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Review of Nasolabial Island Flap as a Useful Option for Reconstruction of Intraoral Defects in Patients with Buccal Mucosa Carcinoma

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Oral carcinoma patients who have undergone tumor excision need tissue reconstruction. Literature reports of Nasolabial flaps as being one of the ways for such reconstruction. The Nasolabial Island flap surgery is known to be a simple, yet efficient method with a very reliable blood supply. Therefore, its advantage over some of the routine conventional techniques needs to be highlighted. A search was done in PubMed and other search engines, keywords were used for collecting information about research articles which cited Nasolabial flap usage for intra oral cavity reconstructive purposes for residual defects occurring after tumor resection in patients suffering from buccal mucosa carcinoma. The type of Patient selected, their details, flap surgery procedure details, reconstructed area , donor area and the surgical outcome in the relevant articles was noted. After the surgery good functional outcome was seen especially for swallowing, talking and tongue movement and reported in all articles. Patients were reported to be satisfied with the cosmetic appearance postoperatively. Nasolabial Island flap provides a practical and feasible option for buccal mucosa defects if they are smaller or moderate in size in early stages of cancers of the oral cavity. Nasolabial flap approach has been used since long in literature for repairing

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mucosal defects. Now with advances made in microsurgery, this technique has been modified into various types to cover a wide range of defects especially mild and moderate defects. Being relatively easier ,associated with fewer complications ,less time consuming ,it can be recommended for comorbid patients of buccal mucosa malignancy in the early stage who are unable to undergo long duration complex surgeries. It is also suitable for economically backward population of India as it is less costly.

Keywords: Island Nasolabial flap; reconstruction; Buccal carcinoma; early stage; functional outcome.

1. INTRODUCTION

Oral malignancy is one of the common malignancies seen in developing countries [1]. Gingiva of mandible and buccal mucosa cavity are the affected sites. Amongst the neoplasms of oral cavity twenty percent are of buccal mucous and trigone cancers. Worldwide cancer of the oral cavity stands at sixth position. In India buccal carcinoma is common and excessive consumption of tobacco is a major contributory factor, large number of cases present at an advanced stage. Incidence of buccal mucosa carcinoma has increased tremendously which is largely due to important risk factors like smoking, alcohol and betel nut consumption. Their course is aggressive and recurrence very frequently occurs. The cancer grows rapidly and is associated with a high recurrence rate. Treatment mainly comprises of surgical removal of the primary tumor and the involved lymph node. Radiation and chemotherapeutic drugs are an additional line of treatment. When a tumor of buccal mucosa is removed, a defect which includes a number of layers of the buccal cavity occurs, less frequently all layers along with skin are included. After oncologic resection it is necessary to have proper functional and aesthetic results. The patient usually has some residual functional defect in the oral cavity mucosa post surgery which may manifest mainly in the form of intraoperative infection, wound site defect, disfigurement etc. This affects function and appearance. Late diagnosis in the advanced stage has an effect on survival and morbidity.

When the cancer has spread to the nearby anatomical structures like jaws, muscles of mastication and cheek then reconstruction according to the extent of part which has been resected has to be considered. Considering all these points all efforts should be made to reconstruct the post resection defect so that ability to swallow, speak, cosmetic appearance are satisfactorily restored. Clearcut recommendation for most suitable choice of technique for reconstruction is not mentioned in literature for replacing buccal mucosa defects. But correction of surgical defects is now possible due to availability of multitude options provided by advances in the field of reconstructive surgery. It has evolved since the past two decades. Technology advancement has tremendously helped in resection and reconstruction plan. Currently there is a shift in approach towards establishing proper function and looks along with a reliability in closing of the wound so that internal essential structures are protected. When there is proper rehabilitation and near normal life quality it indicates an adequate reconstruction. If process is not widely invasive, shorter, brings about pre surgery functions and appearance then the reconstruction is satisfactory. Smaller defects of the oral cavity are reconstructed by natural closure, secondary healing by epithelialization or use of skin grafts. But it may lead to complications like infection and dehiscence of the wound [2]. Free flaps have superior outcomes in terms of functional rehabilitation and aesthetic appearance [3]. A popular trend is reconstructing by microvascular approach, but it is costly, requires more time and superior surgical skills. Amongst the other methods one such technique is the Nasolabial flap cover for replacing the lost oral mucosa. Skin tissue lateral to nasolabial fold is used for reconstructing buccal cavity and face. Low socioeconomic strata patients have limited financial resources and no health insurance, they usually cannot afford free flap surgery due to its cost which are higher due to pre operative evaluation costs. Nasolabial flaps offer excellent solution to circumvent problems associated with free flaps. Similarly for post surgical small defects, nasolabial flap is a robust flap and has rich vascular anastomosis. Since it withstands radiotherapy and lies beyond radiotherapy portals [4], it has excellent vascularity. The objective of this study was to review the literature for assessing the practical utility of Islanded Nasolabial flap in soft tissue reconstruction for intra oral defects in patients with Buccal mucosa carcinoma.

2. METHODOLOGY

Type of study—Narrative review.

Population— Patients diagnosed on histopathological findings with initial stages of oral malignancy and undergone resection of primary tumor. Patients had mild or moderate defects after resection.

Type of intervention --- Island nasolabial flap surgery for reconstruction of buccal mucosa.

Risk factor—Advanced cases of oral malignancy and major post surgical defects.

Outcome studied – Mouth opening, tongue mobility, deglutition, speech, cosmetic satisfaction.

Data base – Electronic database- Articles from PubMed, Google Scholar Cross references.

Data extraction –Details of study included number of participants, Flap design used, Comparison with traditional free flaps, outcomes reported and conclusion drawn.

Table 1. Comparative study

S. no.	Study ID/Country	Details of participants	Intervention /risk factor	Comparison	Outcome	Conclusion
1	India	No.10	Single stage Island nasolabial flap surgery	Faster reliable, cost effective	Good functional outcome-Swallowing, speech, tongue mobility	Single stage, faster, reliable option for small defects [5]
2	India	No.26 Gender-22 male,4 females	Island nasolabial flap surgery	Versatile Patient compliance better	good cosmetic and functional results. 3-wound dehiscence, 1- orocutaneous fistula	Versatile for small/medium defects. No morbidity to donor site [6]
3	India	No.16 Age- 65 yrs. Gender-13 male,3-female	Island nasolabial flap surgery	Faster, technical expertise required is lesser	None of the flaps lost, 26% minor complications.	Proximity to donor site, rapidity and minimal expertise [7]
4	Texas	No. 18	Island nasolabial flap surgery	Patient satisfaction better	No wound dehiscence, necrosis, infection.	For intermediate size defects. Adjunctive with free flap transfer in large defects [4]

3. DISCUSSION

This study was designed to review the literature on use of Nasolabial islanded flap surgery in soft tissue reconstruction following tumor resection in patients of buccal mucosa carcinoma . Data was searched for significance of these flaps for closing defects which are medium to large to see the results regarding functions and quality of life in postoperative period. Studies highlighted on surgical technique used, how long the surgery lasted, patients stay at hospital, complications in the flap that were transplanted, site from where the flap was transplanted and its condition.

After surgical resection of the tumor proper reconstruction is necessary to reduce functional and ethical issues. There are three types of buccal mucus defect sizes – small, medium, large with dimensions of 3 cm, 3-6 cm and more than 6 cm respectively. Since Orofacial reconstruction has entered a phase of sophistication, therefore repair of defects of all types and sizes has become possible [8]. When choosing the appropriate reconstruction the patient's ability to perform routine tasks and his overall quality of leading a normal life serve as relevant criteria.

Available reconstruction procedures are for small defects in the mucous membrane with the help of local flap or by leaving it raw, large defects are reconstructed with the help of free flaps or flaps that are pedicled. Defects in skin are treated by local flaps or free flaps.

Local tissue can be used to close small defects, medium defects need regional or free flaps. Buccal fat pad and platysma for replacing in case of medium defect and artery or fascial flap to conceal large size of defects are used. Different flaps that can be used for defects are free flaps from radial forearm, pectoralis, latissimus.

Some of the measures are myocutaneous flaps and tissue transfer with micro vessel blood supply. Not every patient can tolerate these due to his age or medical condition due to which surgery and anesthesia are contraindicated [8]. Similarly the defect maybe too small for a long complex surgical procedure [8]. Failure rate is of 5-10%, complications like Acute respiratory distress syndrome and pulmonary embolism. It may not be available at many centers [6]. Presence of scar, connective tissue and epithelial lining of skin which closes the mucosal defect all these affect mouth opening. As mouth opening is affected so preserving it indicates good functional results.

Considering the above mentioned drawbacks, it was found through the literature search that the Nasolabial flap has many advantages and is reliable. It is suitable for defects which may be large enough hence primary closure of the wound may not occur or small for traditional myocutaneous and micro vascular flaps [9].

Nasolabial flap is an old technique to replace oro facial soft tissue defect. The flap is taken from the skin that extends from the medial canthus of the eye to the lower margin of the mandible [10]. It comprises of skin, underlying dermis, epidermis and muscle. There is an abundant blood supply to this region by a widespread plexus present sub dermally. The supply is from mainly facial and its transverse branch. The flap based inferiorly is supplied by facial artery and the one based superiorly is supplied by transverse facial artery [11,12].

Inferiorly placed flap is for reconstruction in floor of mouth, tongue, cheek, whereas the superiorly based flap is for nose tip, nasal ala, lower eyelids. The flap based inferiorly has its apex aligning with commissure of oral cavity and superiorly based has its apex located laterally to the medial canthus of eye.

Previously, the nasolabial flap has been used in nasal, facial skin and oral cavity defects, occurring after tumor removal . Defect sizes are in the range of two to four cm for small defects and four to six cm for moderate defects [8,9,13].

Pic. 1. Harvesting island nasolabial flap

Pic. 2. Nasolabial flap inserted into buccal mucosa through cheek

Pic. 3. Final appearance after donor side closure

Today the modified Nasolabial islanded flap (NLF) has become a preferable option after oral cavity cancer resection for defects which are small or medium sized [9,13].

On review it was found that the primary indication for selecting Nasolabial flap in a developing country is resource constraints [5]. Studies also reported of other indications namely time tested option in basic tertiary setting ,medically compromised patients, free flap salvage surgery [6]. It is preferable in older patients and those with underlying medical conditions and for reconstruction in vessel depleted neck [9,13]. Ease of surgery and inconspicuous scar are reported [11].

Studies have pointed towards the flap's viability because of a rich subdermal plexus supplying the skin of the flap. A robust blood supply helps to ensure flap viability and prevents flap breakdown and fistula formation even in adverse conditions of excess tension [14].

Modified nasolabial flap is a versatile flap which has robust vascularity and can be successfully used with minimal complications. Nasolabial flap withstands radiotherapy [6].

Research indicates adequate restorative function of this flap. For limited defects following tumor resection in the buccal mucosa of floor of the mouth, nasolabial flaps show good functional and esthetic results [4,15,16]. Speech remains unaffected [12,13], there is minimal morbidity of donor site [12,13]. None of the studies reported of patient complaint regarding cosmetic appearance [9]. Pronouncing , chewing problems were not encountered.

Rokonuzzaman et al recommended this flap for comorbid patients unable to undergo lengthy surgical procedure as it is relatively safer and faster [17].

Similarly the procedure is not time-consuming or technically difficult [13].

Studies have confirmed that functional aspects like mouth opening, tongue mobility improved, deglutition was not altered, speech gradually returned to normal [8].

Flap loss was reported to be 5% [13], 7% [15].

Goyal et al. [5] used Island Nasolabial flaps which were inferiorly based for smaller and medium sized defects of mucosal soft tissue in ten patients of early stage oral cavity malignancy. The operated patients had good functional outcome in terms of deglutition, speech and tongue movements. Postoperative results in all patients were satisfactory. They concluded that for early stage oral malignancy patients, the modified based island nasolabial flaps based inferiorly option is economical and reliable. Being one staged technique, it is a safer and less time consuming option for smaller or moderate oral cavity defects. They suggested that it could be a feasible alternative for the rural set up of Indian population.

Chandraiah et al. [12] used nasolabial flap for reconstruction, the outcome in form of post operative viability, wound problems, infection, function, scar and recurrence was studied. The flap was found to be viable in all 28 patients ,cosmetic and functional outcome was good. Minor complications were encountered like trismus, wound contracture, ectropion, wound dehiscence, hair growth. According to them, Nasolabial flap is a versatile option in early tumors of oral cavity for small, intermediate defects [10]. Post-operatively little functional deficiency was seen .It was preferred to pectoralis major myocutaneous flap and radial forearm free flap [12].

Bhambar et al. [7] reported no loss of the flaps, 26% of the patients had complications which were conservatively managed. They concluded that inferiorly based flaps were versatile and reliable for older patients for oral floor defects. Flap was helpful for **small** defects, free flap was unsuitable in comorbid, older patients as it involved lengthy surgical and anesthetic procedure and required expertise. Seema Singh et al. [6] studied 26 cases of oral malignancy treated with primary excision and nasolabial flap reconstruction which gave good results. They concluded that the nasolabial flap procedure was simple, fast with minimum donor defect and complication. Rich vascular anastomosis is ideal for reconstruction of anterior floor of mouth. Some of the disadvantages were that some cases required second stage procedure, cheek biting, problem in wearing dentures due to bulky flap, smoking associated with flap failure and hematoma. Barring one patient with oro cutaneous fistula and one with recurrence, results were good in all the patients. Eckardt et al. [15-20] concluded that in comparison to pedicled, free flaps the Nasolabial flap was a convenient alternative, suitable for older medically compromised patients, resulted in tensionless wound closure and restored oral function.

4. CONCLUSION

The study has highlighted results of various researchers through this review and it is concluded that nasolabial flap offers donor site proximity, simplicity, rapidity, minimal morbidity of donor site and better patient compliance which are advantageous especially for small and moderate defects. The islanded NLF is a better option. Now is the phase of minimally invasive surgery with limited blood loss and although free flaps are preferred by reconstructive surgeons, there are certain technical and financial constraints for performing such surgeries in developing countries especially for the rural population . Therefore as reported by various researchers nasolabial flap is an excellent alternative to costlier free flap surgeries. It is recommended to have long term prospective studies to analyse the effects of this type of reconstruction. Larger number of case series are needed to confirm the reliability and effectiveness of the nasolabial flap in restoration of small or moderate defects. Exclusive studies done in developing countries would provide more information. Further research for comparing results in replacing medium and large defects with regional free flaps will be helpful. A comparative analysis on different alternatives for reconstructive purposes with respect to function, structural component, site and size is suggested to provide simpler and better option to the patient associated with less morbidity. Advances including use of technological breakthroughs and feasible outcomes should be studied.

CONSENT AND ETHICAL APPROVAL

As per university standard guideline, participant consent and ethical approval have been collected and preserved by the authors

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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