



Extending the limits of reconstructive microsurgery in elderly patients



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KEYWORDS

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Summary *Background:* Population aging strongly affects the demographic development of industrialized countries. While microsurgical procedures were initially believed to be only feasible in patients of younger age because of the duration of the surgical procedure and the higher risk of vascular insufficiency due to age-related comorbidities, it has become evident that these procedures are beneficial even for patients at an advanced age.

Methods: We retrospectively investigated microsurgical procedures in a patient cohort ($n = 25$ with 27 free flaps) with a minimum age of 78 years with regard to patients' characteristics, flap survival, and postoperative surgical and medical complications.

Results: Median age was 81 years (IQR 6). Most defects were located in the head and neck region. The mean operation time was 384 min (standard deviation (SD) 131). Flap failure was observed in three cases (11%). The median length of hospital stay was 17 days (interquartile range (IQR) 8). The mean ASA score was 2.48. Patients' age and ASA group did not correlate. The mortality rate was 4%. Postoperative surgical complications were observed in 11 cases (41%), while 19 patients (70%) showed one or more medical complications. Higher ASA classes tended to show more postoperative complications. However, neither age nor operating time nor ASA status showed significant influence on the occurrence of postoperative medical or surgical complications.

Conclusion: There is growing demand for structural and functional restoration using free tissue transfer in an aging population. If there are no alternative treatment options available promising similar structural and functional preservation, free tissue transfer is justifiably in very old patients despite a potentially increased flap failure. As such, free tissue transfer is used as a curative treatment concept aiming at a maximum of patients' independence and early

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ambulation. Occurrence of complications can be diminished by adequate patient selection and thorough perioperative care.

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Introduction

First world's population is an aging society. Increasing life expectancy and declining fertility rates are shifting the age distribution of populations towards older age groups.¹ According to rough estimations, the number of people aged over 65 years is projected to rise by 135% between 2000 and 2050. Strikingly, the population aged over 85 years, which is the group most likely to need health and long-term care services, is estimated to increase by 350% within that period.² Health-care systems have to face the consequences of this demographic change. Thus, the current concepts of medical treatment are to be applied onto a broadened age spectrum, which has become particularly apparent in the field of reconstructive microsurgery.

Since the introduction of free tissue transfer in the early 1970s, emboldening surgical results for covering wound defects and restoring functional units of the human body have been achieved.^{3,4} The gradual improvement of microsurgical instruments and techniques increased surgical experience, and important findings in tissue engineering have currently led to success of >95% of free flap procedures.^{5,6} While microsurgical procedures were initially believed to be only feasible in younger patients due to the long operation time, preexistent comorbidities with reduced organ reserves, micro- and macroangiopathy, and dementia-related decreased compliance of the senile patient, it has become evident during past decades that these procedures are successful even in patients at an advanced age.^{7–10}

Surgical and medical care becomes far more complex in aged patients as they usually have at least one chronic ailment, are frequently malnourished, immunosuppressed, are at a higher risk for cognitive impairment, and may lack adequate social support.¹¹ Individuals aged over 65 years have at least one chronic condition, with 80% having three or more chronic sequelae.¹² The variety of these conditions, their individual severity as well as their cumulative impact may significantly affect intra- and postoperative complications and outcomes. However, few decades ago, major surgery in aged patients was considered a high-risk endeavor, criticism has gradually declined in light of rapid advances in anesthesia, increased surgical expertise reducing operating time and overall surgical trauma, and bettered perioperative care.¹¹ To date, in a geriatric patient selection (defined as ≥ 65 years¹³), elective major surgical procedures have been reported to come along with up to 5% mortality and non-fatal occurrence of complications reaching up to 20%.¹¹ Similar results were observed in previous studies investigating the occurrence of medical and surgical complications in the scope of free tissue transfer in aged patient series.^{7,8,10}

In this retrospective analysis, we set out to investigate the outcome of free tissue transfer for defect reconstruction as well as related complications and influencing factors in a very old patient cohort.

Patients and methods

Approval was obtained from the Ethics Committee of the University of Zurich (KEK-ZH No. 2015-0019). In this retrospective study, 25 patients (27 flaps) aged ≥ 78 years underwent reconstructive microsurgery at our institution between 2010 and 2014. There were no special exclusion criteria; however, a complete preoperative dataset for every patient to be included was mandatory. Concerned medical files were reviewed for patients' characteristics, procedure-specific details, flap survival, and postoperative surgical and medical complications. Taking into account the possible influence of preoperative medical conditions on postoperative outcomes, the preoperative medical status of each patient was assessed and classified according to the American Society of Anesthesiologists (ASA) Classification of Physical Status.¹⁴ The anesthesiologist in charge determined this score for every patient preoperatively in our study. Potential influence of age, operation time, and ASA classification on outcomes such as flap survival, mortality, and medical and surgical complications was investigated. Complications were defined as adverse events arising either as a direct result of the operation or from independent causes in the postoperative course. Medical and surgical complications were further subdivided into major and minor categories according to their severity. Major surgical complications were defined as those necessitating a second operative procedure (e.g., flap failure, severe hematoma), while the minor category comprised less severe complications with conservative management. Referring to previous studies, major medical complications – in juxtaposition to "minor" medical complications – were defined as those complications posing a significant risk to a patient's life.^{7,15} Multiple coexisting complications were possible.

Data were analyzed using Statistical Package for Social Sciences (SPSS, Version 20 for Macintosh, Chicago, IL). Discrete values are expressed as counts (percentages). Continuous variables are presented as means with standard deviations (SD) when following Gaussian distribution. For skewed data, medians with interquartile ranges (IQRs) are used. In order to test for differences between groups (categorical data), Fisher's exact test for small sample sizes was performed. Binary logistic regression model with odds ratios (ORs) was applied to investigate influencing variables (age and operating time) on the outcome (flap survival and complications). Nonparametric Spearman's rank correlation ρ (rho) was used to test for association between age

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