

CASE REPORT

Microvascular free tissue transfer of previously irradiated flaps

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Both ablative and reconstructive surgeries are more challenging in irradiated tissues.¹ Radiation causes tissue fibrosis and vascular damage, making dissection difficult and blood vessels friable and prone to thrombosis.² One question that has previously not been addressed is whether tissues that have been irradiated can be reliably used as donor sites for free flap reconstruction.

We performed free tissue transfer in two patients who had total-body irradiation (TBI) for hematologic malignancies and subsequently developed second cancers in the head and neck. In the setting of TBI, all potential free flap donor tissues were irradiated. In addition, both patients had experienced graft-versus-host disease (GVHD), which is also associated with vascular damage and poor wound healing after bone marrow transplantation (BMT). To our knowledge, there have been no prior reports of microvascular free flap reconstruction involving patients with a history of TBI or GVHD. Institutional Review Board approval was obtained prior to presenting our results.

PATIENT 1

A 23-year-old male with a history of acute lymphocytic leukemia treated with TBI (unknown dose) and BMT, after which he developed GVHD, presented with a right buccal squamous cell carcinoma. The patient underwent a resection of the right mandible from condyle to parasymphysis, external cheek, and buccal mucosa (Fig 1). Reconstruction was performed with a fibula osteocutaneous flap for the mandible and facial skin and a radial forearm fasciocutaneous flap for the intraoral mucosa. The flap tissues were noted to be fibrotic but well perfused after transfer. There were no perioperative complications and both flaps healed uneventfully. The patient is active, tolerating a regular diet, and free of recurrent disease 12 months after surgery (Fig 2).

PATIENT 2

A 44-year-old male with a history of lymphoma treated with chemotherapy, 30 Gray TBI, and BMT, after which he

developed GVHD, presented with an undifferentiated sarcoma in the right malar region. The patient underwent a resection that included the right cheek and temple, facial nerve, buccal mucosa, and zygomatic arch. An anterolateral thigh free flap was performed for reconstruction of the composite defect. The donor and recipient vessels were noted to be markedly friable. There was an area of delayed healing at the medial canthus that resolved with local care. At 7 months follow-up, the patient has had no other complications and has completed additional adjuvant radiation therapy.

DISCUSSION

Microvascular free flap surgery after surgery for head and neck cancers is usually performed to reconstruct ablative defects with well-vascularized, nonirradiated tissues to promote wound healing. However, in the patients we describe, all potential free tissue donor sites were previously irradiated. Free tissue transfer using irradiated donor and recipient tissue was accomplished.

Radiation reduces the proliferative capacity of all cells within the treatment field and inhibits all processes involved in wound healing. Fibrosis and increased fragility of cutaneous tissues results from changes to epidermal cells and fibroblasts.² While superficial blood vessels dilate, there is an overall decrease in tissue vascularity due to stasis and occlusion of blood vessels caused by endothelial cell proliferation, wall edema, and thrombosis, as well as impaired angiogenesis.²

Blood vessel occlusion has implications not only for impaired wound healing of the radiated donor and recipient tissues in the cases we have described, but also in the ability to perform microvascular anastomoses due to reduced flap pedicle and recipient vessel patency. Even when the blood vessels are patent, they are often more friable and easily damaged.³ Schultze-Mosgau et al³ described histologic changes of hyalinosis and intimal dehiscence in irradiated

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