



Reconstruction of Defects After Excision of Basal Cell Carcinoma of the Head and Neck

KEYWORDS

Basal cell carcinoma, defect reconstruction, flaps.

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ABSTRACT **Background:** Basal cell carcinoma (BCC) is the most common non-melanoma skin cancer with a potential of local recurrence. **Methods:** In our study we analysed 23 patients with biopsy proven BCC of face, scalp and neck over a period of 24 months. **Results:** The age of the patients ranged from 41 years to 70 years with a mean age of 59.39 years and the male: female ratio was 7:16. The average tumour size was 2.56cm x 1.84cm. The most common location of the tumour was at the nose 07(30.4%) and cheek 07(30.4%) followed by eye 02 (8.69%), lip 02(8.69%) and ear 02(8.69%). Other sites were chin 01(4.34%), forehead 01(4.34%) and scalp 01(4.34%). The clinical variants of BCC were as follows, nodular 15(65.21%); superficial 03(13.04%); cystic 02(8.69%); pigmented 02(8.69%) and morpheaform 01(4.34%). Out of 23 patients, paramedian forehead flap reconstruction was done in 07 (30.4%) patients; V-Y advancement flap in 05(21.7%) patients; primary closure in 04(17.39%) patients; transposition flap in 03(13.04%) patients; rotation flap in 03(13.04%) patients and split skin graft in 01(4.34%) patient. The mean follow up period was 9.21 months. Seven patients were lost to follow up and from the remaining 16 patients, none of them developed recurrence. **Conclusion:** Three dimensional monobloc excision of basal cell carcinoma reduces the recurrence rate. The reconstruction options of these defects depend on the location, size and shape of defects.

Introduction:

Basal cell carcinoma (BCC) is the most common non-melanoma skin cancer. About 80% of all BCC occur on the face, of these tumours 25% to 30% are found on the nose [1]. Surgery is the cornerstone of treatment of BCC and a wide variety of techniques have been developed to combine complete three dimensional tumour removal with good aesthetic and functional outcome. Moh's micrographic surgery has 1% 5-year recurrence rate [2, 3]. The functional and aesthetic outcomes must be considered while planning surgical excision of BCC. Compared with skin grafts and free flaps, primary closure and local flap are advantageous because less scar tissue is formed following reconstruction, the use of adjacent tissue provides good cosmetic results, and it reduces the risk of donor site morbidity [4].

Aim of the study:

To assess the utility various types of local and regional flaps in the reconstruction of defects after excision of basal cell carcinoma of the head and neck.

Patients and Methods:

This prospective study was conducted at Shrimati Kashibai Navale Medical College and General Hospital, Narhe, Pune from January 2013 to December 2014 following the approval of institutional review board. Twenty three patients with biopsy proven basal cell carcinoma of scalp, face and neck who presented to the outpatient department of surgery were included in the study. A special consent for photographs were taken from these patients who underwent the surgical procedure. In all these patients we took preoperative, intraoperative and post operative photographs. The study analysis was done by collecting data from the case records and entering into the proforma of the study. Patients were analysed on the basis of location and size of the tumour, size of the defect after excision, the type of reconstruction used to cover the defect and the post operative complications of the flaps. All these patients were followed up six monthly to assess for recur-

rences and the disease status. At the end of 24 months, the entire data of these patients was analysed.

Results:

The patient demographics and tumour characteristics are shown in **Table 01**.

Table.01 Patient characteristics and demographic data

Age	41 yrs – 70 yrs; mean - 59.39 yrs
Male : Female	7:16
Tumour size (cm)	0.5cm x 0.5cm to 6cm x 4cm mean - 2.56 cm x 1.84cm
Location of lesion	Nose - 07(30.4%) Cheek - 07(30.4%) Eye - 02(8.69%) Forehead - 01(4.34%) Lip - 02(8.69%) Ear - 02(8.69%) Chin - 01(4.34%) Scalp - 01(4.34%)
Clinical variants of BCC	Nodular - 15(65.21%) Superficial - 3(13.04%) Cystic - 2(8.69%) Morpheaform - 01(4.34%) Pigmented - 02 (8.69%)

Type of Reconstruction	Paramedian forehead flap	- 07(30.4%)
	Advancement flap	- 05(21.7%)
	Transposition flap	- 03(13.04%)
	Rotation flap	- 03(13.04%)
	Primary closure	- 04(17.39%)
	Split skin graft	- 01(4.34%)
Complications	Partial flap necrosis	- 01(4.34%)
	Complete flap necrosis	- 00
	Wound dehiscence	- 03(13.04%)
	Hematoma	- 00
	Seroma	- 00
Follow up	2 months to 18 months; mean - 9.21 months	

The age of the patients ranged from 41 years to 70 years with a mean age of 59.39 years. The male : female ratio was 7:16. The tumour size ranged from 0.5cm x 0.5 cm to 6 cm x 4cm with a mean of 2.56cm x 1.84cm. The most common location of the tumour was at the nose 07(30.4%) and cheek 07(30.4%) followed by eye 02 (8.69%), lip 02(8.69%) and ear 02(8.69%). Other sites were chin 01(4.34%), forehead 01(4.34%) and scalp 01(4.34%). One patient had a multicentric basal cell carcinoma located at upper lip, cheek, nasal bridge and left ear [Fig. 01 a) multicentric BCC at upper lip, nasal bridge, cheek and left ear; b) primary closure of upper lip, cheek and nasal bridge done; c) pinna excised and split skin graft done].The clinical variants of BCC were as follows, nodular in 15(65.21%); superficial in 03(13.04%); cystic in 02(8.69%); pigmented in 02(8.69%) and morpheaform in 01(4.34%).

Fig.01



Out of these 23 patients, paramedian forehead flap reconstruction was done in 07 (30.4%) patients [Fig. 02 a) BCC below left lower eyelid; b) post excision defect; c) paramedian forehead flap transferred into the defect; d) flap on fifth post operative day];

Fig. 02



V-Y advancement flap in 05(21.7%) patients; primary closure in 04(17.39%) patients; transposition flap in 03(13.04%) patients; rotation flap in 03(13.04%) patients [Fig. 03 a) BCC at right nasal sidewall; b) defect closed with medial cheek rotation flap] and split skin graft in 01(4.34%) patient. There was partial flap necrosis at the tip in one patient with paramedian forehead flap reconstruction. It was managed with antibiotics and dressings. Wound dehiscence were seen in three patients with transposition flap reconstruction. There was no complete flap necrosis, hematoma or seroma formation in our patients.

Fig.03



The follow up period ranged from 2 months to 18 months with a mean follow up period of 9.21 months. Seven patients were lost to follow up and from the remaining 16 patients, none of them developed recurrence. Although aesthetic outcomes were not a part of our study, during the follow up period we noticed that the cosmetic results were excellent. The scar lines were minimal and barely visible with an excellent skin colour and texture.

Discussion:

In this study, all the patients had basal cell carcinoma of the face and scalp. All these patients underwent a three dimensional monoblock excision of the lesion with a safety margin followed by reconstruction. In basal cell carcinoma, the recommend excision margin is 4mm for small-sized lesion of <2 cm in diameter. For lesions of >2 cm in diameter, recurrent lesions or high risk lesions, the excision margin is 1 cm. In our study, we used mean safety margins of 4 mm, and all margins were ascertained to be negative by intraoperative frozen section.

There are various techniques described for reconstruction of defects following surgical excision of skin tumours. The choice of these techniques depend on the location, size and shape of the defect [5, 6]. The various techniques are primary closure, skin graft, rotation flaps, transposition flaps, advancement flaps and staged interpolation flaps.

Primary Closure:

Primary closure is the most commonly used method to treat soft tissue defects. The reconstruction of circular defects by primary closure leads to a dog-ear formation . To avoid these dog-ears, an elliptical excision is taken that includes the adjacent normal tissue. As a result, a longer scar is created than the defect. Therefore, primary closure may not be appropriate choice for use in the facial region from a cosmetic perspective [7]. In our study four patients underwent primary closure without tension because the defects were small and the results were good with barely visible scar line.

Skin Grafting:

Skin grafting is usually performed when defects are large

and unsuitable for primary closure or a local flap. However, skin grafts are less desirable due to the colour differences between the donor and recipient sites and scarring. Therefore, in patients with small-to-medium defects, a local flap rather than a skin graft is preferred [8]. In our study we used split skin grafting in one patient with a large lesion involving the entire pinna. Incidentally this patient also had multiple lesions over cheek, upper lip, and nasal bridge which were excised and reconstructed.

Rotation Flaps:

The choice of various rotation flap dependent on skin tissue status and skin defect location [4]. Rotational flaps are used frequently because of ease of the technique, but they have a disadvantage of leaving large elliptical scars that require resection of a large amount of normal skin tissue and cause anatomical deformities of the adjacent structures. In younger patients, rotational flaps exert excessive tension on the face due to lack of redundant skin, as a result it leaves obvious scars. We used rotation flap reconstruction in three of our patients with good aesthetic results.

Advancement Flaps:

This method involves the transfer of a flap into the defect site using a random pattern flap involving dermal and subdermal plexus, which are connected by a subcutaneous perforating artery arising from the muscle [9]. The classic example of advancement flap is the V-Y advancement flap. This method involves the transfer of a V-shaped flap to the defect site and converting it to a Y-shaped flap. It can be unilateral or a bilateral V-Y flap depending on the size of the defect.

The V-Y advancement flap preserves the sensation and at the same time provides a good soft tissue coverage. The disadvantage with this flap is tension, especially with larger defects. The point of maximum tension occurs where the gap of the defect is greatest, which is in the mid portion of the defect. A tension-free closure is therefore required to avoid flap necrosis.

When a skin tumour is present on the margin of an aesthetic unit, excellent cosmetic outcomes can be obtained using a V-Y advancement flap. Scar widening is related to excessive ongoing tension on the flap. According to geometric analysis, compared with a pivot flap that includes a rotational flap and transpositional flap, the V-Y advancement flap provides much less tension, which reduces the risk of hypertrophic changes and scar widening in the long term [10]. Since the V-Y flap creates a smaller dead space, it lower risks of postoperative complications such as seroma and hematoma. Advancement flap was used in five patients in our study.

Transposition Flaps:

The classical transposition flap was designed by Limberg. On the nose rhomboid transposition flaps are used for small surgical defects on nasal bridge and on the sidewalls of the nose. While using these flaps the tension vectors should be directed away from lower eyelid and nasal ala, where distortion leads to poor cosmetic results [11].

The Banner type transposition flaps are created as finger-like flaps with a width equal to that of the primary defect. The flap is rotated around the pivot point to cover the defect. The usual angle of rotation is between 60° and 120°. This flap type is often employed at the inferior lateral sidewall and the nasal ala [12].

The bilobed flap is commonly used at the nasal sidewalls and nose tip. The primary lobe is created in the same size of the primary defect or up to 20% smaller in case of enough skin laxity. The second lobe is designed at a ninety degree angle to the pivot point of the flap. The major tension is created by the closure of the tertiary defect [13]. In our study three patients were reconstructed with rotation flap with good cosmetic results.

Staged interpolation Flaps:

The technique of staged interpolation needs greater planning and execution than any other types of flaps. These flaps are based on vascular pedicle, donor location distant from the defect, and at least two stages for completion (pedicle formation and closure, pedicle division, and revision).

The paramedian forehead flap (PFF) is a type of staged interpolation flap used to repair medio-distal nasal defects. The flap design needs a sufficient height of the forehead to create a flap long enough to cover the nasal defect. The arterial supply is derived from the supratrochlear artery. The flap consists of skin musculature and vasculature. The base of the pedicle should be 1 to 1.5 cm. Flap is mobilized down upto to the galea aponeurotica followed by meticulous haemostasis. Subperiosteal release of the flap increases mobility. Before suturing the thickness of the flap needs to be adapted to the surgical defect. Donor site closure is performed with minimal tension. About 3 weeks later the pedicle is thinned and after 6 weeks the PFF is detached from its base and sutured [14,15] [Fig.04 a) BCC at left ala of nose; b) paramedian forehead flap reconstruction done; c) post operative before pedicle division; d) post operative after pedicle division]. In our study seven patient underwent paramedian forehead flap reconstruction with defects on the nose and its subunits.

Fig.04



Free Flaps:

In rare cases the BCC may grow to large dimensions, larger

than 5 cm in diameter, known as giant BCC. In such cases it can invade the underlying fascia, the muscle, and the bone, and when localized on the scalp, the giant BCC can invade the periosteum, the bone, the dura mater, and the brain. Recurrent BCC also entail larger resection and therefore makes reconstruction a challenging task. The availability of microvascular free tissue transfer has been a major advance in head and neck reconstruction, when it comes to complex and large tissue defects. The latissimus dorsi flap can be used as a muscle-only flap with split-thickness skin grafting or as a free myocutaneous flap. It is safe and reliable flap with satisfactory long-term cosmetic and functional result. Other free flaps like the radial forearm free flap and the anterolateral thigh flap can also be used depending upon the site and the size of the tissue defect. In our study we did not have any recurrent or giant BCC cases.

Conclusion:

In our study, nose and cheek were the most common location of the tumour which was reconstructed with paramedian forehead flap and V-Y advancement flap respectively. They have minimal complication rates with good cosmetic outcomes and barely visible scar lines.

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