

One-stage tumor resection and free flap scalp reconstruction in squamous cell carcinoma infiltrating the calvarial bone

Sanas Mirhoseiny¹, Anna Pokrywka², Christian Witzel¹, Arzu Orhun¹, Noor Aljuied¹, Johann Pratschke³, Georgios Kouloxouzidis¹

¹ Charité – Universitätsmedizin Berlin, Chirurgische Klinik, Plastische und Rekonstruktive Chirurgie, Berlin, Deutschland

² Charité – Universitätsmedizin Berlin, Klinik für Dermatologie, Venerologie und Allergologie, Berlin, Deutschland

³ Charité – Universitätsmedizin Berlin, Chirurgische Klinik, Berlin, Deutschland

BACKGROUND

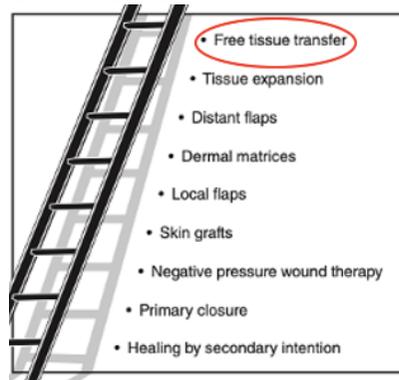
Malignant tumors of the scalp can lead to infiltration of the periosteum, calvarial bone, dura, and brain. Oncologic radicality is of important prognostic significance, thus resulting in complex wounds with challenging reconstructive prospects.

RECONSTRUCTIVE OPTIONS

Depending on the size, depth, and localization of the scalp defect, the therapeutic approach can range from secondary healing, primary closure, skin grafting, or flap reconstruction.

Per the reconstructive ladder, defect reconstruction should be achieved by the simplest method effective.

While secondary healing and primary closure are only applicable for small defects, local flaps can cover medium sized scalp defects. In some cases, free flaps remain the only effective reconstructive option to achieve oncologic radicality especially when previous radiation therapy or operations limit the use of local flaps.

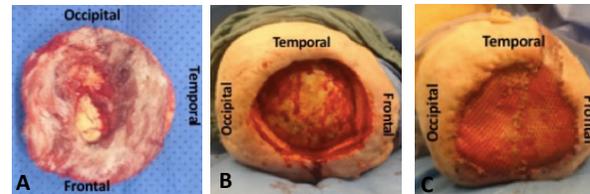


Janis, J. E. (2014). *Essentials of plastic surgery*. CRC Press.

A free flap is a unit of tissue that maintains its own blood supply while being microsurgically transferred from a donor site to a recipient site. Even in smaller defects, free flaps can be chosen over secondary healing to offer a less prolonged, more durable solution. In scalp reconstruction, one of the most commonly performed free flaps is the latissimus dorsi muscle flap.

SURGICAL PROCEDURE

After initial assessment of the recipient vessels for the free flap (superficial temporal artery and vein), tumor resection was performed by both the plastic surgeon and neurosurgeon. The malignancy was removed with surgical margins of 1-2 cm involving circular craniectomy. Depending on the size and localization of the osseous defect, bone reconstruction was performed. The resulting defect was reconstructed with a free latissimus dorsi muscle flap covered with split-thickness skin graft.



A) Excised scalp tumor with oncological margins of ≥ 2 cm including infiltrated calvarial bone B) Resulting composite scalp defect following radical oncological surgery C) Reconstruction of the defect by a free latissimus dorsi flap with split-thickness skin graft.



A) Ulcerative lesion on the parietal scalp measuring 9x6cm in a 77-year-old patient. Biopsy had revealed a relapse of a squamous cell carcinoma. B+C) 3-month follow-up after tumor resection and reconstruction by free latissimus dorsi flap and split-thickness skin graft.

OUTCOME

In total, four patients with cutaneous malignancies infiltrating the calvarium without intracranial invasion or metastasis received radical surgery with craniectomy and free flap reconstruction as a curative treatment. The patients were between 77 - 82 years old and presented with multiple comorbidities including history of kidney and liver transplantation. Bone reconstruction with Palacos cement was necessary in three cases. In all patients, the flap healed uneventfully with only minor complications in two patients (donor site seroma), which were managed conservatively. All patients were discharged 14-16 days postoperatively. In the follow-up period of 6-12 months, no recurrence was detected.

DISCUSSION AND CONCLUSION

In cases of previous radiation or when adjuvant radiation therapy is indicated, free tissue transfer offers a more durable solution compared to skin grafts or local flaps. Research has shown that free flap scalp reconstruction is safe even in elderly patients who suffer from multiple comorbidities (1). Previously published treatment algorithms may facilitate the choice of technique for scalp reconstruction (1,2,3). Rigorous preoperative assessment in an interdisciplinary team including dermatologists, neurosurgeons, and plastic surgeons as well as appropriate patient selection is essential in order to reach good functional and aesthetical outcomes and minimize complications such as flap loss, donor site morbidity, and prolonged wound healing.

REFERENCES

- 1 Iblher, N., Ziegler, M. C., Penna, V., Eisenhardt, S. U., Stark, G. B., & Bannasch, H. (2010). An algorithm for oncologic scalp reconstruction. *Plastic and reconstructive surgery*, 126(2), 450-459.
- 2 Ehl, D., Brueggemann, A., Broer, P. N., Koban, K., Giunta, R., & Thon, N. (2019). Scalp Reconstruction after Malignant Tumor Resection: An Analysis and Algorithm. *Journal of Neurological Surgery Part B: Skull Base*.
- 3 Steiner, D., Horch, R. E., Eyüpoglu, I., Buchfelder, M., Arkudas, A., Schmitz, M., ... & Boos, A. M. (2018). Reconstruction of composite defects of the scalp and neurocranium—a treatment algorithm from local flaps to combined AV loop free flap reconstruction. *World journal of surgical oncology*, 16(1), 217.