

Reconstruction of Defects Following Excision of Basal Cell Carcinoma of Face: A Subunit-based Algorithm

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Abstract

Introduction: Basal cell carcinoma (BCC) is a locally invasive, slowly spreading tumor arising in the basal layer of epidermis and rarely metastasizes. Surgical excision with adequate margins is curative. Reconstruction of post-excisional defects on the face is both essential and challenging. **Clinical Cases and Methods:** A retrospective review of hospital records for patients operated for BCC of the face excluding the pinna at our institute in the last 3 years was done and a review of the literature was carried out to identify the most common principles governing the optimal reconstruction of post-excisional defects on the face. Literature search was made in Embase, Medline, and Cochrane databases in the last two decades with the filters placed for human and English language studies with the search terms (Facial Basal cell carcinoma) AND reconstruction AND (Humans[Mesh]). **Results:** Records of 32 patients with facial BCC who underwent excision and reconstruction at our hospital were identified and details were recorded. Our literature search with the terms and filters mentioned above revealed 244 studies with duplicates removed. After further hand-searching, 218 journal articles were identified, reviewed, and a reconstruction algorithm was designed based on the findings. **Discussion:** Reconstruction of post-BCC excisional defects of the face relies on an adequate understanding of the general principles of reconstruction, subunit principle of facial esthetics, flap anatomy and vascularity as well as operator experience. Complex defects need innovative solutions, multidisciplinary approaches, and newer methods of reconstruction like perforator flaps and newer techniques like supermicrosurgery. **Conclusion:** Multiple reconstructive options for post-excisional defects of the BCC over the face are available and most defects can be approached in an algorithmic manner. Further well-designed prospective research studies are needed to compare outcomes of different reconstructive options for a given defect and identify the most suitable options.

Keywords: Facial basal cell carcinoma, facial reconstruction, facial sub-unit, reconstruction algorithm

INTRODUCTION

Basal cell carcinoma (BCC) is a locally invasive, slowly spreading tumor arising in the basal layer of epidermis and rarely metastasizes. These are more commonly seen in elderly patients, chronic sun exposure is the most common etiology. Head and neck are frequent sites of occurrence and among these, the nose is the most common location for BCC. Although most small BCC lesions can be excised primarily, the neglected ones slowly become bigger, and post-excisional reconstruction becomes more difficult. Esthetic reconstruction becomes paramount when lesions affect the face. This study aimed to highlight the most important principles of soft-tissue reconstruction in cases of post-excisional defects of BCC involving the face and proposes an algorithmic approach toward their management.

CLINICAL CASES AND METHODS

This is a hospital record-based retrospective review of patients operated for BCC of the face at our institute from August 2016 to August 2019. Adult patients (>18 years) with histopathologically confirmed BCC over the face, patients managed surgically (excision and closure with or without flaps) and patients having a post-surgery follow-up of at least 3 months were included in the review whereas patients having lesions over the pinna

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How to cite this article: Mohapatra DP, Friji MT, Dinesh Kumar S, Chittoria RK, Pathan I, Koliath S. Reconstruction of defects following excision of basal cell carcinoma of face: A subunit-based algorithm. *J Cutan Aesthet Surg* 2023;16:1-13.

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10.4103/JCAS.JCAS_87_21

and, whose follow up records were not available were excluded. The size, location, a gross and histological variant of BCC, and type of reconstruction were provided as well as demographic details of the patients were obtained. Subjective esthetic scores were collected from the patient as well as an observer not involved in surgical care; on a 5-point Likert scale (0–5, 0 being unsatisfactory and 5 being highly satisfied). Scores were collected on direct observation, from the observer as well as the patient when the patient came for follow-up in the outpatient department. A review of the literature was carried out to identify the most common techniques used for reconstruction based on size and location for defects arising from the excision of BCC. The research question we wanted to answer was “what are the most suitable reconstructive options for soft-tissue defects following excision of BCC in different aesthetic units of face?” The primary outcome measure was facial esthetics following reconstruction.

A literature search was made in Embase, Medline, and Cochrane databases with the filters placed for human and English language studies with the search terms (Facial Basal cell carcinoma) AND reconstruction AND Humans [Mesh]

The search results were further hand-searched to remove studies that did not include BCC of the face or where nonsurgical therapy had been performed. All types of studies, including letters, conference abstracts, case reports, case series, randomized control trials, and systematic reviews were included in our review. Studies that did not mention esthetic outcomes were excluded.

RESULTS

Records of 32 patients with facial BCC who underwent excision and reconstruction were identified and details were recorded in an excel sheet [Table 1]. The mean age of patients in our series was 56.7 years. Most patients ($n = 26$) were in the age group of 40–60 years, whereas one patient was 35 years old and 5 patients were above 60 years. Gender distribution was in our series with 23 women to 9 men. The defect size ranged from 1.3 cm × 1.3 cm to 8.5 cm × 6.5 cm with an average defect size of 11.5 cm². Among these patients, who underwent primary reconstruction, three patients (five lesions) had their defects corrected with elliptical excision and closure, and the rest were corrected with either skin graft, local or regional flaps. None of the patients in our series had undergone reconstruction with distant flaps. Vascular complications of flap were seen in two patients. Flap tip and margin discoloration was noticed in patients where cheek advancement had been done. However, both situations were managed conservatively, and discoloration improved in 72 h. Recurrence needing revision surgery was seen after 2 years of primary excision in one patient who had undergone cheek advancement flap for lower eyelid

pigmented BCC. The recurrent lesion was excised with adequate margins and closed by local tissue advancement.

Our literature search with the terms and filters mentioned above revealed 244 studies with duplicates removed in MEDLINE and Embase databases. No suitable study could be identified in the Cochrane database. After further hand-searching, 218 journal articles including 95 case reports, 13 review articles, and 4 letters, were identified. Articles that did not discuss surgical management of BCC, facial reconstruction, and esthetic outcomes were excluded from our review.

DISCUSSION

The goals of BCC excision are R0 resection (which means the tumor has been removed completely with margins being free on both macroscopic and microscopic evaluation). Standard margins for excision include 4–5 mm from affected margins of the lesion including induration if any. Moh's micrographic surgery is helpful in determining resection margins, especially in esthetically critical areas like eyelids and canthi. In the absence of availability of Mohs' micrography, the lesions in such critical areas are excised with a conservative margin of 3 mm and the defect is resurfaced initially with a full-thickness graft, which is then revised if histopathology shows residual tumor. If the margins come as clear, the patient is kept under a close follow up and in those cases, full thickness skin graft serves as an acceptable reconstruction. Although total lesion removal is the overarching goal of BCC excision, esthetic reconstruction is paramount when dealing with post-excisional defects over the face.^[1]

Minimizing disfigurement by reducing displacement of facial structures during reconstruction, replacement of like tissue from same esthetic unit, restoration of function to maximum are the primary goals of reconstruction in facial soft-tissue defects.^[2]

Modern principles of soft-tissue defect reconstruction entail identifying and carrying out the most suitable method of reconstruction involving the reconstructive elevator irrespective of the complexity of the defect unlike the application of simplest to complex options as per the reconstructive ladder of the past. In addition, reconstruction involves consideration for restoration of form as well as function along with esthetics. The primary recommendation to reduce the complexity of reconstruction surgery needed for facial BCC is early identification and management.^[3]

Primary closure of the post-excisional defects is done for smaller lesions with surrounding skin laxity.^[4] Optimum method of reconstruction for facial defects is selected based on anatomic location, size of lesion, patient age (skin laxity), patient gender (hair-bearing skin), number of lesions, recurrent lesions, surgical skills as well as patient's preference [Figure 1].

Table 1: Details of patients and lesions

Serial no	Age	Sex	BCC type	Location (facial subunit)	Defect size (cm)	Type of reconstruction	Esthetic outcome	Recurrence
1	55	f	Pigmented	Left zygomatic	2.5×1.5	WLE + Mustarde flap	Satisfactory	No
2	60	m	Infiltrative	Right nasal alar base + upper lip	2.5×2.5	WLE + paramedian forehead flap	Satisfactory	No
3	40	f	Pigmented	lateral canthus of left eye	2×2	WLE + bilobed flap + medial cheek rotation	Satisfactory	No
4	58	f	Ulcerative	Central forehead	1.5×1.5	WLE + Primary closure	Satisfactory	No
5	67	f	Pigmented, ulcerative	Nasal dorsal side wall + medial and cheek	6×5	Paramedian flap with Mustarde flap	Satisfactory	No
6	55	f	Ulcerative	right lower eyelid	1.5×1.3	WLE + Dufourmental flap	Satisfactory	No
7	56	f	Nodular	Right alar base and alar side wall	3×2.5	Nasolabial flap + right composite cartilage graft	Satisfactory	No
8	50	f	Pigmented	Right cheek	3.5×1	Excision + cervicofacial flap right	Satisfactory	No
9	58	f	Pigmented	Tip of nose	2.2×2	WLE + Riegler flap	Satisfactory	No
10	40	f	Ulcerative	Right lower eyelid	4.5×2.5	WLE + Mustarde flap + nasal septum chondromucosal graft	Satisfactory	No
11	64	m	Ulcerative	Left lateral forehead	3×3	WLE + SSG	unsatisfactory	No
12	60	f	Pigmented	Central forehead	3×2.5	WLE and forehead advancement flap	Satisfactory	No
13	76	m	Superficial	left lateral forehead	5×5	Excision and FTSG (donor site: left supraclavicular region)	Satisfactory	No
14	45	f	Ulcerative	Left buccal, lateral and medial cheek	8.5×6.5	WLE+FTSG	Satisfactory	No
15	35	f	Ulcerative	Right Ala	2×2	WLE + Nasolabial flap	unsatisfactory	No
16	56	f	Pigmented	Right lower eyelid	3.5×5	nLE + cheek advancement flap	Satisfactory	Yes
17	60	F	Superficial	Right medial cheek	1.3×1.3	WLE + primary closure	Satisfactory	No
			Superficial	Right lateral cheek	1.3×1.3	WLE + primary closure	Satisfactory	No
			Superficial	Right lateral forehead	1.5×1.5	WLE + primary closure	Satisfactory	No
18	52	m	Ulcerative	Nose tip	2×2	Excision + bilobed flap	Satisfactory	No
19	65	f	Nodular pigmented	Medial canthus of Left eye + left dorsal nasal wall	4.5×4	WLE + median forehead flap	Satisfactory	No
20	50	f	Ulcerative	tip + right alar side wall of nose	3×2.5	WLE + nasolabial flap	Satisfactory	No
21	65	f	Superficial	Central Forehead	3×3	WLE + bilateral advancement flap	Satisfactory	No
22	62	m	Pigmented	Central forehead	4×3	Bilobed flap	Satisfactory	No
23	60	m	Ulcerative pigmented	Right cheek	6×5.5	WLE + forehead flap + Mustarde flap	Satisfactory	No
24	50	f	Nodular	Left lateral canthus + lateral forehead + zygomatic region	5×4.5	WLE + Lateral forehead flap	Satisfactory	No
25	60	f	Ulcerative pigmented	Right medial Cheek	5×3.5	WLE + cheek transposition flap + Forehead flap	Satisfactory	No
26	58	f	Pigmented	Right lateral Forehead	2×2	WLE+ bilateral advancement flap	Satisfactory	No
27	55	f	Nodular	Right lateral upper lip + philtrum	2.5×2.5	WLE + lateral lip advancement	Satisfactory	No
28	60	f	Ulcerative pigmented	Right zygomatic + buccal	5×3.5	WLE + superiorly based post-auricular flap	Satisfactory	No
29	55	m	Ulcerative pigmented	Right Lower eyelid+ zygomatic+ medial and lateral cheek	7×4	WLE + medially based cheek transposition flap	Satisfactory	No
30	55	f	Ulcerative pigmented	left medial cheek	3×2	WLE + cheek advancement flap	Satisfactory	No
31	55	f	Ulcerative	right lateral upper lip + medial cheek	2×2	WLE + primary closure	Satisfactory	No
32	49	m	Ulcerative	Right dorsal side wall of Nose	1.5×1.5	WLE + glabellar flap	Satisfactory	No

WLE = wide local excision

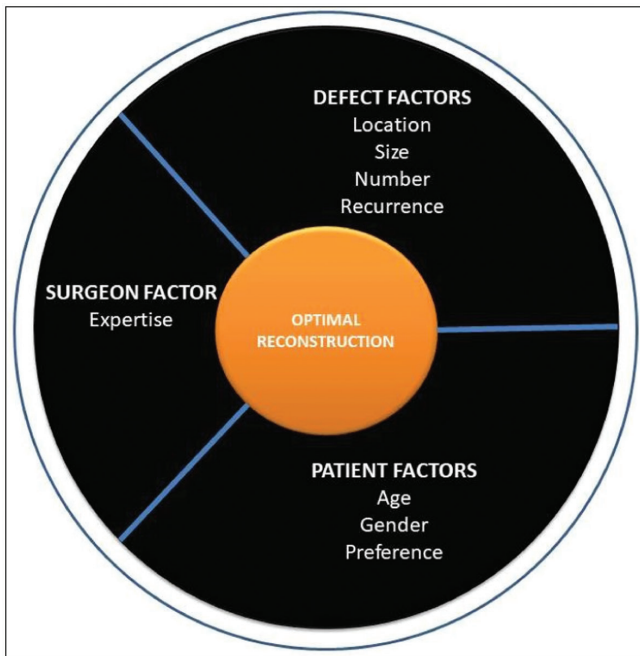


Figure 1: Planning wheel for facial soft-tissue defect reconstruction

Allowing a defect to heal by secondary intention is preferred for very small defects. Larger defects will need flap reconstruction. Aggressive lesions of the head and neck region will need more complex procedures in form of microvascular flap reconstruction.^[5,6]

The face is divided into esthetic units [Figure 2], where the skin has similar characteristics with regard to color, thickness, amount of subcutaneous fat, texture, and presence of hair and bounded by anatomical landmarks. These units are forehead, nasal, cheek, eyelids, lips, chin, pinna, and scalp. They are fairly well-defined within their esthetic borders.^[7,8] The borders which define these esthetic units include hairline, eyebrows, nasolabial fold, philtrum, vermilion border and labiomental fold. These esthetic units are further refined into subunits with imaginary borders for esthetic purposes. Reconstruction of a soft-tissue defect will depend on the esthetic unit where the defect lies. It is preferable to borrow tissues for reconstruction from the same esthetic unit for an optimal result. Location of the defect will also determine the vascular basis for reconstruction if a flap is being planned [Figure 3]. The size of a lesion in relation to the esthetic unit is an important factor in deciding a suitable reconstruction.

Elderly patients are favorable candidates for primary closure as well as flap reconstruction owing to the lax nature of their skin. However, many elderly individuals have comorbidities like diabetes mellitus, hypertension, cardiac issues, and concurrent medications like aspirin which may interfere with outcomes. In contrast younger, individuals with tight skin may need an extensive flap procedure and undermining to mobilize adjacent skin for

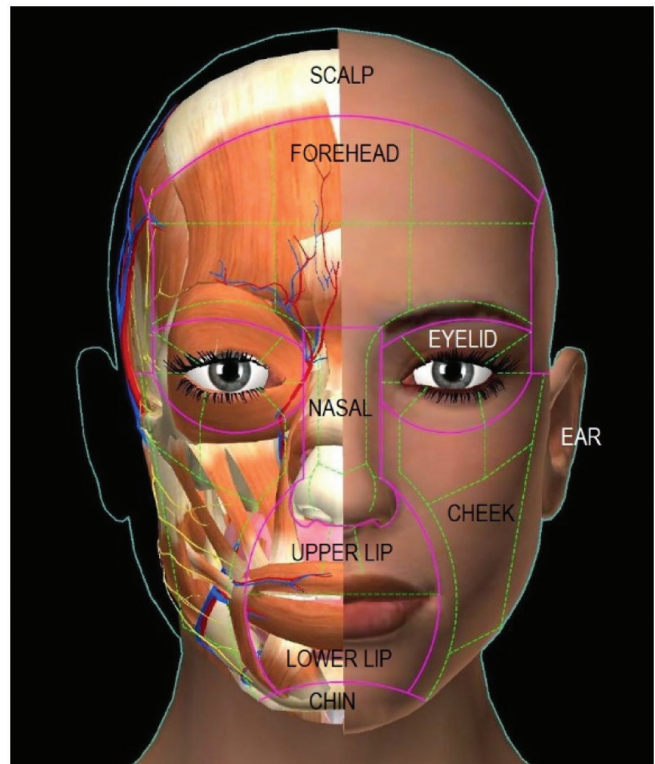


Figure 2: Facial subunit diagram with esthetic and underlying anatomic components. Pink lines represent unit boundaries and green lines represent subunit boundaries

tension-free closure in a given defect but these flaps tend to be more robust. Younger individuals may also be more demanding with regard to cosmetic outcomes.

Patient gender is an important determinant for facial flap selection. This is because hair-bearing skin as in the beard and moustache areas needs to be taken into consideration among male patients before planning a flap reconstruction. However, in women, there is a greater liberty in selecting a flap for reconstruction.

Multiple lesions in a single facial unit are obviously difficult to treat and need more planning to achieve optimum reconstruction [Figure 4]. Lesions in multiple units of the face in the same patient need individual planning for each unit with innovations and consequently increase operating times.

Recurrence of primary lesion needing excision gives a greater challenge for reconstruction as standard operations may have been carried out already in the previous setting and number of reconstructive options may become limited [Figure 5].

Surgical skills of the operator and patient preferences determine reconstruction. More complex reconstructions are better carried out by experienced operators, whereas patients must give the final go-ahead for a specific type of reconstruction when more than one options exist for a specific defect.

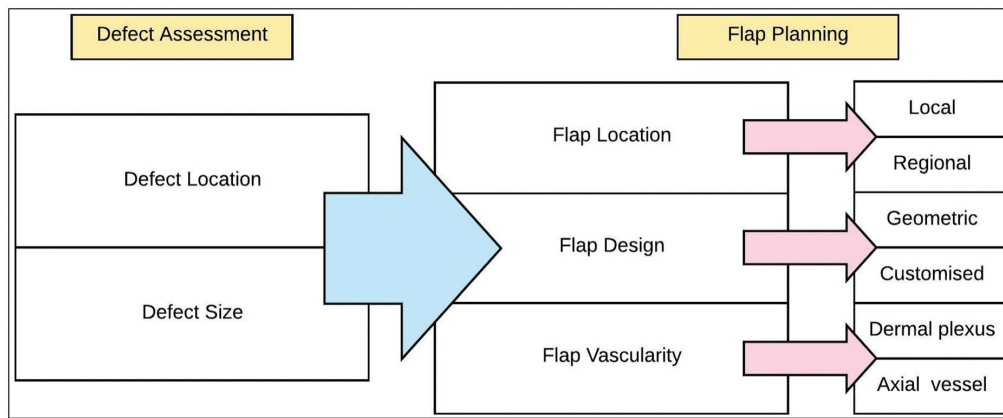


Figure 3: Flow diagram for planning flap reconstruction of facial soft-tissue defects



Figure 4: Extensive BCC of right cheek unit bordering up to right alar and upper-lip subunit in a 60-year-old man (A), resurfaced with a combination of cheek transposition flap and midline forehead flap (B). Division of forehead flap was carried out later

Guidelines for reconstruction in different facial esthetic units are presented [Table 2]. Finer points pertaining to reconstruction in individual units is given below.

LESIONS OF THE FOREHEAD

Forehead unit is subdivided into upper and lower regions and each region is further subdivided by two vertical

lines into one central and two lateral subunits. Eyebrows are specialized landmarks of the forehead unit. Elliptical excision and closure in central subunits are oriented vertically to align along glabellar frown lines. Small to medium-sized defects of the glabellar subunit may be resurfaced with nasal root islanded flap which derives its vascular supply from the dermal plexus originating from branches of angular and supratrochlear, supraorbital arteries^[10] or bilateral advancement flaps.^[10,11] Elliptical excision along lateral subunits may be vertical [Figure 6] or horizontal depending in skin laxity and presence of wrinkle lines. When placed horizontally, the scars should be aligned to hide in the hairline in upper part, in the skin wrinkles on the middle part and along the eyebrow margins in the lower part. The forehead skin is richly supplied on either side of midline by the dermal vascular plexus originating from frontal branch of superficial temporal artery, supra trochlear and supraorbital arteries and terminal branches of angular branch of facial artery. Owing to this vascular plexus, local advancement flaps on the forehead are generally robust and can be elevated at a supra-muscular plane. This vascularity aids in designing double hatchet flaps for small to medium size defects of the lateral forehead or even double advancement flaps [Figure 7] for medium- to large-sized defects.^[12]



Figure 5: Recurrent BCC in a 55-year-old man involving right alar and upper lip subunit, excised and resurfaced with midline forehead flap

Table 2: Algorithm for facial subunit-based defect reconstruction following excision of basal cell carcinoma

Defect location		Defect size				
Anatomic unit	Anatomic subunit	>20% (of subunit)		<20% (of subunit)		
Forehead	Upper central	V-T or A-T advancement flaps for moderate sized defects. Still bigger defects would need specialized procedures like tissue expansion		Elliptical excision and straight-line primary closure		
	Lower central			If straight line closure is not feasible without distortion of important esthetic landmarks, geometric flaps (Limberg flap) can be done.		
	Upper lateral	Unilateral or bilateral advancement flaps for moderate sized defects. Larger defects would require larger transposition flaps				
	Lower lateral					
	Temporal	Cheek/ cervicofacial flap, skin graft, tissue expansion may preferred depending on the size and complexity				
Eyebrow ⁹¹	Upto 1/3 loss	located centrally: H flap	located laterally: V-Y flap	Primary closure		
	Upto ½ loss	Located centrally: double V-Y flap Located medially/ laterally: Superficial temporal artery-based hair bearing flap				
	Complete loss	Superficial temporal artery-based hair bearing flap				
		>50% (of subunit)	20%–50% (of subunit)	<20% (of subunit)		
Nose	Dorsum	Midline forehead flap (preferred for sidewall defects)	Paramedian forehead flap (preferred for dorsum, tip, columella and ala defects)	Glabellar advancement flap (preferred for dorsum and sidewall defects on upper half)	Dorsal nasal flap (Reigler flap; preferred for dorsum and sidewall on lower half and tip defects)	Elliptical excision and straight-line closure. If straight line closure is not feasible without distortion of important esthetic landmarks, geometric flaps (Bilobed flap) can be done.
	Sidewall			Nasolabial islanded flap for sidewall defects in lower half	Nasolabial flap	
	Tip					
	Columella					
Ala						
		>50% (of subunit)	25%–50% (of subunit)	<25% (of subunit)		
Periorbital		Full thickness	Partial thickness	Full thickness	Partial thickness	Full thickness Partial thickness
	Upper eyelid	Lower lid switch flap	Full thickness skin graft	Sliding tarsoconjunctival flap, Cutler-Beard flap	Full thickness skin graft	Primary closure (with or without cantholysis)
	Lower eyelid	Sliding tarsoconjunctival flap with skin graft, Composite graft with cheek advancement	Full thickness skin graft	Primary closure with lateral canthotomy and cantholysis, Tenzel flap	Primary closure with lateral canthotomy and cantholysis	Tripier flap Mustarde flap
	Medial canthus	Midline forehead flap, Paramedian forehead flap		Medially based myocutaneous flap from upper lid, Glabellar advancement flap		
	Lateral canthus	Bilobed flap Cervicofacial flap				
		>50% (of unit)	20%–50% (of unit)	<20% (of unit)		
Cheek	Suborbital	Cervicofacial flap, Skin grafts may be used in selected elderly patient with extensive/ multiple lesion excision		Geometric flaps (bilobed flap, Limberg flap) Mustarde cheek advancement flap		Elliptical excision and straight-line closure.
	Preauricular			Post auricular flap Cheek advancement flaps		Elliptical excision and straight-line closure Geometric flaps for selected defects
		>50% (of subunit)	25%–50% (of subunit)	<25% (of subunit)		
Lip	Upper lip	Complex reconstruction is required. Abbe lip switch flap		Can be closed primarily.		
	Lower lip	Distant flaps like deltopectoral flap, Microvascular free radial artery forearm flap (FRAFF)		If defect is full thickness, layered anatomic closure is done with advancement and alar backcut in case of upper lip		
Chin			Rare site of occurrence of BCC. Small defects can be closed primarily. Larger defects need geometric flaps.			

LESIONS OF THE NOSE

Nasal surface is among the commonest sites for the occurrence of BCC. A planning on the type of reconstruction needed following excision can be made depending on the size of the defect in relation to the subunit it is present as well as location. Defects of the alar subunit and columellar subunit may in addition need consideration for three-dimensional reconstructions, in case of full-thickness involvement.^[13] Elliptical closure is usually done in a vertical manner to hide the scar along the nasal dorsal lines. Geometric flap like bilobed flap is helpful for nasal tip defects. These are dependent on dermal vascular plexus for survival. While planning such flap, position and possible distortion of ala need to be taken into consideration. Apron flap [Figure 8] and glabellar transposition flaps are raised at supraperiosteal and supraperichondral plane for preserving the vascularity which is derived from contralateral angular branch of the facial artery.^[14]

Defects involving nasal tip, supratip, and lateral nasal margins are traditionally resurfaced with nasolabial flaps [Figure 9] or may even need innovative flap designs for complex defects such as the pedicled nasal skin flap based on superficial musculoaponeurotic system.^[15]

Multiple nasal dorsum lesions as seen in syndromes requiring extensive excision may be managed by an unmeshed split-thickness skin graft or a full-thickness graft covering the whole subunit.

LESIONS OF THE EYELIDS AND PERIOCCULAR LESIONS

Lesions involving periocular soft tissues need meticulous planning and execution as both function and esthetics need



Figure 8: BCC involving nasal tip subunit in a 60-year-old woman resurfaced with an apron flap



Figure 6: Pigmented BCC over forehead lower central subunit in a 58-year-old woman managed by elliptical excision and primary closure



Figure 9: BCC post-excisional defect involving nasal tip, supratip, and right nasal wall subunit in a 50-year-old woman resurfaced with ipsilateral superior based nasolabial flap. Flap division and inset was done at a later date



Figure 7: Defect following excision of BCC on lateral forehead subunit in a 65-year-old woman closed with bilateral advancement flaps



Figure 10: Extensive post-excisional defect of the left medial upper eyelid, canthus, lower eyelid, and lateral nasal wall in a 65-year-old woman resurfaced with a midline forehead flap. Division of the forehead flap was carried out at a later date

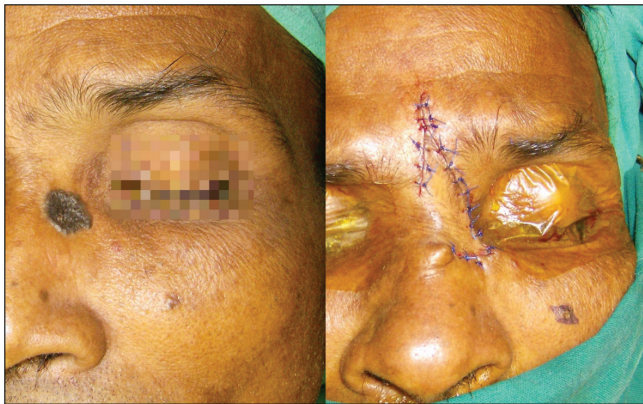


Figure 11: Smaller lesion on left lateral nasal wall resurfaced with a glabellar flap

to be restored. Well-defined algorithms have been defined for reconstruction of periocular soft-tissue defects.^[16]

Smaller defects of medial canthus can be covered with islanded pedicled flaps harvested from nasal saddle or lateral nasal sidewall.^[17] Larger defects are resurfaced with glabellar transposition flaps [Figure 10] or forehead flaps [Figure 11].

Smaller lateral canthal defects are resurfaced with geometric flaps but bigger defects need innovative flap designs [Figure 12]. Moderate-sized defects can be covered

by borrowing tissues from adjacent cheek unit. Flaps are elevated at a subcutaneous plane with attention directed toward preserving branches of facial nerve supplying the eyelids [Figure 13].

Eyelid defects are measured in terms of width of eyelid remaining as well as thickness of eyelid involved. Full-thickness defects with loss of anterior and posterior lamella need reconstruction of both the structures and need meticulous planning [Figure 14]. Perforator flaps based on facial artery perforators can be used for reconstruction of partial thickness losses of lower eyelid.^[18,19] Composite grafts have been used for posterior lamella creation.^[20]

LESIONS OF THE CHEEK

While considering defects following excision of cheek BCC, the size of the lesion and location is taken into consideration with respect to the whole cheek unit rather than individual subunits for simplicity and convenience of reconstructive planning. Cheek unit is defined by the infraorbital rim and zygomatic arch superiorly, the pinna and angle of the mandible posteriorly, the lower border of the mandible inferiorly, and the nasofacial, melolabial, and mentolabial folds medially. Elliptical excision and closure is planned in such a way that the final scar lies where possible in line with the junctions of the unit, for example, nasolabial fold [Figure 15]. In other situations,



Figure 12: Extensive post-excisional defect of right lateral upper lid, canthus, lower lid and upper cheek subunit in a 50-year-old woman resurfaced with a lateral forehead flap



Figure 13: Smaller post-excisional defect of left lateral canthus and upper cheek subunit in a 45-year-old woman resurfaced with a pre-auricular based bilobed flap



Figure 14: Extensive post-excisional defect involving right lower eyelid and cheek subunit in a 48-year-old woman resurfaced with a mustarde cheek advancement flap

scars can be preferably placed parallel to relaxed skin tension lines. All reconstruction should take into consideration, possibility of distortion of surrounding landmarks like lips, nose, eyelids, or pinna.^[21] The skin of cheek is richly supplied by dermal plexus derived from branches of facial artery.

Geometric and advancement flaps in this region supported by this rich dermal plexus are raised at a subcutaneous plane. Medium-sized defects can usually be tackled by geometric flaps.^[22]

To improve the reach of geometric flaps and outcomes, finer dissection to create a subcutaneous pedicle may be done. Although the reach improves, a compromise of vascularity may be seen.^[23]

Retroangular flap based on retrograde blood supply from facial artery may be used in reconstruction of medium-sized defects of cheek and adjoining units although the dissection may be tedious and preoperative angiograms to delineate the facial artery are recommended by some authors.^[24]

Perforator flaps based on facial artery, and superior labial artery can be used to reconstruct defects of cheek and adjoining units. Although the dissection is generally tedious and needs operator experience, the outcomes are reasonably good.^[25-27]

Moderate to large defects are managed with cheek advancement flaps [Figure 16]. Cheek advancement flaps



Figure 15: BCC lesion on right nasolabial fold managed with elliptical excision and primary closure

can be extended to neck to convert it into a cervicofacial flap. Cervicofacial flap done for more extensive defects of cheek unit can be raised at a supraplatysmal plane in the neck or even at a subplatysmal plane with adequate care to preserve the marginal mandibular branch of facial nerve. Although geometric flaps based on axial pedicle can be planned for moderately large defects [Figure 17] of the cheek unit, strict consideration should be taken for presence of facial hair and possible redistribution to non-hair bearing areas of the cheek, particularly in men.

Small defects localized to preauricular subunit of the cheek can be closed primarily with the scar hidden in the sideburns. Bigger defects however need innovative designs [Figure 18] with a primary consideration of not distorting the pinna

LESIONS OF THE LIP

Lip is a composite structure composed of skin, muscle and mucosa with vascularity derived from superior and inferior labial arteries for upper and lower lip, respectively.



Figure 16: BCC of left cheek suborbital unit, resurfaced with a cheek advancement



Figure 17: Extensive defect of right cheek suborbital subunit in a 55-year-old man, managed with medially based cheek transposition flap. This flap is less preferable in men due to the possibility of transposition of facial hair to suborbital regions

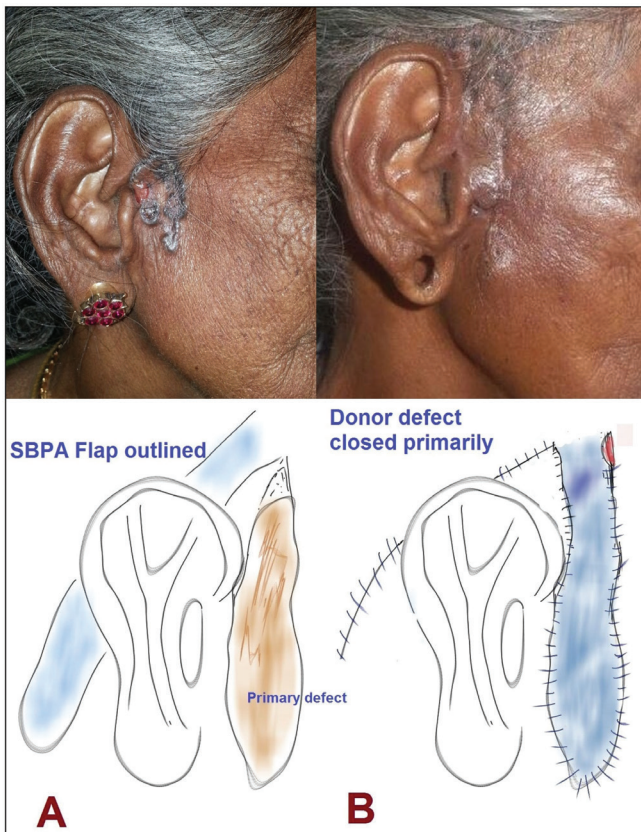


Figure 18: Lesion of preauricular subunit excised and resurfaced in a 60-year-old woman with a superiorly based post-auricular flap

RSTLs in this region are aligned in a radial pattern around the oral stoma, vertical in midline and oblique around the commissures. Small lesions should be closed with scars placed along the RSTLs. Partial thickness defects of medium to large size involving the upper lip can be managed with VY advancement flaps based on dermal plexus vasculature^[28] or lateral advancement flaps aided by an alar back-cut [Figure 19]. Horizontal lip shortening resulting in microstomia is a possible complication of such reconstructions.

Composite defects need to be closed preferably with tissues derived from the same unit. Esthetic improvements

after flap reconstruction can be obtained by fat grafting techniques.^[29]

Complex defects spanning two esthetic units, for example, Ala and upper lip, need innovative flap planning and meticulous execution.^[30]

LESIONS OF THE CHIN

Chin is a rare site of occurrence of BCC and principles governing excision and reconstruction remain same as other esthetic units, namely orientation of scars along the RSTLs, avoidance of distortion to landmarks like lip and preservation of vascularity to flaps if needed by elevating them at an appropriate (supra muscular) plane.

Esthetic outcomes of facial unit reconstructions can be assessed subjectively, using 2D photography or objectively by photography anthropometric methods.^[31,32]

Although most lesions of the face can be managed, if approached in a systematic manner, by local and regional flaps, there will be in rare instances need for more complex dissection and reconstruction techniques. This will need the involvement of a multidisciplinary team including radiologists and plastic surgeons well versed in supermicrosurgical techniques to provide the best outcomes to the patient.^[33]

CONCLUSION

Reconstruction of facial defects in different facial esthetic units is essential following excision of BCC. Surgeon skills, patient's preference, defect size and location are important determinants of esthetic outcomes. Newer modalities of reconstruction including freestyle perforator flaps give better outcomes, but operator experience is necessary. Comparative studies are lacking in comparing two or more types of flaps for reconstruction of a given esthetic unit of face. Further studies are mandated with well-designed randomized studies and an adequate number of participants, to identify an appropriate algorithm for flap reconstruction and validate the algorithm presented in this manuscript.



Figure 19: Post-excisional defect of the central upper lip and adjacent nasal rim in a 55-year-old woman resurfaced with lateral lip advancement

Acknowledgement

The authors are grateful to Miss Devangi Ramakrishnan for the help with digital artwork [Figure 2].

Financial support and sponsorship

Not applicable.

Conflicts of interest

There are no conflicts of interest.

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