A Preoperative Risk-Stratification Model for Medical and Surgical Complications in Complex Head and Neck Microvascular Reconstruction

Patrick Gerety, MD., Marten N. Basta, BA., Megan Fracol, BA., John P. Fischer, MD., Joseph M. Serletti, MD., Suhail Kanchwala, MD., David W. Low, MD., Liza C. Wu, MD.

Background

Free tissue transfer has become the standard of care for reconstructing head/neck defects. Medical and flap complications have been associated with tremendous hospital costs in these patients, and a better understanding of predisposing factors is essential to improve cost-efficacy and patient satisfaction. This project aims to create the first preoperative risk-stratification tool in head/neck reconstruction based upon our free flap experience.

Methods

An institutional retrospective chart review identified all free flap head/neck reconstructions performed from 2005-2013. Demographic information and operative characteristics were collected as preoperative risk factors. Intra/post-operative complications and total hospital cost for were detailed. Primary outcomes were flap complication (anastomotic revision, arterial/venous flap thrombosis, or partial/full flap loss) and medical complication (heart failure, MI, acute renal failure, VTE, pneumonia, respiratory failure, septicemia, or stroke). Preoperative factors were analyzed via step-wise multivariate logistic regression, with significant variables entered into a bootstrap model. Final adjusted beta-coefficients were utilized to generate weighted risk scores for each variable. Each patient was assigned an aggregate risk score for each complication, yielding the risk-assessment tool.

Results

438 free flap head/neck reconstructions were included. Medical complication incidence=15.8% and significant predictors included BMI$\geq$35 (OR=3.09), cardiovascular comorbidity (OR=2.72), floor-of-mouth defect (OR=3.03), fibula flap (OR=2.62), and prolonged operative time (OR=6.31). Patients were risk-stratified into 3 groups: low (complication=6.8%), moderate (complication=36.5%), and high (complication=57%)(Table 1). Flap complication incidence=13%, with predictors including anemia (OR=3.05), radiation (OR=3.95), and fibula flap (OR=3.80). Patients were risk-stratified into 3 groups: low (complication=3%), moderate (complication=19%), and high (complication=46.7%). Patients at intermediate/high risk of medical or flap complications had significantly longer length of stay and more reoperations. Total hospital costs for patients at high-risk for medical complications were $80,368 (vs. $37,606 for low-risk patients), while patients at high-risk for flap complications had total costs=$81,890 (vs. $36,188 for low-risk patients)(Figure 1). The risk models demonstrated high discrimination for complication risks with C-statistic=0.78 (medical) and C-statistic=0.77 (flap).

Conclusion

This study identifies important independent preoperative risk factors for medical and flap complications in head/neck microsurgical reconstruction with high accuracy. Importantly, the model stratifies patients according to risk, demonstrating that high-risk groups suffer significantly more morbidity and incur substantially higher costs. As the first such model in head and neck microvascular reconstruction, it can serve as a simple yet accurate tool for perioperative decision-making.

Disclosure/Financial Support

None of the authors have any financial disclosures or conflicts of interest.