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Case series

Local flaps in facial skin cancer reconstruction: functional and aesthetic outcomes

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Summary

Introduction. The most common malignant facial skin tumors are basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and melanoma. Surgical excision remains the gold standard of treatment, followed by reconstruction of the resulting defect. The aims of this study were to present reconstructive options for facial defects following excision of malignant skin tumors and to evaluate functional and aesthetic outcomes of local flap reconstruction.

Methods. This retrospective case series included 80 patients surgically treated at Varis Clinic in Belgrade and at the Department of Plastic and Reconstructive Surgery, University Hospital in Foča, from January 2021 to October 2025. Patients were analyzed with respect to tumor type, defect size and localization, sex, age, and postoperative complications. Reconstruction was performed using local flaps.

Results. Facial defects resulted from excision of BCC in 51 patients, SCC in 24 patients, and melanoma in five patients. Complete flap survival was achieved in all cases (100%). Postoperative infection with marginal flap necrosis occurred in three patients (3.75%) and resolved after conservative treatment. Functional and aesthetic outcomes were satisfactory in all patients.

Conclusion. Local flaps represent a reliable reconstructive method for small to large facial defects. Proper surgical planning, anatomical knowledge, and meticulous technique are essential for achieving optimal functional and aesthetic outcomes.

Key words: malignant skin tumors, facial defects, reconstruction, local flap

Introduction

The most common malignant tumors of the facial skin are basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and melanoma [1–3]. Basal cell carcinoma accounts for more than three-quarters of facial skin cancers, whereas the remaining cases are predominantly squamous cell carcinomas [4]. The etiology of these carcinomas is multifactorial and includes ultraviolet radiation exposure, fair skin phenotype, ionizing radiation, advanced age, immunosuppressive therapy, and positive family history [5, 6].

Basal cell carcinoma is generally characterized as a locally invasive tumor with rare metastatic potential [7]. Squamous cell carcinoma demonstrates a higher risk of regional metastasis and recurrence compared with BCC [3]. The global incidence of keratinocyte skin cancer and melanoma continues to rise, particularly in aging populations [1, 2].

The facial region represents a particular reconstructive challenge due to its complex anatomy, dynamic function, and high aesthetic visibility. Successful reconstruction requires careful respect for relaxed skin tension lines, lines of facial expression, and the facial aesthetic unit principle [8]. According to the reconstructive ladder concept, surgical planning should progress from simple to more complex techniques [9].

Although direct closure remains the preferred method for small defects, and skin grafts may be used in selected patients, grafting may lead to inferior aesthetic outcomes and long-term contracture, especially on convex facial surfaces [10, 11]. Local flaps provide superior color, texture, and thickness match and preserve facial contour and function. In extensive defects, regional or free flaps may be required; however, these procedures are technically demanding and associated with longer operative time [12–15]. The aims of this study were to present reconstructive options for facial defects following excision of malignant skin tumors and to evaluate functional and aesthetic outcomes after local flap reconstruction.

Methods

This retrospective case series included 80 patients treated between January 2021 and October 2025 at Varis Clinic in Belgrade and the Department of Plastic and Reconstructive Surgery, University Hospital in Foča. Inclusion criteria were histologically confirmed malignant facial skin tumors and reconstruction performed using a local flap. Patients treated by direct closure or skin graft were excluded.

The study population consisted of 50 men (62.5%) and 30 women (37.5%), aged between 47 and 93 years. All patients underwent radical tumor excision according to established oncologic principles. Histopathological confirmation was obtained using paraffin sections or ex tempore biopsy when required. Defect sizes ranged from 2 x 4 cm to 5 x 7 cm.

Patients were analyzed with respect to tumor type, defect localization, involvement of aesthetic units, type of flap, and postoperative complications. Primary outcomes were flap survival and complication rate. Secondary outcomes included functional preservation and aesthetic assessment. This study was conducted in accordance with the Declaration of Helsinki 1964 and its later amendments. Informed consent was obtained from all participants.

Results

A total of 80 patients were included in the study. Patient demographics and the distribution of histopathological diagnoses are presented in Table 1.

Table 1. Patient demographics and tumor histopathology

Parameter	Frequency (n=80)	Percentage (%)
Sex		
Male	50	62.5%
Female	30	37.5%
Histopathological type		
Basal Cell Carcinoma (BCC)	51	63.8%
Squamous Cell Carcinoma (SCC)	24	30.0%
Melanoma	5	6.2%
Synchronous BCC and SCC	7	8.75%

Defect sizes ranged from 2 x 4 cm to 5 x 7 cm. Larger defects were predominantly located in the nasal and cheek regions. The variety

of local flaps used for reconstruction is summarized in Table 2.

Table 2. Distribution of reconstructive techniques

Flap type	Number of cases	Percentage (%)
Limberg flap	25	31.25%
Rotation flap	18	22.50%
V-Y advancement flap	15	18.75%
Nasolabial flap	10	12.50%
Paramedian forehead flap	4	5.00%
Other local flaps	8	10.00%
Total	80	100%
Melanoma	5	6.2%
Synchronous BCC and SCC	7	8.75%

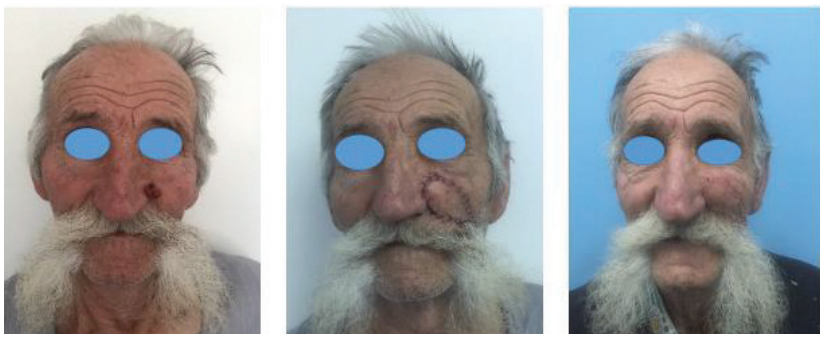
Complete flap survival was achieved in all 80 patients (100%). Postoperative complications occurred in three patients (3.75%), presenting as localized infection with marginal necrosis involving less than 10% of the flap surface area. These cases were successfully managed conservatively. Functional preservation was achieved in all cases, with no instances of ectropion or nasal airway obstruction. Aesthetic outcomes were clinically satisfactory, with optimal color match and scar concealment.

Satisfactory aesthetic and functional outcomes were achieved in all patients following facial defect reconstruction.

A. B. C.

Figure 1. Limberg flap

Reconstruction of a facial defect after excision of basal cell carcinoma using a Limberg flap
(A) Preoperative appearance showing a malignant skin tumor localized on the cheek
(B) Intraoperative view after radical tumor excision with the outlined and elevated Limberg flap
(C) Postoperative result one month after surgery demonstrating good aesthetic integration, preserved facial symmetry, and inconspicuous scar placement along natural skin tension lines



A. B. C.

Figure 2. V-Y advancement flap

V-Y advancement flap reconstruction of a facial defect following excision of basal cell carcinoma
(A) Preoperative appearance of the tumor
(B) Early postoperative appearance at 7 days, showing satisfactory flap viability and wound healing
(C) One-month postoperative result with good skin color and texture match and minimal distortion of surrounding anatomical structures

A. B. C.

Figure 3. Rotation flap

Reconstruction of an infraorbital facial defect after excision of squamous cell carcinoma using a rotation flap
(A) Preoperative appearance of the lesion
(B) Intraoperative view of the defect following tumor excision
(C) Long-term postoperative result two years after surgery demonstrating stable functional outcome, preserved eyelid position, and acceptable aesthetic result

A. B. C.

Figure 4. Paramedian forehead flap - first stage

Paramedian forehead flap used for reconstruction of a full-thickness nasal defect after excision of malignant skin tumor
(A) Preoperative appearance of the nasal tumor
(B) Intraoperative view of the nasal defect following radical excision
(C) Transposition of the paramedian forehead flap showing adequate flap length, orientation, and vascularity

A. B. C.

Figure 5. Paramedian forehead flap - second stage and final result

Staged reconstruction of a nasal defect using a paramedian forehead flap
(A) Postoperative appearance after division of the flap pedicle
(B) Final result one year after surgery demonstrating satisfactory nasal contour, acceptable color match, and good integration with surrounding facial tissues

Discussion

This study confirms the reliability and safety of local flap reconstruction in facial oncologic surgery.

Limberg Flap

The Limberg flap was the most commonly used technique in our series (31.25%). Its geometric design allows for effective tension distribution, making it ideal for small to medium-sized defects, particularly on the cheek and the temple. The robust vascularity of the face ensures reliable perfusion in these random-pattern flaps [16, 17].

Rotation and V-Y Flaps

Rotation flaps (22.5%) proved particularly useful for larger infraorbital defects. In full-thickness lower eyelid reconstructions, combining these with auricular cartilage grafts successfully prevented ectropion [10, 18]. The V-Y advancement flap remains a reliable workhorse for smaller defects on the forehead and nasal sidewall due to its simplicity and excellent tissue match [9].

Nasal Reconstruction and Paramedian Forehead Flap

The nasolabial flap (12.5%) is excellent for the nasal ala and lip, allowing the donor scar to be hidden within the nasolabial fold [8, 19]. For more complex nasal defects, especially in cases with underlying structural changes or chronic skin conditions [27], the paramedian forehead flap remains the gold standard. In our series, this two-stage axial flap, supplied by the supratrochlear artery, was used in four cases (5%). All patients underwent planned secondary thinning 3–6 months post-pedicle division [20, 21].

Clinical Reliability

The 100% flap survival and low complication rate (3.75%) highlight the superior results of flaps compared to skin grafting, which often leads to contraction and poor color match [11, 23, 24]. Adherence to the facial subunit principle [8] and fine suturing techniques [28] were paramount in achieving excellent scar camouflage. Future studies could benefit from objective patient-reported measures like the FACE-Q [26].

Conclusion

Local flaps provide a versatile, reliable, and aesthetically superior method for reconstructing facial defects. With proper patient selection and meticulous technique, excellent functional and cosmetic outcomes can be achieved with minimal complications.

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Ethical approval. The Ethics Committee of the University Hospital Foča, Republic of Srpska, Bosnia and Herzegovina, approved the study and informed consent was obtained from all individual respondents. The research was conducted according to the Declaration of Helsinki.

Conflicts of interest. The authors declare no conflict of interest.

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Lokalni režnjevi u rekonstrukciji karcinoma kože lica: funkcionalni i estetski ishodi

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Uvod. Najčešći maligni tumori kože lica su bazocelularni karcinom (BCC), planocelularni karcinom (SCC) i melanom. Hirurška ekscizija predstavlja zlatni standard liječenja, nakon čega slijedi rekonstrukcija nastalog defekta. Cilj ove studije bio je da se prikažu rekonstruktivne mogućnosti za defekte lica nakon ekscizije malignih tumora kože i da se procijene funkcionalni i estetski ishodi rekonstrukcije lokalnim režnjevima.

Metode. Ova retrospektivna serija slučajeva obuhvatila je 80 pacijenata hirurški liječenih u Klinici Varis u Beogradu i na Odjeljenju za plastičnu i rekonstruktivnu hirurgiju Univerzitetske bolnice u Foči, u periodu od januara 2021. do oktobra 2025. godine. Pacijenti su analizirani u odnosu na tip tumora, veličinu i lokalizaciju defekta, pol, starost i postoperativne komplikacije. Rekonstrukcija je izvedena primjenom lokalnih režnjeva.

Rezultati. Defekti lica nastali su nakon ekscizije BCC kod 51 pacijenta, SCC kod 24 pacijenta i melanoma kod 5 pacijenata. Potpuno preživljavanje režnja postignuto je u svim slučajevima (100%). Postoperativna infekcija sa marginalnom nekrozom režnja javila se kod tri pacijenta (3,75%) i sanirana je konzervativnim liječenjem. Funkcionalni i estetski ishodi bili su zadovoljavajući kod svih pacijenata.

Zaključak. Lokalni režnjevi predstavljaju pouzdanu rekonstruktivnu metodu za male i velike defekte lica. Pravilno hirurško planiranje, poznavanje anatomije i precizna tehnika od ključnog su značaja za postizanje optimalnih funkcionalnih i estetskih ishoda.

Ključne riječi: maligni tumori kože, defekti lica, rekonstrukcija, lokalni režanj