

# Influence of Prior Radiotherapy on the Development of Postoperative Complications and Success of Free Tissue Transfers in Head and Neck Cancer Reconstruction\*

Bradley P. Bengtson, MD, Mark A. Schusterman, MD, Bonnie J. Baldwin, MD, Michael J. Miller, MD, Gregory P. Reece, MD, Stephen S. Kroll, MD, Geoffrey L. Robb, MD, Helmuth Goepfert, MD, Houston, Texas

The purpose of this study was to determine whether prior radiotherapy had any effect on the development of postoperative complications in patients undergoing microvascular tissue transfers for reconstruction of head and neck cancer. A prospective database was used to review 354 consecutive patients who had a total of 368 free tissue transfers limited to the head and neck during the 4-year period from July 1988 to June 1992. Postoperative complications in 167 patients who received preoperative radiotherapy (XRT) were compared with those of 187 patients who did not undergo radiotherapy preoperatively (NR). No statistical differences in complications or flap loss between the two groups were noted using the  $\chi^2$  test or Fisher's exact test ( $p > 0.2$ ). Total flap loss occurred in 5.3% of the XRT group (9 of 169) and 5.0% of the NR patient group (10 of 199), and partial flap loss occurred in 4.1% of the irradiated patients and 2.5% of the nonirradiated patients. Major wound complications requiring additional surgery occurred in 16% of the XRT group and 11% of the NR group. Minor wound complications that did not require further surgery occurred in 21% of the irradiated patients and 18% of the nonirradiated patients. No significant difference in the timing or dose of preoperative radiation, previous neck dissection, or anastomotic type could be documented in failed versus successful flaps (two-tailed  $t$ -test,  $p > 0.80$ , and  $\chi^2$ ,  $p > 0.2$ ). Our results show that, in a large group of cancer patients undergoing free tissue transfers to the head and neck, prior radiotherapy or surgery did not predispose them to a higher rate of acute flap loss or wound complications than their nonirradiated cohorts.

Controversy continues to surround the clinical effects of radiotherapy on the development of postoperative complications and free tissue transfers. Some investigators have concluded that "irradiated vessels are not suitable for microvascular surgery" [1]. Experimental and clinical histopathologic changes induced by external beam radiotherapy have been well documented [2-6]. The most dramatic changes occur in vascular and perivascular tissues and influence fibroblast and fibroblast progenitors. However, clinical studies that prove these radiation-induced histologic changes are responsible for increasing postoperative complication rates are lacking.

Many early experiences with microvascular reconstruction following extensive head and neck cancer resections were fraught with complications. Although the challenges of head and neck reconstruction have continued, the reliability of microvascular transfers has greatly increased. Current clinical experience has demonstrated that free tissue transfer often provides the most reliable, functional, and aesthetic reconstruction while allowing complete resection margins and excellent control of locoregional disease with fewer postoperative complications than local or regional reconstruction methods [7-12].

In 1978, Baker *et al* [12] noted almost universal acceptance of planned radiation in conjunction with surgery as the primary treatment modality of head and neck cancer and called for studies to determine the effects of radiation on recipient tissues and, in particular, recipient vessels used for microvascular anastomosis.

This study was designed to determine if preoperative radiotherapy increased the rate of postoperative wound complications or flap loss in a group of head and neck cancer patients undergoing reconstruction with free tissue transfers. We also sought to determine if the time interval between the completion of radiation to the time of surgery or the total dose of radiation was significant.

## PATIENTS AND METHODS

A total of 368 free tissue transfers were performed in 354 patients for reconstruction following head and neck cancer resection between July 1, 1988, and June 30, 1992, at the M. D. Anderson Cancer Center. One hundred sixty-seven patients had received preoperative radiotherapy (XRT) to the operative site, and 187 had not received radiotherapy (NR). Of the 14 patients who had 2 free flaps, 4 had combination flap procedures (i.e., free fibula and radial forearm), and 10 had repeat free flap procedures following flap failures. The average follow-up was 26 months, with a minimum of 4 months.

From the Department of Reconstructive and Plastic Surgery, The University of Texas M. D. Anderson Cancer Center, Houston, Texas.

\*Dr. Bengtson is the recipient of the 1993 Clinical Research Award of the Society of Head and Neck Surgeons.

Requests for reprints should be addressed to Mark A. Schusterman, MD, Department of Reconstructive and Plastic Surgery, Box #62, M. D. Anderson Cancer Center, 1515 Holcombe Boulevard, Houston, Texas 77030.

Presented at the 39th Annual Meeting of the Society of Head and Neck Surgeons, Los Angeles, California, March 18-21, 1993.