had buccal mucosa lesion, and 1 case had ala defect [3]. In the present study, the most common site of lesion was the tongue followed by the lower lip. For 2 cases, location of defect was in floor of mouth; 8 cases had lesion in the lower lip, 9 cases had tongue lesion, 5 cases had buccal mucosa lesion and 1 case had ala defect.

The nasolabial flap has traditionally been described as an axial flap that depends on the angular, infraorbital, transverse facial and dorsal nasal arteries of the face. However, the vast number of anastomoses and the rich subdermal vascular plexus also mean that it can be utilized as a random skin flap. In the

present study, in all 25 cases, axial nasolabial flap was harvested and facial artery was preserved during neck dissection in all cases. So flap viability was good in all cases.

It is possible to create flaps based on a medial or lateral pedicle; an inferior pedicle, useful in the reconstruction of labial and oral cavity defects; or based on a superior pedicle, useful for defects affecting the tip or ala of the nose, cheek or lower eyelids. In a study by Lakawale et al., in 2016, 18 consecutive cases of oral cavity cancer underwent flap reconstruction with inferiorly based nasolabial flaps without any donor-site morbidity except a scar [2]. In our study also, inferiorly based flap was used for reconstruction in all cases.

The versatility of the nasolabial flap in the reconstruction of oral cavity and facial defects is widely known and accepted. It is capable of providing sufficient tissue to adequately reconstruct small- or medium-sized defects with the option of performing a bilateral procedure when the defect is deemed to be substantial. In a study by Continho et al., the largest defects that required reconstructions with bilateral nasolabial flaps, though the tumours were small to medium in size, had never exceeded 5 cm in diameter. A unilateral flap can cover a defect of around 3 cm, whilst a bilateral one can cover defects of up to 5–7 cm in length [5]. In the present study, the largest defect size reconstructed with unilateral nasolabial flap was a defect of 5 × 2 cm located in right lateral aspect of the tongue following right hemiglossectomy and was closed with nasolabial flap of size 7 × 3 cm.

In the study, 3 patients underwent bilateral nasolabial flap reconstruction, and all were malignancy lower lip. The largest defect size reconstructed was 6 × 4 cm with a bilateral flap of size 5 × 2 cm each.

Lazaridis et al. describe a study in which 9 patients underwent single-stage surgical interventions for the reconstruction of intraoral defects with nasolabial flaps, four of them involving a superior pedicle. In addition to a good aesthetic outcome, the incidence of postsurgical trismus is reduced due to the proximity of the donor region during the reconstruction, enabling a primary closure with little tension [6]. Patients with comorbidities can benefit from reconstructions utilizing this local flap and avoid the longer surgical times involved in microvascularized flaps. In a single-stage intervention, it is preferred to de-epithelialize the base of the flap, bringing about the primary closure of the donor region and omitting the need for a second intervention, thus avoiding further surgery, its associated cost and greater morbidity for the patient. It is possible to perform this reconstruction with a nasolabial flap as a two-stage surgical intervention. The procedure is similar to that of the single-stage intervention described, but after tunnelling the pedicle and suturing it intraorally, a further 1 to 3 weeks must elapse before the pedicle can then be dissected.

El-Marakby et al. in 2012, in a series of 20 patients undergoing single-stage nasolabial flap reconstructions, also reported a 100% survival rate [7]. The study by Varghese et al. in 2001,

with 224 patients, represents the longest series (meta-analysis) of nasolabial flaps with intraoral reconstructions carried out as a two-stage surgical intervention. They reported a partial necrosis rate of 5.5% and a complete one of 6.3%. In the present study, two-stage surgical intervention was done for all patients and flap was released from its pedicle after a period of 3 weeks [8].

In two-stage surgical intervention, in edentulous patients, to block the bite to prevent the pedicle from being damaged, tooth extraction of the ipsilateral canine and premolar regions has to be done. However, this technique is ideal for subjects who are edentulous in the ipsilateral canine and premolar regions.

In most of our patients, the aesthetic and functional outcomes were very good. The presence of intraoral hair among males disappeared with postsurgical radiotherapy treatment. The aesthetic repercussions are minimal, and the functions of phonation, deglutition and mastication are preserved in a satisfactory manner.

Generally speaking, the complication rate is low. In a study by Singh et al., between 2006 and 2010, 26 patients with oral cancer underwent reconstruction of oral defects using nasolabial flaps. Three patients developed wound dehiscence and one developed a leak (an orocutaneous fistula). Apart from these, one patient developed wound infection requiring prolonged nasogastric feeding and antibiotic administration. Only one patient of the 26 developed recurrence. The final outcome was good in all cases, except for one patient, who developed recurrence and one patient, who developed an orocutaneous fistula that required secondary closure [3]. In our series of 25 nasolabial flaps, 4 suffered from complications but all of them were resolved with medical treatment. The complications observed were flap tip necrosis in 2 patients, ectropion in 1 patient and orocutaneous fistula in 1 patient. Two patients had recurrence in the same site. This represents a 100% survival rate, which is comparable to the results published from other series.

Conclusion

The nasolabial flap proves highly versatile in oral cavity and facial reconstructions. The nasolabial flap is a simple, effective and safe flap with a low complication rate. Nasolabial flap is associated with good aesthetic and functional results. It is easy to carry out and has a high success rate, making it the ideal surgical option for small-to-medium intraoral defects. As even small defects require reconstruction, the nasolabial flap has proven to be a useful and reliable alternative without causing much morbidity to the donor site.

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