

# Nonmelanoma facial skin cancer: surgical planning for resection and reconstruction

Nasr Al-Qadasi, Yahia Al-Sayaghi, Abdullfatah Al-tam, Raddad AL-Fakih

Department of General Surgery, Faculty of Medicine, Sanaa University, Sanaa, Yemen

Correspondence to Nasr H. Al-Qadasi, MD, Department of General Surgery, Faculty of Medicine, Sanaa University, Sanaa 00967, Yemen. Tel: +967711940010; e-mail: dr.nasr.hamid@gmail.com

**Received:** 30 November 2023

**Revised:** 11 December 2023

**Accepted:** 18 December 2023

**Published:** 22 March 2024

*The Egyptian Journal of Surgery* 2024, 43:398–406

## Introduction

The most effective treatment for nonmelanotic fascial skin cancer is surgical excision. Preoperative planning and a thorough grasp of reconstructive procedures, such as primary closure skin grafting, locoregional tissue flaps, remote tissue flaps, and free tissue transfer, are essential for the surgical therapy of these tumors. The choice of nonmelanoma skin cancer (NMSC) therapy is very specific to each patient and is influenced by the patient's age, size, histologic subtype, and location of the disease.

Treatment is to obliterate the lesion while maintaining normal tissue, function, and appearance. The ideas and methods of surgical excision and reconstruction of skin malignancies unique to the face were covered in this study.

## Patients and methods

This study involved 98 patients of various ages and sexes. Of them, 89% had basal cell carcinoma and 11% had squamous cell carcinoma, both low-and high-risk tumors with varying sizes, locations, and histological subtypes. A safety margin of 3–5 mm is used for excision of low-risk malignancies and 5–10 mm for high-risk cancers. In 17 patients, skin grafts (split-thickness skin grafts and full-thickness skin grafts) are employed. 56 patients underwent local advancement, transposition, and rotational flaps; 15 patients underwent regional interpolation flaps; 6 patients sustained neck lymph node infiltration so they underwent cervical block dissection and distant pedicled flaps as latissimus dorsi muscle flaps; and 4 patients underwent cervical block dissection and free tissue transfer.

## Results

Six patients experienced problems in the form of two partial graft and flap losses, two wound infections, and one scar retraction; however, with targeted care, they recovered well. Ninety-two percent of patients found the cosmetic outcomes satisfactory, and the functional outcome was good.

## Conclusion

Wide excision and appropriate surgical reconstruction are ideal treatment modalities and may yield good aesthetic results or functional outcome, also the use of split-thickness skin grafts does not come as a first priority, where a lot of cases could have been treated with local flaps, as demonstrated in this consecutive series of treated patients. Treatment of NMSC on the face required a basic knowledge, presents a challenge to plastic surgeons, and is based on achieving the best oncological, functional, and cosmetic result. It is crucial to emphasize the need of patient education and appropriate tumor monitoring after NMSC therapy. A review of a big series of facial malignancy that may guide further studies cannot be understated.

## Keywords:

nonmelanoma, reconstruction, surgery

*Egyptian J Surgery* 43:398–406

© 2024 The Egyptian Journal of Surgery

1110-1121

## Introduction

Nonmelanoma skin cancer (NMSC) is the most prevalent type of cancer worldwide and is on the rise [1]. In Yemen, nonmelanoma skin cancer is the most often diagnosed cancer. Unfortunately, due to the underreporting of NMSC incidence and outcomes and the exclusion of NMSC from typical cancer databases, the incidence in Yemen is likely underestimated [2]. The difficulties in providing cancer care in Yemen demand cautious resource allocation. Squamous cell carcinoma (SCC), which

makes up 15–20% of NMSC cases, and basal cell carcinoma (BCC), which accounts for 75–80% of these cases, are the two most prevalent kinds of NMSC. Approximately 85% of cases of NMSC occur in the head and neck, and surgery is still the primary therapeutic option. Regrettably, the incidence

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

in Yemen is most likely understated since typical cancer databases do not contain NMSC [2,3], so, the incidence and outcomes are underreported. Although NMSC, and especially BCC, seldom pose a threat to life, their local invasion can still result in significant morbidity. Compared with basal cell carcinoma, SCC has a significantly greater propensity to metastasize, which increases its associated morbidity and mortality [4,5]. There are several additional less common NMSC diseases such as sarcoma, cutaneous lymphoma, and Merkel cell cancer. Although there is a variety of potential for these diseases to spread, the overarching premise of managing NMSCs, is that early detection and treatment, for improving both functional and oncologic patient outcomes [6,7]. For NMSC, a wide range of therapeutic techniques are available, such as photodynamic therapy, radiation therapy, electrodesiccation and curettage cryotherapy, brachytherapy, Mohs micrographic surgery, topical and intralesional agents, and surgical excision (Table 1). In this study, we will concentrate on surgery for NMSC. Comprehensive surgical management of NMSC requires clinicians managing these patients to have a thorough understanding of the epidemiology, etiology, preoperative considerations, surgical, options, and postoperative algorithms for

each patient and pathology encountered. For individuals who meet the criteria, the gold standard for treating high-risk NMSC is Mohs micrographic surgery. Unfortunately, financial, geographical, or medical limitations may prevent this surgery from being offered. In the event that Mohs micrographic surgery is not performed, this research will provide an overview for the treatment of non-melanoma face skin cancer.

**Patient and methods**

Patients with nonmelanoma face skin malignancies were enrolled in this prospective cohort trial, which ran from July 2019 to November 2021. There were 98 individuals with facial NMSC, ranging in age from 34 to 70 with a mean of 57 years. There were 40 female patients and 58 male patients. We did a physical examination and a comprehensive medical history before taking a sample of a suspicious lesion. Every patient has their risk factors for tumor growth and metastatic dissemination evaluated. During the examination, we evaluated the draining lymph nodes, the size and location of the lesion. When doing a biopsy, care must be taken to make sure the sample is 3 mm wide and deep enough to reach the

**Table 1 Comparing treatment modalities for low-risk and high-risk nonmelanoma skin cancers**

Treatment modality	5-Year recurrence rate	Benefits	Limitations
<b>Low-risk lesions</b>			
Standard surgical excision	2–5% BCC/SCC	Provides lowest rates of recurrence	Invasive procedure; outcomes highly dependent on surgeon
Electrodesiccation and curettage	1–9% BCC/SCC	Less invasive when compared with surgical excision	Does not permit histologic margin assessment; secondary intention wound healing results in hypopigmented scar; produces post-procedural alopecia in hair-bearing areas
Brachytherapy radiation therapy	1–8% BCC/SCC	Produces high-dose radiation with minimal impact to surrounding structures	Not readily available in many regions
External beam radiation therapy	5–15% BCC/SCC	Useful for nonsurgical candidates older than 60 years	Increases risk for future malignancy; complicates future excisions and reconstruction
<b>Superficial, low-risk lesions</b>			
Cryotherapy	1–5% BCC/SCC	Quick, cost-effective, no local anesthesia required	Potential for posttreatment prolonged edema, neuropathic pain, scarring, hypopigmentation
Photodynamic therapy	5–50% BCC/SCC‡	Superior cosmetic outcomes compared with surgical excision	Painful treatments; potential for posttreatment chronic open wounds and hyperpigmentation
Topical 5-FU and Imiquimod	10–15% BCC/SCC	Superior cosmetic outcomes compared with surgical excision	Prolonged treatment time; end result heavily dependent on patient’s adherence to treatment
<b>High-risk lesions</b>			
Standard surgical excision	4–10% BCC; 8% SCC	Provides lowest rates of recurrence when MMS is not available	Invasive procedure; outcomes highly dependent on surgeon
Brachytherapy radiation therapy	6–13% BCC/SCC	Produces high-dose radiation with minimal impact to surrounding structures	Not readily available in many regions
External beam radiation therapy	14%	Useful for nonsurgical candidates older than 60 years	Increases risk for future malignancy; complicates future excisions and reconstruction

reticular dermis, 6, 9, and 12. The sample has to be classified as either a low-risk or high-risk tumor in accordance with the national comprehensive cancer network standards (Table 2) if the test results are positive for NMSC.

After a tumor is identified and its danger level is determined, we start creating a treatment strategy that works best for the patient. 3–5 mm lateral margins are employed with the subcutaneous fat for low-risk cancers. We used lateral margins of 5–10 mm and down to the first underlying anatomic plane for high-risk cancers. The specimen was tagged using sutures or markers for orientation after being removed and gently rinsed with normal saline to eliminate any remaining blood. The material is then put in a tube or container with a 10% formalin solution, should fixation be recommended. To reduce the possibility of mistakes occurring during the handoff between the pathologist and the surgeon, the specimen tube has to be labeled with information about the

specimen, including its name, location from where it was removed, and other details. For those cancers with cervical lymph node infiltration block neck dissection is done. Several reconstruction techniques that can result in acceptable functional outcomes and great cosmetic results with little morbidity are used in the reconstruction of postexcisional deformities. Analysis was done on lesion removal and the ensuing surgical reconstructive techniques for face BCC and SCC, coupled with the initial histopathology findings, the outcome in terms of appearance, potential problems, and functionality. The research covered patients whose treatment involved some form of flap or graft repair for facial lesions. In all cases, wound healing approach was not used.

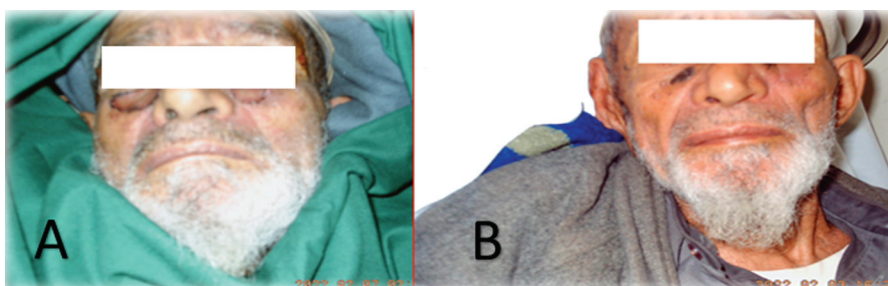
**Results**

The group consisted of 98 patients, including 58 (59.2%) men and 40 (40.8%) women, aged between 34 and 70 years (mean age 57.2%). Their skin type

**Table 2 Differentiating low-risk and high-risk basal and squamous cell carcinoma based on guidelines from the National Comprehensive Cancer Network**

Characteristic	Low-risk	High-risk
Location		
Trunk and extremities	Any lesion <20 mm	Any lesion ≥20 mm
Scalp, forehead, cheeks, neck, pretibia	Any lesion <10 mm	Any lesion ≥10 mm
Mask area† of the face, genitalia, hands, feet	N/A	Any sized lesion
Borders	Well-defined	Poorly defined
Primary versus recurrent	Primary	Recurrent
Immunosuppression	No	Yes
Site of prior radiation therapy	No	Yes
Perineural involvement/neurologic symptoms	No	Yes
Aggressive histologic subtype‡	No	Yes
<i>Unique to squamous cell carcinoma</i>		
Chronic inflammatory process	No	Yes
Rapidly growing tumors	No	Yes
Poorly differentiated	No	Yes
Depth ≥2 mm	No	Yes
Clark level IV or V	No	Yes
Lymphovascular invasion	No	Yes

**Figure 1**

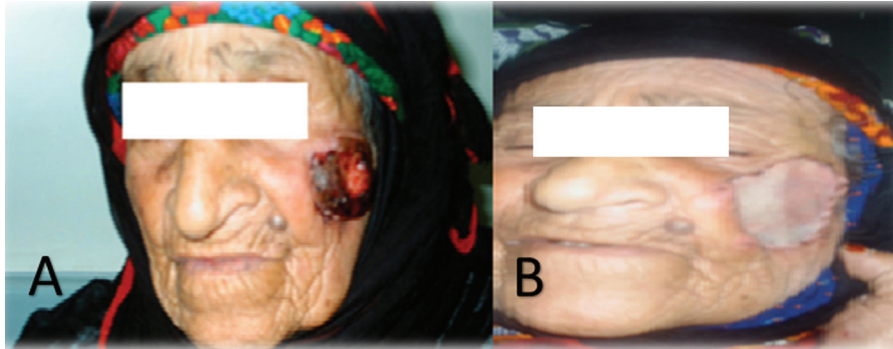


(a) A 65 years old male patient with upper cheek basal cell carcinoma. (b) Postexcision and coverage with full-thickness skin grafts.

distribution indicated predominance of photo types I–III (79.2%) followed by type IV (20.8%), and no patients had type V. Regarding the most common site on the face, 46.1% of the patient’s lesions on the nose and nasolabial fold (Figs 1 and 2), 17.9% on the eyelids (Figs 3 and 4), 9.6% inner and outer canthi of the eyes (Figs 5 and 6), 7.9% on the cheeks (Figs 7 and 8), 7.8% on the ear (Figs 9), 3.9% on the forehead, the

remaining 6.8% of the patients presented lesions on the lips and chin (Figs 10–12). Skin grafting is frequently utilized for facial reconstruction following surgical excision in 17 (17.3%) patients full-thickness skin grafts are used to treat small, superficial defects and can produce excellent aesthetic results if the graft is color-matched to the tissue surrounding the defect [11,16,20,23]. Split-thickness skin grafts are

**Figure 2**



(a) A 70 years old female patient with left upper cheek basal cell carcinoma. (b) Postexcision and coverage with split-thickness skin grafts.

**Figure 3**



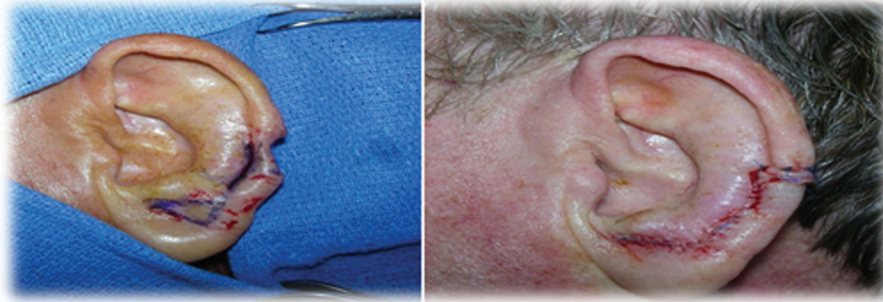
(a) A 43 years old female patient with left pre-auricular squamous cell carcinoma. (b) Postexcision and coverage with split-thickness skin grafts.

**Figure 4**



(a) A 73 years old male patient with right ear basal cell carcinoma. (b) Postexcision and coverage with full-thickness skin grafts.

Figure 5



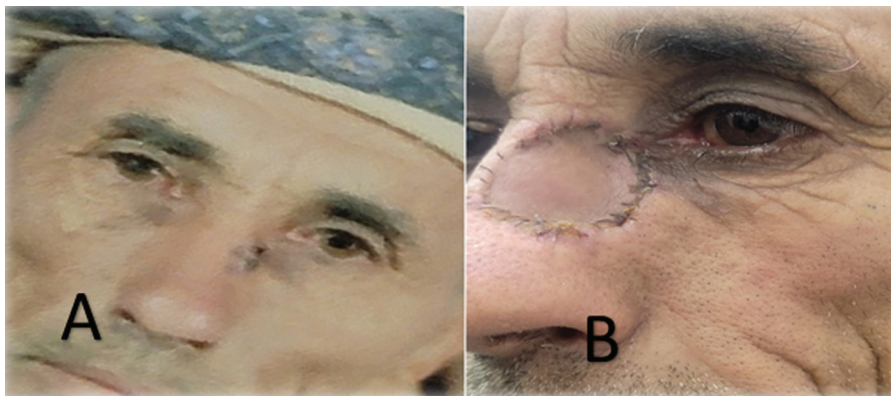
(a) Squamous cell carcinoma mid-helical rim and surgical plan. (b) Postexcision and modified Antia-Buch flap.

Figure 6



(a) A 62 years old male patient with lower right eye lid basal cell carcinoma. (b) Excision and reconstruction with cheek advancement flap.

Figure 7

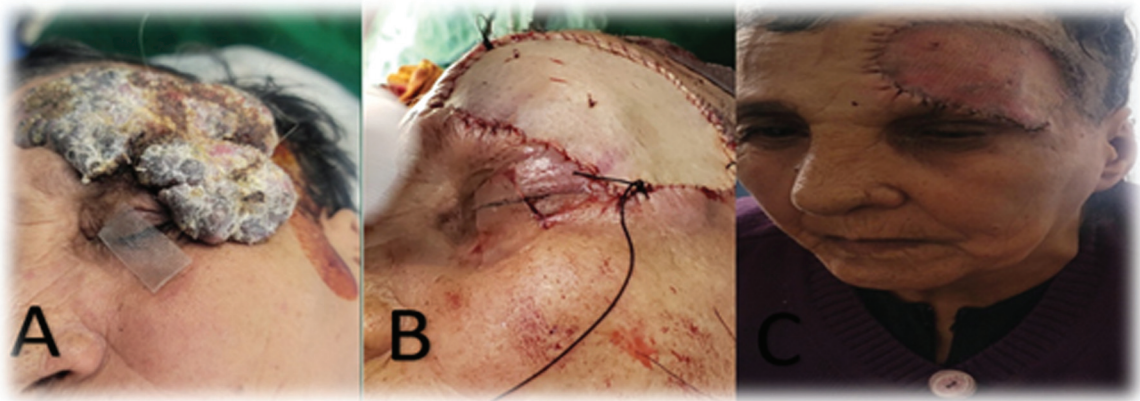


(a) A 65 years old male patient with basal cell carcinoma dorsum nose. (b) Excision and coverage with full-thickness skin grafts, 1 week postoperatively.

primarily used to cover large defects whose an adequate vascular bed exist. Locoregional tissue transfer is frequently employed to treat post excisional moderate to large complex deformities of the face. Advancement flap in 21 (21.4%) patients, including 15 island flaps and 6 Rantala flaps. Transposition flaps

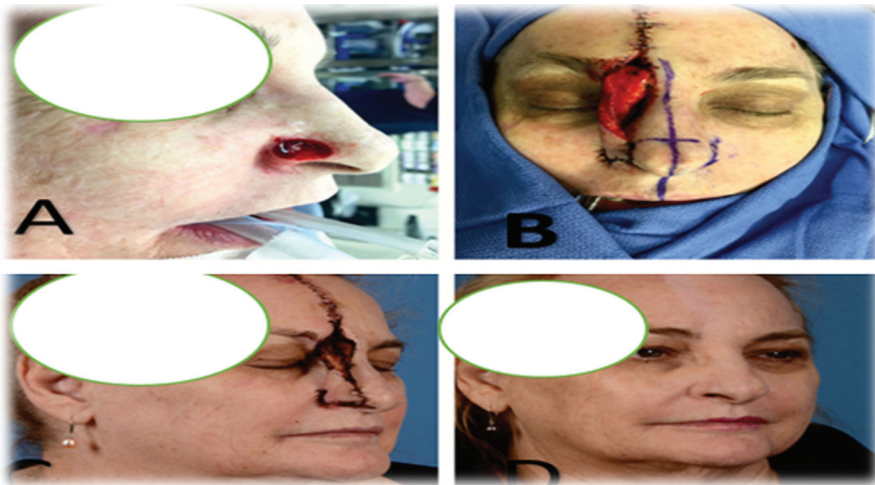
were used in 18 (18.4%) patients and rotation flaps were used in 17 (17.3%) patients, interpolated flaps as the paramedian forehead flap are frequently used to reconstruct the nose in 15 patients (18.8%), some of them with cartilage grafting to provide support to the reconstructed ala. Regarding histological type, the

**Figure 8**



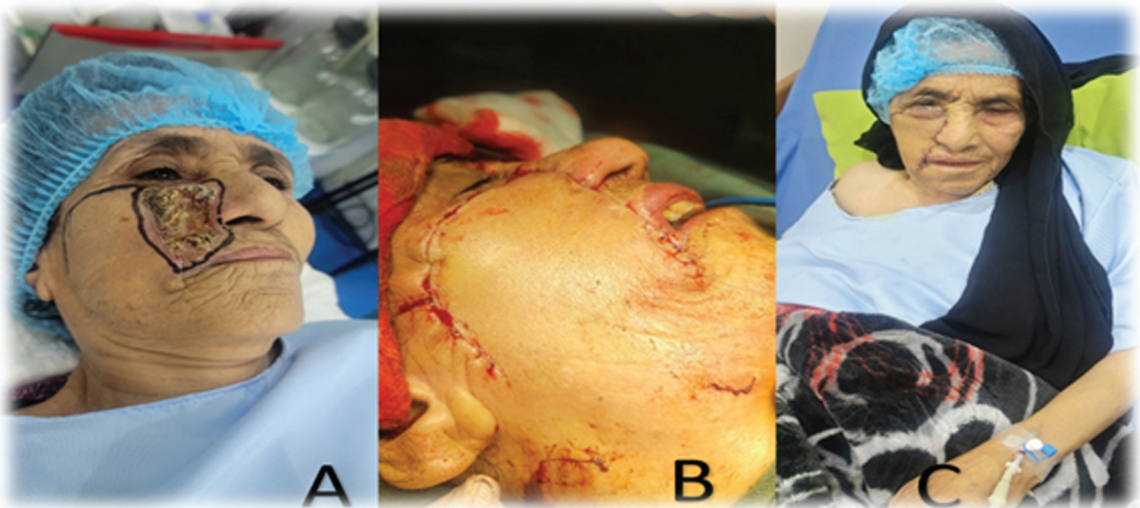
(a) A 65 years old female patient with basal cell carcinoma Forehead. (b) Intraoperative postexcision and split-thickness skin grafts. (c) 1 week postoperatively.

**Figure 9**



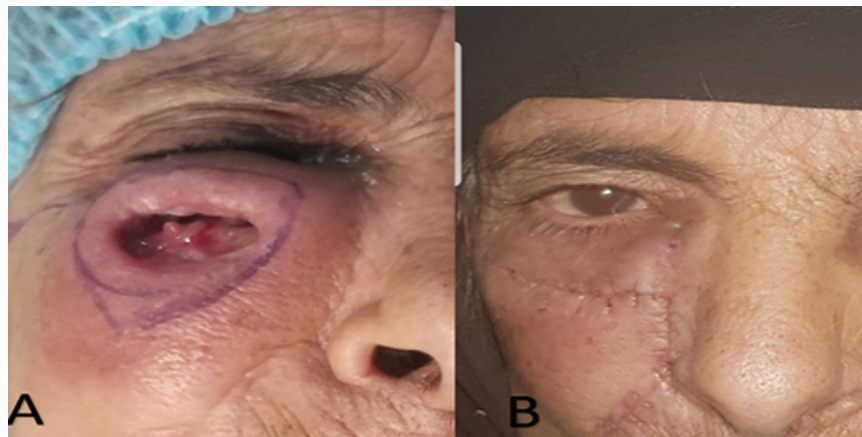
(a) Full-thickness defect of the nasal ala with basal cell carcinoma. (b) Inset of the paramedian forehead flap into the alar defect. (c) 3 weeks postoperatively after flap inset. D) 3 months postoperatively following flap division and inset.

**Figure 10**



(a) Basal cell carcinoma at Infra-orbital area with nasolabial fold. (b) Intraoperative postexcision and cervico facial rotation flap. (c) 1 month postoperatively.

Figure 11



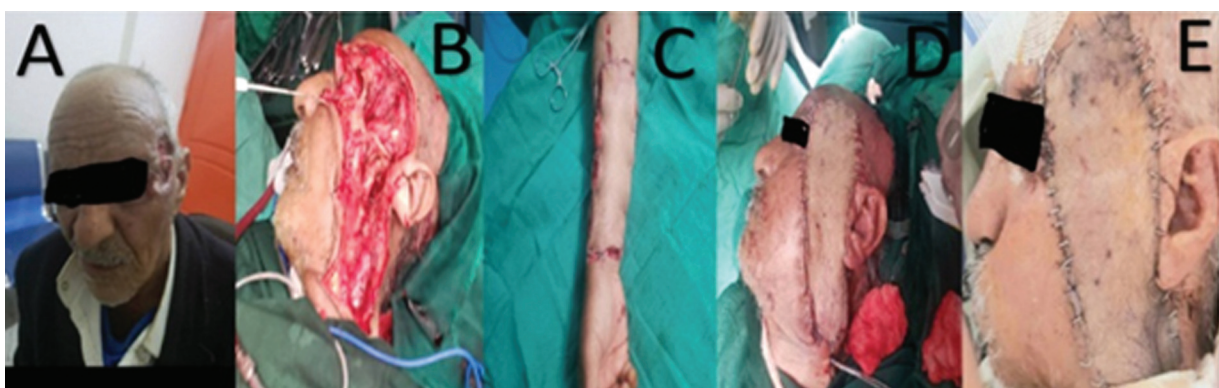
(a) Squamous cell carcinoma at right upper cheek. (b) 1 month postexcision and cheek advancement flap.

Figure 12



(a) Advanced Squamous cell carcinoma at left lower chin with extension to left cheek. (b) Postexcision and coverage using distant pedicled LDM and bilateral temporoparietal flaps.

Figure 13



(a) Advanced squamous cell carcinoma upper cheek and temporal area. (b) Excision and left side bloc neck dissection. (c) Preparation of radial forearm free flap. (d) Immediate postoperation with flap inset. (e) 10 days postoperative view.

majority of the cases were BCC (89%), and the most common subtypes were the following: nodular (52.8%), pigmented (14.2%) superficial (12.6%), basosquamous (9.4%). SCC was diagnosed in (9%) of the patients, with (7.4%) and (3.6%) of the cases being of grade I and grade II, respectively. Adequate margins were obtained in (95.7%) > 2 mm of the patients. Three (3.1%) patients had overlapping margins less than 1 mm. These patients were followed-up and have not shown signs of recurrence to date. One (1%) patient presented with involved margins and was reoperated to extend the margins and one patient presented recurrence during the follow-up off 2 to 36 months and was repeated followed by radiotherapy. The cosmetic results were considered good and fair in 92.13% and 7.87% of the patients studied respectively. The complications were partial graft and flap loss in two patients, surgical wound infection in two patients and scar retraction in one patient. These patients were treated with localised care and made satisfactory progress (Fig. 13).

---

### Discussion and conclusion

Worldwide, the most prevalent cancers are non-melanoma face skin cancers. Nonmelanoma skin malignancies can be locally damaging, requiring intricate excisions and reconstructions, despite their limited metastatic potential. In order to give their patients the best care possible, plastic surgeons must be knowledgeable with the treatment of skin malignancies other than melanoma [8]. The risk categorization of the tumor, as well as the size and location of the postexcisional defect, are major determinants of the outcome of oncologic reconstruction after surgical excision of non-melanoma skin malignancies. For the plastic surgeon, reconstructing facial abnormalities that were removed during surgery presents a number of difficulties [6,7]. Because tiny facial defects are extremely identifiable, the surgeon restoring a facial defect must be exceptionally creative. For individuals who meet the surgical criteria, the gold standard for treating high-risk non-melanoma face skin malignancies is Mohs micrographic surgery. Plastic surgeons must be knowledgeable with alternate treatment techniques for nonmalignant stem cells since Mohs micrographic surgery, despite its effectiveness, is not easily accessible in most geographic places. The best course of action for treating NMSC 8 in low- and high-risk malignancies is routine surgical excision with comprehensive margin evaluation when Mohs micrographic surgery is not available. The surgeon

must strike a compromise between removing the tumor and conserving tissue when planning a tumor resection. For low-risk malignancies, the tumor and its subcutaneous fat should be removed with 3–5 mm lateral margins [6,7]. Surgeons should use lateral margins less than 10 mm and remove to the first underlying plane for high-risk malignancies. Following removal, the specimen has to be appropriately tagged using sutures or marks, and it should be gently rinsed with regular saline to eliminate any remaining blood. If fixation is necessary, the material is then put in a tube with a 10% formalin solution [2]. This paper is using a classification for malignant tumors of the face as nonmelanocytic. In a reference center for NMSC treatment, clinical diagnosis, risk classification, aided by good preoperative planning had high accuracy rates.15 The incidence of compromised margins on the eyelid may reach 39% [6]. In our series by using preoperative cautions mentioned above, the occurrence of compromised margins was very low 5% even in lesions located on the eyelid. When margins are free, the incidence of BCC and SCC recurrence on the face is quite low, particularly in the first two years following surgery. In most cases, the cosmetic outcome was satisfactory. With focused care, patients made good progress and complications were infrequent. BCC is the most prevalent histological type. Its incidence in this series was almost 89% higher than the mean incidence of 78% in the literature [6]. Because the chance of having a second cancer is ten times higher for individuals with a history of NMSC, for the first 2 years after treatment, patients should be scheduled for follow-up appointments every 2–3 months [6–8]. Patients can see their provider for follow-up every 6–12 months after 2 years. In order to obtain the greatest oncological, functional, and cosmetic outcomes, plastic surgeons must become more knowledgeable about the diagnosis, cancer risk categorization, preoperative planning, surgical excision, and reconstruction due to the annual rise incident nonmelanoma facial skin cancer [2]. This sequential series of treated patients demonstrates, surgery and appropriate surgical reconstruction are the optimal treatment strategy and may produce good outcomes. It is crucial to emphasize the need of patient education and appropriate tumor surveillance after treating nonmelanoma facial skin cancer.

---

### Conclusion

Wide excision and appropriate surgical reconstruction are ideal treatment modalities and may yield good



aesthetic results of functional outcome, also the use of split-thickness skin grafts does not come as a first priority, where a lot of cases could have been treated with local flaps, as demonstrated in this consecutive series of treated patients. Treatment of NMSC on the face required a basic knowledge, presents a challenge to plastic surgeons and is based on achieving the best oncological, functional, and cosmetic result. It is crucial to emphasize the need of patient education and appropriate tumor monitoring after NMSC therapy.

A review of a big series of facial malignancy which may be guide for further studies cannot be understated.

#### **Financial support and sponsorship**

Nil.

#### **Conflicts of interest**

There are no conflicts of interest.

---

## **References**

- 1 Rogers HW, Weinstock MA, Feldman SR, Coldiron BM. Incidence estimate of nonmelanoma skin cancer (keratinocyte carcinomas) in the US population, 2012. *JAMA Dermatol* 2015; 151:1081–1086.
- 2 Rogers HW, Weinstock MA, Harris AR, Hinckley MR, Feldman SR, Fleischer AB, *et al*. Incidence estimate of nonmelanoma skin cancer in the United States, 2006. *Arch Dermatol* 2010; 146:283–287.
- 3 Rogers HW, Weinstock MA, Feldman SR, Coldiron BM. Incidence estimate of nonmelanoma skin cancer (keratinocyte carcinomas) in the US population, 2012. *JAMA Dermatol* 2015; 151:1081–1086.
- 4 Muzic JG, Schmitt AR, Wright AC, Alniemi DT, Zubair AS, Lourido JMO, *et al*. Incidence and trends of basal cell carcinoma and cutaneous squamous cell carcinoma: a population-based study in Olmsted County, Minnesota, 2000 to 2010. *Mayo Clin Proc* 2017; 92:890–898.
- 5 Miller DL, Weinstock MA. Nonmelanoma skin cancer in the United States: incidence. *J Am Acad Dermatol* 1994; 30(5 Pt 1):774–778.
- 6 Karia PS, Han J, Schmults CD. Cutaneous squamous cell carcinoma: Estimated incidence of disease, nodal metastasis, and deaths from disease in the United States, 2012. *J Am Acad Dermatol* 2013; 68:957–966.
- 7 National Comprehensive Cancer Network. National clinical practice guidelines in oncology: basal cell skin cancer. Nov 17 2021. Available at [https://www.nccn.org/professionals/physician\\_gls/pdf/nmsc.pdf](https://www.nccn.org/professionals/physician_gls/pdf/nmsc.pdf). [Accessed April 28, 2020]
- 8 National Comprehensive Cancer Network. National clinical practice guidelines in oncology: squamous cell skin cancer. Oct 5 2017. Available at [https://www.nccn.org/professionals/physician\\_gls/pdf/squamous.pdf](https://www.nccn.org/professionals/physician_gls/pdf/squamous.pdf). [Accessed April 28, 2020]