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Nasolabial Flap In The Management Of Oral Submucous Fibrosis- A Systematic Review

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Abstract

Oral submucous fibrosis (OSMF) is a chronic, progressive condition characterized by fibrosis of the oral mucosa, leading to restricted mouth opening and functional limitations. The condition is characterized by chronic inflammation, excessive collagen deposition beneath the oral mucosal epithelium, local inflammation in the lamina propria or deep connective tissues, and muscle degeneration leading to stiffness. In 1952, Schwartz first described this oral mucosal condition as "atrophica idiopathica (tropica) mucosae oris." A year later, in 1953, Joshi coined the term "Oral Submucous Fibrosis." OSMF is a well-recognized precancerous condition predominantly seen in the Indian subcontinent and among individuals who have migrated from the region to Western countries. The incidence of malignant transformation ranges between 4.5% and 7.6%. The condition primarily affects women, with a female-to-male ratio of 3:1. Although the exact pathogenesis remains unclear, it is believed to be multifactorial, with several triggers causing a juxta- epithelial inflammatory response in the oral mucosa. Common contributing factors include areca nut chewing, consumption of spicy food, nutritional deficiencies, genetic predisposition, and immune-related mechanisms.

Keywords: NIL

Introduction

Oral submucous fibrosis (OSMF) is a chronic, progressive condition characterized by fibrosis of the oral mucosa, leading to restricted mouth opening and functional limitations. The condition is characterized by chronic inflammation, excessive collagen deposition beneath the oral mucosal epithelium, local inflammation in the lamina propria or deep connective tissues, and muscle degeneration leading to stiffness. In 1952, Schwartz first described this oral mucosal condition as "atrophica idiopathica (tropica) mucosae oris." A year later, in 1953, Joshi coined the term "Oral Submucous Fibrosis." OSMF is a well-recognized precancerous condition predominantly seen in the Indian subcontinent and among individuals who have migrated from the region to Western countries. The incidence of malignant transformation ranges between 4.5% and 7.6%. The condition primarily affects women, with a female-to-male ratio of 3:1. Although the exact pathogenesis remains unclear, it is believed to be multifactorial, with several triggers causing a juxta- epithelial inflammatory response in the oral mucosa. Common contributing factors include areca nut chewing, consumption of spicy food, nutritional deficiencies, genetic predisposition, and immune-related mechanisms.

The early symptoms of OSMF include stomatitis, vesicle formation, erythematous mucosa, burning sensation, ulceration, mild blanching, mucosal pigmentation, petechiae, and dry mouth, eventually leading to fibrosis. In advanced stages, the condition progresses to widespread posterior blanching (palate and uvula), thick fibrous bands in the cheeks, lips, and floor of the mouth, a stiff depapillated tongue with

limited movement, and reduced mouth opening (trismus). Other features include a shrunken, hockey stick–shaped uvula, speech and swallowing difficulty, hoarseness, sunken cheeks, loss of the nasolabial fold, a prominent antegonial notch, and possible hearing loss.Medical management involves agents such as lycopene, micronutrients, steroids, chymotrypsin, hyaluronidase, turmeric, and placental extracts, combined with oral physiotherapy. However, in advanced stages, surgery is the primary treatment option, involving the excision of fibrotic bands and defect reconstruction using various techniques. Several reconstruction methods have been documented, including the nasolabial flap, buccal fat pad, radial forearm flap, temporalis myocutaneous flap, palatal island flap, tongue flap, placental grafts, skin grafts, and lingual pedicle flaps. The nasolabial flap (NLF) and buccal fat pad (BFP) are two commonly employed techniques for defect reconstruction in OSMF. The NLF is known for its robust vascularity and reliability. Historically, the nasolabial flap was first described for nasal reconstruction by Sushruta in 600 BC, marking the advent of plastic surgery in India nearly 2000 years ago. Since then, it has been widely used for facial and oral cavity reconstructions. Despite the available literature, no comprehensive quantitative analysis has definitively established the nasolabial flap as a treatment for OSMF. To bridge this gap, we conducted a systematic review and meta- analysis to assess the effectiveness of the nasolabial flap in treating OSMF in adults, specifically evaluating its impact on maximum interincisal opening and commissural width.

Materials And Method

The protocol for the present systematic review was registered on the PROSPERO database. The PROSPERO registration number for this study is CRD420251012478. The registration avoids duplication of systematic reviews. The objective of this review was to assess the effectiveness of the nasolabial flap surgical procedure in improving maximum interincisal opening or maximum mouth opening.

The research question was structured using a modified PICO framework: (P) Patients with oral submucous fibrosis, (I) Treatment with a nasolabial flap, and (O) Outcomes measured in terms of maximum interincisal opening.

Inclusion Criteria

1) Articles published in English language
2) Articles having sufficient data on nasolabial flap in the treatment of oral submucous fibrosis
3) Studies reporting clinical outcomes such as improvement in mouth opening, recurrence rates, complications, and histological basis.
4) Studies published between January 2009 – December 2023 and having relevant data on maximum interincisal opening and the nasolabial flap in the treatment of oral submucous fibrosis
5) Clinical studies, prospective studies and retrospective studies
6) Articles reporting the study outcomes in terms of mean and standard deviation

Exclusion Criteria

1) Any studies conducted before 2010
2) Case reports, review articles, and studies focusing on use of nasolabial flap in other conditions.
3) Articles in other than English language

Search Strategy

A comprehensive literature search was conducted across databases including PubMed, Scopus, Web of Science, Google Scholar, and DOAJ to identify studies evaluating the clinical outcomes and efficacy of the nasolabial flap in the management of oral submucous fibrosis. Keywords such as “nasolabial flap,” “oral submucous fibrosis,” and “reconstructive techniques” were used. Filters were applied for article type (prospective, retrospective, and cross-sectional studies) and publication date from January 2009 to December 2023, using the best match option.Both controlled vocabulary (MeSH terms in PubMed) and free-text terms in titles and abstracts were used to develop the search strategy with Boolean operators. The screening process was conducted according to the PRISMA guidelines and is presented as a PRISMA flowchart (Figure 1). In addition, a manual search was performed in leading oral and maxillofacial surgery journals, including the International Journal of Oral and Maxillofacial Surgery, British Journal of Oral and Maxillofacial Surgery, Journal of Oral and Maxillofacial Surgery, Oral Surgery, Oral Medicine,

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Oral Pathology, Oral Radiology and Endodontology, Journal of Cranio-Maxillofacial Surgery, Journal of Craniofacial Surgery, Journal of Maxillofacial and Oral Surgery, and the Journal of the American Dental Association.

Mesh WORDS

Relevant keywords and Medical Subject Headings (MeSH) terms were selected and combined using Boolean operators (AND, OR, NOT). In this case, since the primary variable is the effectiveness of the nasolabial flap in treating oral submucous fibrosis, appropriate MeSH terms may include:

1. "Oral Submucous Fibrosis”
2. "Nasolabial flap" (MeSH) AND "Oral Submucous Fibrosis" (MeSH)
3. "Surgery" (MeSH) AND "Trismus" (MeSH) AND "Mouth opening" (MeSH)
4. “Nasolabial flap” (MeSH) AND "Prospective study" (MeSH) AND "Retrospective study" (MeSH)
5. "Maximal Interincisal Opening

Data Extraction And Data Items:

Two authors independently extracted the required data from the selected studies. The extracted data included the first author, publication year, publication type, interventions and their prescriptions, and outcomes. During this process, any discrepancy was resolved through a consensus discussion with two other authors. Data from the latest follow-up period were extracted from multiple follow-up periods.

Statistical Synthesis Of Study Data:

First, a traditional meta-analysis was conducted to synthesize the studies showing the efficacy of nasolabial flap. A fixed-effects model (Mantel-Haenszel method) was applied when no heterogeneity was detected (p

> 0.05 or $I^2 \leq 24\%$); otherwise, a random-effects model (Der Simonian-Laird method) was used. Statistical analysis was conducted using RevMan 5.3 (Cochrane Collaboration, Software Update, Oxford, UK), with a significance level set at $p < 0.05$. We also assessed the study design and patient characteristics to evaluate the transitivity assumption for reliable data pooling with sufficient similarity between the included studies. Publication bias refers to the bias between the publication and nonpublication of research findings, depending on the nature and direction of the results. Comparison adjusted funnel plots were used to assess the presence of publication bias to avoid small study effects.

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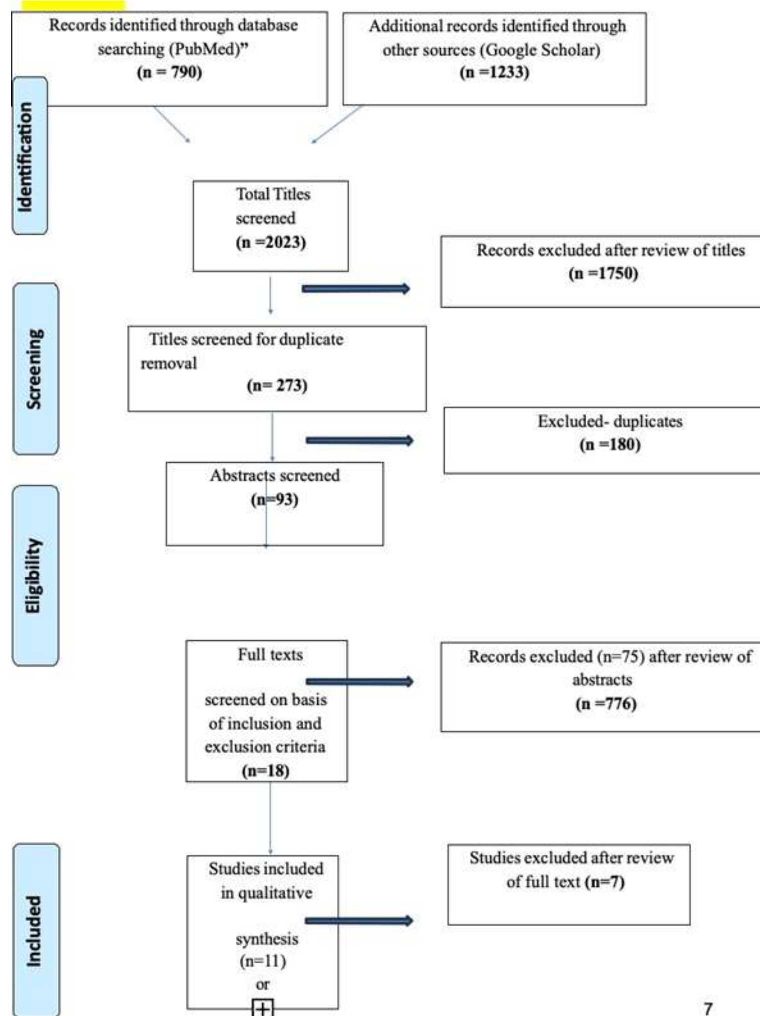
Figure 1: PRISMA Flow chart presenting the screening process



Results

The screening process was undertaken in three steps that included screening of titles followed by screening of abstracts and finally screening of full text for inclusion in the review. All studies evaluated the nasolabial flap outcome in the treatment of moderate to severe (advanced) OSMF. With respect to publication year, the studies were published from 2009 to 2023 wherein 3 studies were in 2011 and 2016 and rest were in 2017, 2019, 2021 and 2023 and only 1 study of 2009 was included. Regarding study design, 4 studies were case series, 3 studies were case reports, 3 were prospective studies and only 1 was retrospective study. The sample size across different studies varied form as less as 6 patients to a maximum of 75 patients and case reports noted the findings of single patient.

Table 1 - Details of the study participants, intervention, and comparator of the studies included in the systematic review [NR – Not Reported]

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Sr. no	Author	Age group	Population	Intervention/ treatments used(Test group)	Follow up period	Primary Outcome	Secondary outcome, if any	Results	Conclusion
1	Kshirsagar R et al	25 – 45 years	patients with a chief complaint of restricted mouth opening and Interincisal Opening	Bilateral inferiorly based nasolabial flaps	1st, 7th and 21st postoperative days	Interincisal Opening (IIO)	vascularity and viability of the flap	There was no incidence of infection in the transferrd flap and the recipient	The nasolabial flap is a versatile flap, which can be successfully used
2	Agarwal M et al	18 and 44 years	patients with histologically confimed oral submucous fibrosis with Interincisal mouth opening	extended nasolabial flaps	one year	Interincisal mouth opening (mm)	complications	Their interincisal opening improved significantly from a mean of 11 mm	The procedure was effective in the management of patients with oral Sub mucous fibrosis
3	Maria A et	27-40 years	advanced oral submucous fibrosis	inferiorly based nasolabial	6 months	Interincisal mouth openin	complications	Adequate mouth opening was achieved &	inferiorly based nasolabial “islanded” flaps provide reliable

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	al		with interincisal distance not more than 1cm	"islanded" flaps		g (mm)		maintained with minimum Intraoral opening 22 mm	coverage of defect
4	Janjua OS et al	24.6 years.	moderate to severe degree of oral submucous fibrosis were treated surgically	Bilateral Nasolabial flap	6 months	mouth opening	NR	patients were able to maintain mouth openings ranging from 32mm to 39mm	Bilateral Nasolabial flap is a satisfactory treatment modality for oral submucous fibrosis
5	Balaji SM	28-60 years	patients who underwent surgical management of OSMF with mouth opening	Inferiorly based nasolabial flaps	upto 2 years follow-up	Mouth opening	NR	All flaps healed without evidence of infection, dehiscence, or necrosis	The nasolabial flap is a versatile flap, which can be successfully used in the treatment of oral sub mucous fibrosis
6	Jamdade V et al	40 years	Oral disability due to restricted mouth opening since last 20 years.	Nasolabial flaps	1-4 days and 6 to 8 months post-op	Mouth opening	NR	There were no further reduction in mouth opening and recurrence of the conditiion	Inferiorly based nasolabial flap can be used to treat severe trismus
7	Thakur S et al	25-45 years	histologically confirmed OSMF with interincisal	nasolabial flap	1 year	Mouth openin	NR	Mouth opening greater than 35 mm	nasolabial flap is a simple and viable option in the

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			opening of less than 20 mm			g		achieved in all patients after release of fibrous bands	reconstruction of selected oral sub mucous fibrosis cases

8	Khan P et al	28 years	restricted mouth opening since 4-5 years, and burning sensation in the mucosa	Nasolabial flap	1-5 days and 5 months post-op	Mouth opening	NR	Even 5 months postoperatively the mouth opening of 35 mm was recorded	Nasolabial flap is one of the easily accessible, versatile and relapse-free flap
9	Ravikumar KK et al	66 years	progressive inability to open his mouth for past three months	bilateral inferiorly based nasolabial flap,	5 years	Mouth opening	NR	patient had reached an acceptable mouth opening with no further recurrence.	this treatment good option for recurrent and advanced cases of OSMF with acceptable results
10	Mehta D et al	30-45 Years	long standing difficulty in mouth opening	nasolabial (NL) flap	15 days, 1 month, 3 months, 6 months, and 12 months	Mouth opening (mm)	Wound healing	Finally the 12 months follow up showed a range from 22 mm to 44 mm of mouth opening	All the patients showed sustained mouth opening, satisfactory epithelialization
11	Ullah H et al	43-32	opening (less than 20 mm),	nasolabial flap	2 months.	nasolabial flap outcome (mouth opening)	NR	The majority of patients, 49 (65.3%), achieved normal mouth opening	Nasolabial flap was determined to be a viable surgical option for management of oral submucous

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									fibrosis

Most studies included patients aged 28–65 years diagnosed with moderate to advanced oral submucous fibrosis, presenting with interincisal mouth opening ≤20 mm, long-standing burning sensation, and difficulty opening the mouth. All studies used bilateral inferiorly placed nasolabial flaps as the intervention. Follow-up periods typically ranged from 1–5 days, 1 month, 3 months, and 6 months, with some studies extending to 1 year and 2 years in retrospective studies. The primary outcome measured was interincisal mouth opening (mm), while some studies categorized mouth opening as normal or inadequate. Secondary outcomes included complications, wound healing, and flap vascularity and viability.

Overall, the studies reported no infection at the flap or recipient site, and no vascular complications such as blue or white flap. Interincisal mouth opening improved significantly after treatment and remained stable during follow-up. The findings suggest that the nasolabial flap is a simple, versatile, and reliable reconstructive option, particularly suitable for oral defect reconstruction in low-resource settings.

Assessment Of Risk Of Bias

Risk of bias was assessed for all 11 included studies: 3 case reports, 4 case series, 3 prospective studies, and 1 retrospective study. The Newcastle–Ottawa Scale was used for prospective and retrospective studies, while the JBI appraisal tool was applied to case reports and case series. Study quality scores ranged from 7/9 to 8/9, with common limitations including unclear control definitions and lack of adjustment for potential confounders (Table 2).

Table 2. Study Quality as Assessed by the Newcastle Ottawa Scale as Judged by the 2 Reviewers Who Performed Data Extraction

Sr. No.	**Authors**	**Ye ar**	**Selection (Maximum, 4 Asterisks)**	**Comparability (Maximum, 2)**	**Exposure/ Intervention (Maximum,4)**
1	Kshirsagar R et al	2009	***	**	**
2	Agarwal M et al	2011	***	**	***
3	Balaji SM	2016	***	**	***
4	Mehta D et al	2021	****	*	**

2. Risk of Bias assessment for Case reports

JBI critical appraisal checklist for Case reports was used to assess Risk of bias of included case reports and case series (Table 3 and Table 4)

Table 3 – Critical appraisal of Case reports (JBI appraisal tool

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Study ID	Author	Were patient's demographic characteristics clearly Described ?	Was the patient's history clearly described and presented as a timeline	Was the current clinical condition of the patient on presentation clearly Described	Were diagnostic tests or assessment methods and the results clearly Described	Was the intervention(s) or treatment procedure (s) clearly described?	Was the post-intervention clinical condition clearly described?	Were adverse events (harms) or unanticipated events identified and describe	Does the case report provide takeaw a y lessons ?
1	Jamdade V et	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	Khan P et	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 4 – Critical appraisal of Case series (JBI appraisal tool)

Study ID	Author	Were there clear criteria for inclusion in the case series ?	Was the condition measured in a standard, reliable way for all participants included in the case series	Were valid methods used for identification of the condition for all participants included in the case	Did the case series have consecutive inclusion of participants?	Did the case series have complete inclusion of participnts?	Was there clear reporting of the demographics of the participants in the study?	Was there clear reporting of clinical information of the participants?	Were the outcomes or follow -up results of cases clearly reported?	Was there clear reporting of the presenting sites'/ clinics' demographic information?	Was statistical analysis appropriate?
1	Maria A et al	Yes	Yes	Yes	Yes	Yes	yes	yes	Yes	yes	Yes

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2	**Janjua OS et al**	Yes	Yes	Yes	Unclear	Yes	yes	yes	Yes	yes	yes
3	**Thakur S et al**	Yes	Yes	Yes	Yes	Yes	yes	yes	Yes	yes	yes
4	**Ullah H et al**	Yes	Yes	Yes	unc lear	Yes	yes	yes	Yes	yes	yes

The above table shows the critical appraisal of the case series included in the review. It has been found that most of the case series included showed majority of the items of appraisal as "yes" response; whereas both the series showed unclear in terms of consecutive inclusion of participants in the case series. Thus, when the overall quality assessment or Risk of bias is done; it can be interpreted that majority of the included case series showed fair quality of assessment.

Quantitative Data Assessment

From all of the included studies the outcome data was measured in terms of Interincisal opening recorded in mm, intra-operatively and post-operatively after the follow-up in the patients. In majority of the studies, patients were able to maintain mouth openings ranging from 32 mm to 39 mm and in most of them the mean value of mouth opening achieved was 34.56 mm after release of bands covering the defects with inferiorly based nasolabial flap. In case of 1 included retrospective study, about 65.3% patients achieved normal mouth opening post-operatively.

Discussion

OSMF was first described by Schwartz in 1952, where it was classified as an idiopathic disorder by the term atrophia idiopathica (tropica) mucosae oris.(27) Oral submucous fibrosis (OSMF) is a chronic, insidious, and progressive condition characterized by fibrosis of the oral mucosa leading to restricted mouth opening, burning sensation, and difficulty in speech and swallowing. Etiologically linked to areca nut chewing, OSMF is considered a potentially malignant disorder with significant functional and aesthetic consequences.(18,27) Oral submucous fibrosis (OSMF) precancerous condition and is chronic, resistant disease characterized by juxta-epithelial inflammatory reaction and progressive fibrosis of the submucosal tissues.(18) In 1966, Pindborg(29) defined OSMF as "an insidious chronic disease affecting any part of the oral cavity and sometimes pharynx. It is associated with juxta-epithelial inflammatory reaction followed by fibroelastic changes in the lamina propria layer, along with epithelial atrophy which leads to rigidity of the oral mucosa proceeding to trismus and difficulty in mouth opening."

It occurs at any age but most commonly seen in young and adults between 25 and 35 years (2nd– 4th decade). Onset of this disease is insidious and is often 2–5 years of duration. It is commonly prevalent in Southeast Asia and Indian subcontinent.(30) The prevalence rate of OSMF in India is about 0.2%–0.5%. This increased prevalence is due to increased use and popularity of commercially prepared areca nut and tobacco product - gutkha, pan masala, flavored supari, etc.The malignant transformation rate of OSMF was found to be 7.6%.

Treatment of oral submucous fibrosis

The treatment of OSMF depends on the degree of disease progression and clinical involvement. At early stages, stopping habit and nutritional supplements are done. At moderate stages, conservative treatment such as intralesional injections along with medical treatment is provided. At advanced stages, surgical interventions are needed.

CLASSIFICATIONS of OSMF - Clinical staging/classification, Pindborg JJ, 1989

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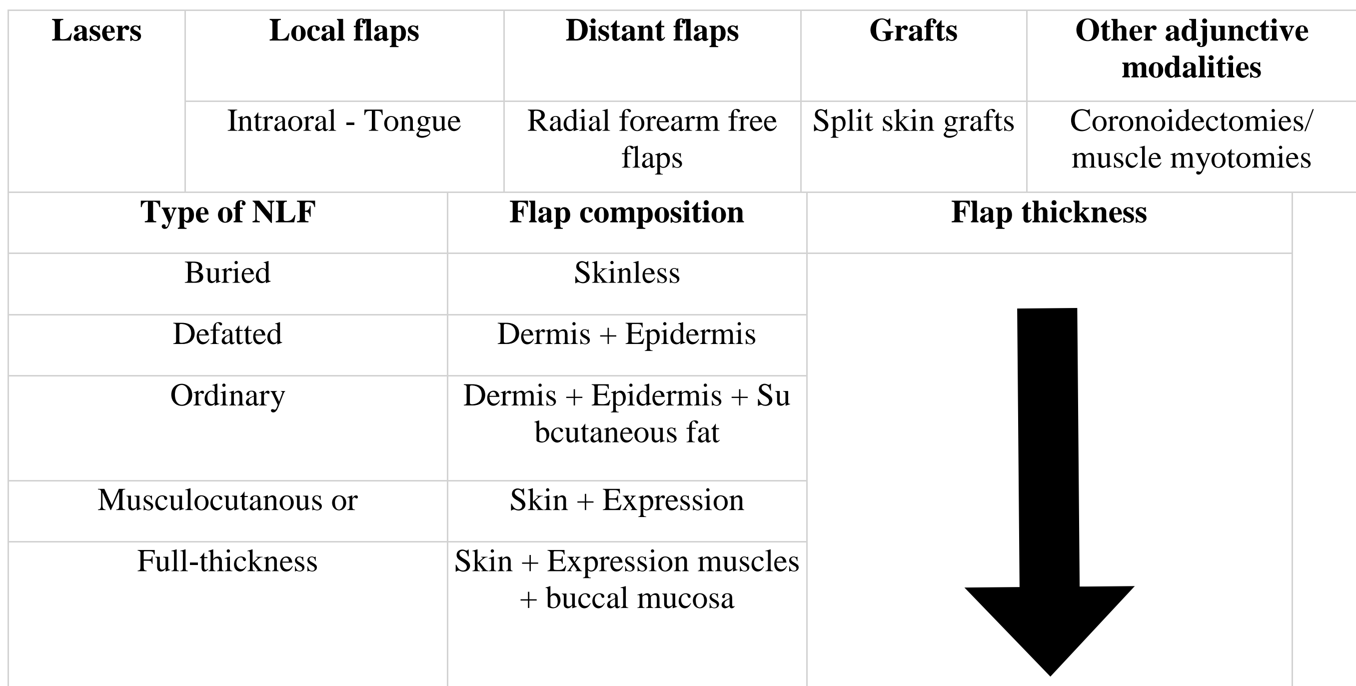
Stage I/Early OSMF	Stage II/Moderate OSMF	Stage III/Severe OSMF
Stomatitis and vesiculation: Stomatitis includes erythematous mucosa, vesicles, mucosal ulcers, melanotic mucosal pigmentation and mucosal petechiae	**Fibrosis:** Blanching of the oral mucosa with palpable vertical and circular fibrous bands in the buccal mucosa and lips, giving a mottled, marble-like appearance. Features include reduced mouth opening, a small stiff tongue, blanched leathery floor of the mouth, fibrotic depigmented gingiva, rubbery soft palate with limited mobility, atrophic blanched tonsils, shrunken cheeks, and a bud-shaped uvula disproportionate to age or nutritional status.	Sequelae of OSMF: Leukoplakia and erythroplakia is present in about 25% of OSMF cases. Speech and hearing difficulties may occur because of involvement of tongue and the eustachian tube

An overview of the surgical treatment modalities used in the management of OSMF.(22)



Lasers	Local flaps	Distant flaps	Grafts	Other adjunctive modalities
	Intraoral - Tongue	Radial forearm free flaps	Split skin grafts	Coronoidectomies/ muscle myotomies

Type of NLF	Flap composition	Flap thickness
Buried	Skinless	
Defatted	Dermis + Epidermis	
Ordinary	Dermis + Epidermis + Su bcutaneous fat	
Musculocutanous or	Skin + Expression	
Full-thickness	Skin + Expression muscles + buccal mucosa	

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Nasolabial flaps can be classified according to the surgical technique into:

1. Interpolation flap-2 stage is lifted over the area of normal skin.
2. Superiorly based nasolabial flap.
3. Inferiorly based nasolabial flap.
4. Nasolabial island flaps:
5. V–Y-advancement flap.
6. Freestyle perforator-based nasolabial flap.
7. Nasolabial propeller flap

Anatomical and Surgical Basis

The nasolabial flap is a regional flap harvested from the nasolabial fold, offering proximity to the oral cavity and dependable vascularity primarily from the facial artery.(5) Nasolabial crease run obliquely from approximately 1 Cm superior to the lateral alar rim to approximately 1 Cm lateral to the corner of the mouth. Four expression muscles present in this region including part of levator labi superioris,levator labi superioris alaque nasi,zygomatic major and minor muscles (Tan et al., 2013).Facial artery passes deep to the risorius and zygomatic major muscles but superficial to the buccinator muscle. It also gave off a superficial branch to the zygomaticus major muscle and other small perforating branches to the overlying skin. Extensive subdermal vascular plexus in this region supplies from four arteries; facial, angular, infraorbital and transverse facial. The buccal and zygomatic branches of the facial nerve innervate the expression muscles of the face from below. The flap can be designed unilaterally or bilaterally, either superiorly or inferiorly based, depending on the defect site and size. Its ease of harvesting and reliable blood supply have made it a preferred choice in the management of moderate to severe trismus associated with OSMF.(3) The angular artery and its perforating branches supply the paranasal cheek area medially. The perforating branches of the internal maxillary artery, as well as extensions of the transverse facial branch of the superficial temporal artery, supply the central cheek. The nasolabial flap can be lifted as an axial-pattern flap or as a random-pattern flap. The subdermal vascular plexus and dermal plexus, which are ultimately fed by musculocutaneous arteries, provide circulatory supply to random flaps. As a result, the appropriate dissection plane is subcutaneous fat.

Advantages and Limitations

The nasolabial flap offers unique benefits but also has certain drawbacks that need consideration.

Advantages	Limitations
Simple and quick harvesting technique.	Limited reach to distal defects.
Reliable vascularity and high success rates.	Risk of hypertrophic scarring at the donor site.
Minimal requirement for secondary donor sites.	Bulky appearance in certain cases requiring secondary revisions.
	Intraoral hair

Clinical Applications And Outcomes

Several studies have demonstrated the effectiveness of nasolabial flaps in managing OSMF. A case series by Ullah et al. (2) reported consistent improvements in mouth opening with minimal complications in patients with advanced disease. Balaji (3) highlighted the versatility of the flap in treating severe trismus in both primary and secondary reconstructions. Jamdade et al. (2016) (1) reported successful reconstruction using a unilateral nasolabial flap with satisfactory postoperative recovery. Similarly, Mehta et al. (2021) (9) observed significant improvements in mouth opening and good aesthetic outcomes. A comparative study by Wadde et al. (2024) (16) concluded that nasolabial flaps provide better structural support and

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long-term stability compared with buccal fat pads in cases with extensive fibrosis.

Long-Term Efficacy And Patient Satisfaction

Long-term follow-up studies demonstrate sustained functional outcomes following nasolabial flap reconstruction. One study reported an increase in mouth opening of over 18 mm after two years with minimal relapse (10). Similarly, Kshirsagar et al. (2019) (28) confirmed stable postoperative results in more than 40 patients. Patient satisfaction is also high due to acceptable aesthetic outcomes of the donor site scar, as reported by Ravikumar et al. (2019) (4).

Variations And Innovations

Several modifications have been introduced to enhance flap adaptability. Tauro (2009) described the melolabial "sea-gull" flap, which provides improved coverage in extensive defects. Borle et al. (2009) and Idrees et al. (2016) proposed extended nasolabial flaps that enable single-stage defect reconstruction and reduce the need for secondary procedures (14,15). Earlier work by Kavarana and Bhathena (1987) (13) laid the foundation for the use of nasolabial flaps in severe trismus management. Recent studies continue to refine flap designs to address varying degrees of fibrosis and mucosal damage (11).

Complications And Limitations

Nasolabial flaps are generally safe, though minor complications such as tip necrosis, flap bulkiness, infection, delayed wound healing, or donor site scarring may occur. Histological evaluation by Shah & Tauro (2015) (5) confirmed minimal donor-site morbidity and favorable healing. Ullah et al. (2023) (2) reported temporary ecchymosis and stiffness that resolved within 7–10 days. Other studies, including Janjua et al. (2011) and Maria et al. (2011), also confirm the flap's strong safety profile (7,8). Partial or total flap failure is rare.

Role In Recurrent And Advanced Cases

Nasolabial flaps are also effective in recurrent or severe OSMF cases. Ravikumar et al. (2019) (4) reported successful management of a patient with complete trismus using bilateral nasolabial flaps, demonstrating the technique's usefulness in complex situations.

Physiotherapy And Postoperative Management

Postoperative physiotherapy plays a crucial role in preventing relapse. Early mouth-opening exercises using tongue depressors, Heister's mouth gags, or custom splints significantly improve functional outcomes (2,9). Nutritional supplementation and antioxidants are also recommended to enhance mucosal healing and reduce oxidative stress (24).

Nasolabial Flap Vs. Other Modalities

Comparative studies suggest that nasolabial flaps provide better durability and functional outcomes compared with alternatives such as the buccal fat pad. Venkatesh et al. (2020) (26) reported superior structural support and long-term stability with nasolabial flaps. However, alternative techniques may be considered in cases of extensive bilateral fibrosis or aesthetic concerns (20,22).

Conclusion

The nasolabial flap remains an important surgical option in managing oral submucous fibrosis (OSMF), providing a reliable, functional, and aesthetically acceptable reconstruction for moderate to severe cases. Its versatility, good vascular supply, minimal complications, and consistent postoperative improvement in mouth opening make it suitable for both primary and recurrent cases.

Evidence from case reports, clinical studies, and systematic reviews supports the nasolabial flap as a standard technique for reconstruction of OSMF-related defects. It allows tension-free closure of intraoral defects, offers stable long-term outcomes, and has minimal donor-site morbidity with good patient satisfaction. Although minor complications such as flap tip necrosis or intraoral hair growth may occur, they are uncommon and manageable. Future improvements may focus on refining flap design, enhancing aesthetics, and integrating adjunctive therapies to further optimize long-term outcomes.

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