



## **Versatility of Nasolabial Flap in Oral and Maxillofacial Surgery**

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### **Abstract**

**Aim:** This review aims to present the versatility of nasolabial flaps in oral and maxillofacial surgeries.

**Introduction-** The rising cases of cancer involving the oral cavity demand the need for reconstruction of the defects to re-establish function and aesthetic. For the reconstruction of small to moderate-size orofacial defects, a nasolabial flap can be used, particularly when the patient’s age, systemic illness, or financial status

does not allow complex surgical procedures, moreover, microvascular surgical procedures are not feasible at every center due to lack of infrastructure and expertise.

**Methods:** Nasolabial flap was searched in PubMed, there was a no year limitation while selecting the articles.

5 articles with different uses of nasolabial flap were selected to review the various uses and show the versatility of nasolabial flaps.

**Results:** Borle et al used the bilateral extended nasolabial flap in forty-seven patients of oral submucous fibrosis, all of the patients had less than 25mm interincisal opening. Their interincisal opening improved significantly from a mean of 14 mm (range 3–23) to a mean of 41 mm (range 23–55).

Sinha et al did a case study of ten cases of basal cell carcinoma of the nose using a nasolabial flap. There was no recurrence in any case. Study done by Tatar et al, in which nine individuals underwent lower eyelid reconstructive surgery after cutaneous malignancies were removed.

Varghese et al. conducted a retrospective study on 224 patients, A study done by Juliana Lemound et al. In a retrospective cohort clinical research, two patient groups with MRONJ and intraoral exposed bone were assessed.

**Conclusion:** It was concluded from this review that the nasolabial flap is a versatile flap that can be used for the reconstruction of various intraoral defects as well as perioral and perinasal defects with a high success rate and better aesthetic outcome.

**Keywords:** Nasolabial flap, reconstruction, oral defects, perinasal defects, oral submucous fibrosis.

### **Introduction**

The rising cases of cancer involving the oral cavity demand the need for reconstruction of the defects that occur due to surgical management of the same, to re-establish the function and aesthetic. Though microvascular free flap transfer is mostly performed for the reconstruction of the more complex defects, however; for the reconstruction of small to moderate-size orofacial defects, nasolabial flap can be used. In particular when the patient's age, systemic illness, or financial status does not allow complex surgical procedures, moreover microvascular surgical procedures

are not feasible at every center due to a lack of infrastructure and expertise.

The nasolabial flap has a long history, the Indian physician Sushruta, who is believed to have been born in 700 BC, wrote the Sushruta Samhita, a book that included descriptions of over 300 surgical techniques. The nasolabial flap was also described in Sushruta's work<sup>1</sup>. Print media started to feature images of nasolabial flaps in the 1800s. Dieffenbach's reconstruction of nasal alae using superiorly based nasolabial flaps in 1830 marked the beginning of contemporary surgical reports<sup>2</sup>. Von Langenbeck rebuilt the nose in 1864 by using the nasolabial flap<sup>3</sup>. For the closure of the palatal fistula, Esser used the inferiorly based nasolabial flap in 1917.<sup>4</sup>

Here we discuss review of literature on Nasolabial flaps and its importances and various uses and shortcomings. This study was approved by institutional review board.

### **Anatomy of the Nasolabial Flap**

The nasolabial area has a complicated anatomy. The nasolabial crease extends about 1 cm from the corner of the mouth to the lateral alar rim and 1 cm superior to it. The orbicularis oris muscle is located medially to the crease around the corner of the mouth. It is unclear exactly what the nasolabial crease's anatomy is. Zufferey<sup>5</sup> demonstrated that the superficial fibers of zygomaticus major muscle are inserted into the dermis under the nasolabial fold, but Yousif and coworkers did not find any separate layer of zygomaticus major muscle<sup>6</sup>. Recent research using cadaveric dissections by Pogrel et al. has revealed the presence of extremely superficial muscle fibers below the fold that insert into the dermis' underside<sup>7</sup>. The muscles around the nasolabial crease are largely innervated by the buccal and zygomatic branches of the facial nerve. It is well

known that the face has a very rich vascular supply; the skin of the nasolabial fold receives blood supply from the superior as well as the inferior, making it possible to harvest both the superiorly based nasolabial flap and the inferiorly based nasolabial flap. The facial artery supplies the inferiorly based flap; to be precise, the supralabial and alar branches of the facial artery supply the skin of the nasolabial fold region. The superiorly based nasolabial flap, infraorbital artery, and transverse facial artery nourish the skin of the nasolabial region.

#### **Type Of Flap (axial flap)**

The angular artery goes deep to the nasolabial flap, which is why it is usually categorized as an axial pattern flap. However, the flap is thinner and does not include the artery in applications like the nose. The flap is thinned and does not include the artery for uses like the nose.

#### **Flap Harvesting Procedure<sup>8</sup>**

To prevent distal necrosis, the length required and the flap's rotational arc must be taken into account prior to flap harvest. Excessive length of the flap, stress on the flap, or constriction of the venous outflow or arterial supply can all lead to necrosis. Once the defect's size are known, preparations can be taken to harvest the nasolabial flap. A piece of gauze can be used to mimic the length, width, and rotation of the nasolabial flap in order to assess whether the flap will reach the defect with a satisfactory level of tension. The gauze can be rotated to mimic the rotation of the flap by holding one end of it at the base of the flap. After that, the flap can be outlined. It is recommended to harvest a substantial amount of subcutaneous tissue. One way to reduce the thickness of the flap is to remove subcutaneous fat. In order to facilitate primary closure, the donor site's subcutaneous tissue typically needs to be undermined;

this is best accomplished on the cheek side of the donor site. In order to harvest an axial pattern flap, the periosteum must normally be dissected. Before stitching the flap into place, it is important to carefully assess the tension on the flap and the torsion on the artery supply after it has been harvested. To lessen tension on the flap, small incisions can be created in the periosteum beyond the flap base, paralleling the flap's long axis. Care must be given to ensure that the artery supply is not disrupted. The distal end of the flap should be examined for colour and turgor once it has been sutured into position.<sup>8</sup>

#### **Inferiorly based nasolabial flap**

When rebuilding perioral deformities, inferiorly based flaps are most frequently utilized. An inferiorly based flap can be used to restore defects in the buccal mucosa, commissure, and upper or lower lips by folding it into the oral cavity. This flap can be used to restore an upper lip defect secondary to scarring after trauma and is also a great source of local tissue to reconstruct full thickness defects soon after trauma.<sup>8</sup> [FIG-1]

#### **Superiorly based nasolabial flap**

Nasal, lip, buccal mucosal, and maxillary abnormalities have all been repaired with superiorly based nasolabial flaps. It has been shown that modestly sized maxillary defects can be repaired with superiorly based nasolabial flaps<sup>9</sup>. A superior nasolabial flap repair of the columella was described by da Silva in 1964.<sup>10</sup> [FIG-2].

#### **Versatility of nasolabial flap in oral and maxillofacial surgery-**

##### **1. Extended nasolabial flap in the management of oral submucous fibrosis.<sup>11</sup>**

Oral submucous fibrosis is a subtle, long-lasting, debilitating condition that affects the entire mouth, occasionally the throat, and infrequently the larynx. It is characterized by the oral mucosa becoming

blanched and stiff, which gradually limits mouth opening and makes food too hot or spicy to eat. It is a known precancerous disease that is more common in the Indian subcontinent.

Borle et al used the bilateral extended nasolabial flap in forty-seven patients of oral submucous fibrosis, all of the patients had less than 25mm interincisal opening.

They had extended grafting using a nasolabial flap, coronoidectomy or coronoidotomy, and bilateral release of fibrous bands as treatments. Every patient underwent postoperative physical therapy and underwent a two-year follow-up period. Between a mean of 14 mm (range 3–23) and a mean of 41 mm (range 23–55), their interincisal openness greatly improved. The primary drawback of the surgery was the extraoral scarring, which was beneficial in managing patients with oral submucous fibrosis.<sup>11</sup>

### 2. **Nasolabial flap for basal cell carcinoma of nose.**<sup>12</sup>

Since the middle of the 1800s, the nasolabial flap has been utilized for nasal reconstruction. Since then, several modifications to this flap have been reported to be used in the reconstruction of various nose abnormalities. Among them are nasal Columellar, tip, and ala defects. Sinha et al did a case study of ten cases of basal cell carcinoma of the nose using a nasolabial flap (FIG-3 and FIG-4). Excellent flap take-up and full flap survival were seen in every case. Since the forehead supplied blood to the cheek flap, which housed the muscle, none of the flaps showed signs of necrosis. There were no recurring cases. There were no colour differences and the skin tone match was superb.

Notwithstanding its benefits, males may have some disadvantages with nasolabial flap repair because the

distal cheek skin is hair-bearing and may transfer hair-bearing tissue to the nose. Poor cosmetic results can be avoided with careful planning and surgical technique, which includes inseting and precise defatting of the flap.<sup>12</sup>

### 3. **Superiorly based nasolabial flap for the reconstruction of the lateral lower eyelid.**<sup>13</sup>

Nasolabial flap is rarely employed for the reconstruction of the lower eyelid. Its applications for nasal and midfacial abnormalities are extensive. It can also be employed as an island<sup>14</sup> or transposition flap<sup>15</sup> for lower eyelid reconstruction. Study done by Tatar et al<sup>13</sup> in which nine individuals underwent lower eyelid reconstructive surgery after cutaneous malignancies were removed. In addition to being frequently used for midfacial defects, the nasolabial flap provides several benefits when it comes to reconstructing the lower eyelids. 1) The flap can be dissected with ease; 2) The skin color and texture closely resembles the remaining eyelid tissue; 3) The eyelid-cheek transition is provided in accordance with aesthetic standards; and 4) Most critically, there is minimal morbidity at the donor site. Donor site scar is hidden within the nasolabial fold. Nonetheless, there are certain drawbacks to the superiorly based nasolabial island flap for lower eyelid reconstruction that should be taken into account: 1) Possibility of blood flow to the flap being compromised; 2) Possibility of ectropion or lagophthalmos.

### 4. **Nasolabial flap for reconstruction of oral defects.**<sup>16</sup>

Reconstruction is frequently necessary to correct even relatively minor deformities in the oral cavity

and face to prevent anatomic distortion and ensuing functional limitations.

Microvascular free flap requires a high level of surgical skill, lengthens hospital stays, prolongs operation times, and ultimately raises treatment costs. Because of the nasolabial flap's accessibility, dependability, short recovery period, and ease of mastery, it is frequently utilized in oral and facial reconstruction. Reconstruction of the nose, cheek, lower eyelid, tongue, buccal mucosa, floor of the mouth, maxillary gingiva, and lip deformities is often carried out with the use of nasolabial flaps.

Varghese et al. conducted a retrospective study on 224 patients (93 men and 91 women) who received nasolabial flap reconstruction after oral cancer excision between 1986 and 1999. In their study distribution of tumours in the order(no.) of (10),upper lip (22),Lower lip (55),Commisure(32),Buccal mucosa(21),floor of the mouth(3),tongue (70) ,lower alveolus 2,upper alveolus 1other sites 18 which include buccal-alveolar sulcus, palate, and marginal zones.

Varghese et al. used a combination of superiorly based and inferiorly based flaps from either side in two patients, 198 patients underwent inferiorly based nasolabial flap reconstruction, and 24 patients underwent superiorly based nasolabial flap reconstruction. Six individuals underwent bilateral superiorly-based flaps, while 24 patients underwent bilateral inferiorly based flaps. According to their findings, in low-resource settings lacking microvascular expertise, the nasolabial flap is a straightforward and practical choice for reconstructing several mouth defects. Speech and deglutition function is improved when the flap is

used for tongue repair instead of primary closure or a skin transplant. In a post-irradiated patient, the procedure can be carried out with little difficulty. Out of 28 superiorly based flaps they found partial necrosis in 8 flaps and absence of total necrosis, while 5 partial necrosis and 15 total flap necrosis were observed out of 210 inferiorly based flaps. Compared to superiorly-based flaps, which displayed a higher rate of partial flap necrosis, inferiorly-based flaps performed better. Nonetheless, inferiorly based flaps were involved in every instance of complete flap necrosis.<sup>16</sup>

#### 5. **Nasolabial flap in medication related osteoradionecrosis of jaw<sup>17</sup>.**

One unfavorable side effect of antiresorptive and antiangiogenic therapeutic drugs is medication-related osteonecrosis of the jaw (MRONJ), due to its high recurrence rate it is difficult to treat. A study done by Juliana Lemound et al shows nasolabial flap improves the healing of medication related osteoradionecrosis of jaws. In a retrospective cohort clinical research, two patient groups with MRONJ and intraoral exposed bone were assessed. Comparison was done between mucoperiosteal flap and nasolabial flap for the closure of exposed bone and it was found that when it comes to covering bone wounds, nasolabial flaps are a very reliable alternative that have better long-term outcomes than mucoperiosteal flaps and less morbidity than microvascular free flaps. 68.8% of the 16 patients who had nasolabial flaps experienced symptomless intact wound closure. Out of the 16 patients who underwent mucoperiosteal closure, 18.7% were able to close their wounds, and 81.2% experienced a relapse of MRONJ. A rather easy technique to

harvest nasolabial flaps utilizing a superiorly based and inferiorly based flap. As a result, they provide a wide range of potential applications, including covering wounds in the mandibular and maxillary anterior and posterior regions. The good cosmetic outcomes typically result in scars that are practically imperceptible and buried in the nasolabial crease. Consequently, the nasolabial flap is very beneficial and adaptable, particularly for elderly individuals with more skin at this location.<sup>17</sup>

**Complications:** The formation of an edematous and bulky flap and the loss of the nasomaxillary crease are minor problems associated with nasolabial flap surgery. The crease can be recreated with a periosteal suture. All the fat on the flap can be cut off to lessen its weight. Partial necrosis of the flap happens when the flap is overly long in relation to the base, as Herbert and Harrison showed in their demonstration that the distal third of the nasolabial flap should be regarded as having a random distribution. In spite of this, Mutimer and Poole found that in their 23 cases of intraoral repair utilizing the nasolabial flap, only 12% had partial necrosis. One of the biggest studies assessing nasolabial flaps for oral reconstruction in 224 instances was published by Varghese et al.<sup>16</sup>. Diabetes may also increase the flap's vulnerability to necrosis. Out of the fifteen patients diagnosed with diabetes, eight had partial necrosis and three had entire necrosis. Patients who received radiation therapy have greater residual abnormalities as a result of flap loss; however, the nasolabial flap is normally outside the radiation portals used to treat oral squamous cell carcinoma. The nasolabial flap has shown to be dependable for the reconstruction of oral and perioral defects in spite of

these reports of problems, and the donor site's cosmetic appearance has typically been outstanding.<sup>8</sup>

### Conclusion

Thus nasolabial flap is a versatile flap that can be used for the reconstruction of various intraoral defects as well as perioral and perinasal defects with a high success rate and better aesthetic outcome. The nasolabial flap has been reported for reconstructing the floor of the mouth, lips, tongue, buccal mucosa, upper and lower alveoli, maxilla, and oronasal abnormalities since these early publications.

### Legend Figures



Figure 1: Diagrammatic Representation of Inferiorly Based Nasolabial Flap



Figure 2: Diagrammatic Representation Of Superiorly Based Nasolabial Flap



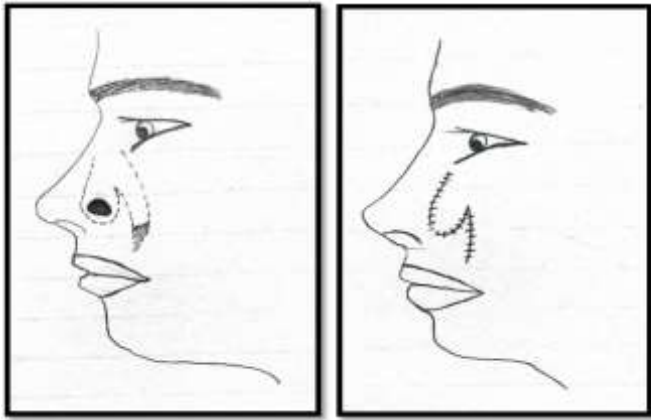


Figure 3 & 4: Diagrammatic Representation of Superiorly Based Nasolabial Flap for The Reconstruction Nasal Defect of Basal Cell Carcinoma.

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