

Complications in the use of bilateral inferiorly based nasolabial flaps for advanced oral submucous fibrosis

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ABSTRACT

Surgical management of advanced oral submucous fibrosis (OSMF) using bilateral inferiorly based nasolabial flaps is becoming increasingly popular. However no comprehensive analysis of delayed complications using this technique is available in the literature. The authors have conducted a retrospective study to examine the delayed complications of bilateral inferiorly based nasolabial flaps used in advanced oral submucous fibrosis at their institute along with a detailed review of literature on the subject. Thirty-two patients from January 2004 to December 2015 with OSMF and an interincisal distance less than 15 mm were included. All patients were treated with bilateral inferiorly based nasolabial flaps for correction of the restricted mouth opening. All patients had postoperative physiotherapy and were followed up for a minimum period of 6 months. All complaints of patients during the follow up phase were included in this study. In this series, complications such as partial necrosis, intra-oral hair growth, unacceptable extra-oral scar, wound dehiscence, oro-cutaneous fistula, and pincushioning effect were observed. Numerous complications can occur with the use of nasolabial flaps for the management of advanced oral submucous fibrosis. Although most complications are of inconsequential nature the surgeon must observe due diligence when using this flap.

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Key words: Complications, nasolabial flaps, oral submucous fibrosis

INTRODUCTION

Nasolabial flaps have been used in the reconstruction of defects created by surgical intervention for squamous cell carcinoma of tongue^[1-4] as well as for the reconstruction of various intraoral and extraoral defects.^[5,6,3,4,7] The use of nasolabial flaps has been documented for the management of defects in the anterior floor of mouth,^[6,3,4,8,9] and the maxillary and mandibular gingivae.^[5,2-4,10] The nasolabial flap has also

been used for the reconstruction of ala of nose, septum and columella, dorsum of nose,^[2,4,11] buccal mucosa,^[5,8] and defects of the lip and commissure.^[2,4,8] Nasolabial flaps are being increasingly used to reconstruct the buccal mucosa after excision of bands^[1,12-15,5,2,16] in advanced oral submucous fibrosis (OSMF).

The nasolabial flap is typically classified as an axial pattern flap based on angular artery. The inferiorly based

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How to cite this article: Kshirsagar R, Mohite A, Gupta S, Patankar A, Sane V, Raut P. Complications in the use of bilateral inferiorly based nasolabial flaps for advanced oral submucous fibrosis. Natl J Maxillofac Surg 2016;7:115-21.

Access this article online	
Quick Response Code: 	Website: www.njms.in
	DOI: 10.4103/0975-5950.201358

nasolabial flap is a reliable, economical option for the management of advanced OSMF.^[12,13] Reconstruction of the defect following fibrotomy using nasolabial flap is fast becoming the universally accepted line of treatment for patients having interincisal opening (IIO) <15 mm.^[12,13,5]

Complications associated with inferiorly based nasolabial flaps for intraoral reconstruction have been not discussed in literature so far. In this article, we present our experiences with various complications, namely, minimal improvement in IIO, total and partial necrosis,^[1,15,4,8] intra-oral hair growth,^[12,14,15,5,2] unacceptable extraoral scar,^[12-15,6,2,8] wound dehiscence,^[2,4] loss of nasomaxillary crease,^[12,15] orocutaneous fistula,^[13,5,2-4] ectropion,^[6,2,3] and pincushioning effect around the nasolabial fold.^[15,5] Complications not observed in our series, namely, total flap necrosis, ectropion, damage to facial nerve branches, obstructive sialadenitis are also deliberated.

METHODS

Between January 2004 and December 2015, 32 cases diagnosed with advanced OSMF with IIO <15 mm reported to the Department of Oral and Maxillofacial Surgery, Bharati Vidyapeeth Deemed University, Dental College and Hospital, Pune. After histopathological confirmation of the condition, all patients underwent bilateral intraoral release of fibrous bands and reconstruction of the resultant defects with bilateral inferiorly based nasolabial flaps. The current study is a retrospective analysis of complications associated with these patients.

A total of 32 cases were available with suitable data including status on arrival, similar operative procedure, operative notes, and postoperative follow-up for a minimum of 6 months.

In addition to the evaluation of IIO, all records were evaluated for partial or total necrosis, flap loss, intraoral hair growth, unacceptable extraoral scar, wound dehiscence, upper lip weakness, loss of nasomaxillary crease, orocutaneous fistula, flap dehiscence, and pincushioning effect around the nasolabial fold.

Surgical procedure used in the current series

All the procedures were carried out under general anesthesia using awake nasotracheal intubation with flexible fiberoptic bronchoscopes. The intraoral incisions were made bilaterally to release the fibrous bands using electrocautery or knife along the buccal mucosa at the level of occlusal plane from anterior faucial pillars to 1 cm short of the oral commissure [Figure 1]. The collagen bands were incised up to the muscle layer. After the release of fibrotic bands, tapered defects of approximate



Figure 1: Intraoral defect

length 5.5 cm and a base of 2 cm were created. Using Fergusson's mouth gag forcible mouth opening was carried out. Interincisal distance was measured, and a bite block was placed. At this stage, intraoral bilateral coronoidectomy and removal of all third molars were performed.

The flap was outlined on cheek and raised with sufficient subcutaneous tissue and fat to ensure a good blood supply and adequate bulk, but remained superficial to facial muscles. The medial incision line followed the nasolabial fold on superior two-thirds and was placed 3–4 mm medial in inferior one-third. The base of flap was 1.5–2.5 cm wide. It has been observed in the previous studies that width greater than this makes rotation of flap difficult while narrower than this compromises the blood supply. The medial and lateral incision lines tapered superiorly, approximately 0.5–0.75 cm inferior to medial canthus. The inferior limit of the flap was at the level of oral commissure. The flap was raised from the superior to inferior in supramuscular plane using dissecting scissors. Whenever encountered the angular branch of the facial artery was tied off. The transbuccal tunnel was made in the region of the modiolus just medial to the pedicle. The cutaneous surface of the flap in the region of the modiolus was deepithelized to eliminate the need for pedicle division after 3 weeks. The flap was then transferred into the oral cavity in a tension free manner. Intraorally, the flap was sutured by placing interrupted resorbable sutures. Donor site was closed primarily in layers using 3-0 resorbable suture for deeper layer and 5-0 nonresorbable sutures Prolene/Ethilon for final skin closure.

Nasogastric feeding was carried out for 7 days postoperatively. Antibiotics, analgesics, and supportive medications were administered.

A mouth prop was placed in the mouth to maintain the interincisal distance for the first 48 h. The mouth was

covered with wet gauze to prevent dryness of mouth. The prop was removed intermittently, every 2 h for 15 min. IIO was measured daily for the first 7 days and physiotherapy was advised. Mouth opening exercises using Hiester’s mouth gag were taught to the patient and relatives. IIO was maintained over 35 mm for 7 days in all cases during immediate postoperative period.

Flap viability was checked using needle prick at the most distal tip of flap in the retromolar area after 24 and 72 h.

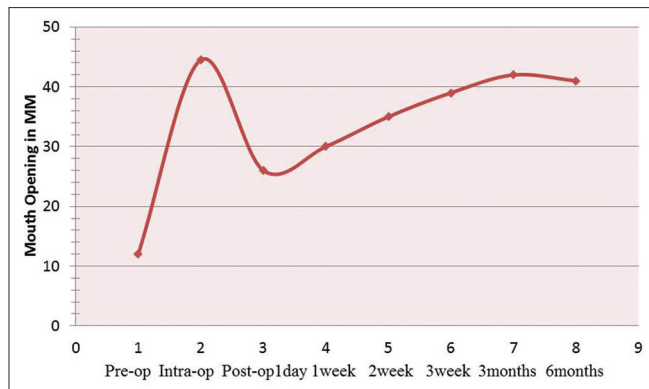
The success of the flap was determined 7 days after surgery by reassessment of vascularity, adaptability to underlying surface, and appropriate coverage of the raw surface following excision of bands and evaluation of scar. All sutures were removed between 5th and 10th postoperative day.

For this retrospective study, all cases fulfilling the criteria for the study were retrieved. Only cases which used the procedure as outlined above and patients who were followed up for a minimum of 6 months postoperatively were included in the study.

RESULTS

All patients showed satisfactory IIO at 6 months. Average IIO of the patients on arrival was 12 mm. After release of fibrotic bands and coronoidectomy, a mean forced intraoperative mouth opening of 44 mm was achieved. On the first postoperative day, a mean unforced mouth opening of 26 mm was achieved. Mean mouth opening of 41 mm was achieved at 6 months, with a mean increase of 29 mm [Graph 1].

In our series complications, such as partial necrosis, intraoral hair growth, unacceptable extraoral scar, wound dehiscence, loss of nasomaxillary crease, orocutaneous fistula, and pincushioning effect around the nasolabial fold were observed [Diagram 1 and Table 1]. In the



Graph 1: Mouthopening in graph

present series, complications such as total flap necrosis, wound dehiscence, ectropion were not observed.

Out of all 32 patients, two patients had partial flap necrosis, in which excision of the necrotic portion was done. It is pertinent to note that both these patients had undergone radiation for carcinoma of the tongue [Figure 2].

Intraoral hair growth was seen in two patients.

An unacceptable extraoral scar at the donor site was seen in 8 patients, i.e. 16 donor sites. Of these two of the patients underwent surgical intervention for scar correction, and six patients underwent nonsurgical local treatment [Figure 3].

Loss of nasomaxillary crease was seen in six patients. None of the patients sought correction for the same [Figure 4].

Orocutaneous fistulae occurred in two patients which were corrected surgically [Figure 5].

Pincushioning effect around the nasolabial fold was present in six patients. No surgical correction was performed for this complaint [Figure 6].

Table 1: Data of complications

Complication	Number of patients involved	Resolution
Insignificant improvement in IIO	0	-
Partial necrosis	2	Excision of necrotic portion
Total necrosis	0	-
Intraoral hair growth	2	No treatment
Unacceptable extraoral scar	8	2 cases scar revision 6 cases nonsurgical local treatment
Wound dehiscence	0	-
Loss of nasomaxillary crease	6	-
Orocutaneous fistula	2	Surgical correction
Ectropion	0	-
Pincushioning effect around the nasolabial fold	6	-

IIO: Interincisal opening

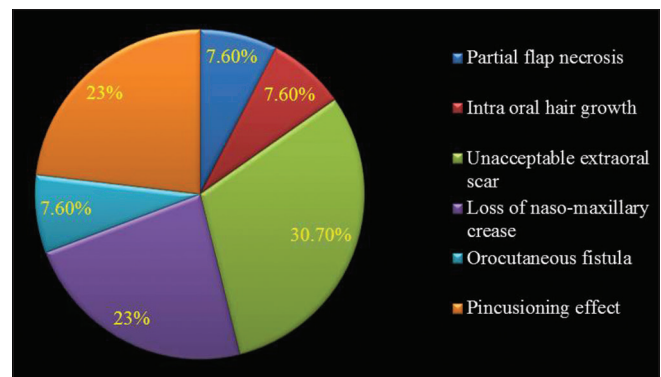


Diagram 1: Complications in nasolabial flap

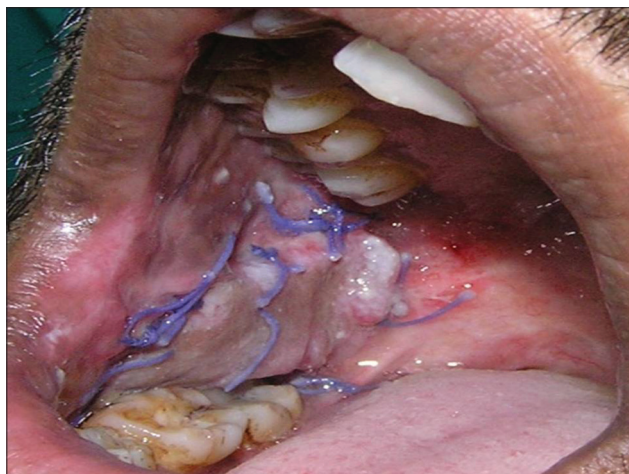


Figure 2: Partial flap necrosis



Figure 3: Extraoral scar



Figure 4: Loss of nasomaxillary crease

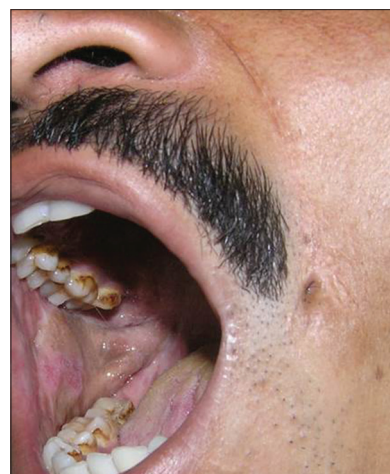


Figure 5: Orocutaneous fistula

DISCUSSION

Bilateral inferiorly based nasolabial flaps provide a pragmatic solution to advanced OSMF.^[1,12-14] Most commonly selected as a treatment modality in patients in whom the IIO is <15 mm, nasolabial flaps provide appropriate dimensions as well as easy intraoral transposition due to their proximity to the defect. Numerous case series including those comparing nasolabial flaps with other treatment options are well documented.^[15,24] However, complications related to the design, execution as well as inherent limitations of the flap are not extensively evaluated.

In addition to failure of the nasolabial flap to significantly improve the IIO^[13] in patients afflicted with advanced OSMF, complications such as partial necrosis,^[1,15,4,8] total necrosis,^[1,15,4,8] intraoral hair growth,^[12,14,15,5,2] unacceptable extraoral scar,^[12-15,6,2,8] wound dehiscence,^[2,4] loss of nasomaxillary crease,^[12,15] orocutaneous fistula,^[13,5,2-4] ectropion,^[6,2,3] and pincushioning effect around the

nasolabial fold^[15,5] may also occur. It is prudent to note that these complications occur in a significant proportion of operated patients but are eclipsed by the resultant increase in the IIO.

Inadequate improvement in IIO is mainly because of incomplete fibrotomy, inadequate dimensions of the flap, lack of temporalis myotomy or coronoidectomy, and lack of postoperative physiotherapy.^[13]

In our current series, all patients showed satisfactory IIO at 6 months. Average IIO of the patients at arrival was 12 mm. After release of fibrotic bands, a mean forced intraoperative mouth opening of 44 mm was achieved. On the first postoperative day, a mean unforced mouth opening of 26 mm was achieved. Mean mouth opening of 41 mm was achieved at 6 months, with a mean increase of 29 mm.

In a study conducted by Agarwal *et al.* in 2011, the mean increase in IIO after bilateral release of the fibrous bands was 24 mm (range 18–39 mm). The IIO improved from a



Figure 6: Pincushioning effect

mean range of 11 mm (3–19 mm) to 39 mm (23–48 mm) at the end of 6 months and persisted without relapse for 1 year.^[14]

Shah and Tauro conducted a study on 14 patients of submucous fibrosis with a mean mouth opening of 43.2 mm at 10 years postoperatively with a mean increase of 24.4 mm.^[2]

Naphade *et al.* reported a case of OSMF with initial interincisal mouth opening of 8 mm treated surgically with nasolabial flap technique. The patient could maintain mouth opening of 32 mm at the end of 18-month providing evidence of sustained increase in mouth opening by 24 mm.^[16]

Partial or total necrosis

Partial necrosis of the flap occurs when the flap is too long relative to the base.^[1] It has also been observed that strangulation of the base of the flap at the site of transbuccal transfer may cause venous congestion. In such cases, the necrosis occurs at the tip of the flap without vascular compromise of the remainder of the flap.^[15]

In our study, total necrosis did not occur in any case. We encountered two cases of partial necrosis which were treated merely by excision of the necrotic portion. The raw area healed uneventfully by secondary intention.

Mutimer and Poole in their study reported 12% partial necrosis in their 23 cases of intraoral reconstruction using the nasolabial flap.^[17]

Balaji conducted a study that involved 19 patients of advanced OSMF treated surgically by pedicled lingual ($n = 9$) and nasolabial flap ($n = 10$). On comparison of graft shrinkage, postoperative mouth opening need for secondary surgery, functional disfigurement, and

esthetic outcome of surgery, he concluded that the nasolabial flaps interpolated into the oral cavity provide an expedient solution to soft tissue deficit produced after excision of bands.^[18]

Varghese *et al.* published one of the largest series evaluating nasolabial flaps for oral reconstruction in 224 cases. They encountered total flap necrosis in 15 patients, whereas partial necrosis occurred in 13 patients.^[19]

Intraoral hair growth

In our study, two patients had a complication of intraoral hair growth. No active surgical treatment was rendered to either patient.

Shim conducted a series of 5 cases on the unusual indication for laser epilation for intraoral hair defect, in which he concluded that laser depilation of intraoral flaps with a long-pulsed alexandrite laser is effective and beneficial for correction of intraoral hair growth. Treatment alleviates oral discomfort improves the esthetic appearance and oral hygiene. The procedure is performed using fiberoptic instrumentation as an outpatient procedure.^[20]

Cunha-Gomes *et al.*, 12 patients underwent excision of severe buccal submucous fibrosis with reconstruction by inferiorly based nasolabial flaps to increase interincisal distance. Flap survival reported was 100%. All their patients had preoperative IIO of 15.5 mm or less. The average mouth opening at 3 months was 31.3 mm, and average follow-up period was 13.08 months. No reduction in mouth opening had been noted during that period.^[21]

Shah and Tauro conducted a study on 14 patients of submucous fibrosis reported three patients with intraoral hair growth managed by regular trimming. Epilation was carried out after 1.5 months.^[2]

Extraoral scar

The postoperative extraoral scar is usually well hidden in the nasolabial fold. The scars are more acceptable in older patients who have prominent nasolabial folds and laxity of the skin as compared to the younger patients.^[15] Flattening of the facial contour and the permanent facial scars become barely perceptible in older patients.^[2]

In our study, unacceptable extraoral scars at the donor site were seen in eight patients at a total of sixteen donor sites. Of these, two of the patients underwent surgical intervention for scar correction and six patients underwent nonsurgical local treatment. It is prudent to note that unacceptable scars occurred bilaterally in all eight patients. Not a single patient with unilaterally objectionable scar was observed.

Ioannides and Fossion reported the use of 59 inferiorly based nasolabial flaps in 43 patients over a period of 10 years, of which 2 flaps in 16 patients were reviewed. They utilized a two-stage procedure and noted a few complications such as dehiscence, loss of flap, unaesthetic extraoral scar, and bulky flap which were duly managed. Based on their experience, they concluded that the nasolabial flap is a good alternative for reconstruction of moderate defects of the floor of the mouth, especially in older patients in whom more tissue could be harvested owing to laxity of skin.^[22]

Shah and Tauro conducted a study on 14 patients of submucous fibrosis, they had three patients ($n = 14$) developed with hypertrophic scars and subsequently underwent revision and plastic closure.^[2]

Bande *et al.* conducted a study to compare nasolabial flap with that of platysma muscle flap and they recommend the use of the platysma muscle flap rather than the extended nasolabial flap for reconstruction of intraoral defects after release of OSMF as facial esthetics are not compromised.^[15]

Wound dehiscence

In our study, no case of wound dehiscence was encountered.

Singh *et al.* conducted a study on nasolabial flap reconstruction in oral cancer, in which three of 26 patients developed wound dehiscence requiring secondary closure.^[5]

Alonso-Rodríguez *et al.* conducted a study on versatility of nasolabial flaps in oral cavity reconstructions, in which they encountered two patients ($n = 15$) who developed wound dehiscence. These were resolved with minor surgical interventions and had no repercussions on survival of flap.^[3]

Shah and Tauro conducted a study on 14 patients of submucous fibrosis reported 4 cases of wound dehiscence at the modiolar region, where maximal tension was observed during closure. The cause for the dehiscence could be attributed to the excessive muscular forces exerted in that region during vigorous physiotherapy. This complication usually occurred in the 2nd to 3rd months and was managed with systemic antibiotics and local dressings until the defect healed secondarily. To minimize this complication, properly layered closure, especially at the modiolar region, is mandatory.^[2]

Lazaridis described the use of a single-stage unilateral subcutaneous pedicled nasolabial island flap, for reconstruction of defects of the anterior floor of mouth by raising the flap as "skin island" relying on the pedicle

of subcutaneous tissue. Nine flap procedures were performed on 9 patients for reconstruction of defects of the anterior floor of mouth. All flaps healed without evidence of infection, dehiscence, or necrosis and the flap provided improved functional integrity of the reconstructed area. The author concluded that this flap provides reliable coverage of small and intermediate-sized defects of the anterior floor of mouth when used alone, improving the tongue mobility, articulation, and deglutition.^[23]

Loss of nasomaxillary crease

In our study, total six patients exhibited loss of nasomaxillary crease. No patient sought correction of this condition.

Schmidt in his study of nasolabial flap said that loss of nasomaxillary crease can be corrected by a giving periosteal suture to recreate the crease.^[1]

Orocutaneous fistula

In our study, oro-cutaneous fistula occurred in two patients. Both patients underwent surgical correction under local anesthesia for the same.

Varghese *et al.*, in his series, of 224 cases reported three cases of persistent oro-cutaneous fistulae. These were managed by surgical closure under local anesthesia.^[19]

Singh *et al.* conducted a study on nasolabial flap reconstruction in oral cancer, in which out of 26 patients, one patient developed an oro-cutaneous fistula that required secondary closure.^[5]

Alonso-Rodríguez *et al.* conducted a study on versatility of nasolabial flaps in oral cavity reconstructions, in which they encountered one patient out of 15 who developed oro-cutaneous fistula which was resolved with minor surgical interventions and had no repercussions on the survival of the flap. Only one patient required their flap to be thinned.^[3]

Ectropion

No case of ectropion occurred in our study.

Eliasoph published an article on current techniques for correction of entropion and ectropion by giving "Snellen" suture technique. This is simply passing sutures through the lower fornix and out on the skin inferiorly. This is like inverting a trouser pocket that was pulled out. Using chromic suture material gives some fibrosis and a longer lasting result. Snellen sutures alone fail in many cases because the other anatomic changes have not been addressed. After a drop or two of anesthetic to the eye, a moistened cotton-tipped applicator or a muscle hook inserted inside the lid can show what "Snellen" sutures can be expected to accomplish.^[24]

El-Marakby *et al.* conducted a study, twenty patients subjected to single stage reconstruction with pedicled nasolabial flaps reconstruction for a variety of oral defects. There was one case of ectropion and that was due to extending the upper limit of the flap to the inner canthus.^[6]

Pincushioning effect around the nasolabial fold

Pincushioning effect is a complication of a transposition flap, in which the graft fails to adhere to the underline bed and bulges out to leave a pocket underneath.

In our study, there were six patients in whom pincushioning effect around the nasolabial fold developed.

There may be a “pincushioning” effect around the nasolabial fold, which can be avoided using a rhomboid design.^[5]

CONCLUSIONS

The nasolabial flap is a simple and viable treatment option for advanced OSMF in patients with IIO <15 mm. Complications commonly associated with nasolabial flap include insignificant improvement in IIO,^[13] partial necrosis,^[1,15,4,8] intraoral hair growth,^[12,14,15,5,2] and unacceptable extraoral scar.^[12-15,6,2,8] However, the benefits far outweigh the risk of these complications. Moreover, the complications are minor in nature and can be corrected by local measures.

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.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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