# Salient Points in Reconstruction of Nasal Skin after Tumor Ablation with Local Flaps

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## ABSTRACT

**Objective:** A variety of nasal skin reconstruction methods are available to meet the esthetic patient's needs. In this article, we review some of modifications of these procedures and share our experience in reconstruction of different parts of the nasal skin following skin tumor ablation. **Patients and Methods :** From January 2010 to January 2014, 171 patients underwent nasal skin reconstruction after excising cancerous lesions of the involved nasal skin. The patient's history, pre- and post-operation photographs, and the surgery data were collected and assessed. Demographic data related to the type of cancer, defect size and location, type of reconstruction were collected. **Results:** A variety of local flaps were used based on location and defect features. Nearly all flaps healed primarily without postsurgical significant complications. **Conclusion:** According to the results and the outcomes of the operations, we concluded that a certain flaps are more effective than others in nasal skin reconstruction. Local flap reconstruction of the nose has good esthetic result with low complication rate.

**KEYWORDS:** Defects, local flaps, nasal skin, reconstruction

## INTRODUCTION

The frequency of skin tumors of the nasal region is high. Surgical removal results in loss of the skin that is extremely difficult to repair. Reconstructive rhinoplasty dates back to early writings from India as long ago as 600 BC[1] when amputation of the nose was a form of punishment, thus the demand for nasal reconstruction. At present, the etiology of nasal defects relates mostly to ablation of cutaneous malignancies or external trauma such as accidents, conflicts, or animal bites. New medical advancements have set higher standards for nasal reconstruction. Given the vital functions of the nose in everyday life, it is necessary that the reconstruction of facial defects preserve the integrity of facial functions and expressions, as well as facial symmetries and esthetics. The aim and objective of this study is to explain the modifications of different procedures in nasal defects reconstructions and advantages and disadvantages of each one according to nasal skin subunits. To reconstruct a defect, a surgeon must consider a number of nasal characteristics including inherent structure of the nose with its convex and concave surfaces, symmetry of the nose, limited laxity of the nasal skin, and sebaceous composition of distal nasal skin. To repair such a defect, a full-thickness skin graft or a local flap can be used. If skin grafts are used, the esthetic outcome is usually poor due to the color and texture of the transplanted skin that is different from the quality of the skin removed. Better results may be obtained by extending the excision to entire nasal ala skin; in fact, the final outcome of a skin graft of an entire unit has a more natural appearance.[2] The

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function of the nose must be maintained by preserving or replacing the bony and cartilaginous framework and the mucosal lining without compromising the airway. Both the cosmetic and functional outcomes are desired along with minimal scarring of the donor site. Re-establishing the nose framework is critical to achieving both form and function. Familiarity with a variety of flaps is essential to reach these goals.[3-7]

## PATIENTS AND METHODS

A total of 171 patients referred for excision of skin cancer of the nose from 2010 to 2014. There were 138 males and 33 females, aged 30–80 years (mean = 55), who followed for 12–48 months. The most frequent pathology of skin cancers was basal cell carcinoma (BCC) (142 cases) and squamous cell carcinoma (29 cases). The study was approved by the Ethics Committee and Institutional review board of our university.

Immediately after tumor excision, all wounds were managed surgically including primary closure; local skin flaps including bilobed double transposition flap, nasolabial flap, modified nasalis flap, glabellar flap, dorsal nasal flap, V-Y flap, Rintala flap, or a combination of reconstructive options to preserve the nasal esthetic subunits. We divided nasal skin into three zones according to Mathes and Hentz [Figure 1].[8] The various types of flaps and other characteristics of patients have shown in Table 1. The most common location of tumors was in the tip area (Zone III).

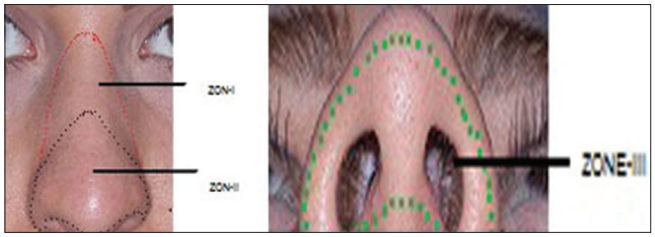


**Figure 1: Schematic representation of nasal skin zones according to Mathes textbook of plastic surgery**

## RESULTS

All flaps healed primarily without postsurgical significant complications and follow-up from 12 to 48 months revealed cosmetically good results without any recurrences to date. The safe margin for tumor excision was 4–10 mm depending on the pathology and tumor size and location; complete excision was confirmed by both frozen section and permanent pathology report. We used epinephrine 1/200,000 for hemostasis in all patients. There were no significant complications in flap reconstructions.

The reconstructive technique was selected according to the size and the location of the defect to achieve an anatomical and esthetically desirable result. Direct closure technique was usually used for defects < 5 mm in diameter in some parts of the nose. Upper nonsebaceous areas proved most amenable for direct closure. Dimension of excision made parallel to Langer lines had better esthetic results. In lower third of the nose because of sebaceous skin, local flaps have better results than direct closure. In this part, we focus on modifications of different local flaps that were used for nasal skin reconstructions after tumor ablation.

### Bilobed flap

Zitelli's flap was one of the most useful flaps for nasal reconstruction.[9,10] The double transposition flap design mobilized the skin, without deformation, over a larger distance. This was used for defects located between 0.5 and 1.5 cm of the distal and lateral aspect of the nose, particularly defects involving the lateral tip, supratip, or tissue near the tip.[9,11,12] We used this type of flap for nasal skin defects in Zone III [Figure 2]; correct designing of lobes and tension-free repair are important for good result and prevention of nasal tip deviation. Our results showed that this flap has better esthetic outcome in smaller defects. It is better for prevention of nasal tip deviation and also tension-free repair in tip area after tumor ablation; we add cartilaginous tip plasty before flap transposition.

**Table 1: Some characteristic of nasal tumors and location of defects and local flaps that used for nasal skin reconstruction after tumor ablation**

| Type of reconstruction | Number | Defect size (cm) | Indication of flaps | Advantage of flap | Disadvantage of flap | Squamous cell carcinoma | Basal cell carcinoma |
|---|---|---|---|---|---|---|---|
| Forehead flap | 8 | 2-3 | Lower third | Good vascularity | Multiple stages operation | 2 | 6 |
| Rintala flap | 25 | 1.5-2.5 | Lower third | Good for larger defects, less ischemia | Large nasal side scar, narrowing of interbrow distance | 5 | 20 |
| Nasolabial flap | 45 | 1.5-2.5 | Lower third | Good for alar defects | Alar retraction, cheek scar | 4 | 41 |
| Banner flap | 15 | 1-1.5 | Upper third | Good contour | Not good for larger defects scar | 4 | 11 |
| Glabellar flap | 15 | 2-3 | Upper third | Single stage-good contour | Narrowing of interbrow distance glabellar scar | 3 | 12 |
| Dorsal nasal flap | 15 | 1.5-2.5 | Lower third | Single stage-good contour | Not good for larger defects scar | 1 | 14 |
| V-Y flap | 8 | 1-2 | Middle third | Single stage-good contour | Not good for larger defects scar | 2 | 6 |
| Bilobed flap | 40 | 1-1.5 | Lower third | Single stage-good esthetic and contour | Not good for larger defects | 5 | 35 |
| Total | 171 | | | | | | |

## Dorsal nasal flaps

The modified nasalis flap was extremely useful for the closure of central and lateral nasal tip and supratip defects of up to 2.0 cm in diameter.[11] We also used Rintala [Figure 3], dorsal nasal flap [Figure 4], V-Y flap [Figure 5], and Banner flaps. Rintala is a random pattern dorsal advancement flap; it has low risk of ischemia in distal part of the flap. We used modified form of this flap that previously we reported. This flap is suitable for nasal tip skin defects after BCC excision.[13] Dorsal nasal flap is an advancement rotation flap of dorsal skin for nasal tip reconstruction. Dorsal pedicle V to Y island flaps worked well on the dorsum of the nose. They take advantage of the loose skin on the upper dorsum of the nose to replace the tighter skin toward the tip. The banner flap is a small rotation–transposition flap for upper lateral nasal skin reconstruction released from the dorsum or glabella. All these flaps are random pattern local flaps; therefore, they provide contour and color similar to original skin of the nose. We must choose flap based on our experience and defect size and location for esthetic nasal reconstruction.

## Nasolabial flap

The nasolabial transposition flap was useful for reconstruction of defects with diameter between 1.5 and 2.0 cm and involving the alar area.[6,14,15] The nasolabial flap is a superiorly or inferiorly based transposition flap that uses the cheek skin and subcutaneous tissue for nasal skin reconstruction or nasal lining reconstruction [Figure 4]. Designing of this flap can be transposition, island, pedicled, in all variations the important point is to reconstruct ala without retraction or deformity that is not rare after this flap reconstruction, and this esthetic point can achieve with correct flap designing and transposition in a suitable alar or lateral nose defect.

## Forehead flap

In general, defects > 2.5–3 cm in diameter were difficult to close with a nasolabial flap. When local transposition flaps were precluded, distant tissue such as a forehead flap was usually required. This axial vascularized flap based on the supratrochlear artery was an effective method for complex nasal tip and supratip defects. We used this flap in two forms of nasal reconstruction namely, pedicled multistage and single stage island


**Figure 2: Nasal tip basal cell carcinoma (a) before operation and bilobed flap designing, (b) 1 week postoperation, (c) 1 year postoperation**


**Figure 3: Nasal alar basal cell carcinoma was reconstructed with V-Y flap from cheek (a) before operation, (b) 1 week postoperation (c) 1 year postoperation**

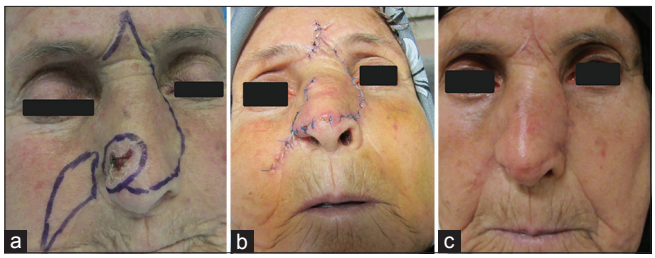


**Figure 4: (a) before operation and designing of flaps, dorsal nasal flap for skin reconstruction, and nasolabial flap for nasal lining reconstruction, also ear cartilage for alar cartilage reconstruction, (b) 1 week postoperation, (c) 3 months postoperation**

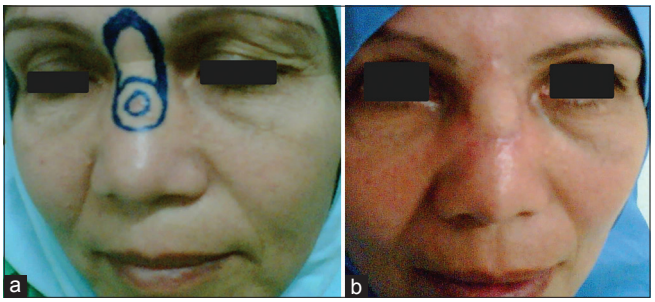


**Figure 5: V-Y flap for dorsal nasal skin basal cell carcinoma reconstruction in zone II (a) before operation, (b) 1 year postoperation**

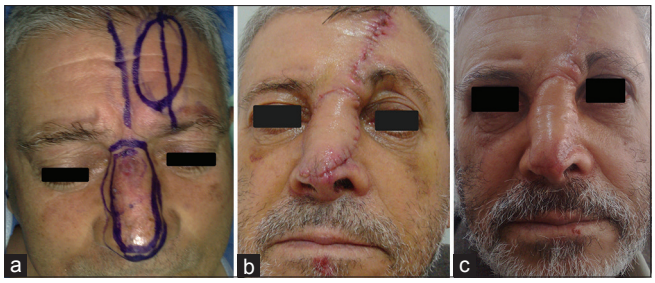


**Figure 6: Island forehead flap for wide nasal skin reconstruction after basal cell carcinoma excision (a) before operation, (b) 1 week postoperation, (c) 1 month postoperation**

flap [Figure 6]. The advantage of single island flap is less morbidity and cost for patient compared to multistage pedicle flap. We reported single stage modification of this flap previously.[16] The most significant advantage of this flap was the ability to bury the pedicle, obviate the second stage, preservation of interbrows distance, and limited scar length in the forehead donor site. In both forms, preservation of vascular pedicle is necessary.

## DISCUSSION

BCC is the most common malignancy in human beings; one of the common locations for this malignancy is the nose. The reconstruction of nasal defects involves many options. Using skin flaps to repair a defect on this area remains challenging. An island flap does not always guarantee the best mobility,[17] which can be increased with a few simple modifications[18] to increase the flap compatibility, adapt to the skin layers,[19] or better correct a circular defect.[20] A rotary flap from the cheek, a modified Texier flap,[21] or a pedicle flap performed at two different sessions[22] could represent a good option.

The "skin helix" flap is a versatile flap can be used on several body sites,[23] also on the face to correct circular skin losses, as well as treat nasal ala loss.

Although the topographic nasal subunit principle of Burget and Menick[24] is important in preoperative analysis and planning of the reconstruction, other esthetic considerations such as skin texture, color, and contour are also crucial.[4,25] A balance must be achieved between these various factors and the patient's medical condition, adjacent tissue availability, skin history, and expectations.[4,26]

Patient's skin history should be considered; scars from previous nasal cancers may necessitate a modified treatment plan. In these patients, a flap may be used to incorporate a past scar; on the other hand, scar tissue may impede the blood supply to a flap.

The reconstructive choice depends on the defect's size, location, and remaining tissues.

Nevertheless, reconstructive plans should be customized and not be based solely on the size or location of the defect.[27] Individualized therapy is important, and various flaps have been designed to treat different defects. We recommend reconstructive plans (reconstructive ladder) and flaps or grafts selected according to the anatomical nasal subunits to be restored.

The basic concern with using a skin graft was the resultant patchwork appearance caused by color mismatch and contour defects.[13] Other concerns such as history of skin defects and smoking are also important; an excellent cosmetic result is the main desire of the patient. However, in some cases with wide superficial tumor surface, it is necessary to use skin graft for nasal coverage. Usually, the skin near the face that has no hair is suitable for grafting. We did not use skin graft for nasal skin defects in this study.

Esser designed the first bilobed flap in 1918 and applied it to the reconstruction of defects of the nasal tip.[27] In 1989, Zitelli adapted the design of Esser's bilobed flap by reducing its rotation angles, and it is one of the most useful flaps for nasal reconstruction.[9,10] It is the choice to repair defects located within 0.5 and 1.5 cm of the distal and lateral aspects of the nose, particularly those involving the lateral tip, supratip, or ala near the tip.[9,24,28] In the lower third of the nose, skin mobility is minimum; a bilobed flap allows the surgical site to be filled with nearby skin, and then a matched flap from nearby donor site can repair the secondary defect. The tip is the esthetic focal point of the nose, and irregularities in color, texture, and thickness are easily noted.[3,4,6,14] The modified nasalis flap provides an additional option for reconstruction of this difficult region.[11,29]

In any facial and nasal reconstruction, complications can occur; these complications sometimes require antibiotic therapy or even secondary surgery. Such complications involve dehiscence of wound, infection of the wound bed, or partial or complete loss of the reconstruction. These complications occur within the first 4 weeks after surgery. Other complications that appear later involve the esthetic aspect, even after a primarily unobtrusive procedure and normal wound healing. Most common esthetic problems are trapdoor or bulkiness in local flaps and color mismatch or atrophy and shriveling of the graft with secondary distortion of the soft tissue in skin grafts.[5-7]

Few studies and case reports about complications and patient satisfaction after facial skin repair are available. Jun-Hui *et al*.[30] reported 19 facial and nasal defects in 17 patients with a subcutaneous pedicle Limberg flap. All flaps healed primarily without postsurgical complications, and follow-up from 1 to 22 months revealed that functionally and cosmetically satisfactory outcomes were achieved. No complications were observed in this

study. Belmahi *et al*.[6] suggested that bilobed flap is a better alternative for nasal small skin defects. Using this method, defects are reconstructed esthetically without any nose anatomy distortion, and skin will have the same color, texture, and thickness. During an average follow-up period of 28 months, all reconstructions were stable with discreet scars and no trapdoor phenomenon. No complications were reported. Although complications occurred in Rustemeyer and Gunter's study,[4] results reported by Copcu[31] and El-Marakby[32] indicate that bilobed or nasolabial flaps are versatile, simple, and easy to harvest and can cover a variety of defects on the face and nasal regions. Bouhanna *et al*.[33] also achieved excellent cosmetic and functional reconstruction in seven cases of nasal alar defects including the alar rim and lobule defect by using superiorly based nasolabial flaps. Hence, one goal of nasal defect repair is to perform the excisions of the lesions according to the nasal subunits as introduced by Burget and Menick.[2]

We had no major complications in this study. Temporary ischemia was seen early postoperation, but there were no significant complications with local flaps nasal reconstructions.

## CONCLUSION

According to the our results and the outcomes of the operations, we concluded that a certain flaps are more effective than others in nasal skin reconstruction. Local flap reconstruction of the nose has good esthetic result with low complication rate.

### 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.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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