

Fourth Dimension in Reconstruction of Defects Following Excision of Basal Cell Carcinoma of Head and Neck!

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Abstract

Background: Basal cell carcinomas (BCCs) are the most common skin tumors of the face. Excision results in soft tissue defects that require reconstruction with the focus on form, function, and patient satisfaction. **Aim:** To analyze the reconstruction of BCC excision defects of the head and neck region using local flaps and skin grafts with respect to the four dimensions of oncological reconstruction: clearance, form, function, and patient satisfaction. **Materials and Methods:** This is a prospective study conducted on 88 patients who presented with BCC of the head and neck region and who were operated in our hospital from January 2015 to December 2016 with a minimum follow-up period of 6 months up to June 2017. All patients underwent wide local excision and reconstruction using appropriate local flaps or split-thickness skin graft (SSG). Patients were analyzed with respect to age, sex, site, size, reconstruction method, complications, and patient satisfaction using the customized Patient Satisfaction Questionnaire (PSQ), derived from PSQ III. **Results:** A total of 77.3% defects were immediately reconstructed using local flaps and 18.2% underwent SSG. All flaps and grafts survived well with a complication rate of 6.8%. Approximately 72.7% of patients had good satisfaction with the medical care and reconstruction. **Conclusion:** Post-excisional defects of BCC in the head and neck region have to be reconstructed with equal weightage to the four pillars of oncological reconstruction: clearance, form, function, and patient satisfaction. Flap reconstruction is ideal as it brings about reconstruction with patient satisfaction, which is indeed the fourth dimension in any reconstructive surgery.

Keywords: Basal cell carcinoma, local flaps, patient satisfaction, reconstruction

INTRODUCTION

Basal cell carcinomas (BCCs) are the most common cutaneous tumors accounting for 70% of skin malignancies.^[1] Approximately 80% of BCCs occur on the face.^[2] Wide local excision is the standard management, followed by reconstruction with flap or split-thickness skin graft (SSG).

Oncological surgery focuses on clearance, whereas reconstruction has to focus on form, function, and patient satisfaction, which is valued less and has a negative impact on the patients' daily life.

We analyzed BCC defects of the head and neck region, reconstructed using local flaps and SSG, with respect to clearance, form, function, and the fourth dimension patient satisfaction by using a customized Patient Satisfaction Questionnaire (PSQ), derived from PSQ III.

MATERIALS AND METHODS

This is a prospective study conducted on 88 patients who presented with BCC of the head and neck region in our hospital from January 2015 to December 2016 with a minimum follow-up of 6 months and a maximum of 2.5 years up to June 2017. All patients underwent routine workup. Lesions less than or equal to 2 cm were subjected to excision biopsy with a 5-mm margin clearance. Lesions more than 2 cm were subjected to wedge biopsy first, and once diagnosis was confirmed, wide local excision was carried out with a 5-mm margin clearance. All cases were operated under general anesthesia. Resultant defects

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How to cite this article: Mahadevan K, Sruthi S, Sridevi S, Vivek R. Fourth dimension in reconstruction of defects following excision of basal cell carcinoma of head and neck!. J Cutan Aesthet Surg 2018;11:110-9.

Access this article online

Quick Response Code:



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DOI:
10.4103/JCAS.JCAS_100_17

were immediately reconstructed using appropriate local flaps or SSG. Postoperatively, the patients were assessed for any local complications. The patients were followed up for 1–2 years. Patient satisfaction was assessed using the customized PSQ scale. We made a questionnaire, which was derived from PSQ III, representing the six aspects—general satisfaction, technical quality, interpersonal manner, communication, time spent with doctor, accessibility, and convenience—by including 10 questions numbered 1, 2, 3, 6, 11, 17, 31, 41, 49, and 50 from PSQ III [Table 1]. As the study was being conducted in a government hospital where medical care is free, we did not include the financial aspect of patient satisfaction. The patients were explained the questions in their native language. Responses were graded as follows:

1. Strongly agree
2. Agree
3. Uncertain
4. Disagree
5. Strongly disagree

Each question was scored as shown in Table 2 and the scores were added. Total score equal or above 40 was considered good overall satisfaction. Scores were also analyzed with respect to six aspects of patient satisfaction.

Number of patients: 88

Duration of study: 2 years and 6 months

Inclusion criteria:

1. Primary BCC involving the face and neck region—treated by fusiform excision and primary closure, SSG, and local flaps
2. Patients who could be followed up post-op for a minimum of 6 months

Exclusion criteria:

1. Recurrent BCC
2. Primary BCC reconstructed using regional or free flaps
3. Metastatic BCC
4. Other skin malignancies
5. Patients who opted out or lost to follow-up before 6 months

Parameters assessed:

Apart from patient satisfaction, the following parameters were also assessed:

1. Age and sex
2. Site of BCC
3. Size
4. Reconstruction option used
5. Complications and management
6. Donor-site morbidity

RESULTS

All patients recovered well. No systemic complications were observed. None reported any functional deficit. All

Table 2: Scoring chart for the customized PSQ scale

Question number	Response value	Scored value
1, 3, 4, 5, 6, 7, 10	1	5
	2	4
	3	3
	4	2
	5	1
2, 8, 9	1	1
	2	2
	3	3
	4	4
	5	5

Table 1: Customized PSQ scale to evaluate patient satisfaction

S. no.	Question	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
1.	If I need hospital care, I can get admitted without any trouble	1	2	3	4	5
2.	Doctors need to be more thorough in treating and examining me	1	2	3	4	5
3.	I am very satisfied with the medical care I receive	1	2	3	4	5
4.	Doctors are good about explaining the reason for medical tests	1	2	3	4	5
5.	The medical care I have been receiving is just about perfect	1	2	3	4	5
6.	The doctors who treat me have a genuine interest in me as a person	1	2	3	4	5
7.	Doctors never expose me to unnecessary risk	1	2	3	4	5
8.	Doctors rarely give me advice about ways to avoid illness and stay healthy	1	2	3	4	5
9.	I am dissatisfied with some things about the medical care I receive	1	2	3	4	5
10.	My doctors are very competent and well trained	1	2	3	4	5

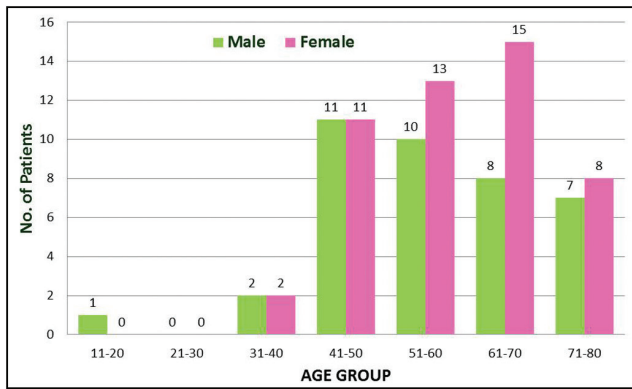


Figure 1: Number of patients who presented with BCC with respect to age and sex

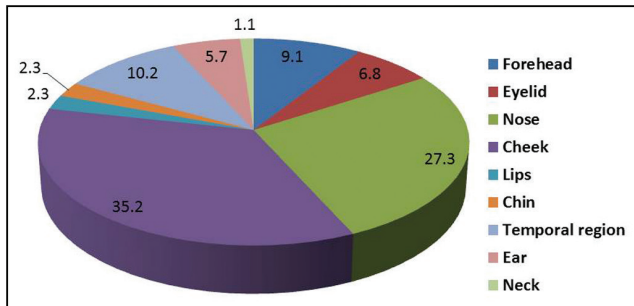


Figure 2: Percentage distribution of BCC in different areas of head and neck

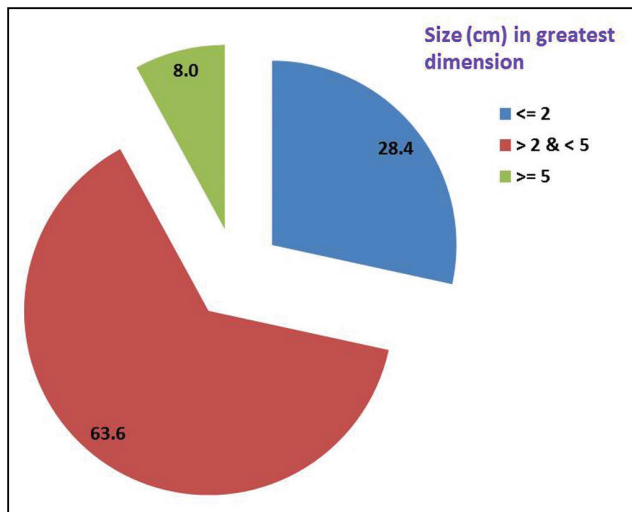


Figure 3: Percentage distribution of lesions based on their maximum dimension

flaps and grafts survived. All donor wounds healed well without any complications. All margins were free from tumor pathologically in all cases.

Incidence was more common in female population (55.7%) [Figure 1]. Majority of patients (52.3%) were in their sixth and seventh decades. The youngest in our series was of 15 years and the oldest was of 79 years.

A total of 35.2% cases were present in the cheek and 27.3% in the nose [Figure 2]. Approximately 19.3% of defects

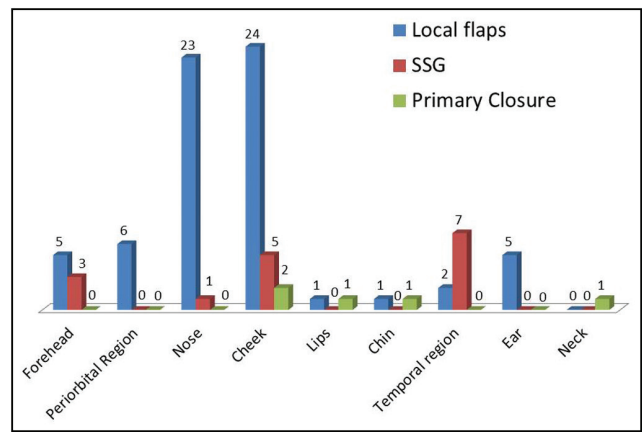


Figure 4: Reconstruction method used, expressed as percentage for each area

Table 3: Procedure done for each area of head and neck

S. no.	Site	Number of cases	Flaps used
1.	Forehead	8	Bilateral advancement flap (2) Paramedian forehead flap (1) SSG (3) Rotation (Worthen) flap (2)
2.	Periorbital region	6	Paramedian forehead flap (2) Glabellar flap (1) Nasojugal flap (3)
3.	Nose	24	Glabellar flap (2) Dorsal nasal flap (1) Paramedian forehead flap (20) SSG (1)
4.	Cheek	31	Fusiform excision and primary closure (2) Limberg flap (15) Rotation flap (5) Paramedian forehead flap (3) Horizontal forehead flap (1) SSG (5)
5.	Lips	2	Abbe flap (1) Wedge excision and closure (1)
6.	Chin	2	Limberg flap (1) Fusiform excision and primary closure (1)
7.	Temporal region	9	Rotation flap (2) SSG (7)
8.	Ear	5	Cervicofacial rotation flap (1) Preauricular flap (1) Retro-auricular flap (3)
9.	Neck	1	Fusiform excision and primary closure (1)

involved multiple aesthetic subunits. Clinically, 84% cases were nodular, 10.5% ulcerative, 4.5% superficial spreading, and 1% basosquamous. Approximately 28.4% of patients presented with lesions equal to or less than 2 cm in greatest dimension [Figure 3] and underwent excision biopsy based on clinical diagnosis. In 71.6% patients, lesion was

more than 2 cm and preoperative biopsy was performed to confirm the diagnosis. Eight percent presented with giant BCC.

Approximately 77.3% defects were reconstructed using local flaps, 18.2% underwent SSG, and 4.5% underwent fusiform excision and primary closure [Figure 4]. The most common flap for cheek defects was Limberg flap (48.4%) [Table 3]. The most common flap for nose defects

was paramedian forehead flap (70.8%) [Figure 5A–D]. In 32.9% (29) cases, reconstruction was a staged procedure. Initial flap inset was given and flap division and final inset were carried out after 3 weeks. Flap division was required in all 29 cases. Flap thinning was carried out in 10 cases.

Flap donor site wounds were closed primarily, except in two cases of paramedian forehead flap and one case of horizontal forehead flap, which were covered with SSG.



Figure 5: (A) BCC of nose. (B) Post-excision defect and elevation of paramedian forehead flap. (C) Reconstruction using paramedian forehead flap. (D) Paramedian forehead flap reconstruction after division and inset



Figure 6: Rotation flap in cheek, which developed wound dehiscence in the medial aspect

Complications were seen in six cases: two cases with wound dehiscence, two cases with marginal necrosis, one case with partial necrosis, and one case with recurrence [Figure 6]. Both cases of wound dehiscence, seen in rotation flap for cheek, were managed by secondary suturing. Cases of marginal necrosis, one involving the ear and the other involving the nose, were managed conservatively. Partial necrosis was observed in cervicofacial rotation flap for ear and was managed by re-rotation of flap cover [Figure 7]. Recurrence was observed in a case of BCC of the cheek and nose, reconstructed by paramedian forehead flap after 1 year, which was managed by re-excision with a 5-mm clearance and cheek rotation flap [Figure 8A–E].

As per the customized PSQ scale and our scoring system, 64 of 88 patients (72.7%) were satisfied with the medical care and reconstruction with a score of 40 and above. Eighteen patients (20.5%) scored between 30 and 39. Thirteen patients had issues with technical quality, three with communication, and two with accessibility and convenience. Six patients (6.8%) scored between 20 and 29, including three cases of flap cover and three cases of SSG. Their primary domain of dissatisfaction was with technical quality. None of the patients scored less than 20 [Table 4].

On the basis of the six main aspects of PSQ III, 24 patients (27.3%) were not satisfied with the medical care. All patients were satisfied with the general aspects of the medical care, interpersonal manner, and time spent with doctor. Nineteen patients (21.6%) were dissatisfied



Figure 7: Partial necrosis of the cervicofacial rotation flap for BCC of ear

with the technical quality. Among them, sixteen patients underwent SSG and three underwent flap reconstruction. Dissatisfaction was due to color mismatch in SSG, recurrence, pinna excision, and ectropion of lower eyelid. Recurrence was managed by re-excision and flap cover. Ectropion was because of the weight of the flap and was managed by static sling [Figure 9]. The patient with absent pinna secondary to excision was given external ear prosthesis. Color mismatch because of SSG could not be corrected. Among the 24 patients, three (3.4%) were dissatisfied with the communication because of language issues. Two patients (2.3%) were dissatisfied with the accessibility and convenience.

DISCUSSION

Face is the most common site of BCC because of chronic sun exposure. Nose is the most common site of facial BCC, accounting for 25%–30% because of cumulative exposure.^[2-10] In our study, cheek was the most common site accounting for 35.2%, whereas nose accounted for 27.3% of facial BCC. BCC is usually observed in older patients who are frequently and chronically exposed to sunlight. Men are more commonly affected due to their outdoor occupation. In few studies, when the whole head and neck region was encountered, no statistically significant difference between men and women was observed.^[11-14] In our study, 55.7% cases were of female patients probably because of dynamic epidemiology of BCC with increasing female preponderance.



Figure 8: (A) BCC involving right cheek and nose. (B) Reconstruction using paramedian forehead flap. (C) Postoperative picture after flap division and inset of paramedian forehead flap. (D) Recurrence in the lateral aspect after 1 year. (E) Postoperative picture after re-excision and rotation flap

Risk factors identified for recurrence of BCC include tumor size (≥ 2 cm), tumors located in the “H zone” of the face (representing embryonic fusion planes and includes portions of the nose, scalp, ears, and lips), recurrent tumors, perineural invasion, poorly defined borders, and more aggressive histologies (infiltrative, morpheaform, or basosquamous histology).^[15-17]

Giant BCCs are defined as the tumors that are more than or equal to 5 cm in its greatest dimension. The most common location of giant BCC is the back.^[18] Eight percent of our patients presented with giant BCC of the head and neck.

Though various treatment modalities are available for the treatment of BCC, wide local excision is the standard line of management. Although Mohs micrographic surgery (MMS) has been widely used and has been proven to achieve a high percentage of tumor resection with clear margins, it is not immune to controversies when treating truly aggressive tumors.^[19,20] Also, frozen section facility is not available in all centers making MMS practically difficult.

After surgical excision, reconstruction is carried out using local flaps, regional flaps, free flaps, or skin grafts. Reconstruction of facial BCC is challenging because equal importance has to be given to clearance, form, function,

Table 4: Satisfaction score percentage

S. no.	Score	No. of patients	Percentage
1.	≥ 40	64	72.7
2.	30-39	18	20.5
3.	20-29	6	6.8
4.	< 20	0	0

and patient satisfaction. Local flaps have the advantage of skin color and texture match and are more aesthetically acceptable with minimum donor-site morbidity.

In our study, 77.3% defects were reconstructed using local flaps. The choice of reconstructive procedure depends on several factors, including size, location, and involvement of deeper structures [Figures 10 and 11].^[21,22] Flaps were chosen for better color and texture match. In our study, most commonly used flap for cheek defects was Limberg flap, which is of single-stage reconstruction type, and for nose defects paramedian forehead flap was used, which is two or three staged depending on the need for thinning [Figure 12A-C]. Split-thickness skin grafting is widely used for primary wound coverage after skin cancer resection because donor-site morbidity is lower and larger donor area is available. SSG was carried out for giant BCC when multiple aesthetic subunits were involved and local

flaps were insufficient. SSG was performed only in cases in which underlying bone was not exposed. Defects in the temporal region were predominantly reconstructed using

SSG because any local flap would bring down the hairline and would be aesthetically unacceptable. Approximately 93.2% of the cases healed well without any complications.

Patient satisfaction has emerged as a critical outcome of medical care because of the increasing emphasis on patients as consumers of services in the medical marketplace (Davies and Ware, 1988).^[23,24,25] Patient satisfaction is not a clearly defined concept, although it is identified as an important quality outcome indicator to measure success of the services delivery system.^[26] It is all the more important when reconstructing defects in the exposed regions of the body, particularly, the face and the neck. Ware and his colleagues developed PSQ to assess the quality of medical care.^[23] Subsequently, revisions have been introduced. One of the recent versions of PSQ III contains 50 items tapping on the seven aspects of patient satisfaction: general satisfaction, technical quality, interpersonal manner, communication, financial aspects, time spent with doctor, accessibility, and convenience.^[24,27]

Patient satisfaction has been given the least importance in oncological resection surgeries. This is counterproductive in any case of reconstruction of the defects of the face and neck because of the psychological impact the reconstruction has on the patient. An unsightly scar or a formless floppy flap on the face or neck would negatively impact the psyche of the patient and impair normal life [Figures 13 and 14]. Importance of satisfaction in the health system, especially reconstructive surgery, is more than in other services because of the experience of illness and the need to adhere to and follow long treatment process, increased vulnerability of the patients, and requirement of a more comprehensive psychological support.^[28] In our study, equal weightage was given to



Figure 9: BCC of cheek reconstructed using horizontal forehead flap showing unsightly scar over forehead and right lower eyelid ectropion

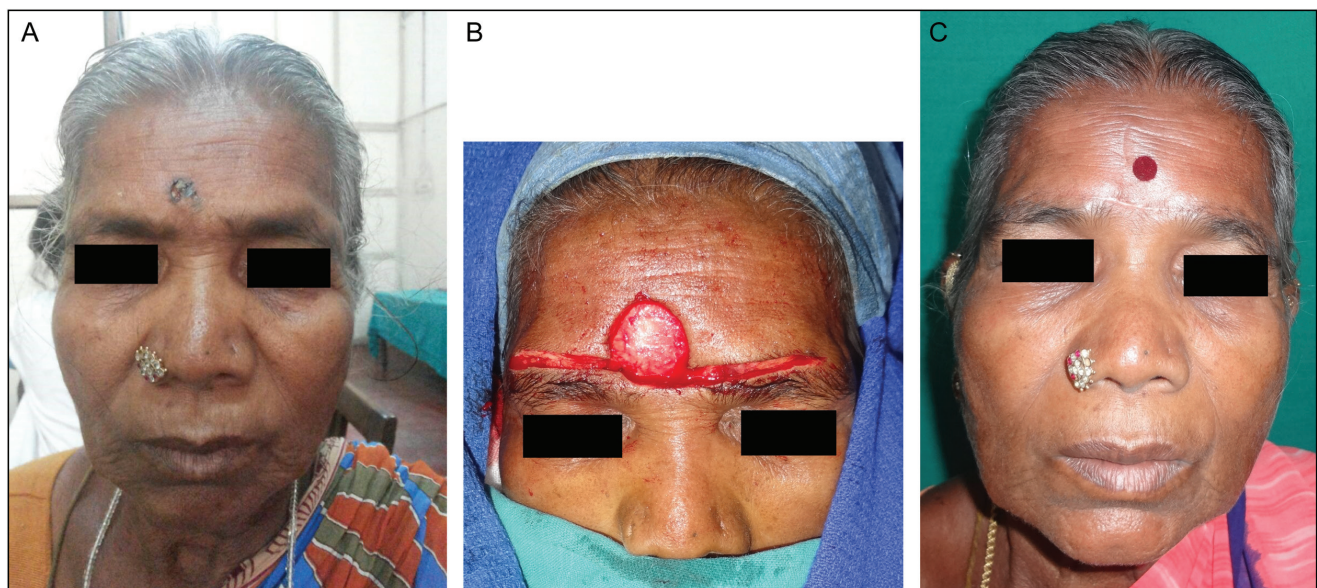


Figure 10: (A) BCC of forehead. (B) Post-excision defect over forehead and elevation of advancement flaps. (C) Bilateral advancement flap late postoperative status



Figure 11: (A) BCC of upper lip right side. (B) Reconstruction using Abbe flap. (C) Abbe flap after division and inset

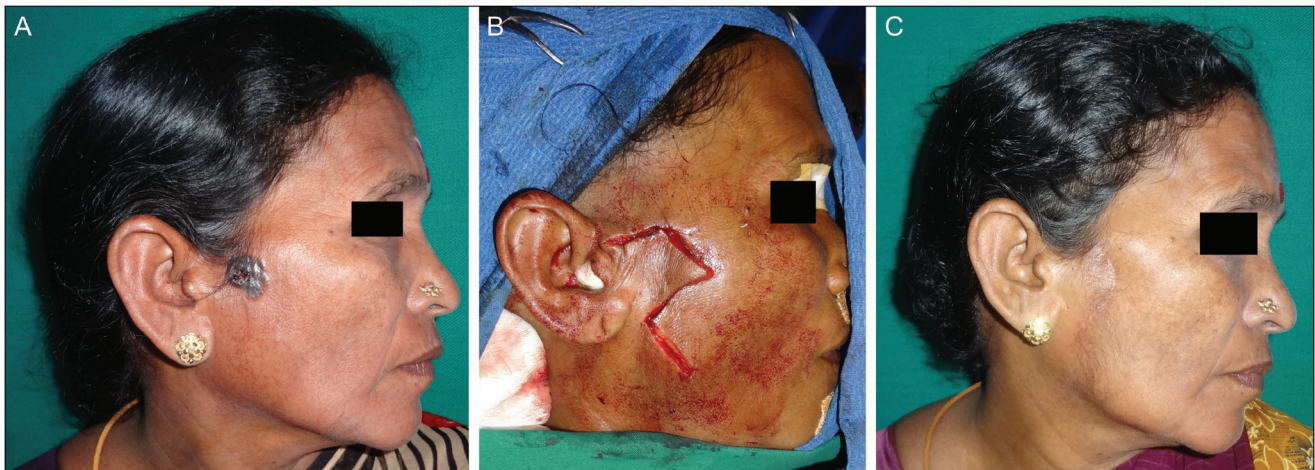


Figure 12: (A) BCC of right pretragal region. (B) Limberg flap reconstruction. (C) Limberg flap late postoperative status

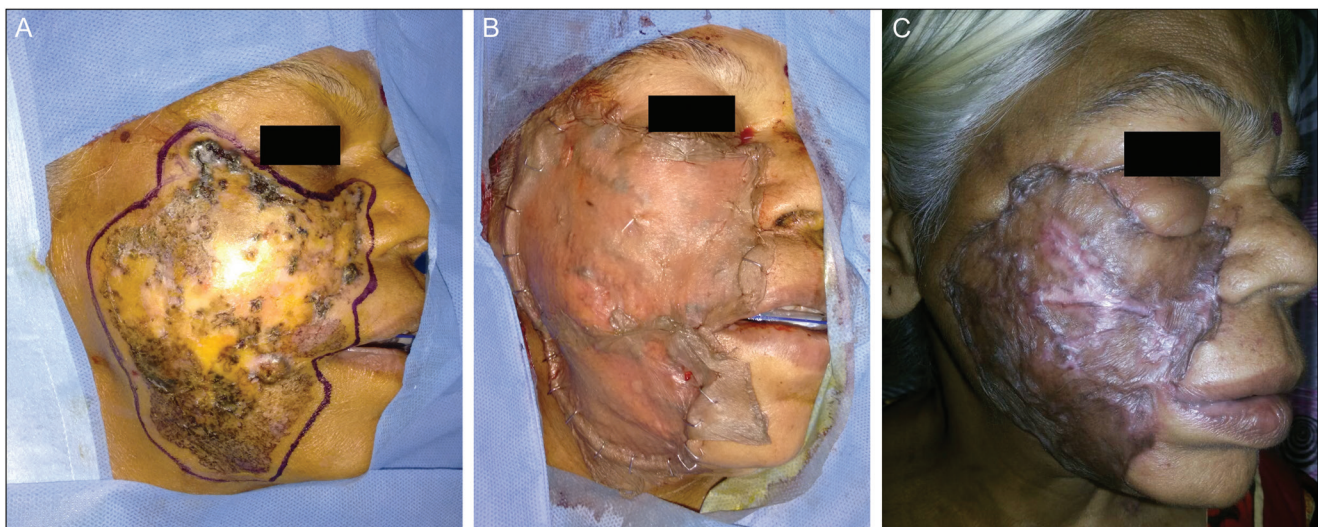


Figure 13: (A) Giant BCC involving right cheek. (B) SSG applied over the cheek defect after excision of BCC. (C) Hypertrophic scarring of the SSG

oncological clearance, form and function, and the fourth dimension, which is satisfaction of the patient in terms of reconstruction.

Skin grafting is usually performed when defects are large and unsuitable for primary closure or a local flap.^[29] The

patients who underwent SSG were dissatisfied with the cosmesis because of poor texture, color, and contour match. Studies have shown that skin grafting was one of the most useful reconstructive modalities for skin and subcutaneous tissue defects; however, postoperative



Figure 14: Limberg flap reconstruction in cheek showing trapdoor scar

scars were a determining factor of patient satisfaction, in particular, the color match between the grafted skin and the surrounding recipient skin was important.^[30] The reconstruction poses a challenge for the surgeon when the lesions are large, the depth of resection exposes bone, and when like or local tissues are paucity. The risk–benefit balance and the choice of reconstruction were explained to all patients. Though initially accepted, on late post-op follow-up, the patients were discontented with the end result. Fulfilling the four dimensions was more possible with local flaps than with SSG. The patients with smaller lesions and those with lesions in the lateral segments of the face were easily satisfied with the reconstruction. In the central segment of face, some patients who were initially unhappy were satisfied after flap thinning. As reconstructive surgeons, our main aim is to provide a method of reconstruction where donor tissue resembles native tissue, contour match is good, suture line scars are less obvious, and complications are nil. This brings about a better patient satisfaction.

CONCLUSION

Post-excisional defects of BCC in the head and neck region have to be reconstructed with equal weightage to all the dimensions of oncological

reconstruction: clearance, form, function, and patient satisfaction. Though split-thickness skin grafting is an easier option, it is fraught with unsightly scars on healing. Local flaps have good color and texture match and are sensate, making them ideal for reconstruction of facial defects. Facial animation is also better restored after flap reconstruction. Thus, local flaps are better in satisfying the fourth dimension of reconstruction, which is patient satisfaction.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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