Original Article

Versatility of Cheek Rotation and Advancement Flaps in Multizonal Facial Reconstruction

Asif Aziz and Tauseef ul Hassan

ABSTRACT

Objective: To systematically assess the versatility, safety, and results of cheek rotation and advancement flaps after BCC excision, focusing on indications, techniques, complications, and outcomes to refine reconstructive strategies in facial plastic surgery.

Study Design: Retrospective study

Place and Duration of Study: This study was conducted at the Mufti Mehmood Memorial Teaching Hospital, Dera Ismail Khan from June 2020–March 2024.

Methods: This retrospective study evaluated 18 patients (mean age 56.1 years; range 40–75) with facial defects from BCC excision, treated using cheek rotation, advancement, or combined flap techniques by a single surgeon. Patient demographics, comorbidities, defect characteristics, and outcomes were reviewed from medical and photographic records.

Results: All patients were followed for 6 months to 3 years to assess flap viability, scar quality, and recurrence. Most defects were nodular or nodulo-ulcerative BCC, with single-zone involvement most common; multizonal defects accounted for about one-third of cases. Rotation flaps were used in 44%, advancement flaps in 33%, and combined approaches in 22%. The medial cheek was the most frequently reconstructed area. Complications were rare and included flap necrosis (6%), ectropion (6%), transient numbness (17%), and dog-ear formation (22%), all managed successfully. No infections, hematomas, wound dehiscence, or tumor recurrences were observed.

Conclusion: Cheek rotation and advancement flaps are safe, effective, and versatile for reconstructing facial defects post-BCC excision. Individualized planning and meticulous technique are key to optimal outcomes.

Key Words: Basal cell carcinoma, Rotation flap, Facial reconstruction, Skin cancer, Multizonal defects

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INTRODUCTION

Facial reconstruction after tumor excision, trauma, or congenital deformities represents a significant challenge in reconstructive surgery due to functional and aesthetic complexity of the human face[1,2]. The face plays vital role in communication, identity, and essential functions like speech, mastication, and respiration, making optimal restoration paramount for surgeons. Basal cell carcinoma (BCC) is the most prevalent skin malignancy, accounting for nearly 80% of all non-melanoma skin cancers globally[3,4].

Its incidence continues to rise, particularly among elderly, fair-skinned populations with high sun exposure[5,6]. While BCC rarely metastasizes, its locally invasive nature can result in considerable tissue destruction, especially on the face—most commonly the cheek[7,8]. Risk factors for BCC include chronic ultraviolet (UV) exposure, immunosuppression, genetic syndromes such as Gorlin-Goltz, prior skin cancer history, and phenotypic features like light skin, hair, and eyes[9,10].

Clinically, BCC usually presents as a slow-growing, painless lesion that may ulcerate or bleed, with complete surgical excision and histologically clear margins being the standard treatment[11]. Excision of BCC in the cheek, a complex and centrally located facial region, often leads to significant defects that cross multiple aesthetic zones, making reconstruction especially challenging[12]. Many patients with BCC are elderly and present with comorbidities like hypertension, diabetes, or a smoking history, further complicating reconstructive planning[13,14]. As BCC incidence increases, so does the need for effective, aesthetically pleasing reconstructive solutions for cheek and periorbital defects[15].

The cheek, bordered by the infraorbital rim, nasolabial fold, mandibular border, and preauricular area, serves as a key aesthetic and functional facial subunit[16,17]. Defects here may involve one or multiple zones,

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necessitating reconstructive approaches that restore both appearance and function while maintaining symmetry and respecting facial landmarks[18]. Ideally, reconstruction uses well-vascularized, color- and texture-matched tissue, preserves facial movement, and minimizes donor site morbidity. Local flaps, particularly rotation and advancement flaps, are favored for small to moderate cheek defects due to their superior aesthetic results and robust blood supply[19–21]. Techniques like the Mustardé cheek rotation flap effectively close various defect types with minimal distortion, while advancement flaps suit defects in the nasolabial or medial cheek and can be combined for complex cases[22–24].

METHODS

This retrospective observational study was conducted at Mufti Mehmood Memorial Teaching Hospital, Dera Ismail Khan, following ethical approval and the Declaration of Helsinki. Eighteen consecutive patients who underwent facial reconstruction with cheek rotation and/or advancement flaps after excision of histopathologically confirmed basal cell carcinoma (BCC) were included. All surgeries were performed by a single experienced surgeon between June 2020 and March 2024. Exclusion criteria comprised recurrent tumors, prior facial surgeries in the same area, metastatic disease, or incomplete records.

Demographic data (age, gender, comorbidities), tumor characteristics (site, size, type), and smoking status were collected from patient files and photographs. Surgical excisions and reconstructions were performed under local or general anesthesia, ensuring tumor-free margins according to oncological principles. The selection of flap technique (rotation, advancement, or combined) depended on defect size, location, and involvement of adjacent facial subunits. For more extensive or multizonal defects, cheek flaps were combined with additional local or regional flaps (e.g., glabellar or forehead flaps) to enhance functional and aesthetic outcomes.

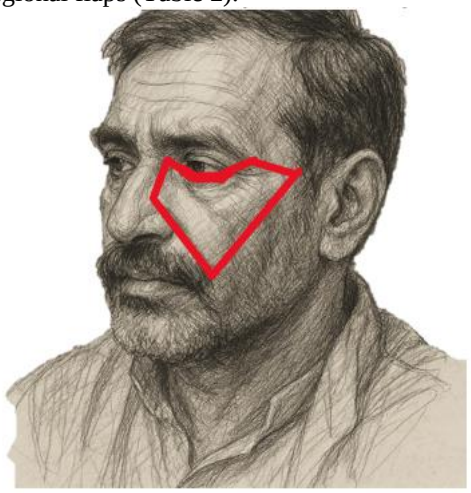
The operative approach included careful flap design, undermining in the subcutaneous or sub-SMAS plane to ensure mobility and vascularity, and tension-minimizing layered closure. Adjunctive techniques such as lateral canthoplasty were employed when indicated to address specific anatomical or reconstructive challenges.

Patients were followed postoperatively for at least 6 months and up to 3 years. Outcomes were assessed clinically and photographically, evaluating scar quality, contour restoration, function, and tumor recurrence. The primary endpoints were flap viability, restoration of facial form, and patient satisfaction; secondary endpoints included complication rates (e.g., flap necrosis, ectropion, infection, hematoma, wound dehiscence, transient numbness, and dog-ear formation) and their management.

Data analysis was performed using appropriate statistical software, with variables presented as mean ± standard deviation and range, and categorical variables summarized as frequencies and percentages. Descriptive statistics characterized the cohort, defect details, reconstruction techniques, and outcomes.

RESULTS

Eighteen patients (mean age 56.1 years; range: 40–75) were included, with two-thirds male and one-third female. Hypertension was most common comorbidity followed by diabetes and ischemic heart disease. Most patients were non-smokers (Table 1). All facial defects resulted from BCC excision, with nine cases involving a single facial zone, followed by two zones, and then complex multizonal defects requiring combined local or regional flaps (Table 2).



Cheek rotation flaps were used in majority cases (44%), followed by advancement flaps and combined techniques for complex or multizonal reconstructions (Table 3). The medial cheek was the most commonly reconstructed subunit (33%), followed by mid-cheek (22%), with other areas including nasal side wall, infraorbital cheek, nasolabial/nasofacial junction, and lower eyelid (17%), and zygomatic region and medial canthus (Table 4). Many cases involved more than one anatomical zone.

Postoperative complications were infrequent, with flap necrosis (6%) managed by secondary healing, ectropion (6%) requiring lateral canthoplasty, and transient numbness (17%) that resolved spontaneously. Dog-ear formation occurred (22%) and was corrected at surgery or follow-up; no infections, hematomas, or wound dehiscence occurred (Table 5).

Clinical figures illustrate the versatility of cheek flaps (Figure 2-7). A case-wise summary (Table 6) is also presented.

Table No.1: Patient Demographics

Variable	Value (n=18)
Age(years)	
• Mean ± SD	56.1 ± 10.4
• Age range	40–75
Gender	
• Male	12
• Female	6
Comorbidities	
• Hypertension	4
• Diabetes Mellitus	2
• Ischemic Heart Disease	2
• Steroids Use	1
Smoking Status	
• Current Smokers	3
• Ex-Smokers	2
• Never Smoked	13

Table No.2: Defect Characteristics

Variable	Value
Etiology	Basal Cell Carcinoma
Zones involved	
• 1 zone	9
• 2 zones	7
• ≥3 zones	2*
*cheek flaps were combined with other flaps	

Table No.3: Flap Type and Design Details

Technique	Number (n)	Frequency (%)
Rotation	8	44%
Advancement	6	33%
Combined	4	22%

Table No.4: Anatomic Distribution of Reconstructed Zones

Zone/Subunit	Number of Cases n	Frequency (%)
Nasal side wall*	3	17%
Infraorbital cheek	3	17%
Nasolabial, Nasofacial junction	3	17%
Medial Cheek	6	33%
Zygomatic	2	11%
Lower eyelid	3	17%
Medial canthus**	1	6%
Mid-cheek	4	22%
*Excluding the case where forehead flap was used for nasal sidewall **Excluding the case where Glabellar flap was Combined with cheek movement (Totals >100% due to multizonal cases)		

Table No. 5: Complications and Management

Compli-cation	No of Cases n	Frequency (%)	Management
Flap necrosis	1	6%	Secondary healing
Ectropion	1	6%	Lateral canthoplasty
Infection	0	0	-
Hematoma	0	0	-
Wound dehiscence	0	0	-
Transient numbness	3	17%	Observed; resolved
Dog-ear formation	4	22%	Primary excision

Figure No. 2. Advancement of cheek flap for middle and medial cheek region, with no significant distortion of beard line

Figure No.3: Rotation and Advancement of cheek for infraorbital BCC

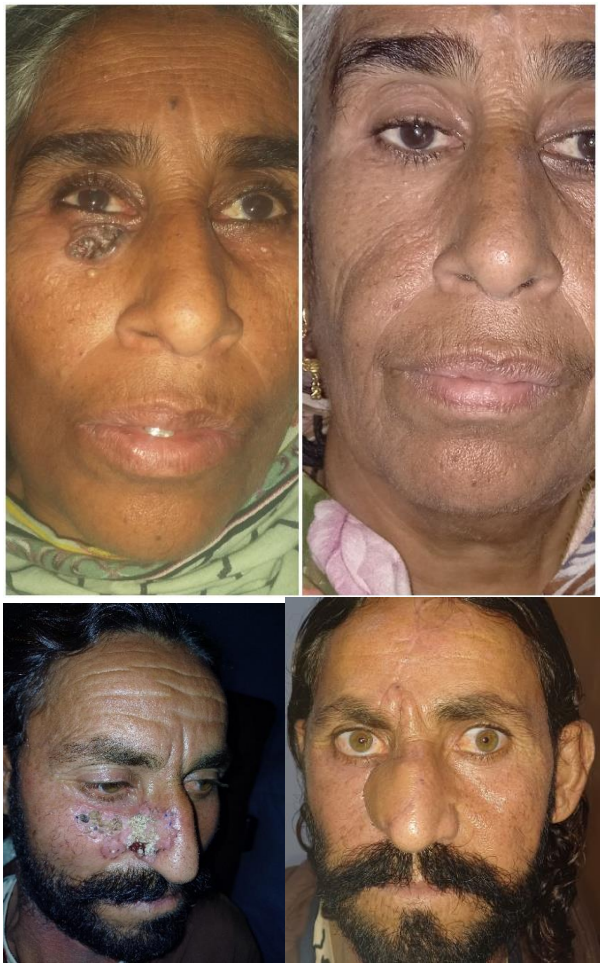


Figure No.4. Combining Mastardé flap with Paramedian forehead flap for larger Morpheaform BCC involving middle and medial cheek, infraorbital cheek, nasal side wall, nasal ala and nasolabial fold

Table 6 presents a case-by-case summary detailing patient demographics, lesion locations, BCC subtypes, and the specific flap techniques utilized for reconstruction. The table underscores the diversity of facial zones addressed and demonstrates the individualized use of rotation, advancement, and combined flaps for managing different presentations of BCC.

Figure No.5: Combining Mastardé flap with Glabellar flap

Figure No.6: Advancement cheek tissue for Naso-labial defect

Figure No.7: Advancement of cheek flap for mid cheek region with no significant movement of beard line

Table No.6: Case-wise Summary Table

S.No	Age	Gender	Location	BCC type	Flap movement
1.	45	Female	Left lower Eyelid	Nodular	Rotation-Advancement
2.	50	Female	Right Infra-orbital cheek	Nodulo-Ulcerative	Rotation-Advancement
3.	60	Male	Right Nasolabial area	Nodulo-Ulcerative	Advancement
4.	48	Male	Left Naso-facial area, Medial Cheek	Recurrent/ Ulcer	Advancement
5.	55	Female	Right Medial Cheek, Medial canthus, Nasal side wall	Nodulo-Ulcerative	Rotation-Advancement + Glabellar Flap
6.	75	Male	Right Zygomatic region, Lateral lower	Nodulo-Ulcerative	Rotation-Advancement

			eyelid		
7.	50	Male	Right Medial cheek, Nasal sidewall	Nodular	Advancement
8.	45	Female	Right medial Cheek	Nodular-Ulcerative	Advancement
9.	45	Male	Left Medial Canthus	Nodular	Rotation-Advancement
10.	55	Male	Left Medial Cheek, Nasal side wall	Nodulo-Ulcerative	Advancement
11.	57	Male	Left Nasolabial area	Nodulo-Ulcerative	Advancement
12.	60	Female	Right Infra-orbital Cheek	Nodular	Rotation-Advancement
13.	70	Male	Right Infra-orbital cheek, Mid-cheek	Nodulo-Ulcerative	Rotation-Advancement
14.	55	Male	Left Medial and Mid-cheek	Nodulo-Ulcerative	Advancement
15.	48	Female	Right Lower Eyelid	Nodulo-Ulcerative	Rotation-Advancement
16.	60	Male	Left Mid-cheek	Nodular	Advancement
17.	65	Male	Left Lateral canthus, Zygomatic region	Nodulo-Ulcerative	Rotation-Advancement
18.	40	Male	Right Mid-cheek, Medial Cheek, Nasal Sidewall	Morpheaform	Rotation-Advancement + Forehead Flap

DISCUSSION

Reconstructing facial defects, particularly after basal cell carcinoma (BCC) excision, is a recognized challenge in reconstructive surgery due to the intricate anatomy and the face's central role in function and appearance[1,3,7]. This retrospective study analyzed 18 cases of cheek and adjacent facial subunit defects managed with rotation, advancement, or combined cheek flaps, providing further evidence of the versatility and effectiveness of these techniques in multizonal facial reconstruction post-BCC excision.

The patient cohort mainly included middle-aged to elderly adults (mean age 56.1 years), consistent with the global epidemiology of BCC, which is more prevalent in older populations with higher cumulative sun exposure[3,5]. Most patients were male, echoing trends of increased sun exposure among men[3,4]. Common comorbidities included hypertension, diabetes, and a history of smoking—factors known to affect wound healing and postoperative outcomes, emphasize the need for tailored perioperative management in this demographic[13-15].

All defects resulted from surgical excision of BCC particularly in fair-skinned individuals with significant UV exposure[3,5,6]. The majority of tumors were nodular or nodulo-ulcerative, which aligns with common BCC subtypes[3,11]. A single case involved morpheaform BCC, highlighting the importance of vigilant postoperative monitoring for aggressive histologies[3,11]. The most commonly affected regions included the medial cheek, nasolabial fold, infraorbital area, and eyelid, all highly visible, sun-exposed[3,8].

Local tissue flaps were preferred due to their favorable color, texture, and vascularity[7,16,17]. Rotation flaps, notably the Mustardé flap, were used in 44% of cases, especially for infraorbital and periorbital defects. Literature supports their ability to close large, complex defects with minimal distortion by distributing closure tension[9,10,21,22]. Advancement flaps were utilized in 33% of cases, mainly for smaller, localized defects in the nasolabial and medial cheek areas, and are associated with minimal donor site morbidity[11,23]. In 22% of cases, combined or adjunct flaps, such as glabellar or forehead flaps, were necessary to reconstruct extensive multizonal defects—illustrating the need for a flexible, individualized approach as recommended in current reconstructive algorithms[12,18,24].

The study's reconstructed zones highlighted the complexity of midface BCC excisions: the medial cheek was most frequently addressed, followed by infraorbital, nasal sidewall, and nasolabial regions—areas crucial for both function and aesthetics[16,17,18]. Multizonal defects (two cases involving three or more zones) required a combination of flaps for optimal closure. The robust blood supply from the facial and transverse facial arteries contributed to high flap survival, even in patients with medical comorbidities[14].

Complications were infrequent and manageable. Only one case each of flap necrosis and ectropion occurred, both resolved without lasting effects. Rates of transient numbness and dog-ear formation matched those in the literature, resolved with observation or minor revision[19]. No infections, hematomas, or wound dehiscence occurred, underscoring the safety and reliability of these techniques in skilled hands. These results support published data showing that careful technique and flap selection are vital for minimizing complications[20].

With follow-up ranging from 6 months to 3 years, all patients showed good to excellent scar quality, restoration of facial contour and expression, and no BCC recurrence. This reflects the completeness of tumor excision and the low metastatic potential of BCC[11,15].

The results align with other studies confirming the reliability of cheek rotation and advancement flaps for midface reconstruction after oncologic resection[9,10,19,21]. Flap survival rates exceeded 90%, in line with published figures [20]. These techniques also proved safe in patients with diabetes or cardiovascular disease when performed with meticulous technique[14].

Nevertheless, the optimal approach for large, multizonal, or high-risk defects remains debated. While local flaps offer superior color and texture match, some advocate for regional or free tissue transfer in extensive or recurrent cases[24]. In this series, combining cheek flaps with regional flaps proved effective for complex reconstructions, supporting a flexible, individualized approach[12,18].

This study is limited by its retrospective, single-surgeon, single-center design, small sample size, and lack of a control group, which may introduce bias and limit generalizability. Short to medium follow-up and subjective aesthetic assessments further constrain the findings. Future research should include prospective,

multicenter studies with larger cohorts, standardized outcomes, and comparisons to alternative reconstructive methods.

CONCLUSION

Cheek rotation and advancement flaps are reliable and versatile for reconstructing complex facial defects after BCC excision, yielding high viability and low complication rates. Excellent functional and aesthetic outcomes were achieved even in patients with significant comorbidities. Meticulous surgical planning and ongoing research are essential for continued improvement in facial reconstructive care.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Asif Aziz, Tauseef ul Hassan
Drafting or Revising Critically:	Asif Aziz, Tauseef ul Hassan
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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