

*Prikaz bolesnika/
Case reports*

SCALP RECONSTRUCTION WITH SINGLE
ROTATION FLAP AFTER BASAL
CELL CARCINOMA ABLATION-
CLINICAL CASE REPORT

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REKONSTRUKCIJA SKALPA JEDNIM
ROTACIONIM REŽNJEM NAKON ABLACIJE
BAZOCELULARNOG KARCINOMA -
KLINIČKI PRIKAZ SLUČAJA

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Ključne reči

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rotacioni režanj, hirurška tehnika

Abstract

Basal cell carcinoma is the most frequently occurring skin malignancy being the scalp a main predilection site for tumor affection in the human body. To manage scalp defects is often a challenging initiative considering its complex structure and stiff texture. Taking into account the anatomic, functional and aesthetic aspects of the scalp, local flaps are preferable reconstructive option in most cases. The author presents a case of a female patient with a morpheaform basal cell carcinoma on the left parietal zone of her scalp. After wide surgical excision, a complex circular defect was created. For the reconstruction aim a single rotation scalp flap was successfully applied with an excellent outcome. The surgical approach is demonstrated step by step with a special emphasis on some pearls and pitfalls of the rotation flap technique. It is author's conviction that rotation flaps are reliable option in scalp reconstruction with relatively short learning curve.

INTRODUCTION

Basal cell carcinoma (BCC) is the most common skin cancer worldwide occurring predominantly but not exclusively in sun exposed areas being the head and neck the main predilection site (1). Typical BCC is slow growing, locally invasive, and destructive and develops from the basal layers of the epidermis and hair follicles. Studies show that BCC comprises approximately 80% of non-melanoma skin cancers and that its mortality rate is <1% (1,2). Metastases are extremely rare, with incidences ranging from 0.0028% to 0.5% (3).

The World Health Organization International Histologic Classification of Tumors divides BCC into different histologic subtypes: nodular (solid), superficial, infiltrating, micronodular, fibroepithelial, basosquamous, keratotic, and BCC with adnexal differentiation (4). Morphoea-like (scleroderma-form) infiltrative and micronodular variants are considered more aggressive subtypes that must be treated with particular attention (5). From clinical point of view, an important issue is the staging of BCC which depends on three parameters, i.e., size (diameter), depth of invasion, and metastatic spread (Table 1) (6,7).

Table 1: Staging of basal cell carcinoma

Stage	Characteristics of the malignancy
Stage I	Tumors < 2 cm, limited to the skin
Stage II	Tumors ≥ 2 cm, limited to skin and subcutaneous adipose tissue
Stage III	Invasion of muscle, cartilage, bone, lymphatics, and perineural invasion
Stage IV	Distant metastases

The options for primary tumor eradication of BCC can be divided into destructive or surgical/excisional modalities (8). Destructive treatment options are generally reserved for low-risk basal cell tumors and use a variety of methods to destroy neoplastic tissue including electrosurgery, cryosurgery, topical 5-fluorouracil, topical imiquimod, intralesional interferon, radiation, and photodynamic therapy. Notably, these modalities do not definitively ensure a margin clear of neoplasm. However, in selected low-risk cases, the overall success rate can be excellent. In the head and neck region Mohs surgery and wide excision provide the highest cure rates (9,10).

When dealing with the scalp as a common site for malignancies, the surgeon is often faced with complex defects in need of repair. The scalp presents unique challenge to the reconstructive surgeon: it is thick and inelastic; it is hair bearing; it covers a convex surface; and it provides the sole soft tissue covering for the cranium. In particular, the lack of elasticity of the scalp makes the repair of even small defects difficult. In patients with defects involving skin and galea local flaps and free skin grafts are equally suitable to achieve full closure. In case of injured pericranium, local flaps are the first choice as long as sufficient mobilization of surrounding tissue is possible (11,12). Taking into account the aesthetic aspects, local flaps are preferable in most cases when scalp repair is needed being the rotation flaps the gold standard in reconstruction (Fig. 1) (11,14).

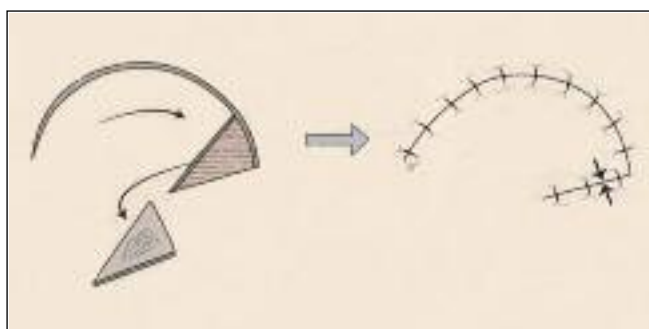


Figure 1: Rotation flaps are pivotal flaps with curvilinear configuration that are designed immediately adjacent to defect. They were originally used to repair triangular defects. Opposing arrows indicate greatest wound closure tension.

In the present article a case of morpheiform BCC affecting the scalp which led to a large circular scalp defect successfully reconstructed with local rotation flap is presented.

Case Report

A 67-year-old white woman was referred to the Unit of Plastic Surgery and Burns, Military Medical Academy, Sofia, for surgical treatment of a histologically proven morpheiform BCC in the parietal zone of the scalp (Fig. 2A). It had been there for more than 8 months and was asymptomatic except for occasional itching. The patient vigorously

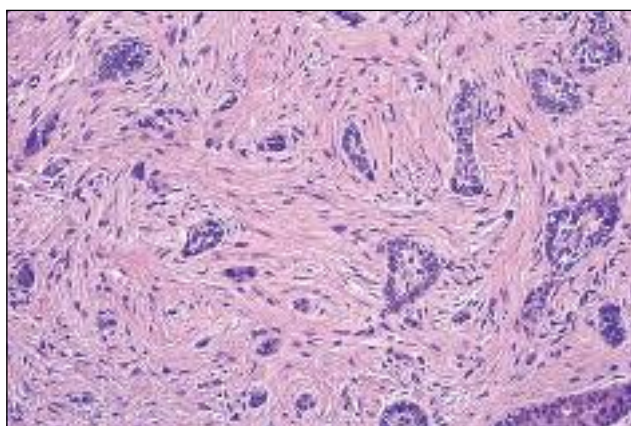


Figure 2: Histological and clinical presentation of our patient. (A) Microphotographs of morpheiform BCC (HE staining): it is characterized by its deep invasion of the dermis. (B) Clinical features of the lesion: atrophic sclerotic plaque with peripheral hyperpigmentation.

denied a prior history of surgery, trauma or radiation on this site. She had no prior history of skin cancer. Physical examination revealed a poorly defined circular, indurated and pitted plaque, 2.4 cm in diameter. It was fixed to underlying tissues and resembled a scar with peripheral spot-like pigmentation (Fig. 2B). The BCC was classified as stage II and the patient was referred for excisional surgery. Intraoperatively, clear lateral margins were achieved, leaving a 3.5cm post-excisional circular defect (Fig. 3A). The underlying periosteum (pericranium) was also excised and histologically examined but no tumor infiltration was found which confirmed the preoperative staging of the malignancy. The scalp was reconstructed by using a single rotation flap adjacent to the defect (Fig. 3B-D) with excellent functional and aesthetic outcome (Fig. 3E). The staples used for wound closure were removed on the 10th postoperative day. The patient was presented to the oncologic committee and the decision was that no further treatment was needed.

DISCUSSION

In daily practice the standard therapy of BCC is surgery encompassing a wide variety of approaches ranging from simple excision to complex microsurgical reconstruction in advanced cases (7,15). Excisional treatment of BCC can be used in low-risk and high-risk cases. In order to achieve histologically negative margins, guidelines exist to assist the surgeon: for tumors <1 cm a clinical margin of 4 to 5 mm, and for tumors >1 cm a clinical margin of 5 to 10 mm is recommended (8,16). As for the reconstruction of the post-excisional defects, in general, if they are up to 3 cm in diameter they may be repaired with primary wound closure; for defects over 3 cm in size, large rotational flaps are preferred (11,14).

In our case after the excision we created a defect of 3.5 cm. That's why we used a rotation scalp flap in which skin, subcutaneous tissue and galea were elevated and rotated in an arc from a pivot point at the flap base. At the time of flap harvesting we made meticulous blunt dissection preserving the galea intact because we aimed to protect the blood supply to the scalp which runs in the subcutaneous plane (superficial to the galea) (Fig.4). Our flap was designed 4.5 times the diameter of the defect in order to be sufficient for the flap length to cover the most distal aspect of the defect. Our approach coincided with the classical recommendation of



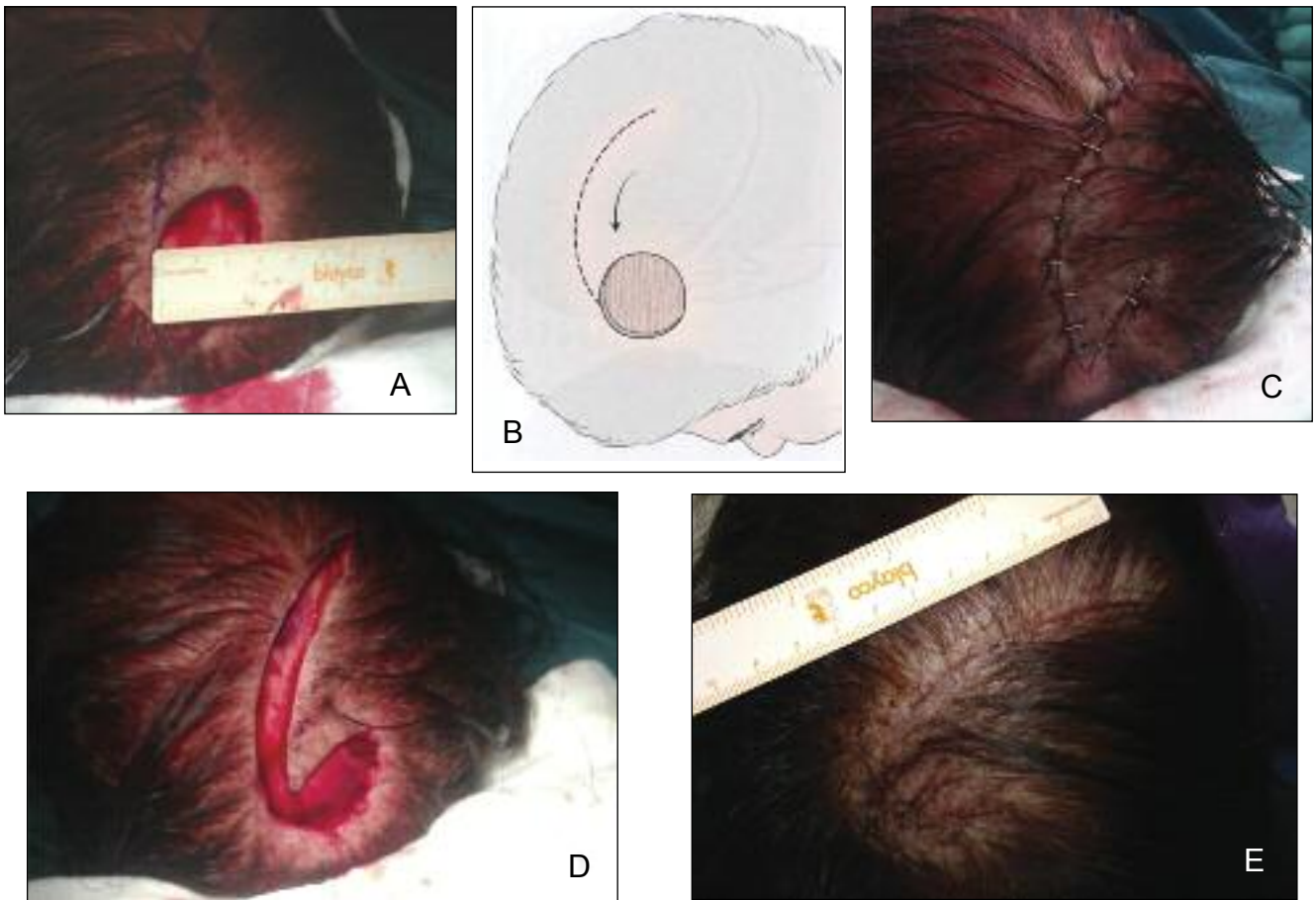


Figure 3: Clinical case- surgical technique and outcome. (A) Circular defect following excision and flap marking (blue ink line). The curvilinear incision is beveled to parallel the direction of growth of the hair follicles. (B) Drawing depicting our rotation flap designed for repair: length of the flap border should be 4 to 6 times width of the defect. (C) Flap harvested. Wide undermining of scalp was required for good mobility to be achieved. (D) Flap mounted at the site of the defect by non-traumatic closure using staples. Note that the donor site is closed by primary closure (E) Final result at 2 months.

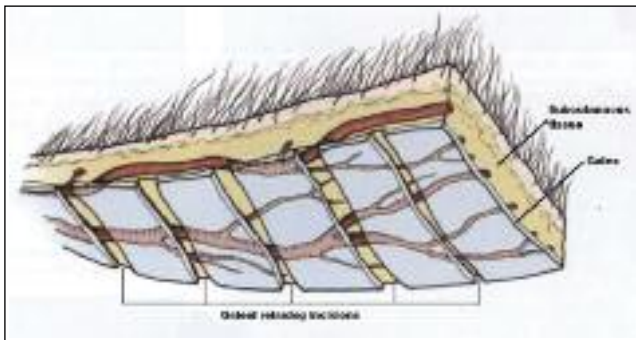


Figure 4: Blood supply of the scalp: the vessels run immediately superficial to the galea. If needed, galeal relaxing incisions must be performed cautiously to avoid damaging the vascular structures.

Ahuja according which the rotation flaps should be designed 4 to 6 times as long as the defect is wide (17). But when we tried to close the defect with the flap a great tension was observed and the flap seemed not to be large enough. With wide undermining in the same subgaleal (suprapericranial) plane all around the defect which increase the tissue mobility we succeed to close the defect; a little amount of excess tissue (standing deformity) was removed at the base of the defect. The donor site was closed by primary closure (Fig. 3D). In larger defects in other cases we had also used the priyom of subgaleal relaxing incisions which gives addition-

al length of the flap by increasing the scalp elasticity (Fig. 4) (11). In this case that was unnecessary but we kept that option in mind.

CONCLUSION

Scalp is a common location of malignancies and traumas and the plastic surgeon should be familiar with distinct methods for repair of this complex structure. Dealing with defects in this area, rotation flaps are basic tool in the armamentarium of reconstructive surgery.

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Sažetak

Bazocelularni karcinom je najčešći maligni tumor kože, a skalp je mesto na kome se ovaj tumor najčešće javlja. Otklanjanje defekta na skalpu je često veliki izazov zbog njegove kompleksne strukture i velike čvrstine. Uzimajući u obzir anatomske, funkcionalne i estetske osobine skalpa, u najvećem broju slučajeva je lokalni režanj najbolji izbor za rekonstrukciju. Prikazan je slučaj pacijentkinje sa morfeaformnim bazocelularnim karcinomom u parijetalnoj zoni skalpa sa leve strane. Nakon obimne hirurške ekscizije stvoren je veliki okrugli defekt. U cilju rekonstrukcije kreiran je jedan rotacioni režanj, uspešno je postavljen i dao je odličan rezultat. Hirurški pristup je prikazan korak po korak sa posebnim naglaskom na neke prednosti i mane tehnike rotacionog režnja. Uvereni smo da je rotacioni režanj pouzdan izbor za rekonstrukciju skalpa sa kratkim periodom potrebnim za obuku za izvođenje.

REFERENCES

1. Fartasch M, Dieppen TL, Schmitt J, Drexler H. The relationship between occupational sun exposure and non-melanoma skin cancer. *Dtsch Arztebl Int* 2012;109(43):715-20. doi: 10.3238/arztebl.2012.0715. Epub 2012 Oct 26.
2. Miller DL, Weinstock MA. Non-melanoma skin cancer in the United States: incidence. *J Am Acad Dermatol* 1994;30(5 Pt 1): 774-8.
3. Moser S, Borm J, Mihic-Probst D, Jacobsen C, Kruse Gujer AL. Metastatic basal cell carcinoma: report of a case and review of the literature. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2014;117(2):e79-82. doi: 10.1016/j.oooo.2012.04.030. Epub 2013 Jan 10.
4. Heenan PJ, Elder DJ, Sobin LH. Histological typing of skin tumors. 26. WHO international histological classification of tumors. Berlin, Heidelberg, New York, Tokyo: Springer Verlag; 1996.
5. Raasch BA, Buettner PG, Garbe C. Basal cell carcinoma: histological classification and body-site distribution. *Br J Dermatol*. 2006;155(2): 401-7.
6. Chinem VP, Mior HA. Epidemiology of basal cell carcinoma. *An Bras Dermatol* 2011;86(2): 292-305.
7. Wollina U, Tchernev G. Advanced basal cell carcinoma. *Wien Med Wochenschr* 2013;163(15-16):347-53. doi: 10.1007/s10354-013-0193-5. Epub 2013 Apr 16.
8. Ceradini DC, Blechman KM. Dermatology for plastic surgeons II- cutaneous malignancies. In: Thorn CH, Chung KC, Gosain AK, Gurtner GC, Mehrara BJ, Rubin JP, Spear SL editors: *Grabb and Smith's Plastic Surgery*. USA, Philadelphia; Lippincott Williams & Wilkins 2014: 115-26.
9. Tuerdi M, Yarbog A, Maimaiti A, Mijiti A, Moming A. Standard surgical excision and reconstruction of giant basal cell carcinoma of the face: may be an alternative to the Mohs micrographic surgery. *J Eur Acad Dermatol Venereol* 2014 Jan 8. doi: 10.1111/jdv.12360. Epub 2014 Jan 8.
10. Ad Hoc Task Force, Connolly SM, Baker DR, Coldiron BM, Fazio MJ, Storrs PA, Vidimos AT, Zalla MJ, Brewer JD, Smith Begolka W; Ratings Panel, Berger TG, Bigby M, Bologna JL, Brodland DG, Collins S, Cronin TA Jr, Dahl MV, Grant-Kels JM, Hanke CW, Hruza GJ, James WD, Lober CW, McBurney EI, Norton SA, Roenigk RK, Wheeland RG, Wisco OJ. AAD/ACMS/ASDSA/ASMS 2012 appropriate use criteria for Mohs micrographic surgery: a report of the American Academy of Dermatology, American College of Mohs Surgery, American Society for Dermatologic Surgery Association, and the American Society for Mohs Surgery. *J Am Acad Dermatol* 2012;67(4): 531-50. Epub 2012 Sep 5.
11. Hoffmann JF. Reconstruction of the scalp. In: Baker SR, editor. *Local Flaps in Facial Reconstruction*, 2nd ed. Mosby-Elsevier, Philadelphia, 2007: 637-63.
12. Mueller CK, Bader RD, Ewald C, Kalf R, Schultze-Mosgau S. Scalp defect repair: a comparative analysis of different surgical techniques. *Ann Plast Surg* 2012;68(6):594-8. doi: 10.1097/SAP.0b013e318218f32a.
13. Baker SR. Flap classification and design. In: Baker SR, editor. *Local Flaps in Facial Reconstruction*, 2nd ed. Mosby-Elsevier, Philadelphia, 2007: 71-106.
14. Seitz IA, Gottlieb LJ. Reconstruction of scalp and forehead defects. *Clin Plast Surg* 2009;36(3):355-77. doi: 10.1016/j.cps.2009.02.001.
15. Yordanov Y, Shef A, Lasso JM. Microsurgical reconstruction of a complex mid-facial defect- a case report. *Medical Review* 2014;50(1):52-58.
16. Wolf DJ, Zitelli JA. Surgical margins for basal cell carcinoma. *Arch Dermatol* 1987; 123(3): 340-4.
17. Ahuja RB. Geometric considerations in the design of rotation flaps in the scalp and forehead region. *Plast Reconstr Surg* 1988;81(6):900-6.