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The importance of in-hospital mortality for patients requiring free tissue transfer for head and neck oncology

P. Pohlenz [a,*], J. Klatt [a], R. Schmelzle [a], L. Li [b]

[a] *Department of Plastic and Reconstructive Surgery, University Medical Center Hamburg-Eppendorf, Martinistrasse 52, 20246 Hamburg, Germany*
[b] *Department of Oral and Maxillofacial Surgery, University Medical Center Oldenburg, Hamburg, Rahel-Straus-Straße 10, 26133 Oldenburg, Germany*

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Abstract

Mortality is a rare but disastrous complication of microvascular head and neck reconstruction. The investigators attempt to identify the procedure-related mortality cases and analyse the causes of death. A retrospective analysis of 804 consecutive free flap procedures during a 19-year period was performed and fatal cases were identified ($n = 42$ deaths). Multivariate logistic regression was employed to determine the association of in-hospital mortality with patient-related characteristics. The 30-day post-operative mortality rate was 1% (8 out of 804 patients), and the in-hospital mortality rate (post-operative deaths in-hospital before or after the 30th post-operative day without discharge) was 5.2% (42 out of 804 patients). Cancer recurrence and metastases related pneumonia were the most common causes of death ($n = 26$, 62%), followed by cardiac, pulmonary, infectious and hepatic/renal aetiologies. Logistic regression analysis revealed that patients with stage IV disease and an operation time of >9 h were significantly associated with post-operative mortality. Malignancy-related conditions were the most common causes of death following free flap transfer for head and neck reconstruction. For patients with stage IV head and neck cancer, this aggressive surgical approach should be cautiously justified due to its association with post-operative mortality. To shorten the operation time, experienced microsurgical operation teams are necessary.

Keywords: Mortality; Microsurgery; Head and neck; Free tissue transfer

Introduction

Free flaps are extremely reliable in achieving successful reconstruction of the head and neck.[1] The success rate of microvascular reconstruction in the head and neck region has been reported to be more than 90% in most series.[1–4] In comparison to regional flaps, free tissue transfer is more complicated surgery but yields better functional and cosmetic outcomes in patients with head and neck defects. Despite efforts to optimize the surgical results, potential surgical complications of microvascular reconstruction can be disastrous. Many reports have focused on measures to enhance the flap success rate and avoid flap failure.[5–10] Nevertheless, medical complications, which have been reported to affect 62% of elderly patients undergoing free flap transfer,[11] have attracted less attention in certain studies.

Post-operative medical complications in these elderly patients have been statistically far more important in negatively affecting the outcomes and true costs of microsurgical reconstruction.[12]

Although quite uncommon, post-operative mortality seems to be inevitable in such major surgery in a field full of important anatomical structures.[1,9,12–14] Therefore, it is important to analyse the causes of death and identify associated factors. The present study aimed to review our experience in microvascular head and neck reconstruction and investigated the 30-day post-operative mortality rate and the in-hospital mortality rate.

* Corresponding author. Tel.: +49 40741058922; fax: +49 4081976520.
E-mail addresses: ppohlenz@uke.de, ppohlenz@t-online.de (P. Pohlenz).

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Patients and methods

804 consecutive surgical procedures of microvascular head and neck reconstruction in 804 patients performed at the University Medical Center Hamburg between 1987 and 2008 have been analysed in this study. Patients' salient demographic data, aetiology and defect location, reconstructive technique, and post-operative morbidity were compiled from the medical records. The surgery was carried out with the intention to cure by resecting a 1.5 cm margin of normal tissue and using reconstructive techniques as deemed necessary by the individual surgeon. The ages ranged from 39 to 75 years, with a mean of 58 years. Pre-existing medical comorbidities, such as diabetes, arterial hypertension, heart, liver and renal diseases, were exhibited by 133 patients (16.5%). All patients received microvascular head and neck reconstruction because of ablative cancer surgery. The most common pathology was squamous cell carcinoma, which affected 747 patients (93%), and the floor of the mouth was most frequently involved (387, 48.2%). All other pathologies were malignant, such as salivary gland tumour, clear cell carcinoma and tonsil cancer. Odontogenic pathologies were not included. 84 patients received the second free flap for recurrent head and neck cancer and five patients underwent three separate microvascular flap transfers.

We further identified the patients who died within 30 days after receiving microvascular head and neck reconstruction, and analysed their causes of death. The second index was the in-hospital mortality rate, which is the rate of post-operative deaths in-hospital before or after the 30th post-operative day without discharge. The cause of death and associated factors were determined from the patients' death certificates. Recurrence was defined as local (arising only in the oral cavity relative to the primary tumour), regional (arising only in the neck), loco-regional (arising in both primary site and neck) and distant metastases. The preferred method of confirming recurrence was by biopsy and this was done for all patients treated with a further attempt to cure. Another acceptable way to confirm recurrence was scanning; fine needle aspiration cytology was not performed.

Decisions about treatment and discussions about how to proceed when a tumour recurred involved a multidisciplinary tumour board on which radiation therapists, oncologists, radiologists, oral and maxillofacial surgeons as well as general surgeons participate.

Logistic regression was used to determine factors significantly associated with post-operative mortality, including patient age, sex, primary tumour stage, previous radiotherapy/chemotherapy, pre-existing medical comorbidities, choices of free flap, surgical complications and operation time. SPSS software (version 14.01S; SPSS Incorporation (Inc.), Chicago, IL, USA) was used for the statistical analysis, and $p < 0.05$ was considered to indicate statistical significance.

Results

In total, 804 free flaps were transferred. The most commonly used free flaps were latissimus dorsi flaps ($n = 233$, 29%), radial forearm flaps ($n = 218$, 27.2%), iliac crest flaps ($n = 160$, 20%), fibula flaps ($n = 96$, 12%) and anterolateral thigh flaps ($n = 18$, 2.2%). These types of flaps accounted for 90% of the flaps employed in this study. Flap complications occurred in 134 cases (16.6%), including minor complications (haematoma, wound infection, fistula, seroma) and major complications (venous thrombosis, arterial thrombosis, bleeding and iatrogenic flap loss). 48 flaps failed, yielding a microsurgical failure rate of 5.9%. The main reasons for graft loss were venous thrombosis ($n = 29$, 60.4%), arterial thrombosis ($n = 9$, 18.75%), bleeding ($n = 8$, 16.66%) and iatrogenic flap loss ($n = 3$, 6.25%).

A total of 42 patients died during hospitalization after the microsurgical procedure. Eight patients died during the 30-day post-operative period (Table 1). The post-operative mortality rate for microvascular head and neck reconstruction was estimated to be 1.0% (8 out of 804 patients). 34 mortality cases were noted after 30 days, and the mortality rate was estimated to be 4.2% (34 out of 804). The in-hospital mortality rate (post-operative deaths in-hospital before or after the 30th post-operative day without discharge) was 5.2% (42 out of 804 patients). The occurrences of death ranged from post-operative day 6 to 99 (mean 58). There were 34 males and 8 females. Patient age at the time of microvascular reconstruction ranged from 39 to 75 years, with an average of 58 years. All patients had squamous cell carcinoma and all received secondary free flap reconstruction after cancer resection in the head and neck region. The most commonly involved recipient sites were the floor of the mouth ($n = 25$), tongue ($n = 8$), buccal region ($n = 4$), gingiva ($n = 4$) and lip ($n = 1$). Forty-two free flap transfers were performed: latissimus dorsi flap ($n = 23$), radial forearm flap ($n = 8$), iliac crest flap ($n = 6$), fibula flap ($n = 4$) and TRAM flap (transverse rectus abdominis myocutaneous flap, $n = 1$). One fibula flap and one latissimus flap failed, and a myocutaneous pectoralis major flap was used for salvage reconstruction in both cases. Partial flap necrosis was noted in another latissimus flap. The necrotic part was debrided and skin grafted.

The most common cause of death in our series was cancer-related ($n = 26$, 62%), including local recurrence in 14 cases and distant metastases in 12 cases. The majority of patients who died from the sequelae of distant metastases had multiple metastases or were inoperable as a result of their general condition.

Other aetiologies of death could be attributed to cardiac, hepatic, renal, pulmonary and infectious complications (Table 2). Two out of 42 cases of stage IV disease had a fatal outcome, and all died from lung metastases (patient 8 and 31, Table 1). Logistic regression analysis further showed that tumour stage IV [odds ratio (OR) = 4.039, confidence interval (CI) = 4.45–1.82, $p = 0.045$] and the operation time > 9 h [odds ratio (OR) = 3.894, confidence