

Reconstruction of a Scalp Defect After Cutaneous Squamous Cell Carcinoma Resection with a Rotation Flap: A Case Report

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ABSTRACT

Introduction: Cutaneous squamous cell carcinoma of the scalp requires complete oncologic excision followed by reconstruction that provides durable soft-tissue coverage while preserving scalp contour and hair-bearing tissue. Local rotation flaps remain a reliable reconstructive option for appropriately selected defects.

Case Presentation: A 94-year-old man presented with a progressively enlarging left frontotemporal scalp lesion. Wide local excision with oncologically appropriate margins was performed, followed by immediate reconstruction using a wide-based local rotation flap elevated in the subgaleal plane. The flap achieved tension-free closure with preservation of scalp contour. Histopathological examination confirmed invasive cutaneous squamous cell carcinoma with negative surgical margins. The postoperative course was uneventful, with complete primary wound healing and no evidence of regional or distant metastasis.

Discussion: Local rotation flaps remain a safe and effective reconstructive option for selected scalp defects following cSCC excision, providing reliable vascularity, tension-free closure, and favorable functional and aesthetic outcomes, even in elderly patients.

Conclusion: This case highlights the role of local rotation flaps as a dependable first-line reconstructive option for selected scalp defects following cSCC excision, achieving durable coverage with favorable functional and aesthetic outcomes.

KEYWORDS: Cutaneous squamous cell carcinoma; Scalp reconstruction; Rotation flap; Scalp neoplasms; Reconstructive surgical procedures; Case report.

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INTRODUCTION

Cutaneous squamous cell carcinoma (cSCC) is the second most common non-melanoma skin cancer and arises from the malignant transformation of epidermal keratinocytes.¹ Although several treatment modalities are available for cutaneous squamous cell carcinoma, complete surgical excision with histopathologically negative margins remains the gold standard, providing optimal local tumor control and facilitating definitive reconstruction.² Early treatment of cutaneous scalp tumors is essential for achieving optimal

oncologic control while preserving reconstructive options and maximizing long-term aesthetic outcomes.

CASE PRESENTATION

A 94-year-old man was referred to the Department of Plastic and Reconstructive Surgery because of a scalp tumor. The patient reported that the lesion had been present for approximately 1–2 years, with progressive enlargement over time. Physical examination revealed a solitary exophytic tumor located in the left frontotemporal region of the scalp,

Reconstruction of a Scalp Defect After Cutaneous Squamous Cell Carcinoma Resection with a Rotation Flap: A Case Report

measuring approximately 0.8–1.0 cm in diameter. The lesion was round, well circumscribed, dark brown to black in color, with a hyperkeratotic surface covered by an adherent hemorrhagic-necrotic crust. It had a broad base of implantation, slightly raised borders, and a surrounding erythematous halo. The adjacent skin showed marked signs of chronic photodamage, including solar lentigines and actinic elastosis (Figure 1A). The patient had no history of trauma or previous lesions in the affected area and no family history of cutaneous malignancies. The skin and mucous membranes were normally colored, and no palpable regional lymphadenopathy was identified. A full-thickness oncologic resection of the scalp lesion with appropriate surgical margins was planned. Reconstruction was subsequently designed using a wide-based local rotation flap, outlined by a curvilinear incision extending from the ipsilateral parietotemporal region toward the occipital scalp. The flap design incorporated a Burow's triangle adjacent to the defect to facilitate flap rotation, reduce wound closure tension, and

prevent standing cone deformities ("dog ears"). The flap was oriented along the scalp's lines of greatest laxity while preserving the vascular supply from the superficial temporal and occipital arteries (Figures 1B and 1C). Wide local excision of the lesion was then performed with adequate oncologic margins in all directions (Figure 1D). Subsequently, the scalp rotation flap was elevated in the subgaleal plane. The flap demonstrated adequate thickness and excellent vascularity, allowing sufficient mobilization to achieve tension-free closure of the defect while preserving its vascular pedicle (Figure 1E). The postoperative course was uneventful. Pain was adequately controlled, daily wound care was performed, and the surgical wound healed by primary intention without complications (Figure 1F). Histopathological examination confirmed an invasive cutaneous squamous cell carcinoma with histologically negative surgical margins. No evidence of regional lymph node involvement or distant metastasis was identified.



Figure 1. Surgical management of a cutaneous squamous cell carcinoma of the scalp. (A) Preoperative lesion. (B–C) Rotation flap design. (D) Defect after tumor excision. (E) Rotation flap elevation and inset. (F) Early postoperative outcome.

DISCUSSION

Cutaneous squamous cell carcinoma (cSCC) is the second most common non-melanoma skin cancer, accounting for approximately 20% of all keratinocyte carcinomas, and its incidence continues to increase worldwide owing to population aging and cumulative ultraviolet (UV) exposure. Unlike basal cell carcinoma, cSCC has a well-recognized

potential for local invasion, perineural spread, regional lymph node metastasis, and disease-specific mortality. Tumors arising on the scalp, ear, and lip have consistently demonstrated a more aggressive biological behavior than lesions at other sun-exposed sites, making early diagnosis and definitive surgical management particularly important.^{3,4} The scalp presents unique reconstructive challenges because of

Reconstruction of a Scalp Defect After Cutaneous Squamous Cell Carcinoma Resection with a Rotation Flap: A Case Report

the limited elasticity of the galea aponeurotica and its firm adherence to the underlying pericranium. Consequently, even relatively small defects may be difficult to close primarily without excessive tension. In addition, reconstruction of hair-bearing scalp should restore not only durable soft-tissue coverage but also contour and hairline preservation. Therefore, scalp reconstruction should be considered an integral component of oncologic management rather than a simple closure procedure.⁵⁻⁷ Current multidisciplinary guidelines recommend complete surgical excision with histologically negative margins as the standard treatment for localized cSCC. Margin status remains one of the strongest predictors of local control, and oncologic principles should always take precedence over reconstructive considerations. In the present case, wide local excision achieved tumor-free margins, allowing immediate definitive reconstruction without compromising oncologic safety.⁵ Modern reconstructive algorithms advocate an individualized approach based on defect size, depth, location, surrounding tissue quality, previous irradiation, and patient-related factors.⁶⁻⁷ Among the available options, local rotation flaps remain one of the most reliable techniques for reconstruction of small- and medium-sized scalp defects because they provide excellent tissue match while preserving hair-bearing scalp. Their predictable vascularity is supported by the extensive anastomotic network of the superficial temporal, posterior auricular, and occipital arteries. Wide subgaleal undermining increases flap mobility while distributing closure tension over a broad surface, and the use of Burow's triangles facilitates tissue redistribution and minimizes standing cone deformities.⁸⁻¹¹ In our patient, preservation of the surrounding scalp and meticulous subgaleal dissection allowed tension-free closure using a local rotation flap. This approach avoided the need for skin grafting, which is frequently associated with alopecia, contour irregularities, and poor color match, as well as the greater morbidity associated with free tissue transfer. Complete flap survival and uncomplicated wound healing further support the reliability of local rotation flaps when careful surgical planning and preservation of the scalp vascular supply are achieved. Another noteworthy aspect of this case is the patient's advanced age. Although surgical management in nonagenarians is often approached cautiously, current evidence suggests that physiological reserve and functional status are more relevant predictors of postoperative outcomes than chronological age alone.^{3,5} In appropriately selected elderly patients, local flap reconstruction offers shorter operative times, lower perioperative morbidity, and faster recovery while maintaining excellent reconstructive outcomes. The favorable postoperative course observed in this patient supports these recommendations. Although limited by its single-case design, this report reinforces several reconstructive principles supported by the current literature. Complete oncologic excision with histologically negative

margins should precede definitive reconstruction, and preservation of vascularized local tissue whenever feasible provides excellent functional and aesthetic outcomes with minimal donor-site morbidity. Additional comparative studies evaluating long-term oncologic outcomes, complication rates, and patient-reported outcomes are needed to further refine reconstructive algorithms for scalp cSCC.

CONCLUSION

Reconstruction following resection of scalp cutaneous squamous cell carcinoma should be tailored to the characteristics of both the defect and the patient. This case highlights that local rotation flaps remain a versatile and dependable reconstructive option for moderate-sized scalp defects, providing durable coverage with excellent tissue match and preservation of hair-bearing scalp while avoiding the morbidity of more complex procedures. When combined with meticulous oncologic resection and careful surgical planning, this technique can achieve predictable functional and aesthetic outcomes, even in very elderly patients. These findings support the continued role of local scalp flaps as a first-line reconstructive strategy in appropriately selected cases.

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Reconstruction of a Scalp Defect After Cutaneous Squamous Cell Carcinoma Resection with a Rotation Flap: A Case Report

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