

Reconstruction after removal of basal cell carcinoma

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Abstract: Basal cell carcinoma (BCC) is by far the most prevalent skin cancer. Eighty percent of BCC affect the facial skin. The greatest challenge is removing all tumor cells to prevent a recurrence in complicated cases, as recurrent tumor are more difficult to cure. Ten patients with basal cell carcinoma on the nose and five patients with basal cell carcinoma on the ear were operated on between November 2008 to February 2011. The mean age was 55 years (range 45-75 years). With follow up from 12-37 months. A shave biopsy under local anesthesia was done for some cases which cannot be diagnosed clinically. All cases were treated surgically by standard surgical excision, with standard surgical margin is applied (usually 4 mm or more). All cases were reconstructed by local flaps [3 cases by rhomboid flap, 4 cases by superiorly based nasolabial flap, 3 cases by bilobe flap and 5 cases by superior Pedicle retroauricular island flap (SP-RIF) for ear reconstruction]. A relatively short procedure with a good result, yields an aesthetically satisfactory looking nose, ear and achieve the goal of primary treatment of basal cell skin cancer is the cure of the tumor and the maximal preservation of function and cosmesis. No recurrence was occurred during the follow up period. The patients' satisfaction was very high in all cases.

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1. Introduction

Neoplasm of the skin are found most often on the face. Cosmetically, the face is the most important anatomic area for most patients. Because of this, malignant tumor of the facial skin pose a great challenge in treatment, prohibiting compromises between oncologically responsible surgery and functional plus cosmetic outcome⁽¹⁾.

Basal cell carcinoma (BCC) is the most common human malignancy, amounting to 90% of skin cancers. Risk factors for BCC include fair skin type, sun exposure, ionizing radiation, advanced age, immune-suppression, and a personal history of non-melanoma skin cancer⁽²⁾.

Ultraviolet (UV) and ionizing radiation can induce DNA damage that leads to the development of skin cancer, and defective DNA repair is associated with advanced age. In addition, studies of long-term immune-suppression after organ transplantation and in patients with chronic lymphocytic leukemia showed increased risks for cancers⁽³⁾.

Hereditary predisposition to BCC occurs among individuals with albinism, xeroderma pigmentosum, nevroid basal cell carcinoma syndrome, and Darrier disease. Occurrence of BCCs in these disorders can be linked to either instability of the skin or diminished pigmentation^(2,4).

The sonic (SHH) hedgehog pathway is an important regulator of embryologic development and is also involved in tumor formation. Aberrant activation of this pathway leads to increased cell proliferation and

subsequent tumors (5). The hedgehog gene encodes an extracellular protein that binds to cell membrane receptor complex to start cascade of events leading to cells proliferation. Of the three known human homologous, sonic hedgehog protein is the most relevant to BCC⁽⁶⁾.

The incidence of non-melanoma skin cancer is still rising, which commonly is attributed to increased exposure to UV light in white population. Also, mutation caused by UV radiation in Tp53 tumor suppressor gene, mutation in BAX gene can cause BCC⁽⁷⁾.

It can arise from pluripotential cells in basal layer of the epidermis or hair follicle (outer root sheath) from the bulge region site of stem cells of the follicle. An increased elderly population also contributes to this increase in incidence of non-melanoma skin cancer. Although BCC is observed in all races and all skin types, but it rarely affects dark individuals. In addition, many patients develop more than one non-melanoma skin cancer after the first one. Basal cell carcinoma is the most common type of skin cancer. It rarely metastasizes or kills, but it is still considered malignant because it can cause significant destruction and disfigurement by invading surrounding tissues⁽⁸⁾. Regardless of size, all basal cell carcinomas arise in the basal layer of the epidermis and the pilosebaceous follicle units. Basal cell carcinoma usually grows solely by local extension in both horizontal and vertical directions; local extension can continue into the deeper tissues, such as cartilage and bone⁽⁹⁾.

The incidence of nasal skin cancer is increasing rapidly worldwide ⁽¹⁰⁾. While basal cell carcinomas and other skin cancers are almost always curable when detected and treated early ⁽¹¹⁾.

Anatomy of the nose:

Macro-surgically and microscopically study of the nose revealed five soft tissue layers overlying the Osseo-cartilaginous framework: the skin, the subcutaneous areolar plane, the vascular-fibromuscular layer, the deep areolar plane and perichondrium/periosteum. Two natural planes of dissection are represented by these areolar planes which separate the nose into an overlying skin envelope, a vascular-fibromuscular layer and an underlying Osseo-cartilaginous framework ⁽¹²⁾.

The nose is covered by skin. Interestingly, the skin quality changes dramatically from one part of the nose to the next which directly influences nasal appearance. In general, from top to bottom the nasal skin starts out thick, gets thinner and thick again. In the **upper, portion** the skin between the eyebrows and just below is relatively thick. The skin overlying the **mid-portion** of the nose is thin. The **lower tip segment** of the nose again has thicker skin ⁽¹³⁾.

The nose can be conveniently divided into several subunits: (as shown in fig.1). Viewing the external nasal anatomy by its subunits is important because defects that span an entire subunit are usually repaired with reconstruction of that subunit. Burget suggests replacement of the entire subunit if more than 50% of the subunit is lost during resection ⁽¹⁴⁾.

The skin of the nose is specialized and has the ability to retain its shape even after dissection. This is due to an arrangement of elastin fibres in the upper dermis and the subcutaneous areolar plane which confers elasticity to the skin especially in the region of the alar lobule which is a skin and fibromuscular sandwich. The vascular fibromuscular layer is like a sheet draping the osseocartilaginous framework. The main arteries of the nose lie on this layer ⁽¹²⁾.

Anatomy of the ear :

The complex concavities and convexities of the elastic cartilage auricular framework are covered by thin skin that is more closely adherent laterally than medially. The helical border terminates anteriorly above the external auditory meatus. The antihelix diverges superiorly into the superior and anterior crura, creating the fossa triangularis. Between the helix and antihelix is the scaphoid fossa. The concha is separated into a concha cymba and concha cavum by the crus helices. The tragus is at the anterior edge of the concha cavum and the antitragus lies along the posterior edge. The auricular cartilage framework ends inferiorly at the cauda helices, with the fibrofatty lobule being devoid of

cartilage. The cartilage framework is continuous with the cartilaginous external auditory canal (Fig. 2) ⁽¹⁵⁾.

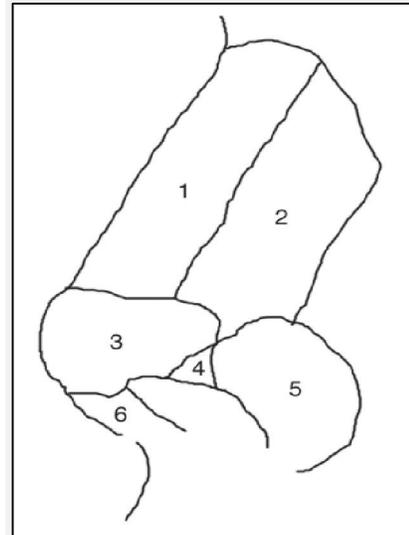


Fig .1. Surface anatomy of the nose: the aesthetic subunits. (1) Dorsum, (2) sidewall, (3) tip, (4) soft triangle, (5) alar-nostril sill, (6) columella ⁽¹⁴⁾.

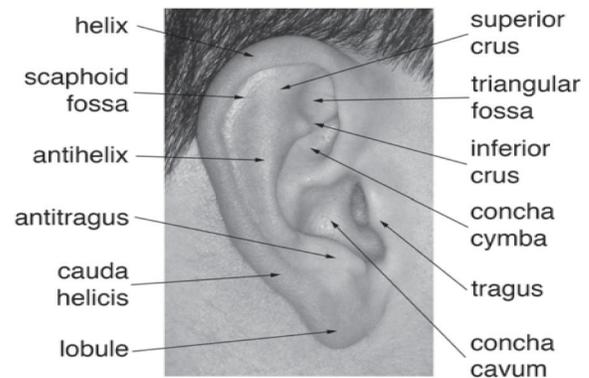


Fig. 2. Showing the surface anatomy of the external ear ⁽¹⁵⁾.

Clinical presentation:

Early tumor can be recognized as small, translucent, light-colored papules of the skin, completely covered by a thin epidermis through which telangiectases are noticeable or erosion and ulceration. So different types of BCC nodular, keratotic, infiltrative, morphea form, micronodular or superficial on dermoscopy. Sometimes the lesion is pigmented so that confusion with a melanoma is possible ⁽¹⁶⁾.

2. Patient and methods:

This study was carried out on fifteen participants, their ages ranged from 45-75 years old. All participants were selected from Dermatology and plastic surgery outpatient clinic at Al-Zahra university hospital during the period from November 2008 to February 2011.

After informed consent, complete history taking from the patients, thorough clinical dermatological and

histopathological examinations (by hematoxylin and eosin stained section) and examined by light microscopy (5 patients diagnosed as nodulo-ulcerative BCC, 5 cases ulcerative type, 3 cases superficial type and 2 cases pigmented type).

By hematoxylin and eosin staining section, it revealed typical palisading manner with peritumoral lacunae and dilated blood vessels (as shown in fig. 3-

5) and (5 sections were keratotic, 2 sections were pigmented, 3 sections adenoid, and 5 sections were ulcerative).

Ten patients with basal cell carcinoma on the nose and five patients with basal cell carcinoma on the ear, were operated. A shave biopsy under local anesthesia was done for three cases which cannot be diagnosed clinically.

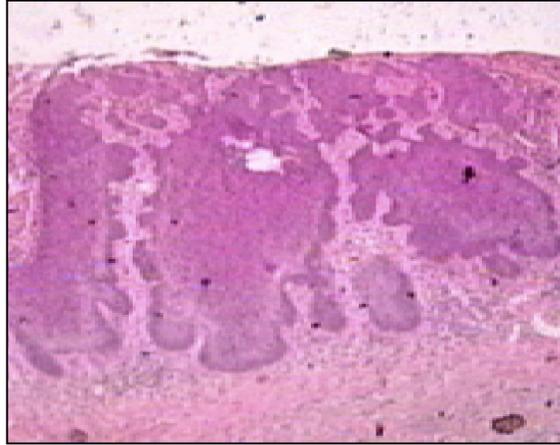


Fig.3: Ulcerated epidermis & the dermis is infiltrated by masses of malignant cells.

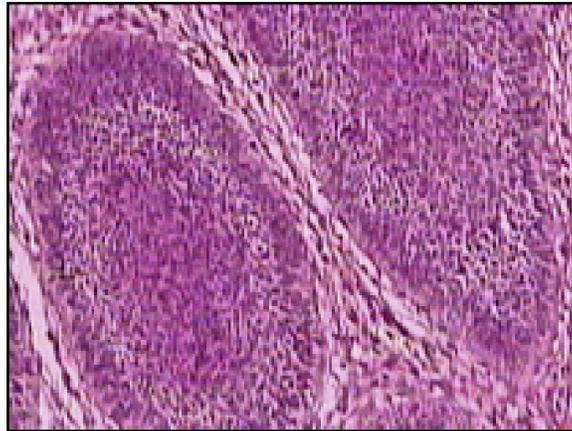


Fig.4: The outer columnar cells with palisading arrangement with no evidence of central keratinization.

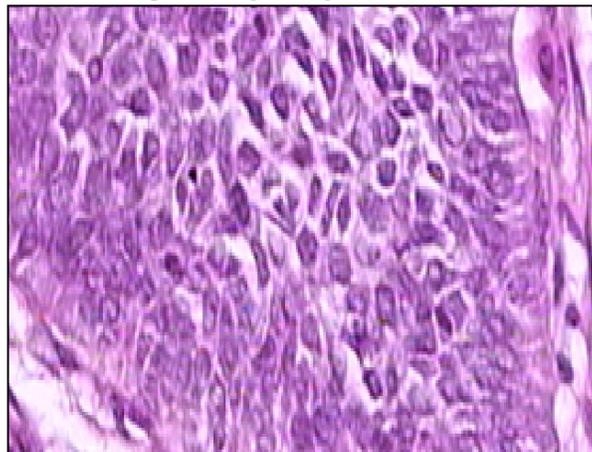


Fig.5: Higher magnification of peripheral palisading arrangement.

Surgical procedure:

Preoperative planning is the most important aspect of a successful reconstruction. Although small defects may only require a single procedure. Poor planning leads to complication that result in nasal distortion or collapse.

All cases were treated surgically by Standard surgical excision, with standard surgical margin is applied (usually 4 mm or more). surgical excision

involves the full-thickness removal of the lesion, down to subcutaneous fat, along with a rim of "normal" tissue. All cases was treated surgically by Standard surgical excision, with standard surgical margin. All cases was reconstructed by local flaps (3 cases by rhomboid flap, 4 cases by superiorly based nasolabial flap, 3 cases by bilobed flap and 5 cases by (SP-RIF) for ear reconstruction as shown in fig.6).

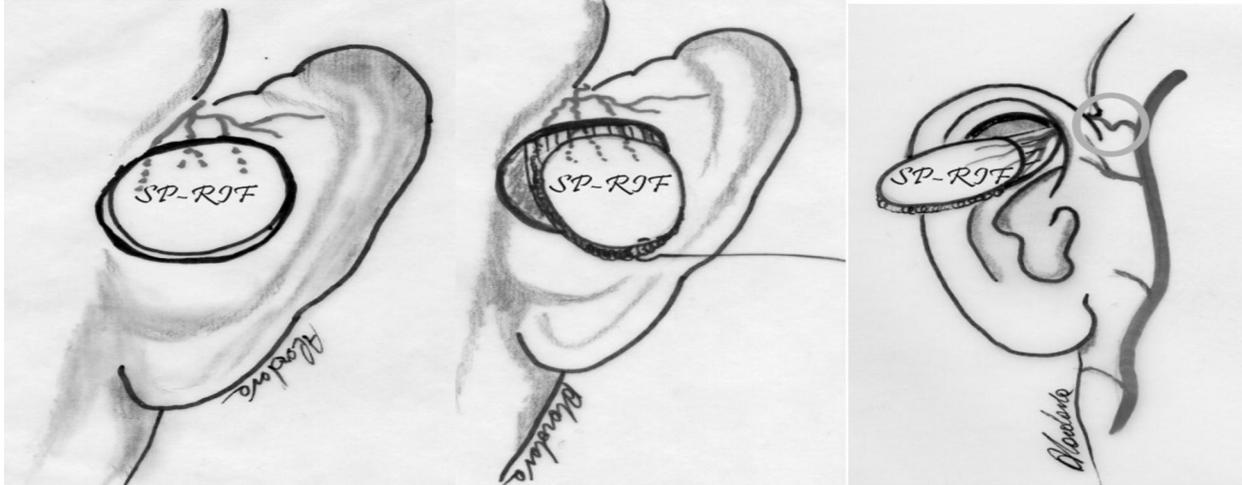


Fig. 6. Schematic drawings of the surgical technique of (SP-RIF). The skin is incised circumferentially. The subcutaneous tissue is incised full thickness except in the area corresponding to the upper auriculocephalic groove. The pedicle is freed from the surrounding tissues by means of careful subdermal dissection. A tunnel of adequate dimensions is created into the auricular cartilage through which the flap is passed. The donor site is closed directly⁽¹⁶⁾.

3. Results:

Ten patients with basal cell carcinoma on the nose, and five patients with basal cell carcinoma on the ear were operated on between November 2008 to February 2011. The mean age was 55 years (range 45-75 years). A relatively short procedure with a good results, yields an aesthetically satisfactory looking

nose, ear and achieve the goal of primary treatment of basal cell skin cancer is the cure of the tumor and the maximal preservation of function and cosmeses (as shown in fig.7-11). With follow up from 12-37 months. No recurrence was occurred during the follow up period. The patients satisfaction was very high in all cases.

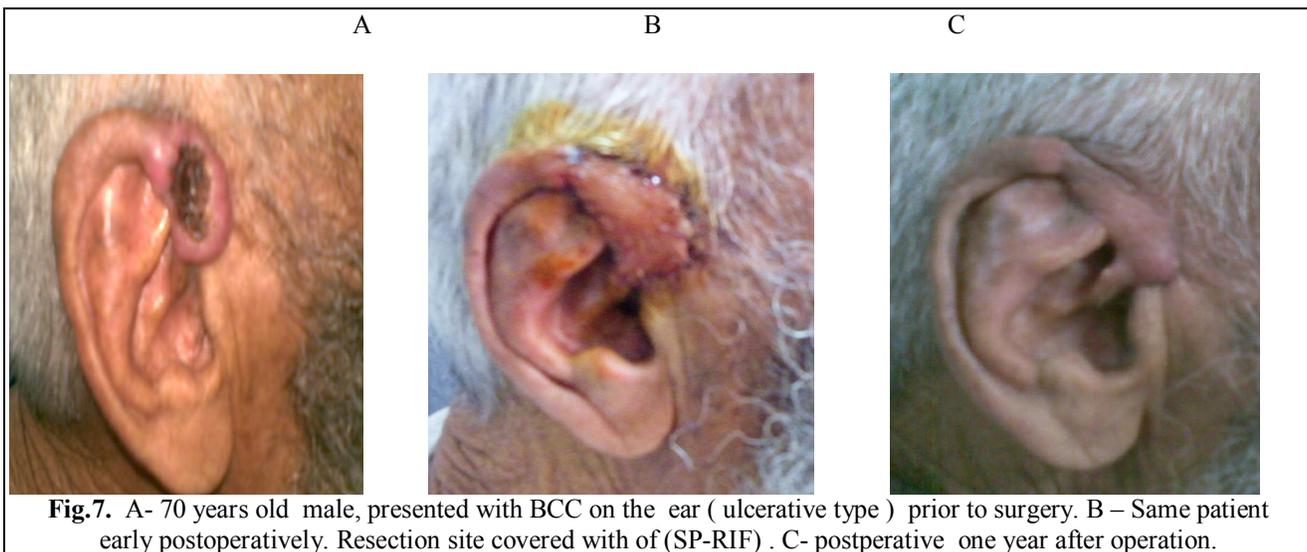


Fig.7. A- 70 years old male, presented with BCC on the ear (ulcerative type) prior to surgery. B – Same patient early postoperatively. Resection site covered with of (SP-RIF) . C- postoperative one year after operation.



Fig. 8. A- 50 years old male, presented with BCC on the tip of the nose (ulcerative type) prior to surgery. B – Same patient postoperatively. Resection site covered with bilobed flap two years after operation (frontal view). C- preoperative lateral view. D- postoperative lateral view .





Fig. 9. A-69-year-old patient with nodular BCC, on the dorsum and sidewall of the nose, preoperative frontal view. B- Appearance of the patient after one year postoperatively the defect was reconstructed by nasolabial flap. C-Preoperative lateral view. D-Post-operative lateral view.



Fig.10. A- 55-year-old patient with nodulo-ulcerative BCC, on the ala and sidewall of the nose, preoperative lateral view. B- Appearance of the patient after one year postoperatively the defect was reconstructed by rhomboid flap .

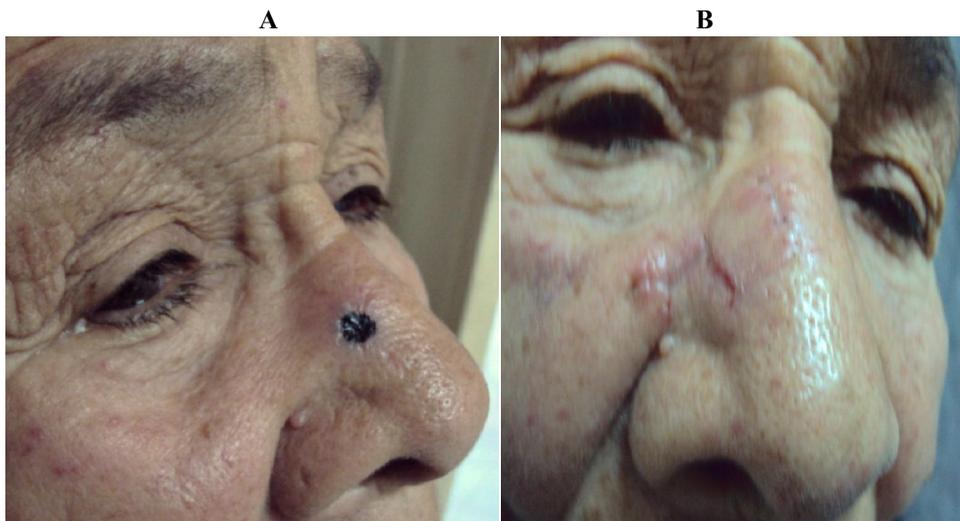


Fig.11. A- 75-years old female with pigmented BCC, on the sidewall of the nose, preoperative lateral view. B- Appearance of the patient after 3 months postoperatively the defect was reconstructed by nasolabial flap.

4. Discussion:

The nose maintain the central position on the face and may be the most difficult facial feature to reconstruct well. Defects of the nose are common after cancer resection and trauma and, fortunately, there are many options available for reconstruction . The is to select the most appropriate option for a given defect . The goal for treatment of nasal defects based on their location, concentrating on local flap reconstruction of small to medium-sized defects.

Clear guidelines and a multidisciplinary approach for treatment of nasal skin cancer are important to ensure that patients receive optimal care with satisfactory end results for tumor control as well as reconstructive outcome⁽¹⁸⁾.

Appropriate follow-up after complete BCC excision has been discussed by several previous studies. Park et al report only a 1% recurrence rate after complete excision of BCC and suggest no follow-up of these patients is Required⁽¹⁹⁾. The national guidelines concur with this view unless a patient has had multiple previous lesions and is therefore at a high risk of developing further BCC (twelve months risk of around 20% and a five year risk of 36%)⁽²⁰⁾. In2010 Sherry, et al had found incomplete excision rate of 3.2% is low compared with previously published results which vary between 5% and 20%. Reasons for this may be the teaching of new trainees to use loupe magnification(reduces rates of incomplete excision)and to take at least a three millimeter margin of normal tissue when excising BCC⁽²¹⁾.

Important Points:

- A 0.4-cm margin will likely remove a BCC with a 95%5-year cure rate provided the tumor is at low-risk of having significant subclinical extension. Low-risk tumors have the following characteristics: well-defined,<2 cm in diameter, nonaggressive histology (superficial, nodular), located in a low or intermediate-risk area, and being primary in treatment status.
- Tumors that are at high-risk of having significant subclinical extension are optimally treated with Mohs micrographic surgery or excision with complete circumferential peripheral and deep margin assessment with frozen or permanent sections. High-risk tumors have the following characteristics: ill-defined, >2 cm in diameter, aggressive histology (micronodular, infiltrative, or morpheaform), located in intermediate or high-risk areas, and of recurrent treatment status⁽²²⁾.

The present study found no recurrence rate in patients who were observed after complete excisions. Local flaps have a good reputation for reconstruction of skin-only nose and ear defects. The nasolabial flap has been used for reconstruction of defects of the nasal ala , dorsum , and sidewall .For nasal tip or distal defects up to 1.5cm, we recommend the bilobed flap ,

which give excellent skin matching and leaving no donor site defect.

Conclusion:

Local and regional flaps give the best results and are the first choice for nose reconstruction. After defining defect geometry, determine from which direction skin will be donated. This depends on tissue laxity , vascularity, and resulting donor site distortion. Although many flaps are described for nasal reconstruction, most defects can be best closed by nasolabial flap, bilobed flap, and rhombiod flap. The SP-RIF can be considered as a first choice option to repair losses of substance of the upper half of the ear. Because of its wide arc of rotation, it can also be used for superficial marginal defects of the helix and in selected cases of temporal region defects.

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