The Evaluation of Surgical Outcomes in Skin Tumors of the Nose: Our Experience

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Abstract

Objective: The nose is a common site for skin tumors because of its location on the face and it being exposed to sun. This study aimed to evaluate the tumor characteristics and reconstruction techniques in patients who underwent surgery for nasal skin tumors.

Material and Methods: Eighty-six patients who were operated in Manisa, Department of Otolaryngology Head and Neck Surgery between 2007 and 2017 were included in the study. The sociodemographic data, size, depth, volume, and histopathological type of the tumor; the reconstruction technique; and surgical outcomes were evaluated.

Results: The mean age of all patients was 64.8 years (range between 18 and 86 years). Among them, 45 patients were female, and 41 were male. Tumor histopathology was defined as basal cell carcinoma in 57 patients, squamous cell carcinoma in 14 patients, malignant melanoma in one patient, and solar keratosis in three patients. Local and regional flaps were used in 57 patients, primary repair in 17 patients, skin grafts in eight patients, and other techniques in four patients. The paramedian forehead flap and the melolabial flap were the most common and the second most common flap techniques, respectively.

Conclusion: The most common histopathological type in nasal skin tumors is basal cell carcinoma. The nasal reconstruction technique should be individualized based on the size, and depth, and location of the defect that occurs after tumor excision.

Keywords: Nasal skin cancer, nasal reconstruction, basal cell carcinoma, squamous cell carcinoma

INTRODUCTION

The nose is located at the midface, and determines it the characteristic of face owing to its anatomy, physiology, and aesthetic appearance. Structurally, the nose involves three layers: 1) inner layer involving mucoperichondrium/periosteum and nasal vestibule skin; 2) framework including upper and lower lateral cartilages, quadrangular cartilage, nasal bones; and 3) outer layer consisting of skin, subcutaneous tissue, and muscles. The outer layer is mainly grouped into three zones according to degrees of subcutaneous fat, skin thickness, sebaceous content and mobility: Zone 1: non-sebaceous, thin, and mobile skin (upper dorsum and sidewalls); Zone 2: sebaceous, thick, and semi-mobile skin (supratip, tip, and alar lobules); Zone 3: non-sebaceous, thin, non-mobile skin (soft tissue triangles, infratip lobules, and columella). Moreover, the nose is aesthetically divided into five different subunits: 1) dorsum, 2) sidewalls, 3) tip, 4) alar regions, and 5) columella (1).

Skin cancers are the most common cancers, and they are histopathologically divided into malignant melanoma (MM) and non-melanoma skin cancers (NMSC). Approximately 80% of all NMSCs are in the head-neck area, and they are most commonly seen on the nasal skin (2). The gold standard and most commonly used treatment for nasal skin cancers is surgical excision. Many techniques have been described for nasal reconstruction such as primary closure, secondary healing, skin grafts, and flaps.

In the preoperative evaluation and reconstruction planning, nasal subunits and aesthetic properties such as color, contour, and structure of the nasal skin are very important, and all of them should be balanced to achieve the best

Cite this article as: Tanyeri Toker G, Temiz P, Dombaycı O, Eskiizmir G. The Evaluation of Surgical Outcomes in Skin Tumors of the Nose: Our Experience. Eur J Rhinol Allergy 2018; 1: 58-62.

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Received: 11.10.2018

Accepted: 21.01.2019

DOI: 10.5152/ejra.2019.55

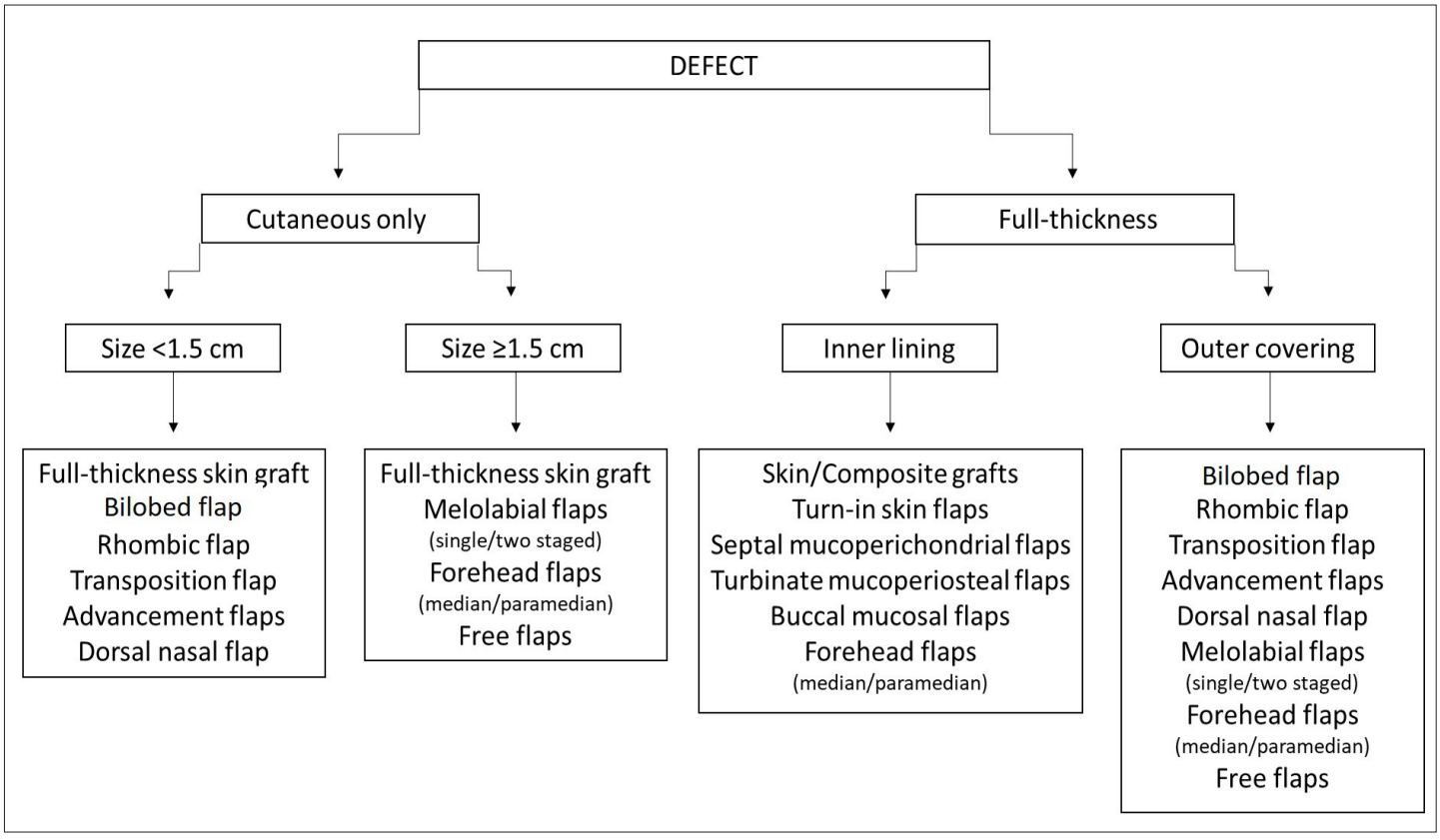

Figure 1. The algorithm for nasal reconstruction (1)

result. The nasal anatomy of each patient should be individually evaluated to ensure symmetry in the reconstruction.

The aim of this study was to evaluate tumor characteristics and reconstructive techniques after removal of nasal skin tumors.

MATERIAL AND METHODS

This study was performed after approval by the institutional review board (15.08.2018-20.478.486). Written and signed informed consent form was taken from all patients.

Patients

Ninety-eight patients who were operated in Manisa, Department of Otolaryngology Head and Neck Surgery between 2007 and 2017 were retrospectively examined. Eighty-six patients whose medical records were complete were included in the study.

Surgical Techniques

The same surgeon (G.E.) operated all patients. An incision line was identified around the lesion by marking the surgical margin according to histopathological type (5–7 mm in basal cell carcinoma (BCC), 7–10 mm in squamous cell carcinoma (SCC), and 15 mm in MM). Local anesthetic infiltration was performed on the incision line and deep into the tumor. The tumor was excised and marked for pathological examination. After removal of the tumor, strip-shaped tissues from the defect site were sent to the frozen section examination to control the surgical margin, if necessary. All patients were reported to have no tumors at the surgical margins, and the defect was reconstructed thereafter. There construction techniques were determined according to the location, size, and thickness of the defect. For nasal reconstruction, primary closure, skin grafts, local-regional flaps, and other techniques were used. The algorithm used in selecting the reconstruction technique is presented in Figure 1 (1).

i. Primary Closure: This technique was generally applied to nasal defects which are <1.5 cm on the dorsum or sidewalls.

ii. Skin Grafts: Full thickness-skin grafts were preferred as skin grafts. Since the two-thirds of upper part of the nasal skin is thin and mobile, and contains less sebaceous glands, defects including only skin of this region were reconstructed with skin grafts. Postauricular or supraclavicular regions were used as donor sites.

iii. Flaps: Flaps were preferred for repair in deep soft tissue defects extending to cartilage or bone. Local nasal and regional [particularly paramedian forehead flap (PMFF) and melolabial flap] were was the most common flap techniques. Therefore, we briefly explained the local and regional flap techniques below.

1. Local Flaps: Local nasal flaps used in this study were 1) dorsal nasal flap (Rieger flap), 2) bilobed flap, 3) advancement flap (Rintala flap), and 4) rhombic flap. Local nasal flaps provide ideal skin color, thickness, and matching texture as they are adjacent to the defect area. Therefore, almost perfect aesthetic results can be obtained when the most appropriate flap technique is selected.

2. Regional Flaps: Regional nasal flaps used in this study were 1) PMFF, 2) melolabial flap, and 3) V-Y advancement flap. Regional flaps are designed to reconstruct the large or full thickness nasal defects from adjacent areas such as forehead and cheeks.

- **PMFF:** All flaps were designed as a two-staged procedure that we had reported previously (3). Preoperatively, the transverse axis of the superior orbital rim and the vertical axis of the medial canthus were marked as the "primary lines" on the forehead. The medial and lateral borders of the pedicle were marked as the "secondary lines" after measuring 7 mm medial and lateral to the medial canthal vertical line. The lower border was marked at 1 cm above the superior orbital rim. Then, the size of the defect was measured and marked on a template. This template was prepared from a suture package to transfer the size and shape of the defect to the donor area. Local anesthetic infiltration [lidocaine (1%) + adrenaline (1:100.000)] was performed on the incision lines and deep into the donor area. Incisions were made, and the flap was elevated until the lower border. The donor area was sutured in layers by primary closure. Finally, the flap was harvested, transposed, and sutured to the defect area. All flaps were separated on the postoperative second week (Figure 2).
- **Melolabial Flap:** First, local anesthetic infiltration [lidocaine (1%) + adrenaline (1:100.000)] was performed to block infraorbital nerve. The defect size was measured, and it was then transferred via a template as mentioned in PMFF. Medial edge of the template was placed on the melolabial crease and marked. Then, incisions were performed, and the flap was elevated in a subcutaneous plane. The donor area was undermined, and it was closed primarily. All flaps were separated on the postoperative second week.

Statistical Analysis

The sociodemographic data, size, depth, volume, and histopathological type of the tumor; the reconstruction technique; and surgical success were evaluated and recorded. All statistical analysis was performed using the Statistical Package for Social Sciences version 15.0 for Windows (SPSS Inc.; Chicago, IL, USA). The mean values and standard deviations were calculated according to sociodemographic and clinicopathological characteristics of study population.

RESULTS

Sociodemographic Data

In the study population of 86 patients, 45 (52.3%) were female and 41 (47.3%) were male. The mean patient age was 64.8 years (range from 18 to 86 years). The mean follow-up period was 62 months (ranged from 8 months to 10 years). None of these patients had a major complication, graft/flap failure, or recurrence.

Tumor Characteristics

Tumor histopathology was defined as BCC in 57 (66.3%) patients, SCC in 14 (16.3%) patients, MM in 1 (1.2%) patient, and solar keratosis in 3 (3.5%) patients. According to the pathology reports, the mean value of the tumor size was 1.94 cm (ranged from 0.3 to 5.0 cm) while tumor depth was 1.63 cm (ranged from 0.2 to 5.0 cm) and tumor volume ranged from 0.01 to 45.5 cm^3 with a mean value of 5.4 cm^3.

Reconstruction Techniques

A total of 86 patients who underwent nasal reconstruction after removal of skin tumor were treated with the procedures described above. Local and regional flaps are the most commonly used reconstruction techniques (n=57, 66.3%) (Table 1). Moreover, primary closure (n=17, 19.8%), skin grafts (n=8, 9.3%), and other techniques (n=4, 4.7%) were performed. The flaps used for nasal reconstruction were presented in Table 1.

Surgical Outcomes

The surgical margins were negative in all patients; therefore, re-excision was not necessary. There was no recurrence in the follow-up period. No complete or partial flap necrosis was encountered. No dog's ear deformities, abnormal scar tissue, tenting, or flat nose occurred in any of the patients. In terms of color and texture, aesthetically acceptable to good results were obtained. The nasal contour was distinct in all patients.

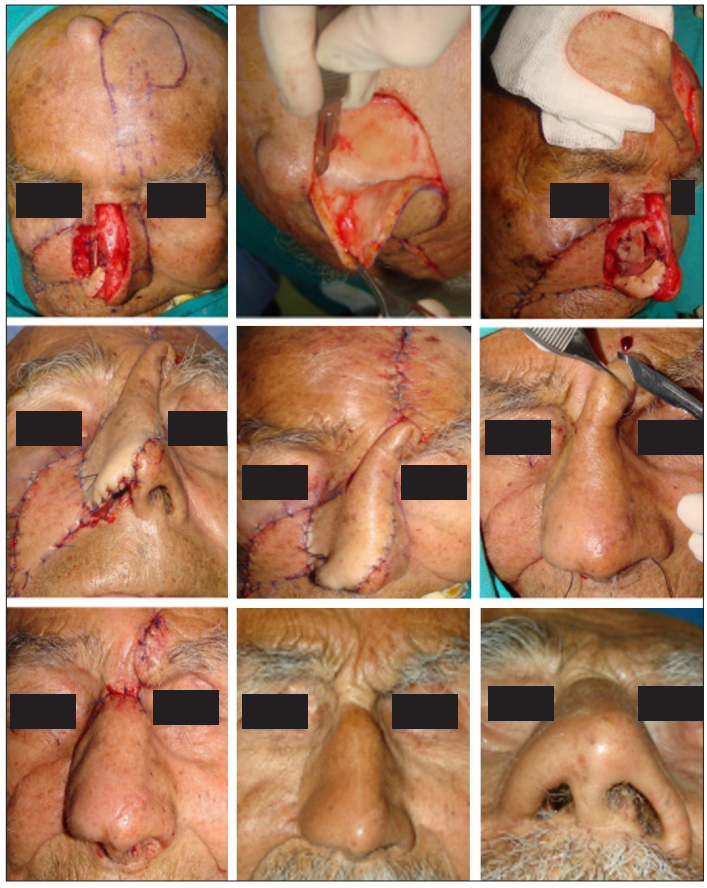

Figure 2. Paramedian forehead flap

Table 1. Local and regional flap techniques

Flap Techniques	Patients	%
Paramedian forehead	27	31.3
Melolabial	16	18.6
Dorsal nasal	4	4.6
Bilobed	3	3.4
Advancement	3	3.4
Rhombic	2	2.3
V-Y advancement	2	2.3

DISCUSSION

The nose is a common site of skin tumors due to its location in the face and it being exposed to sun. After tumor resection, reconstructions of nasal defects are closely related to the nasal anatomy, physiology, and topography. Prior to the reconstruction plan, support structures, deep features, vascular feeding, and aesthetic units of the nose should be considered. In 1956, Gonzalez-Ulloa identified the specific topographic subunits of the nose as dorsum, sidewalls, alar regions, nasal tip, soft triangles,

and columella (4). Millard and Burget and Menick brought a different perspective to the reconstruction of the nose. They revealed that it is not enough to dominate the various techniques to create a normal-looking nose, but aesthetic appearance is also necessary (5-7).

Therefore, these authors divided the nose into five aesthetic subunits: dorsum, sidewalls, alar regions, tip, and columella. Moreover, they reported a "subunit principle" depending on the differences of subunits' topography, skin thickness, and texture. According to this principle, the entire aesthetic subunit should be removed when the defect covers more than 50% of the subunit. In addition, incisions should be made along the boundaries of these aesthetic units to close the defect and keep the scar obscure; thereby aesthetically better results can be obtained. On the contrary, Rohrichet al. suggested the reconstruction of only the defect area (8). Eskiizmir et al. reported that the ideal technique for nasal reconstruction should be chosen based on the location, size, and thickness of the defect, and they offered an algorithm for the selection of the nasal reconstruction technique (Figure 1) (1). Based on this algorithm, we evaluated the tumor characteristics and reconstruction techniques in this study.

Evaluation of Demographic Data

Our study demonstrated that nasal skin tumors were frequently found at the sixth decade (between 18 and 86 years, mean 64.8 years). Consistent with this data, the incidence of skin cancers are significantly high after 60 years of age (9). In this study, a slight predominance of female patients (52.3%) was detected. Two studies which were conducted in different districts of Turkey determined that skin cancers were more common in women, even though a male predominance was reported in literature (10, 11). This gender difference may be explained by the fact that women are working in agriculture since younger ages and for a longer time without sun protection in Turkey. In addition, it is suggested that the occurrence of these tumors in older ages is the result of long-term exposure to ultraviolet radiation (12).

Evaluation of Tumor Characteristics

Tumor Histopathological Type: BCC is the most common, and SCC is the second most common histopathological type of skin tumors, and both have an increasing incidence (13, 14). On the other hand, MM is the least common histopathological type of skin tumors; however, it has a high mortality rate. According to the literature, the incidence of these skin cancers is 75% for BCC, 20% for SCC, and 5% for MM (15). Furthermore, the ratio of BCC to SCC was reported to be 3–4:1 in the literature (16, 17). Our results were correlated with the literature; and BCC was detected in 66.3% of the patients, SCC in 16.3%, and MM in 1.2%. In addition, our data demonstrated that BCC/SCC ratio was 4:1.

Tumor Size: According to the literature, large-sized BCCs (>10 mm for head-neck) have an aggressive pattern. The tumor size for SCC is a hallmark of the staging criteria of the American Joint Committee on Cancer, and it is directly related to high-risk (>20 mm) pathological features (18, 19). In our study, the mean value of tumor size was 1.94 cm, which indicated high-risk NMSCs. Although the risk of recurrence increases in high-risk tumors, no recurrence was determined in our patients. We believe that the absence of tumor recurrence was related to the proper surgical technique and oncologic approach.

Tumor Depth: Tumor depth/thickness is the most important factor for prognosis and predictor of metastasis in MM and SCC (20, 21). Preoperative assessment of the tumoral depth may affect the treatment approach in MM. In our study, there was only one patient with MM. Therefore, it was not possible to compare the tumor depth with the other tumor histopathological types. However, the mean value of tumor depth was 1.63 cm. A thickness exceeding the epidermis like this value is evaluated in the high-risk group for SCC, but none of our patients with SCC had metastases or recurrences.

Tumor Volume: Tumor volume has been reported as a prognostic factor in MM (22-25). In addition, Voss et al. reported that the logarithmic tumor volume is a better prognostic factor than Breslow tumor thickness in multivariate analysis, and MM with a tumor volume less than 140 mm^3 has a significantly higher relapse-free survival after 5 years of 98% versus 47% in larger MM (26). Unfortunately, the role of tumor volume in NMSCs was inadequately reviewed in the literature. In our study, we evaluated the tumor volume in all histopathological types, and we found that the mean value of the tumor volume was 5.4 cm^3. This value is above the threshold of 140 mm^3 defined for MM. Since there is no threshold value defined for other histological types, it is not possible to comment about tumor volume. It is noteworthy that there is a need for more comprehensive studies in which the correlation between tumor volume and recurrence were evaluated in NMSCs.

Evaluation of Reconstruction Techniques

In preoperative reconstruction planning, the size and depth of the defect, nasal subunits, as well as other aesthetic features such as color, contour, and structure of the nasal skin are important, and all of them should be balanced to achieve the best outcome. In addition, the nasal anatomy of each patient should be individually evaluated, and the patient's expectations should be considered (1). In this study, we evaluated various factors such as the tumor, defect, and patient characteristics in reconstruction planning while we assessed our experience in nasal reconstruction.

Primary closure is the easiest reconstruction technique, and it is used for small defects on the nasal dorsum or sidewalls. Skin grafts are generally preferred in the repair of two-thirds of upper part of the nose because nasal skin is thin and easy-moving, and it contains less sebaceous glands in this region. Flaps are preferred for repair in deep soft tissue defects extending to cartilage or bone (1). In this study, flaps (66.3%) were the most preferred reconstruction techniques followed by the primary closure (19.8%) and skin grafts (9.3%). The PMFF (31.3%) was the most common, and the melolabial flap (18.6%) was the second most common flap technique. We generally preferred primer closure, skin grafts, or local nasal flaps for small cutaneous defects and regional flaps for large cutaneous defects. In addition, the defect size is larger because of the surgical margins in SCC and MM when compared with BCC. Therefore, the histopathological type of the tumor is also important for the selection of the reconstruction technique.

Evaluation of Surgical Success

None of the patients had recurrences. We think that this success depends on complete surgical excision of all the tumors and the negative surgical margins in all patients. In literature, tumor recurrence rate was reported to be 35% when the surgical margin was positive (27). Therefore, we use staged surgery with histopathological examination of permanent pathology or frozen section in patients with high-risk of recurrence to provide complete surgical excision of the tumor. In our previous study, we reported that staged surgery with histopathological examination of permanent pathology reduces recurrence risk and is an oncologically safe method. The skin lesions on the nose are very suitable for this method (28).

According to the literature, the overall success rate of the interpolation flaps in nasal reconstruction was reported to be 94.4% (29), while the overall graft success rate was 79% (30). No graft/flap failure was encountered in our study. We think that this success was achieved with a comprehensive preoperative evaluation, well-designed reconstruction, and good understanding of the nasal anatomy.

CONCLUSION

The most common histopathological type in nasal skin cancers is BCC. The gold standard and most commonly used treatment for nasal skin cancers is surgical excision. Many techniques have been described for nasal reconstruction such as primary closure, secondary healing, skin grafts, and flaps. In our experience, flaps were the first option for nasal reconstruction. Defects that occur after excision of nasal skin tumors should be repaired according to the aesthetic subunits, considering tumor size, depth, and volume. The ideal reconstruction technique may be selected with this approach to obtain oncologically and aesthetically acceptable results.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of Manisa Celal Bayar University (15.08.2018-20.478.486).

Informed Consent: Written informed consent was obtained from the patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Consept - G.T.T., P.T., O.D., G.E.; Design - G.T.T., P.T., O.D., G.E.; Supervision - G.T.T., P.T., G.E.; Materials - G.T.T., O.D., G.E.; Data Collection and/or Processing - G.T.T., P.T., O.D., G.E.; Analysis and/or Interpretation - G.T.T., P.T., O.D., G.E.; Literature Search - G.T.T., O.D., G.E.; Writing Manuscript - G.T.T., P.T., O.D., G.E.; Critical Review - G.T.T., P.T., G.E.

Conflict of Interest: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

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