Identification of Independent Risk Factors for Complications: A Retrospective Analysis of 163 Fibular Free Flaps for Mandibulofacial Reconstruction

Haixuan Wu, MD, * *Funing Liu, MD, PhD,* † *Fengtao Ji, MD, PhD,* ‡ *Mingyan Guo, MD, PhD,* § *Youyuan Wang, MD, PhD,* ‖ *and Minghui Cao, MD, PhD* ¶

Purpose: Fibular free flap transfer is a powerful tool available to the reconstructive surgeon when treating oral and maxillofacial defects, but complications still occasionally occur and predictive analysis focusing on this specific flap is limited in terms of risk factors for complication. The purpose of this study was to identify key variables associated with complications in patients undergoing fibular free flap transfer.

Patients and Methods: The data of 163 consecutive patients who underwent fibular free flap surgery at the Department of Oral and Maxillofacial Surgery, Sun Yat-Sen Memorial Hospital of Sun Yat-Sen University, between 2012 and 2015 were reviewed retrospectively. Patient demographic data, laboratory data, surgical data, and fluid infusion–related data that may have an influence on free flap outcomes were recorded. Univariate and multivariate logistic regression analyses were used to identify relevant risk factors.

Results: A total of 163 fibular free flaps were transferred for mandibulofacial reconstruction in 163 patients with a mean age of 50.9 years. Postoperative complications developed in 33 (20.2%). Multivariate analysis showed that free flap complications were significantly associated with radiotherapy history (odds ratio [OR], 5.12; $P = .001$), postoperative anemia (OR, 1.048; $P = .041$), postoperative hypoalbuminemia (OR, 0.844; $P = .002$), and prolonged operative time (OR, 1.005; $P = .004$).

Conclusions: Radiotherapy history, decreased postoperative hemoglobin and albumin levels, and prolonged operative time are potential predictors of postoperative complications after fibular free flap reconstruction for mandibulofacial defects.

J Oral Maxillofac Surg ■*:1-7, 2018*

Received from Sun Yat-Sen Memorial Hospital, Sun Yat-Sen University, Guangzhou, China.

*Resident, Department of Anesthesiology.

†Attending, Department of Anesthesiology.

‡Professor, Department of Anesthesiology.

§Attending, Department of Anesthesiology.

‖Professor, Department of Oral and Maxillofacial Surgery.

¶Department Head, Department of Anesthesiology.

Funing Liu and Haixuan Wu contributed equally to this work.

This work was supported by the National Natural Science Foundation of China (No. 81471352 to M.C.).

Conflict of Interest Disclosures: None of the authors have any relevant financial relationship(s) with a commercial interest.

Address correspondence and reprint requests to Dr Cao: Department of Anesthesiology, Sun Yat-Sen Memorial Hospital, Sun Yat-Sen University, 107 Yanjiang West Road, Guangzhou 510120, Guangdong Province, China; e-mail: caofox5188@163.com

Received September 9 2017

Accepted December 26 2017

0278-2391/18/30003-X

https://doi.org/10.1016/j.joms.2017.12.026

With advancements in reconstructive microsurgery, fibular free flap transfer has become the preferred reconstructive technique at many oncology centers to repair complex defects of the maxilla and mandible. Q3 Although various donor sites are available to provide vascularized bone grafts for reconstruction, including the fibular flap, radius flap, iliac flap, and scapular flap, the fibular free flap has been considered the flap of first choice for the reconstruction of mandibular continuity defects in patients with oral cavity cancer,[1] owing to its potential for contouring, the implant osseointegration, the satisfying pedicle length, and the skin paddle reliability.[2] However, as reported, reconstructions of head and neck sites were significantly associated with higher rates of flap failure compared with other sites such as the breast and extremities.[3] Q4 Although surgical technical issues are dominant factors that contribute to microvascular free flap failure, many nontechnical variables are also contributory. In fact, predictors of complications after reconstruction of mandibular continuity defects with fibular free flaps have been extensively studied. However, most of the research analyzed different types of flaps at the same time, which compromises the specificity and applicability of their outcomes in fibular free flap microsurgery.[4,5] Moreover, perioperative fluid management, which is an important aspect of patient care, has not been adequately explored in fibular flap transfer. There is currently a dearth of guidelines regarding the optimal rate or volume of perioperative fluid infusion, but it has been well shown that fluid therapy plays a role in microsurgical outcomes of head and neck free flap reconstruction, and aggressive fluid delivery has been found to be an independent predictor of complications after free flap reconstruction of the head and neck.[6] However, to our knowledge, there has been no literature assessing fluid management solely in fibular free flap microsurgery. For these reasons, it may be more prudent to explore risk factors for complications in a study that includes only fibular free flaps.

Therefore, we undertook a retrospective study focusing on fibular free flap reconstruction for mandibulofacial defects. We hypothesized that some treatment-related variables such as the intraoperative infusion rate of fluid and operative time could influence the outcome. The specific aim of the study was to estimate the effect of demographic and treatment-related variables on the development of early in-hospital complications.

Patients and Methods

STUDY DESIGN

To address the research purpose, we designed and implemented a retrospective review of fibular free flaps in mandibulofacial reconstruction surgery. The study protocol was approved by the Institutional Review Board (IRB) of Sun-Yat San Memorial Hospital of Sun-Yat San University. Because the work was designed to retrospectively review medical records and was certified by the IRB as low risk, informed consent was not required by the IRB. The medical records Q5 of all consecutive patients who underwent fibular free flap interventions for reconstruction of defects in the mandibulofacial region at Sun Yat-Sen Memorial Hospital (Guangzhou, China) between January 1, 2012, and December 31, 2015, were reviewed.

POTENTIAL PREDICTOR VARIABLES

Potential predictors were selected based on review of the literature[7] and clinical experience. Demographic, surgical, and fluid infusion data were recorded. Demographic variables included age, tobacco use, comorbidities, history of radiotherapy, reasons for flap, and preoperative and postoperative hemoglobin (Hgb) and albumin levels. Active smoking Q6 was determined at the time of diagnosis; hence, patients who ceased smoking after primary referral were counted as active. Regarding comorbidities, heart disease, hypertension, and diabetes were investigated because they could have altered the condition of the peripheral blood vessels.[8] Surgical variables included intraoperative blood loss, intraoperative blood transfusions, and duration of surgery. A blood transfusion was indicated when the Hgb level was lower than 7 g/dL or the hematocrit (Hct) level was lower than 25% in patients with uncompromised function (cardiac or pulmonary). In hemodynamically Q7 stressed patients, a blood transfusion was recommended when the Hct level was lower than 25% for patients younger than 60 years or when the Hct level was lower than 30% for patients older than 60 years.[9] Fluid variables included the intraoperative intravenous crystalloid and colloid infusion rate and the intravenous crystalloid and colloid infusion rate in the first 24 hours postoperatively, both of which were standardized to the patient's body weight (in milliliters per kilogram per hour). The intraoperative fluid infusion was determined at the discretion of the anesthesiologists on the basis of intra-arterial blood pressure monitoring, the stroke volume variation, and the patient's urine output. The rate of postoperative fluid infusion was titrated by the surgical team, taking the patient's heart rate, blood pressure, and urine output into account.

OUTCOME MEASURES

The primary outcome was postoperative in-hospital complications defined as any adverse event requiring intervention or affecting length of stay. We