

Cheek advancement flap for nasal reconstruction following surgical excision of basal cell carcinoma; Early outcome and patient satisfaction

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Background: Many reconstructive techniques have been used for reconstruction of the nose after wide excision of basal cell carcinoma with variable aesthetic outcome. Patient satisfaction is a crucial determinant of the reliability of any reconstructive technique.

Aim of this prospective clinical study was to evaluate the cutaneous cheek advancement flap as a reliable method for nasal reconstruction following wide excision of basal cell carcinoma as regards early postoperative complications and patient satisfaction

Methodology: The current study included 51 patients with basal cell carcinoma at side of nose who are eligible for wide excision and immediate reconstruction using cutaneous cheek advancement flap. Follow-up was planned for 3 months to report early postoperative complications. Aesthetic outcome was assessed using Likert score and Vancouver's scar scale.

Results: The age of the included patients ranged from (46-63 years). The current study showed wound infection in 3.9 % of patients, seroma occurred in 3 patients while hematomas occurred in 2 patients. No total flap loss was reported while partial flap loss had occurred in 1 case (1.9%). The patients' overall satisfaction was good and only 2 patients (3.9%) showed poor esthetic outcome. There was a strong positive correlation between patients' evaluation and independent surgeons' assessment ($r=0.922$).

Conclusion: According to the current results, cheek advancement flap is feasible and simple method for reconstruction of medium and large sized defects in the sidewall of the nose with minimal postoperative complications and excellent aesthetic outcome.

Keywords: Basal cell carcinoma, reconstruction, cheek advancement flap.

Introduction

Basal cell carcinoma (BCC) is the most common malignant cutaneous tumor. It represents about 75% of all skin cancers. [1] The accurate incidence of BCC is significantly underestimated as BCC cases are not routinely recorded by cancer registries and this is assumed to be due to large number of cases and histopathological examination is not done for all excised lesions. [2] Basal cell carcinoma affects mainly adults and elderly people. The male to female ratio 2:13. About 80% of all BCC occur on the face and 25% to 30% of these tumors are found on the nose with 2.5 times higher incidence of recurrence after excision. [4]

BCCs are presented as slowly growing nodular skin lesion or as an ulcerated lesion, and this clinical presentation is the corner stone of diagnosis. Addition of dermatoscopic findings increase the accuracy of diagnosis up to 98.2%. Tumor biopsy is retained for ambiguous lesions or when the diagnosis is uncertain. [5,6]

BCCs are classified into difficult-to-treat and easy-to-treat. According to the risk of recurrence, BCCs can be classified into low and high risk lesions. High risk BCCs includes all difficult-to-treat subtypes while low risk BCCs includes easy-to-treat ones. The risk of recurrence increases with perivascular or perineural involvement and in immunocompromised patients. [7] BCCs of the nose are classified to be high-risk BCC due their anatomical considerations and problems in pre-surgical identification of tumor margins. Standard 2D Surgical excision of BCCs or microscopically controlled surgery (3D) are the main lines of treatment with preferable 3D excision in recurrent BCCs, high-risk BCC or BCC located in critical anatomical sites. [9]

Nasal reconstruction is a challenge due to the multiple nasal convexities and concavities. Small sized lesions can be excised with primary closure of the defect however medium and large defects are better to be reconstructed using local flaps, grafts or combined methods. Many types of local flaps can be used for this reconstruction. Advancement flaps are considered important reconstructive methods following excision of Cutaneous tumors with favorable aesthetic outcome. [10] Many factors will affect the decision of using these flaps, including skin laxity, texture, color and defect size and depth. [11] When considering an advancement flap, proper plan and design is required to ensure adequate tissue reservoir for the donor site. Also suture lines should be along skin tension lines. [12]

Cheek advancement flap is a simple method that assumed to be a method of reconstruction for medium-sized and larger defects of the nasal sidewall. [13]

Although there are many types of local flaps that can be used for nasal reconstruction, some are very complex in design, cannot cover large sized defects or may leave a permanent donor site scar. These have motivated the authors to evaluate cheek advancement flap as regards postoperative complications and aesthetic outcome.

Methods

Study design

The current prospective study was conducted at the surgery department, Benha and Menoufia University Hospitals throughout the period from January 2019 till August 2020. The study protocol was approved by ethical and research

committee, of both institutes. A written informed consent was obtained from all participants after full explanation about the study design and possibility to use intraoperative or postoperative pictures.

Subjects

The study included 51 adult patients who presented with BCC at side of nose who were eligible for wide local excision and immediate reconstruction of the nose using cutaneous cheek advancement flap. Exclusion criteria included patients with BCCs that are crossing the midline, or eroding the nasal cartilage or bone. Patients with central nasal lesions were also excluded. Preoperative assessment for all participants was done including complete medical history taking, detailed general and local assessment. Tissue biopsy was obtained when the diagnosis was uncertain or in ambiguous lesions.

Surgical technique

For all participants, preoperative marking of the lesion and the appropriate 2D safety margin was determined to be 5-10 mm. Then Cutaneous Cheek advancement flap design was performed by marking a transverse line over the infraorbital margin and another line along the nasolabial fold (**Fig. 1a**).



Fig 1a: Flap design.

Under general anesthesia, complete excision of the tumor with approximately 5-10 mm safety margin (**Fig. 1b**). Microscopic oriented safety margin was done when we were not sure about safety margin then proper hemostasis was performed. Flap dissection was carried on in the subcutaneous plane till proper mobilization was achieved. Simple advancement was done till it reached the farthest edge of the defect without tension and with proper care about its vascularity (**Fig. 1c**). Closure of the defect was performed using simple sutures (**Fig. 1d**).



Fig 1 b. Excision of BCC with safety margin.



Fig 1c: Mobilization of flap.



Fig 1d. Closure of defect by the flap.

Immediate postoperative management included prophylactic antibiotic therapy, analgesics and antiedematous drugs. Postoperative follow up with reporting of any flap loss either partially or totally was done. Also seroma, hematoma, wound dehiscence or infection was reported.

This close follow-up was performed for at least 3 months for postoperative complications. Also the early aesthetic outcome was reported (**Figs. 2 a,b**).



Fig 2a: Early aesthetic outcome after 3 month in a 61 year-old female;



Fig 2b: Aesthetic outcome after 1 month in a 54 year-old male.

Assessment

The Study primary outcome was proper surgical excision of the tumor with appropriate safety margin and successful closure of the defect using cheek advancement flap without major early postoperative complications.

The secondary outcome was to achieve favorable patient satisfaction and good aesthetic outcome. The assessment of patient satisfaction was achieved by Likertscale14 which is the most commonly used survey scale for assessment of patient satisfaction since 1932 up till now. In this assessment patient questionnaire regarding facial symmetry, the scar appearance, keloid, pigmentation and finally the eye opening were simply presented as a 5-point score (1 = excellent, 2 = good, 3 = fair, 4 = poor, and 5 = bad). On the other hand, esthetic outcome was obtained by assessment of the final scar appearance. This was done by 3 independent plastic surgeons using Vancouver's scar scale^{15,16} that assesses the scar according to 4 main categories; vascularity, pliability, pigmentation and height (**Table 1**). Total score ranges from 0 (normal skin) and 13(the worst imaginable scar).

Table 1: Vancouver's scar scale^{15,16}

Scar characteristic	Score
Vascularity	
Normal	0
Pink	1
Red	2
Purple	3
Pigmentation	
Normal	0
Hypopigmentation	1
Hyperpigmentation	2
Pliability	
Normal	0
Supple	1
Yielding	2
Firm	3
Ropes	4
Contracture	5
Height (mm)	
Flat 0	1
2~5	2
5	3
3 Total score	13

Statistical analysis

Quantitative parameters were described using range (minimum and maximum), mean, and SD, while qualitative parameters were described as frequency with percent. SPSS-20 (Statistical Package for Social Sciences version 21) was used. Relation between related variables has been assessed by measuring correlation coefficient. one way mixed ANOVA was used to compare between measured variables and the significance level was set at $P \leq 0.05$. Rank correlation coefficient (r) was used to measure Person's linear correlation between quantitative variables namely VSS and patient satisfaction

Results

In the current study 51 patients were recruited with a mean age of 55.29 ± 5.01 (range from 46 – 63 years) Thirty patients were males (58.8%) while 21 patients were females (41.2%). **Table 2** includes the encountered co morbidities and tumor characteristics of the enrolled patients. Postoperative histopathological examination revealed that all the excised tumors were basal cell carcinoma. The diameter of the excised tumors ranged from (16 – 23 mm) with a mean of ($18.53 \pm$

2.01). All the tumors have been excised with a clinical safety margin that ranged from 7-10 mm and a mean of 7.63 ± 0.66 , relevant to the original tumor size. Histopathological examination confirmed a pathological safety margin that ranged from 3-7 mm with a mean of 5.27 ± 1.02 . There was statistically significant difference between clinically and histopathologically assessed safety margin ($p < 0.001$). The tumor excisions revealed a defect size ranged from 30-43 mm with a mean of 33.82 ± 2.93 . **Table 2** also includes number of patients who have encountered immediate postoperative complications as seroma or hematoma formation, wound dehiscence, partial or total flap loss or keloid formation (**Fig. 3**).

Using Likert scale¹⁴, patients' satisfaction was evaluated. Patients were evaluated from (Excellent to poor) with the highest percentage was good 56.9% and least was poor 3.9%. The esthetic outcome using Vancouver's scar scale ranged from (1 -7) with a mean of 3.33 ± 1.32 (**Table 3**). As shown in (**Fig. 4**) there was a strong positive correlation between patients' evaluation and independent surgeons' assessment ($r=0.922$).

Table 2: Patients' comorbidities , tumor characteristics and postoperative complications

Parameter	No	%	
Comorbidities	DM	8	15.7%
	HTN	6	11.8%
	IHD	10	19.6%
	Seroma	3	5.9%
	Hematoma	2	3.9%
Postoperative Complications	Wound infection	2	3.9%
	Wound dehiscence	3	5.9%
	Partial flap loss	1	1.9%
	Total flap loss	0	0.0%
	Keloid formation	5	9.8%
Size (Diameter in mm) Mean \pm SD	18.53 \pm 2.01		
Defect (Diameter in mm) Mean \pm SD	33.82 \pm 2.93		
Safety margin (in mm) Mean \pm SD			
Clinically :	7.63 \pm 0.66		
Histopathologically:	5.27 \pm 1.02		
P value	P=0.001*		

Table 3: Patients' satisfaction and Doctors' evaluation

Parameter	No	%	
Patients' satisfaction	Excellent	14	27.5%
	Fair	6	11.8%
	Good	29	56.9%
	Poor	2	3.9%
Doctors' evaluation	Range	1 - 7	
	Mean \pm SD	3.33 \pm 1.32	

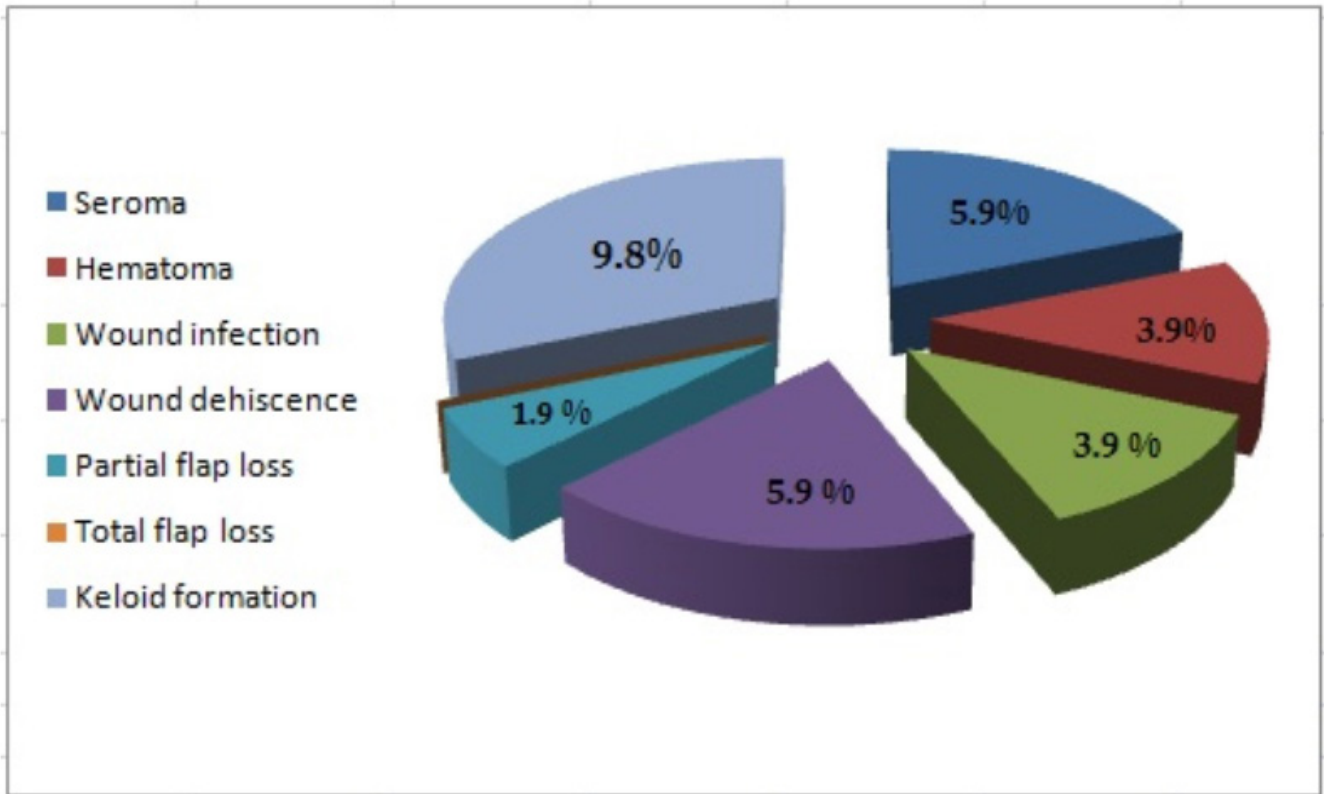


Fig 3: Postoperative complications.

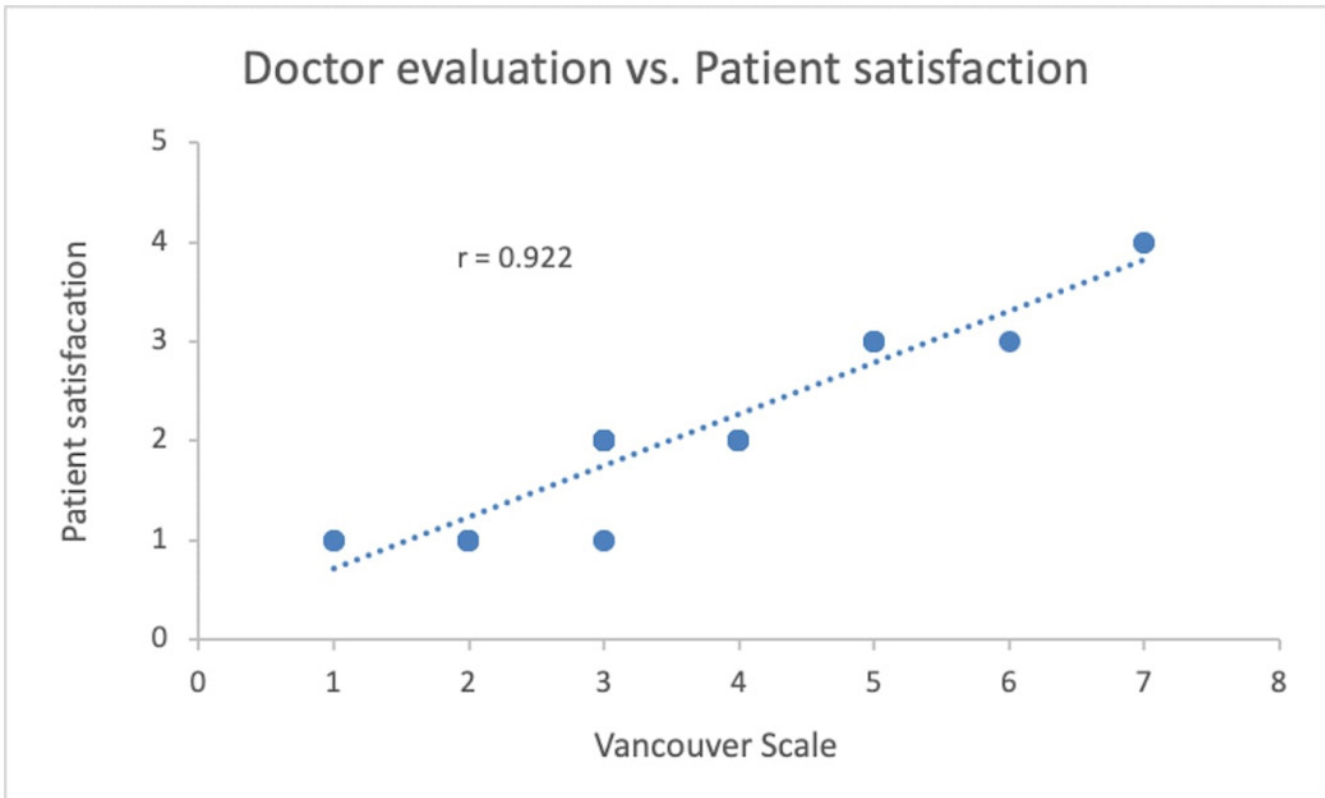


Fig 4. Correlation between doctor evaluation VS patient satisfaction.

Discussion

The first ground rule in oncologic surgery is adequate extirpation of the tumor followed by reconstruction. Once excision of the tumor on oncological basis is established, it is the surgeon's role to determine the best method of defect closure or coverage in view of respective patient, tumor and defect considerations. Proper defect reconstruction provides better functional and aesthetic results with minimal potential complications. [17]

European consensus-based interdisciplinary guidelines established by multidisciplinary experts from European Organization of Research and Treatment of Cancer, the European Association of Dermato-Oncology and the European Dermatology Forum, have recommended surgical removal of medium sized and large BCC. East to treat BCCs represents about 95% of cases and standard complete 2D surgical excision is the appropriate treatment. Microscopically controlled surgery is usually done for recurrent BCC, high-risk BCC and BCC in critical anatomical sites. [6]

These guidelines recommended 2-5 mm safety margin for low-risk BCCs, while for high risk BCCs, especially when micrographic surgery is not available, a safety margin of 5-15 mm should be applied depending on individual tumor features. On the other hand, the recommended deep margins are down to the level of the fat and down to the of the fascia, periosteum or perichondrium In BCCs involving the face. [9] In the current study, the main consideration was not to compromise oncological safety in favor of esthetic outcome. The excised tumor clinical safety margin ranged from 7-10 mm which was quite adequate as per the recommended guidelines. In general, clinical safety margin doesn't necessarily correspond to the histological safety margin. The current study revealed statistically significant difference between the preoperative clinically determined safety margin and the histopathological safety margin ($p < 0.001$). This may be assumed to be due to microscopic infiltration that cannot be detected clinically, and also due to tissue shrinkage after fixation for histopathological examination. Shrinkage of the excised safety margin has been reported also by Kerns et al [18] and Blasco-Morente et al [19], to be 17-20 % in length and up to 10% in width. However, up to date, there are no recommendations to support the need for re-excision if histologically free margins are achieved. [6]

Many complications may follow nasal reconstruction using facial flaps and usually require prolonged antibiotic therapy or even secondary surgery. These complications usually occur within the first 4 weeks after surgery and include wound infection, wound dehiscence or even flap loss either partially or totally. Those postoperative complications are very crucial in determining the esthetic outcome. [20]

The current study showed wound infection in 3.9% of cases and this is higher than other studies, [20-23] that encountered 0.5% -2.6% infection rates. This difference can be attributed to inclusion of more simple techniques requiring less dissection and mobilization in their studies and reconstruction of smaller defects than what reported in the our study. In the current study, three patients developed seroma while hematomas occurred in 2 patients and this matches the early results of van Onna et al, [24] who reported the same incidence of hematomas.

No total flap loss was reported in the current study there but partial flap loss was reported only in 1 case (1.9%). In a similar study, [24] the authors encountered 2% distal tip necrosis as well. However, in other studies using other facial flaps, as the one performed by Rustemyeter et al, [22] they reported 3.4% and 1.7% for total and partial flap

loss respectively. Wollina et al, [25] in a review study on 312 patients with nasal reconstruction, have attributed the occurrence of partial flap loss to the presence associated comorbidities as diabetes mellitus and atherosclerosis. The low rate of necrosis encountered in cheek advancement flap could be attributed to the feasibility of the cheek advancement flap that depends on laxity of cheek that in turn provides enough advancement without tension. In addition, the cheek advancement flap is characterized by relatively a wide base that ensures adequate blood supply even to its periphery.

Since the nose is one of the most affected areas by BCC, plastic surgeons should become familiarized with different reconstructive options for this site. [12] Nasal reconstruction presents a unique challenge as in such reconstruction, both functional maintaining nasal air flow and good esthetic outcome should be achieved. [26,27] Wide variety of techniques has been developed to combine complete tumor removal with good esthetic and functional outcomes. [28] Salgarelli et al, [29] used in their study a diversity of flaps to construct nasal defects after tumor excision. They recommended that the anatomical nasal subunits are the main determinant of the selected reconstructive techniques in addition to the other esthetic considerations such as skin color, contour, and texture.

The cheek advancement flap is one of the workhorses in the reconstruction of large defects in the cheek area. It was primarily described by Beare [30] in 1969. It was originally designed as an upward transposition flap. Later on, it was tuned and modified by Mustarde, [31] and Schrudde et al [32] to have wider indications in facial reconstruction. It can be planned alone or in combination with other flaps like a Glabella rotation flap to reconstruct very large defects, [13,25] In the current study, there was a wider extension of usage of the cheek advancement flap to reconstruct lateral nasal wall defects.

The cosmetic outcome of local flap reconstructions is usually superior to other reconstructive techniques. [27,33] Facial skin scar is usually associated with adverse physical and psychological disturbances in patients undergoing surgical treatment for cutaneous malignancy with subsequent negative impact on quality of life. [34] In terms of evaluation of the facial scars by using subjective methods, both VSS and patient satisfaction scale had acceptable inter-observer reliability. [16] Typical esthetic deficits for local flaps consist of the bulkiness phenomenon and color mismatch between the reconstructed area and the surrounding skin. [35]

In the current study, the patients' overall satisfaction was good and only 2 patients (3.9%) showed poor esthetic outcome. These two cases have encountered postoperative complications as wound dehiscence and partial flap loss. These results are comparable and even better to those reported in several studies, [22,23,36,37] that assessed the esthetic outcome of other facial flaps. In the current study, there was a significant positive correlation between VSS and patients' satisfaction score ($r = 0.922$). This favorable esthetic outcome is assumed to be due to the design of cheek advancement flap where all suture lines are designed to be placed along relaxed skin tension lines in consideration to the aesthetic units of the nose.

Conclusion

According to the current results, cheek advancement flap is feasible and simple method for reconstruction of medium and large sized defects in the sidewall of the nose with minimal postoperative complications and excellent aesthetic outcome.

Acknowledgement

All authors appreciate the effort of Dr/ Eman I. Elgendy, Lecturer of Pathology, Benha University for her dedicated work in intraoperative assessment for safety margin of the excised basal cell carcinoma

Funding

The authors receive no financial support for the research project or in the publication of this article.

Author contributions

All authors contributed in data acquisition, drafting of manuscript and revision of manuscript. All authors have approved the final manuscript

Compliance with ethical standards

Conflicts of interest

There are no potential conflicts of interest

Ethical approval

It was obtained from ethical and research committee, of both Benha and Menoufia Universities, Egypt.

Informed consent: It was obtained from all participants after full explanation about the study design and possibility to use intraoperative or postoperative pictures.

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