



Success of sequential free flaps in head and neck reconstruction



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KEYWORDS

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Microsurgical free flaps;
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Complications

Summary *Background:* The need for additional free flaps following an initial free flap reconstruction sometimes arises. However, there is understandable hesitation to perform subsequent free flaps due to concerns regarding recipient vessel availability, flap loss, and other complications.

Methods: An analysis of patients undergoing one or more sequential head and neck free flap reconstructions between 2000 and 2012 was performed.

Results: Two hundred seventy-three free flaps were performed on 117 patients over the course of 2, 3, or 4 surgeries, with 23 patients receiving 2 or 3 simultaneous free flaps in a single surgery. The success rate of subsequent free flaps was 98.7% compared to 99.1% for initial free flaps in the same patients ($p = 1.00$). The complication rate following subsequent free flaps was 42.9% compared to 36.8% following initial free flaps ($p = 0.46$). Flap success rates for double/triple simultaneous free flaps were 97.8% compared to 99.1% for single flaps ($p = 0.41$) and the complication rate for double/triple simultaneous free flaps was 34.6% compared to 47.8% for single flaps ($p = 0.20$). In patients receiving oral or pharyngeal sequential free flap reconstructions, 90.1% demonstrated at least 80% speech intelligibility and 81.6% remained feeding tube-independent. The 5-year survival of patients undergoing sequential free flaps was 75.4%. *Conclusions:* Multiple sequential free flaps are feasible and reliable in appropriately selected patients. These findings suggest that the ability to perform free flap reconstruction should rarely limit a patient's candidacy for resection of recurrent cancers or consideration for surgery intended to improve patient aesthetics or function.

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Introduction

Most patients with advanced head and neck cancers now undergo microvascular free flap reconstruction following oncologic resection as part of their comprehensive treatment since it facilitates complete tumor removal by providing very reliable wound coverage with generally better restoration of function and cosmesis than local and regional flaps.^{1,2} However, despite aggressive surgical resection and multimodality therapy, locoregional recurrence remains the dominant form of treatment failure in head and neck cancer.³ Furthermore, head and neck cancer patients are at risk for developing a second primary malignancy at a rate of 5–30 percent.⁴ Finally, even when their cancer has been cured, patients remain susceptible to long-term complications, such as osteoradionecrosis, fistula, stricture, and deformities related to tissue fibrosis and atrophy. In all of these cases, the optimal treatment may involve further reconstruction with one or more additional microvascular free flaps.

Several studies have reported successfully performing a second or even a third free flap in the same patient, including one from our own institution describing our early (1988–1996) experience.^{5–12} Nevertheless, there continues to be understandable hesitation to performing one or more sequential free flaps in the same patient because of concerns involving lack of recipient vessels, flap loss, and other postoperative complications. These factors have yet to be studied in depth in prior studies, which are mostly limited by small sample sizes.

In this study, our goal was to evaluate the success of performing one or more free flaps in patients who had already undergone at least one prior free flap operation. We also evaluated postoperative complications that occurred following sequential free flap operations to get a sense of the morbidity associated with re-operative microsurgery. Finally, survival and, where applicable, functional outcomes were analyzed to help further evaluate whether the potential risks of performing sequential free flaps are justified.

Methods

A review of patients who underwent multiple microvascular free flap transfers for head and neck reconstruction at our institution between January 2000 and December 2012 was performed. Patients were included in the study if they had received at least two free flaps performed on separate occasions. That is, patients were included if they underwent two or more *sequential* free flap reconstructions, in contrast to reconstructions with two or more *simultaneous* free flaps performed during the same operation, which many patients in this series also received. Patients undergoing a subsequent free flap performed following a free flap failure were excluded from this study. That is, only patients undergoing sequential free flap reconstruction for recurrent/second primary cancer, osteoradionecrosis, or other events unrelated to flap loss were included in this study. Institutional Board Review approval was obtained prior to undertaking this study.

Using patients as their own controls, flap success rates and complication rates were compared between the initial free flaps and subsequent free flaps to determine the reliability and safety of sequential free flap reconstructions, respectively. Speech and swallowing outcomes were collected for the subset of patients who underwent reconstruction of the oral cavity or pharynx to acquire some sense of whether sequential free flaps result in reasonable functional gains that may be associated with an improved quality of life. Speech was classified as normal (100% intelligible), >80% intelligible but not normal, 50–80% intelligible, or <50% intelligible.¹³ Diet was categorized as unrestricted, soft, pureed, liquid, partial oral, or nonoral.¹³ Finally, data involving survival and disease status, were collected to evaluate whether the potential morbidity of sequential free flaps were justified by the long-term prognosis of the patient population studied.

Continuous data are reported as mean $\pm$ standard deviation. Frequency data were compared using Fisher's exact test. All tests were two-tailed. *P*-values less than 0.05 were considered significant. Survival was estimated using the Kaplan–Meier method.

Results

A total of 278 microvascular free flaps, both simultaneous and sequential, were performed on 117 patients, including 25 females and 92 males (Table 1). One patient received 3 successful simultaneous free flaps on his second free flap reconstruction surgery. The remainder of patients receiving multiple simultaneous free flap reconstructions received 2 simultaneous free flaps. One patient who underwent 4 sequential free flap reconstruction surgeries had a double free flap at the time of his second surgery, for a total of 5 successful free flaps. Second, third, and fourth free flap surgeries were performed a mean of 27.8 ± 29.7 months, 40.3 ± 21.6 months, and 67.0 ± 43.7 months following the initial free flap, respectively.

The mean patient age at the time of the most recent free flap reconstruction was 58.7 ± 14.7 years. Other patient characteristics that might increase the risk for flap loss or other perioperative complications are summarized in Table 2. Forty-six patients (39.3%) had one or more major medical comorbidities such as diabetes mellitus, peripheral vascular disease, lung disease, cardiac disease, or cerebral vascular disease. The head and neck sites that were reconstructed following the initial oncologic resection are summarized in Table 3. The indications for performing

Table 1 Number of sequential free flaps performed.

Free flap surgery	Single free flaps	Double/Triple Free Flaps ^a	Total flaps
First surgery	108	9	126
Second surgery	105	12	130
Third surgery	17	1	19
Fourth surgery	3	—	3
Total flaps	233	45	278

^a One patient had a triple free flap on the second surgery.

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