



Reconstruction of Nasal Defects with a Two-stage Nasolabial Flap

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Abstract

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BACKGROUND: Reconstruction of nasal defects represents a significant challenge in reconstructive surgery, due to nose's delicate anatomy, combined with its functional and esthetic relevance. Radical tumor excision, function preservation, and a pleasing esthetic outcome are the primary targets. The reconstructive approach will depend on the esthetic subunit involved, size and depth of the defect.

AIM: We describe our experience in the reconstruction of nasal skin defects of the tip, columella, and alae, with a two-stage nasolabial flap.

PATIENTS AND METHODS: After institutional review board approval, a retrospective study was performed including consecutive patients (n = 489) who underwent surgery for skin cancer of the nose, from 2016 to 2020 at the Service of Burns and Plastic Surgery, "Mother Theresa" University Hospital Center, of Tirana.

RESULTS: The procedures were well tolerated and achieved good cosmetic results without complications.

CONCLUSIONS: The nasolabial two-stage-based flap is a well-established technique for nasal reconstruction after skin cancer removal. It represents one of the best methods for repair of extensive nasal defects, particularly for the restoration of defects located on the tip, alae, or columella.

Introduction

The nose is the most prominent and sun-exposed unit of the face, bearing an increased risk for non-melanoma and melanoma skin cancers [1]. The goals of reconstructions for nasal defects must be preservation of the nasal function and a pleasing esthetic outcome.

Nasal reconstruction principles have not evolved much over time. While smaller defects may be reconstructed by primary closure, local flaps or skin grafts, for extensive nasal defects, interpolation flaps can provide better cosmetic and functional outcomes restoring the anatomy and nasal function. The nasal subunit principle of Burget and Menick is incorporated as an important step in surgical planning. In patients with more than 50% of a convex subunit loss (tip or ala), reconstructing the whole subunit is preferable [2]. Placement of incisions along the junction of esthetic units minimizes the scars.

One of the most known interpolation flaps is the two-stage-based nasolabial flap. It is found by us to be a suitable choice for reconstruction of the defects in the nasal tip, alae, and columella. This two-stage surgical procedure uses a temporary bridging pedicle to nourish the transposed tissues until a new vascular supply be established between the wound and the flap, usually after 3 weeks [3], [4]. The main disadvantage of this

technique is the temporary cosmetic deformity, which is solved after dividing the pedicle, without mentioning the fact that the patient needs to go twice to the operating theatre. Another disadvantage is the scarring in the donor area, which becomes conspicuous with a meticulous surgical technique. Pincushioning effect can also be a problem, which might be minimized with more vigorous trimming of the flap and other auxiliary procedures after completing the reconstruction.

Materials and Methods

After institutional board review approval, a retrospective study was performed on consecutive patients (n = 489) who underwent nasal surgery for skin cancer from 2016 to 2020 at the Service of Burns and Plastic Surgery "Mother Theresa." Based on the review of the database, the following demographic and surgical data were analyzed: Patients' age, sex, comorbidities, size and location of the defect, method of reconstruction, anesthesia type, and post-operative result.

A total of 489 patients were included in the study. The age of the patients ranged from 20 to 96 (mean = 66), with predominance of men (303 men/186 women). The male gender seems 20% more affected by nose cancer (Figure 1).

We see a positive growth tendency of nasal cancer by 2% to 3% on a yearly basis, (exception is Year 2020 that is influenced from the pandemic situation), while in general, the peak months seems to be September and October (Figure 2).

At least, one comorbid disease was seen in 320 of patients, such as hypertension, diabetes mellitus, or smoking. Excision of malignant skin tumors (380) was the most common reason of the operation, followed by excision of benign and premalignant skin tumors (109).

Immediately after tumor excision, all wounds were managed by one of the following procedures: primary closure, local skin flaps, glabellar flap, nasolabial flap, paramedian forehead flap, or FTSG (Figure 3). When excision includes bony or cartilagenous support as well as mucosa, replacement of lost part should be done following the surgical principle replacing like with like [5]. The excisions were performed under local anesthesia or local anesthesia plus intravenous sedation and very rarely under general anesthesia.

The nose was divided into three subunits for the description of the location of defects: sidewalls and dorsum, tip region and alar region. Two hundred and fifty-eight defects were located on the sidewalls and dorsum, 85 defects were located on the tip region, 76 on the alar region, and 70 were located on two or more adjacent areas (Figure 4).

From 93 cases that were solved with a nasolabial flap, 38 cases were transposition type nasolabial flap, 34 cases were V-Y advancement type nasolabial flap, 10 cases subcutaneous pedicled nasolabial flaps, and 4 cases two-stage nasolabial flap (Figure 5).

V-Y advancement type nasolabial flap and subcutaneous pedicled nasolabial flaps were used in the repair of the defects in the sidewalls and dorsum. Transposition type nasolabial flap was used in the repair of defects in the alar and tip region. Two-stage nasolabial flap was the treatment of choice for complex and medium size defects of the tip, ala and/or columella. From four cases, two needed support with cartilage and this was done with an auricular graft in one case and septal hinge flap in the other.

The raw surface of the pedicle was not covered with skin graft, but treated with Vaseline gauze, which was changed on the 3rd day of the operation, and afterward, the patients were instructed to change the gauze themselves every other day. The flap was observed again, and sutures were removed on the 7th day of the operation.

In all the cases, division of the pedicle was done on the 22nd day after the initial operation. No modification of the flap was done at that stage, with the aim of not disturbing the newly established blood supply to the flap. Careful approximation of the wound edges was performed, leaving more tissue at the beginning, and trimming it sequentially: moderate tension to the closure was aimed to avoid future bulkiness. In only

one of the cases, the most proximal part of the pedicle was reinserted at the donor site; in three others, pedicle remained after the division was discarded, such a maneuver allowing a better esthetic appearance of the nasolabial fold. Two of the cases were reoperated 6 months after the second operation: defatting of the bulky flap was done and recontouring of the alacolumella junction (soft triangle) was attempted.

Case Report

Case 1



A 59-year-old woman was operated for a squamous cell carcinoma (SCCs) 2 years before she consulted us. The defect was closed primarily, and after the histopathology results, she was referred to

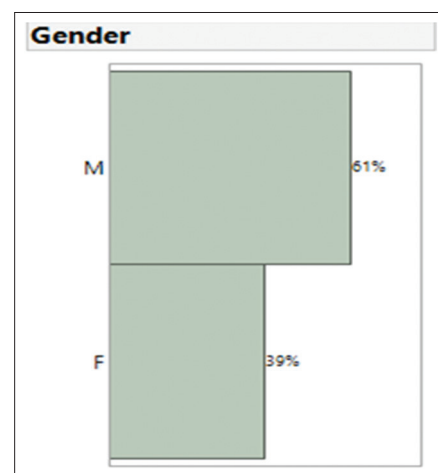


Figure 1: Nose cancer distribution based on sex

the Oncology Department of the UHC Mother Theresa. Some radiation treatment was recommended to her, and after that, a defect was created at the left alar rim. The previous surgeon, who removed the lesion initially, attempted twice to close the alar gap by simple approximation, attempts that resulted unsuccessful (above the left). Hence, a two-stage nasiolabial flap was done (above the right) and the result after 4 years is stable and esthetically pleasant (below the left and right).

Case 2

A 60-year-old male represent a lesion involving the tip 1/3 of the columella as well as alar margin close to soft triangles (above the left). A broad excision was done with 3 mm of free margins. Reconstruction was discussed between a paramedian forehead flap and a staged nasiolabial flap) but was finally done by a pedicle nasiolabial flap, which was left in place for 23 days (above the middle and right). A template was created to mimic the defect, and this was transposed to the most apical part of the flap to be raised. The primary closure of the donor site was achieved even though width of the flap was considerable. On division of the flap, the pedicle was set back to the recipient area and no further manipulation of the flap was done (middle left). Six months later (middle right), the patient was taken to the OR for further improvement of the flap: 5/8 of the perimeter of the flap was incised, flap was extensively defatted and some infolding of it was done at the corresponding areas of the soft triangles, helped with mattress sutures to keep the infolded parts well attached to the flap (below the left and right). No healing issues were observed.



Discussion

Nose is one the most prominent features on the face and a common site of tumors because of its cumulative exposure to sunlight. Basal cell carcinoma is considered the most frequent type of skin cancer, followed by SCCs [6].

Multiple options exist for the functional and esthetic nasal reconstruction after skin cancer removal, such as primary closure, local flaps, or grafts. However, reconstruction of complex nose defects is challenging. In these cases, the surgeon must ensure that beyond skin cover, mucosal lining, and support (cartilage and bone) requirements are met. Although the subunit principle of Burget and Menick is important for achieving good results, other esthetic considerations such as skin texture, color, and contour are crucial [2], [7]. Reconstructive plan should be customized to the patients' medical condition and expectations.

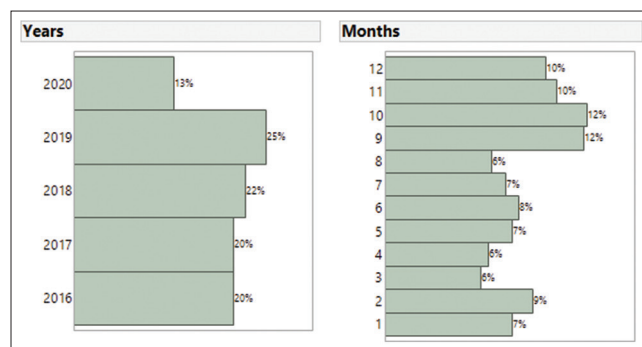


Figure 2: Intervention distribution by years and months

For small defects of <1 cm, primary closure are used. Dorsum and sidewalls were most amenable for primary closure. The margins of the surgical defect should be closed under minimal tension after sufficient undermining is accomplished.

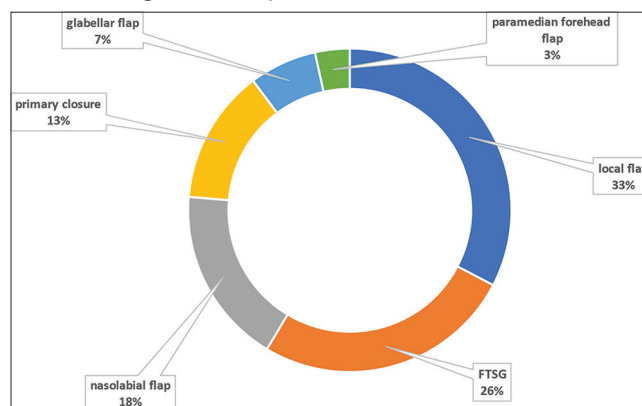


Figure 3: Surgical wound management of the nose (258 cases)

Although skin grafting is not considered a good option for reconstruction of nasal defects due to color and texture mismatch, it can be used successfully for small, superficial defects, or in patients who refuse to undergo a staged procedure. In this series, 26% of the cases were solved with FTSG with overall satisfactory

results, representing a simple and useful technique in carefully selected patients.

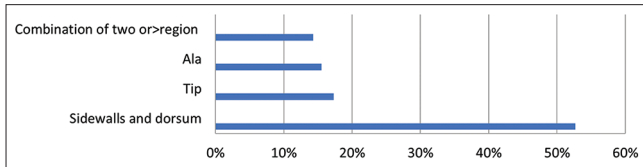


Figure 4: Nose cancer distribution based on localization

Dorsal nasal flap is a highly recommended flap for closure of defects of the lower third of the nose. However, authors recommend not to use it when the defect goes beyond the tip defining points [8].

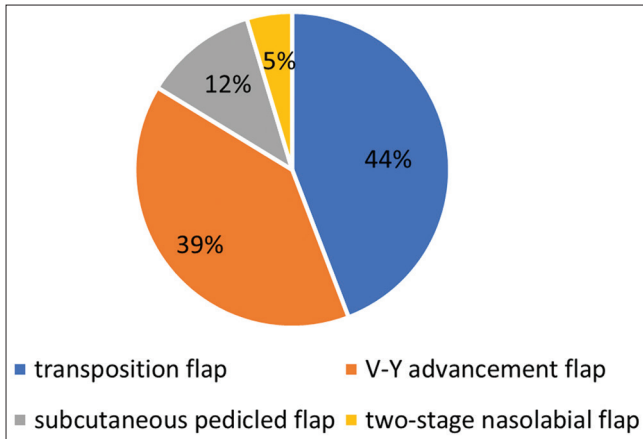


Figure 5: Types of nasolabial flaps used to reconstruct the nasal defects (93 cases)

Defects of >2 cm are reconstructed with a paramedian forehead flap. The PFF is the workhorse for nasal defects. It is traditionally described as a staged operation; 2 or 3 stages. In our experience, PFF was used in complex, large and deep surgical defects of tip, ala, and dorsum, as a two-stage procedure. The flap is based on the supratrochlear artery, which exits the orbit 1.7–2.2 cm lateral to the midline at the level of the orbital rim [9]. Its excellent blood allows the use of free cartilage or bone grafts within the same operation.

The nasolabial flap is one of the most used flaps for reconstructions of nasal defects [10]. Rich blood supply, well-camouflaged scar, hidden in the nasolabial fold, proximity, and compatibility with the skin characteristics of the nose: color, texture, makes it an ideal reconstructive modality for small and moderately sized defects. Nasolabial flaps are usually used as transposition, V-Y advancement, subcutaneously pedicled island, and two-stage interpolation flaps. Classically, this flap is not the flap of choice for nasal tip defects because of the pincushion effect in the long term. However, vigorously trimming and defatting of the flap in the initial as well as during the pedicle division can minimize this disadvantage [11], [12].

Recent modifications of this flap, when used for defects of the tip, suggest: Design of the flap and vigorous thinning of the flap before flap inset, liberal use of alar cartilage grafts to prevent cicatricial distortion of the nasal ala or tip, inset of the flap under a slight degree

of tension, continued vigorous defatting and thinning at the time of flap division and inset, and liberal use of post-operative dermabrasion, could further improve the final result [13].

In our practice, as we have illustrated with the above cases, we use the two-stage nasolabial flap when insufficient tissue in nearby skin prevents coverage with an adjacent flap like the dorsal or Miter flap. This method is suitable for patients who have either ala tip or columella defects; however, most of our alar reconstructions are solved with a simple nasolabial flap. The main reason for using this flap rather than another flap is that other flaps can deform the alar facial sulcus and lateral portion of the alar groove. Pedicle of the flap crosses over the alar facial sulcus and is detached from the cheek after 3 weeks from the initial procedure. The authors prefer waiting 3–4 weeks to allow adequate time for the edema to resolve and to allow maximal vascularity.

Conclusions

The two-stage nasolabial flap is a safe option for repairing nasal surgical defects affecting the nasal ala and columella, yielding a good functional and esthetic outcome. The flap could be extended to reach and the nasal tip. It matches the requirements of complex reconstruction. Accurate planning and execution technique are important for a good surgical outcome.

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