Versatility of nasolabial flaps for the management of severe trismus in oral submucous fibrosis

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ABSTRACT

Background: Oral submucous fibrosis (OSMF) is a chronic insidious disease affecting any part of the oral cavity and sometimes the pharynx. It is a collagen-related disorder predominantly associated with tobacco/areca nut chewing habit and characterized by progressive hyalinization of the submucosa. Prevalence of OSMF is 2.01%, and malignant transformation rate of 2.3%–7.6% has been reported in the literature. Measures such as forcing the mouth open and cutting the fibrotic bands have resulted in more fibrosis and disability.

Aim: Various surgical treatment modalities have been advocated in the surgical management of OSMF with variable results. This retrospective study evaluates the efficacy of nasolabial flap in the surgical treatment of OSMF.

Materials and Methods: Retrospective analysis of 42 patients who underwent surgical management of OSMF with mouth opening < 20 mm by nasolabial flap at authors center from 2000 to 2015. Only the cases diagnosed as advanced OSMF based on long-standing positive history of habits (chewing tobacco, betel nut, etc.), clinical and histopathological examination. OSMF due to other causes such as nutritional deficiency, immunological diseases, and systemic illness with medically compromised patients were excluded from the study. Inferiorly based nasolabial flaps were raised in the supramuscular plane and transferred intraorally through a transbuccal tunnel.

Results: The study groups consist of 42 cases of clinical and histopathologically proven cases of OSMF treated by nasolabial flap. Out of 42 cases, 39 (92.85%) were males and 3 (7.15%) were females which showed a male predominance and the ratio was 13:1. The mean (standard deviation [SD]) preoperative mouth opening was 14.60 mm (3.06). After release of fibrotic bands, a mean forced intraoperative mouth opening of 36.27 (2.11) mm was achieved. The mean (SD) postoperative mouth opening was 33.05 mm (2.40) at the end of 2-year follow-up. The mean (SD) increase in mouth opening after surgical management at the end of 2-year follow-up is 18.46 mm (1.89). Sixteen out of 42 patients' histopathological report turned out to be dysplastic. The mean (SD) follow-up was 2.79 years (1.08). There was no incidence of infection in the transferred flap and the recipient site in all cases except one case with malignant transformation. All flaps healed without evidence of infection, dehiscence, or necrosis. Results were assessed by comparing the pre- and post-operative maximum mouth opening.

Conclusion: The nasolabial flap is a versatile flap, which can be successfully used in the reconstruction of defects created after the release of fibrotic bands in OSMF. The versatility of the nasolabial flap has been attributed to its reliable vascularity derived from numerous vessels in the vicinity. Major advantage is the ease of elevation, proximity to the defect, suitable size for coverage of defect, minimal swallowing and speech difficulties, and a relatively cosmetic result as scar is in natural crease. All the cases treated for OSMF using bilateral nasolabial flaps showed adequate mouth opening at 2-year follow-up postoperatively, recommending its use.

Key words: Nasolabial flap, oral submucous fibrosis, reduced mouth opening, trismus

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Oral submucous fibrosis (OSMF) is commonly seen potentially malignant disorder in the Indian subcontinent having multifactorial origin but is commonly associated with chewing of areca nut (betel nut) habitually. This condition was first described by Schwartz in 1952. It is the condition which carries a high risk of malignant transformation, that is, 3%–7.6%. It is an insidious chronic disease, causing trismus due to fibroelastic changes by causing both increased collagen production and decreased collagen breakdown, accompanied by epithelial atrophy. Various treatments have been described with inconsistent results. The surgical procedures for the management of advanced OSMF include excision of fibrous bands with or without coverage of the surgically created defect.

Surgical treatment is warranted in patients with marked limitation to mouth opening, where fibrous bands are excised, and the surgical defects reconstructed utilizing various grafts such as split thickness skin graft, tongue flap, nasolabial flap, palatal island flap, and buccal fat pad graft.

The nasolabial flap is typically classified as an axial pattern flap based on angular artery. It can be based superiorly or inferiorly. The versatility of the nasolabial flap has been attributed to its reliable vascularity derived from numerous vessels in the vicinity. It is advocated because of ease of elevation, proximity to the defect, suitable size for coverage of defect, minimal swallowing and speech difficulties, and a relatively cosmetic result as scar is in natural crease.

MATERIALS AND METHODS

This retrospective analysis was performed from the archival records of the authors’ center from 2000 to 2015. Over a period of 15 years, 128 patients between 18 and 65 years had reported to the center with inability to open the mouth (excluding TMJ pathology). Out of 128 patients, 10 OSMF patients without habits were excluded from the study. Of the 118 patients, 26 patients did not turn up for biopsy appointment. One-third of the biopsies reported dysplastic changes.

OSMF was staged into four categories. Treatment was chosen according to the stage of clinical progression and limitation in mouth opening to gain maximal interincisal opening (IIO) to gain maximal interincisal distance (ID). Medical treatment involved conservative oral administration of Vitamin A and Vitamin B-complex, topical triamcinolone acetonide 0.1%, and conventional submucosal injections of a combination of dexamethasone and hyaluronidase. The surgical group was treated by the excision of fibrotic tissues and covering the defect with nasolabial flaps.

When advised to stop tobacco chewing and report for further treatment, twenty early cases did not report for complete treatment. Of those who reported, 20 early patients were successfully treated medically, while 52 advanced patients were treated by surgical intervention after initially trying medical treatment, of which 42 were treated by nasolabial flap.

A detailed personal history with special reference to tobacco habit was obtained from each patient’s record. Patients with severe trismus <20 mm (measured from the mesioincisal edge of the maxillary central incisor to the mesioincisal edge of the mandibular central incisor) underwent simultaneous reconstructive flap surgery by nasolabial flap. Sample group of 42 was the advanced OSMF cases based on the long-standing positive history of habits (chewing tobacco, betel nut, etc.), clinical and histopathological examination. Patients underwent incision of the fibrotic bands, achieving full mouth opening using mouth gags and coverage of the buccal defect with nasolabial flap. All lesions were sent for histopathological examination. The donor sites were primarily closed, and all flaps survived completely. The patients were followed up by monthly examinations for at least first 6 months of the years and definitely till 2 years, or when possible, even longer.

Periodic evaluation of the IIO and pinprick test of the flap (to assess vascularity) was carried out.

Surgical procedure

Under nasoendotracheal intubation, fibrous bands in the buccal mucosa were excised. Forcible mouth opening was achieved using mouth gags, and a satisfactory voluntary mouth opening was achieved. To cover the defect, inferiorly based nasolabial flap was planned.

Nasolabial flap

A 5 cm wide spindle-shaped flap is raised superior to the nasolabial fold. The incisions are placed in such a way that medial margin of the incision falls in the nasolabial fold. [Figures 1a-j and 2a-d]. The flap is raised in a subcutaneous fat plane and then rotated 90°, pedicled to facial artery such that the skin faces the raw excised area of the buccal mucosa. Suturing the margins of the mucosa to the flap closes the defect in the mucosa, and donor site is closed in layers.

RESULTS

The results were found to be satisfactory in all 42 patients as shown in Tables 1 and 2. All the 42 cases encountered no flap loss, either complete or partial. Adequate mouth opening was achieved and maintained with no incidence of infection in the transferred flap and the recipient site in all cases. Complications due to vascularity (blue flap or white flap) were not encountered though slight ecchymosis occurs at the flap tips and suture margins, which subsided 7–10 days postoperatively.
Out of 42 cases, only one case encountered malignant transformation at the end of 5-year follow-up which was treated accordingly. Patients were comfortable and satisfied regarding the postoperative mouth opening.

All patients were followed up regularly with the mean follow-up of 2.79 years (1.08) with the range of 2–5 years. Postoperatively, patients were prescribed nutritional and antioxidant supplements along with mouth opening exercises for at least 6 months. Results were assessed by comparing the pre- and post-operative maximum mouth opening as mentioned in the Tables 1 and 2.

DISCUSSION

OSMF is a potential premalignant condition with an incidence of oral cancer in 3%–7.6% cases. The treatment for OSMF focuses on relieving the symptoms and improving the mouth opening by therapeutic and/or surgical methods. Medical treatment involved conservative oral administration of Vitamin A and Vitamin B-complex, topical triamcinolone acetonide 0.1%, and conventional submucosal injections of a combination of dexamethasone and hyaluronidase.[5] However, the role of these medications in advanced cases of OSMF with established restricted mouth opening is limited.
According to Khanna and Andrade’s grouping of OSMF based on clinical and histopathologic features, it is a well-established fact that in OSMF, there is decreased vascularity to the affected region by fibrosis due to contraction and narrowing of blood vessels as a result of increased pressure on them by fibrous tissue bands.\[6\]

In patients with moderate to advanced OSMF, surgical therapy is beneficial. Materials used for covering the defect following the excision of bands include skin grafts, tongue flaps, buccal fat pad, amnion graft, nasolabial flaps, and palatal island flaps. Additional procedures such as temporalis myotomy and bilateral coronoidectomy may be performed to enhance mouth opening.\[3\]

A mucosal graft is the best treatment for OSMF, as it is an ideal graft to cover the oral mucosa but is limited by the quantity of oral mucosal available for grafting. Split-skin grafting has been tried, but it has a high failure rate as fibrotic areas have less vascular supply. Skin is not suitable for grafting in elderly people due to atrophy and inelasticity.\[7\]

Tongue flaps are bulky and when used bilaterally cause disarticulation, dysphagia, and increased chances of aspiration. In addition, the tongue is involved with the disease process in 38% cases.\[8\]

Buccal fat pad may also be used to cover the defects after excision of the fibrous bands. Harvesting of buccal pad fat is easy, but the anterior reach of the flap is often inadequate and cannot be used for larger defects.\[9\]

Nasolabial region has an excellent dual blood supply, which assures the successful take-up of the flap. The IIO achieved was maintained with minimal relapse till the last follow-up. No partial or complete flap failures were noted in our series of cases. The technique of harvesting the nasolabial flap is simple. The donor site is in close proximity to the defect. In our series of patients, bilateral inferiorly based nasolabial flap with a reliable subdermal plexus was used for the treatment of advanced OSMF.

The dimensions of the flap were adequate to cover the intraoral defect and layered closure of donor site was achieved to minimize the postoperative extraoral scar. Intraoperative complications such as damage to facial vessels, parotid duct, and branches of facial nerve were not encountered in any of the patients in the study. The technique is easy to master and defects as large as 6–7 cm can be closed. The postoperative extraoral scars are hidden in the nasolabial fold. Minor complications of the nasolabial flap include loss of the nasomaxillary crease and the creation of an edematous and bulky flap and intraoral growth of hair in men. A periosseal suture can be used to recreate the crease. By trimming all of the fat from the flap, the bulkiness can be reduced. Growth of hair decreased with time, and no patient required scar revision. Except in two patients, no intraoral hair growth was seen in our cases which decreases with time.

The scars were more acceptable in older patients who had prominent nasolabial folds and laxity of the skin as compared to the younger patients. Postsurgical scars were barely perceptible in all cases except two cases which required scar revision after 3 months.

Various previous studies\[3,10,11\] reported successful reconstruction without complication using nasolabial flap in the management of OSMF. They concluded that nasolabial flap proved very useful in the immediate single-stage reconstruction of anterior intraoral defects along with the improvement in overall functional outcome.

Definite increase in mouth opening was observed in all cases which can be attributed to the success of the surgery.

**CONCLUSION**

The nasolabial flap is a versatile flap, which can be successfully used in the reconstruction of defects created after the release of fibrotic bands in OSMF. The versatility of the

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### Table 1: Demographic data

| Age (in years) | Mean | SD  | Range  |
|----------------|------|-----|--------|
| 36.15          | 6.65 | 28-60 |
| Male/female ratio (%) | 39 (92.85):3 (7.15) |
| Dysplastic changes | 16 |
| Duration of complaint (years) | Mean | SD  | Range  |
| 3.12          | 1.20 | 2-5  |
| Duration of habit (years) | Mean | SD  | Range  |
| 9.31          | 4.40 | 5-30 |
| Preoperative mouth opening (mm) | Mean | SD  | Range  |
| 14.6          | 3.06 | 10-20 |
| Intraoperative mouth opening (mm) | Mean | SD  | Range  |
| 36.27          | 2.11 | 32-40 |
| Follow-up (years) | Mean | SD  | Range  |
| 2.79          | 1.08 | 1-5  |
| Mouth opening at 2-year follow-up (mm) | Mean | SD  | Range  |
| 33.05          | 2.40 | 30-38 |
| Mean increase in mouth opening (mm) | Mean | SD  | Range  |
| 18.46          | 1.89 | 16-20 |

SD=Standard deviation
nasolabial flap has been attributed to its reliable vascularity derived from numerous vessels in the vicinity. It is advocated because of ease of elevation, proximity to the defect, suitable size for coverage of defect, minimal swallowing and speech difficulties, and a relatively cosmetic result as scar is in natural crease. All the cases treated for OSMF using bilateral nasolabial flaps showed adequate mouth opening at 2-year follow-up postoperatively, recommending its use.

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Conflicts of interest
There are no conflicts of interest.

Table 2: Treatment details and outcome of oral submucous fibrosis cases treated at author’s center between 2000 and 2015

| Serial number | Age/sex | Average duration of complaint (years) | Habit/duration (years) | Preoperative mouth opening (mm) | Dysplasia | Intraoperative mouth opening (mm) | Follow-up (years) | Final mouth opening at 2 year follow-up (mm) | Increase in mouth opening (mm) |
|---------------|---------|----------------------------------------|-------------------------|-------------------------------|-----------|----------------------------------|------------------|---------------------------------------------|-----------------------------|
| 1             | 38/male | 3                                      | 8                       | 16                            | +         | 40                               | 3                | 35                                          | 19                          |
| 2             | 32/male | 2                                      | 6                       | 15                            | +         | 38                               | 3                | 34                                          | 19                          |
| 3             | 40/male | 3                                      | 12                      | 12                            |           | 35                               | 2                | 32                                          | 20                          |
| 4             | 38/male | 3                                      | 10                      | 13                            |           | 35                               | 5                | 32                                          | 19                          |
| 5             | 35/male | 2                                      | 5                       | 13                            | +         | 34                               | 3                | 30                                          | 17                          |
| 6             | 33/male | 2                                      | 7                       | 17                            | +         | 36                               | 2                | 33                                          | 16                          |
| 7             | 36/male | 3                                      | 8                       | 15                            |           | 38                               | 2                | 35                                          | 20                          |
| 8             | 29/male | 2                                      | 6                       | 15                            |           | 36                               | 3                | 34                                          | 19                          |
| 9             | 30/male | 4                                      | 10                      | 12                            |           | 36                               | 2                | 34                                          | 22                          |
| 10            | 32/male | 5                                      | 12                      | 12                            | +         | 38                               | 3                | 35                                          | 23                          |
| 11            | 29/male | 2                                      | 5                       | 20                            |           | 40                               | 3                | 38                                          | 18                          |
| 12            | 28/male | 3                                      | 8                       | 18                            |           | 38                               | 3                | 35                                          | 17                          |
| 13            | 30/female | 5                                    | 30                      | 15                            | +         | 35                               | 2                | 30                                          | 20                          |
| 14            | 31/male | 2                                      | 5                       | 16                            |           | 38                               | 2                | 35                                          | 19                          |
| 15            | 33/male | 2                                      | 6                       | 15                            | +         | 38                               | 2                | 35                                          | 20                          |
| 16            | 35/male | 3                                      | 8                       | 15                            | +         | 37                               | 2                | 33                                          | 18                          |
| 17            | 42/male | 5                                      | 12                      | 11                            | +         | 35                               | 4                | 32                                          | 21                          |
| 18            | 52/female | 6                                    | 15                      | 12                            | +         | 35                               | 2                | 32                                          | 20                          |
| 19            | 33/male | 2                                      | 7                       | 19                            |           | 38                               | 3                | 35                                          | 16                          |
| 20            | 35/male | 3                                      | 8                       | 15                            |           | 38                               | 2                | 35                                          | 20                          |
| 21            | 36/male | 2                                      | 6                       | 18                            | +         | 37                               | 2                | 34                                          | 16                          |
| 22            | 39/male | 4                                      | 10                      | 17                            |           | 36                               | 2                | 33                                          | 16                          |
| 23            | 32/male | 5                                      | 11                      | 15                            |           | 36                               | 3                | 33                                          | 18                          |
| 24            | 29/male | 2                                      | 5                       | 19                            |           | 39                               | 3                | 35                                          | 16                          |
| 25            | 37/male | 2                                      | 6                       | 20                            | +         | 40                               | 4                | 36                                          | 16                          |
| 26            | 32/male | 3                                      | 8                       | 12                            |           | 35                               | 3                | 32                                          | 20                          |
| 27            | 36/male | 4                                      | 10                      | 11                            |           | 33                               | 4                | 30                                          | 19                          |
| 28            | 28/male | 3                                      | 8                       | 13                            |           | 35                               | 3                | 32                                          | 19                          |
| 29            | 32/male | 2                                      | 9                       | 12                            |           | 35                               | 4                | 32                                          | 20                          |
| 30            | 50/female | 5                                    | 15                      | 10                            | +         | 33                               | 4                | 30                                          | 20                          |
| 31            | 42/male | 4                                      | 12                      | 10                            | +         | 32                               | 5                | 30                                          | 20                          |
| 32            | 49/male | 5                                      | 15                      | 12                            | +         | 34                               | 2                | 30                                          | 18                          |
| 33            | 35/male | 3                                      | 10                      | 13                            |           | 35                               | 3                | 32                                          | 19                          |
| 34            | 32/male | 2                                      | 8                       | 15                            |           | 35                               | 3                | 32                                          | 17                          |
| 35            | 40/male | 4                                      | 16                      | 10                            | +         | 32                               | 2                | 28                                          | 18                          |
| 36            | 36/male | 2                                      | 8                       | 15                            |           | 36                               | 2                | 32                                          | 17                          |
| 37            | 33/male | 2                                      | 6                       | 16                            |           | 36                               | 2                | 30                                          | 14                          |
| 38            | 35/male | 2                                      | 8                       | 14                            |           | 34                               | 2                | 30                                          | 16                          |
| 39            | 36/male | 2                                      | 8                       | 19                            |           | 39                               | 2                | 35                                          | 16                          |
| 40            | 39/male | 3                                      | 9                       | 20                            |           | 38                               | 3                | 38                                          | 18                          |
| 41            | 36/male | 4                                      | 10                      | 12                            |           | 36                               | 3                | 32                                          | 20                          |
| 42            | 33/male | 2                                      | 5                       | 19                            |           | 39                               | 4                | 38                                          | 19                          |

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