Complications of Microvascular Head and Neck Surgery in the Elderly

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Objectives: To evaluate the complications of head and neck reconstruction using microvascular free tissue transfers (MFTTs) performed in an elderly population and to determine whether these complications are more common than in a younger population.

Setting: Tertiary referral center.

Patients and Design: Retrospective, consecutive chart review of patients older than 70 years who underwent MFTT in the past 5 years (group 1). The complications in this population were compared with those in a second group (group 2) of consecutive patients younger than 70 years who were matched according to the site of the primary tumor.

Main Outcome Measures: Surgical and medical complications.

Results: The median age for group 1 was 74 years and for group 2, 55 years. The overall complication rate for group 1 was 48%, compared with 57% for group 2. In group 1, surgical morbidity was less common and medical morbidity was more common than in group 2. Mortality rate was 6% for group 1 and 0% for group 2. The types of complications were similar for both groups. There was no difference in complication rates when complications were classified by site of the defect, patient status determined by American Society of Anesthesiologists classification, or use of preoperative radiation. The overall success rate of MFTT was 100% for group 1 and 94% for group 2.

Conclusions: Microvascular free tissue transfers for head and neck reconstruction can be safely performed in the elderly. An age older than 70 years does not increase the rate of surgical complications following head and neck reconstruction with MFTT. Medical complications, however, are more common and are equally divided between bronchopulmonary and cardiovascular effects.


THE MORE widespread application of microvascular free tissue transfer (MFTT) during the past 20 years has revolutionized head and neck reconstruction. While the safety and success of MFTT has been well documented in the general population, the utility of MFTT in the elderly has received little attention. The surgeon faced with an elderly patient with advanced head and neck cancer must weigh the risks and benefits of operating on this sometimes frail population. While perioperative mortality after head and neck surgery in the elderly is substantially less than after cardiovascular or gastrointestinal tract surgery, other issues warrant consideration if a lengthy reconstruction is planned. Can the elderly patient tolerate the medical insult of prolonged surgery? Are the surgical complications higher? Should major surgical reconstruction even be considered in this older population? Of course, these issues must be balanced against the presumed functional and aesthetic benefits that are gained by microvascular surgery.

The purpose of this study was to examine the complications of free tissue transfers in elderly patients with advanced head and neck cancer, and to compare overall complication rates with a control group of younger patients who underwent MFTT. In this study, the chronologic age of 70 years was arbitrarily selected to represent elderly patients. This study is unique in that results are not only compared with those of a control group of younger patients, but the results are also statistically analyzed according to several variables, including American Society of Anesthesiologists (ASA) classification, site of primary tumor involvement, and use of preoperative radiation therapy.
PATIENTS AND METHODS

Between July 1992 and April 1997, charts of all patients older than 70 years who underwent reconstruction with MFTT were retrospectively reviewed (group 1, n=52) and served as the study population. The control population (group 2, n=35) was obtained by reviewing the charts of patients younger than 70 years who underwent MFTT. This consecutive, retrospective process was undertaken for group 2 until the sites of the primary tumor were similar between groups 1 and 2 (January 1996-April 1997). Age, diagnosis, site of defect, ASA classification, TNM stage, type of reconstruction, and the use of preoperative radiation therapy were examined in all patients.

Fifty-two patients underwent 54 operations with 56 MFTTs in group 1. The age range was 70 to 82 years (mean age, 74 years; median age, 74 years). Thirty-five patients underwent 35 operations with 36 MFTTs in group 2. The age range was 3 to 69 years (mean age, 52 years; median age, 55 years).

Characteristics of groups 1 and 2 are depicted in Table 1. The oral cavity was the most frequent site of reconstruction in both groups, and most patients were preoperatively classified based on comorbidities as ASA II or III. In both groups, the majority of patients underwent surgery for stage III or IV disease. In both groups, the most frequent diagnosis was squamous cell carcinoma and the most frequent MFTT performed was the radial forearm flap. Preoperative radiation was used in 22 (41%) of 54 operations in group 1 and in 14 (40%) of 35 operations in group 2.

Complications that occurred within 30 days of surgery were divided into surgical or medical complications. They were further divided into major or minor complications as follows: major surgical complications were defined as requiring a return to the operating room for correction, whereas major medical complications were considered life-threatening, requiring immediate medical intervention. Complication rates were compared between group 1 and group 2.

For each group, complications were examined according to site of the defect, ASA classification, use of preoperative radiation therapy, and type of reconstruction; complications were then compared between groups. Statistical analysis was performed using the Mantel-Haenszel χ² test.

Table 1. Patient Characteristics*

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Group 1 (&gt;70 y)</th>
<th>Group 2 (&lt;70 y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site of defect, %</td>
<td>42 43</td>
<td>Oral cavity</td>
</tr>
<tr>
<td>Oropharynx</td>
<td>25 17</td>
<td>Hyopharynx</td>
</tr>
<tr>
<td>Hypopharynx</td>
<td>22 20</td>
<td>Midface</td>
</tr>
<tr>
<td>Skull base</td>
<td>2 3</td>
<td>ASA classification</td>
</tr>
<tr>
<td>I</td>
<td>4 5</td>
<td>II</td>
</tr>
<tr>
<td>II</td>
<td>24 14</td>
<td>III</td>
</tr>
<tr>
<td>III</td>
<td>22 13</td>
<td>IV</td>
</tr>
<tr>
<td>IV</td>
<td>4 3</td>
<td>0 0</td>
</tr>
<tr>
<td>0 0</td>
<td>1 2</td>
<td>0 1</td>
</tr>
<tr>
<td>0 1</td>
<td>0 1</td>
<td>0 1</td>
</tr>
<tr>
<td>Diagnoses</td>
<td>47 22</td>
<td>Squamous cell carcinoma</td>
</tr>
<tr>
<td>Adenoid cystic carcinoma</td>
<td>1 3</td>
<td>Clear cell odontogenic carcinoma</td>
</tr>
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<td>Basal cell carcinoma</td>
<td>1 0</td>
<td>Secondary reconstruction</td>
</tr>
<tr>
<td>Osteoradionecrosis</td>
<td>0 4</td>
<td>Ameloblastoma</td>
</tr>
<tr>
<td>Sialoblastoma</td>
<td>0 1</td>
<td>Sialoblastoma</td>
</tr>
<tr>
<td>Meningioma</td>
<td>0 1</td>
<td>Method of reconstruction</td>
</tr>
<tr>
<td>Radial forearm</td>
<td>28 10</td>
<td>Fibula</td>
</tr>
<tr>
<td>Fibula</td>
<td>9 6</td>
<td>Iliac crest</td>
</tr>
<tr>
<td>Scapula</td>
<td>4 7</td>
<td>Lateral thigh</td>
</tr>
<tr>
<td>Lateral arm</td>
<td>3 5</td>
<td>Rectus abdominis</td>
</tr>
<tr>
<td>Rectus abdominis</td>
<td>2 4</td>
<td>Gastro-omental</td>
</tr>
<tr>
<td>Gastro-omental</td>
<td>1 0</td>
<td>1 0</td>
</tr>
</tbody>
</table>

*All data are presented as the number of patients with the exception of site of defect. ASA indicates American Society of Anesthesiologists.

SUCCESS OF MFTTs

Three flaps (6%) in group 1 developed complications resulting from venous congestion on postoperative day 1. The patients were immediately returned to the operating room for exploration. Two patients had problems with vessel geometry (redundant pedicle or twisted pedicle) and 1 patient had a venous thrombus that was successfully removed. All flaps were successfully salvaged. The overall success rate of MFTT in group 1 was 100%.

Three MFTTs in group 2 also developed complications. Two patients developed arterial insufficiency caused by thrombosis and 1 patient developed venous congestion from a thrombosis. The 2 flaps with arterial insufficiency were completely lost and the flap with venous congestion was salvaged. The overall success rate of MFTT in group 2 was 94%, which was not significantly different from group 1 (P=.47).

MORTALITY

Perioperative mortality included 3 patients in group 1 and none in group 2. One patient died suddenly on postoperative day 5 following a scapula osteocutaneous free flap reconstruction of a through-and-through oral cavity resection. The patient had normal electrocardio-
gram readings before the operation and an ejection fraction of 75%. The family refused to allow a postmortem examination, but the cause of death was attributed to pulmonary embolism. The second patient underwent a partial glossectomy that was reconstructed with a radial forearm free flap. The patient developed mediastinitis that resulted from an esophageal perforation that occurred during rigid esophagoscopy in the postoperative period. The third patient underwent radial forearm free flap reconstruction of a lower lip and buccal mucosa defect, and died of massive bilateral aspiration pneumonia that failed to respond to prolonged intravenous antibiotic therapy.

STATISTICAL ANALYSIS OF COMPLICATIONS

For the purpose of statistical analysis, any patient who underwent 2 separate reconstructions was considered only once to make the analysis more uniform. The small number of patients within the subgroups of midface and skull base reconstruction required that these subgroups be considered as one region of reconstruction.

Within each group, there was no significant difference in overall complications whether the reconstruction was limited to soft tissue or included bone (group 1, P=.38; group 2, P=.36), the site of primary tumor involved the hypopharynx, oral cavity, oropharynx, or skull base and midface (group 1, P=.47; group 2, P=.47), or radiation was given following the operation (group 1, P=.57; group 2, P=.13).

There was no significant difference in the incidence of overall complications between groups 1 and 2 (P=.47). When stratified according to the site of the primary tumor (hypopharynx, oropharynx, oral cavity, and skull base and/or midface), there was no significant difference in complications between groups 1 and 2 when the variables included ASA classification, use of preoperative radiation therapy, and age. Multivariate analysis using a logistic regression model demonstrated that age did not significantly increase the incidence of overall complications (P=.52). In fact, of all variables considered (age, ASA classification, site of primary tumor, and bone or soft tissue reconstruction), the only variable that approached statistical significance (P=.08) for developing complications was an ASA classification of 3 or 4.

The fastest growing segment of the population is older than 75 years. With advanced age comes an increased incidence of malignant neoplasms, as well as an increased incidence of multisystem disease. When determining whether surgery should be part of a therapeutic protocol for an elderly patient with head and neck cancer, the surgeon must consider the risks and benefits of operating, including anesthetic risks, surgical and medical complications, and average life expectancy of this population. Surgical mortality has dramatically decreased since the 1950s when the dictum was to avoid operating on the elderly until all nonsurgical modalities were exhausted. Today, the overall surgical mortality...
is about 0.9% to 2.4% even in patients with cardiac disease, largely as a result of safer anesthetic techniques. In addition, there has been an increase to the benefit side of the equation. The average life expectancy of a 70-year-old man is 11 years and of a 70-year-old woman, 14 years.

If surgery is chosen as part of the therapy, when should palliative therapy be selected over an oncologic resection? In 1977, McGuirt et al addressed this dilemma, stating that

Being conservative in elderly patients with head and neck cancer is too often the most radical course possible. Many patients outline a less than curative procedure, only to develop a recurrence when the risk of surgery is greater.

How safe is major reconstructive surgery in the elderly? Although many recent studies have documented that complications of head and neck surgery in the elderly are no more common than in the younger population, few studies have addressed a patient population undergoing reconstruction with an MFTT. Considering that the adaptive abilities of older patients are less than in younger patients, elderly patients may have the most to gain from a more accurate restoration of aerodigestive tract anatomy using MFTT.

This analysis suggests that an age older than 70 years is not associated with an increased rate of surgical complications following microvascular reconstruction of the head and neck when compared with a younger population with similar defects. Most surgical complications in the elderly could be managed without a second operation and consist of wound healing problems in the neck. Donor site problems, such as wound dehiscence or infection, were unusual, as suggested by the lack of significant difference in complications between soft tissue or bone reconstructions. Major surgical complications were most often problems relating to the MFTT that, because successfully treated, resulted in an overall success rate of free tissue transfer of 100%.

Our results are similar to those of other published series. Shestak and colleagues reviewed 19 patients who underwent MFTT for head and neck reconstruction and found a 16% major surgical complication rate in the elderly, compared with a 13% major complication rate for those younger than 70 years. Although there was no attempt to classify complication rate according to the site of primary tumor or type of reconstruction, the authors conclude that the risk of medical complications is directly related to concurrent illness of the individual rather than to the age alone.

Bridger et al found no statistically significant difference in postoperative surgical complication rates between patients older or younger than 70 years. The authors found an overall surgical complication rate for the older population of 42%, compared with the complication rate in the younger population of 37%. The authors similarly conclude that age alone should not exclude a patient from head and neck MFTT reconstruction.

To determine whether complications in the elderly occurred at different reconstructive sites, according to different ASA classifications, if preoperative radiation therapy was given, or if a particular free flap was used, complications in the present study were analyzed according to these categories. The only variable found to be associated with an increased rate of complications was increasing ASA classification, although this was not statistically significant (P=0.08). In both age groups, hypopharyngeal reconstruction was more commonly associated with surgical complications compared with other sites of reconstruction, preoperative radiation therapy was associated with surgical complications in a similar percentage of cases, and the frequency of surgical complications was similar for each type of MFTT reconstruction.

An encouraging finding was that the overall success rate of MFTT in the elderly was 100%. Although 3 patients required a return to the operating room for venous congestion of the MFTT, all flaps were salvaged. All 3 patients had undergone reconstruction of a hypopharyngeal defect with a tubed fasciocutaneous flap. Ischemic injuries of a donor site did not occur.

Similar to other recent reports, the medical morbidity rate was higher in the elderly population, with most complications consisting of bronchopulmonary conditions. Chick and colleagues found that medically related complications occurred in 35% of the elderly population, compared with 10% in a younger population. In 2 separate studies, McGuirt and associates found that postoperative pulmonary and cardiovascular complications increased with age. Aging is associated with a decreased vital capacity and increased alveolar-arterial oxygen gradient, which may contribute to the increased pulmonary complications in this age group.

Operative mortality occurred in 6% of the elderly population in our study, compared with 0% in the younger group. Of note, the flaps in these patients were considered nonevaluable and not flap failures. Bronchopulmonary events were responsible for 2 of 3 deaths, whereas mediastinitis resulting from an esophageal dehiscence was responsible for the third death. Perioperative mortality was noted by Morgan et al to be significantly increased with age, but most series report a rate of 3% to 6% in elderly patients undergoing head and neck reconstruction.

The major limitation of this study is similar to any retrospective study of head and neck cancer. To stratify all variables that may possibly affect the outcome, a multi-institutional study with significantly more patients must be examined. Many additional variables must be considered, including nutritional status, smoking history, and comorbid illnesses.

In conclusion, MFTTs can be safely performed in the elderly. Surgical morbidity does not appear to be increased in elderly patients undergoing head and neck reconstructive surgery using MFTTs, compared with results in a younger control group. In our series, the mortality and medical morbidity rates were increased in the elderly and were largely caused by bronchopulmonary and cardiovascular events.
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REFERENCES