



Original Contribution

Incidence, outcome, and risk factors for postoperative pulmonary complications in head and neck cancer surgery patients with free flap reconstructions^{☆,☆☆}



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Received 26 November 2014; revised 8 March 2015; accepted 13 August 2015

Keywords:

ARDS;
Post-operative complications;
Pneumonia;
Risk factors;
Pulmonary edema

Abstract

Study Objective: Postoperative pulmonary complications (PPCs) are significant problems in patients undergoing radical head and neck cancer surgery with free flap reconstruction. The objective of the study was to identify the incidence, outcome, and risk factors for PPCs. We hypothesized that preoperative pulmonary disease and amount of fluid administered during the surgery would be associated with PPCs.

Design: A retrospective clinical observational study.

Setting: A large academic institution.

Subjects: A total of 110 patients who underwent head and neck cancer surgery with microvascular free flap reconstruction between January 1, 2005 and December 31, 2011.

Interventions: No study interventions were performed.

Measurements: PPCs including pulmonary edema, pneumonia, and acute respiratory distress syndrome were clinically diagnosed. Perioperative parameters and outcomes among patients with and without PPCs were compared. Factors predictive of PPCs were identified with univariate and multiple logistic regression analyses.

Main Results: The incidence of PPCs was 32.7% (36 patients): pulmonary edema in 23.6% (26) and pneumonia in 9.1% (10). No acute respiratory distress syndrome was found. In-hospital mortality was 1.8% (2).

[☆] Funding support: The authors report no external funding source for this study.

^{☆☆} Competing interests: The authors declare that they do not have any conflicts of interest.

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No difference was found in survival between the patients with PPCs and those without (1 year survival was 69.4% vs 78.4%; $P = .85$). The patients with PPCs required longer ventilation support (median, 4 vs 2 days; $P = .002$) and more frequent intensive care unit readmissions (30.3% vs 5.7%; $P = .001$) and stayed longer in the hospital (median, 17 vs 12 days; $P = .014$). None of the preoperative parameters or intraoperative parameters including pulmonary comorbidity or the amounts of intraoperative fluid/blood administration was found as the factor to predict postoperative pulmonary complications.

Conclusion: The incidence of PPCs in patients undergoing radical head and neck surgery was 32.7% in 110 patients. Preoperative pulmonary disease or the amount of fluid administered during the surgery was not associated with PPCs.

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1. Introduction

Postoperative pulmonary complications (PPCs) present a constant clinical challenge to physicians. Unlike chest and abdominal surgeries, head and neck surgeries do not invade the pleural space or transgress accessory respiratory muscles; nonetheless, pulmonary complications can occur after radical head and neck cancer resection, with reported incidences ranging from 11% to 44.8% [1-5]. Radical head and neck cancer resection with microvascular free tissue transfer especially is one of the most extensive forms of head and neck cancer surgery. This type of surgery is particularly challenging for anesthesiologists, as there are 2 distinctive phases in a long surgical procedure, namely, the resection phase and the reconstruction phase. Especially during the reconstruction phase, because of microvascular surgeons' belief against the use of vasopressors during free flap surgery [6] despite several retrospective studies to demonstrate the safe use of vasopressors [7-9], anesthesiologists may have a tendency to administer a large amount of intravenous fluid or blood products to maintain systemic blood pressure. In this type of procedure, the reported incidence of overall PPCs is 44.8% [5], and the reported incidence of postoperative acute respiratory distress syndrome (ARDS) is 1.9% with a mortality of 50% [10]. The propensity of these patients toward having histories of heavy smoking; increased age; and other comorbidities including chronic obstructive pulmonary disease (COPD) [1], hypertension, and coronary artery disease may increase the incidence of PPCs and worsen their sequelae.

Several studies were performed to analyze the incidence and outcome of PPCs with radical head and neck cancer resection with microvascular free tissue transfer [3,5]. However, comprehensive risk factor analyses to predict PPCs were scarcely performed, especially taking into account of intraoperative indices including fluid administrations.

The aims of this study were to describe the incidence and outcome of PPCs in the current surgical practice of head and neck cancer resection with microvascular free flap and to elucidate risk factors to predict development of PPCs in this patient population. We hypothesized that preoperative pulmonary disease and amount of fluid administered during the surgery would be associated with PPCs.

2. Materials and methods

The study was approved by our local institutional review board (IRB no. PRO11070497; approved on August 21, 2011).

2.1. Study population

The clinical data of adult (age >18 years) patients who underwent head and neck cancer surgeries with free flap reconstruction at a single institution during a 6-year period between January 1, 2005, and December 31, 2011, were reviewed and analyzed in a retrospective fashion.

2.2. Surgical technique

All patients were treated using ablative techniques with the intent of achieving complete tumor resection. Patients were all deemed operable before surgical resection was attempted. A standard open surgical technique was used to extirpate tumors in this patient cohort. This often included the performance of a selective or modified nodal dissection, as determined by the extent of nodal disease. After establishing surgical margin status, reconstruction commenced. Briefly, the defects were reconstructed with the appropriate microvascular flap or pedicled pectoralis major flap. The flap was harvested from the donor site by the microvascular reconstruction service. The flap was then inset into the wound, and the operation was subsequently terminated. Tracheotomies were performed to secure the airways of patients who did not undergo a laryngectomy.

2.3. Anesthetic and postoperative management

All patients were placed under general anesthesia with a halogenate agent and continuous infusion of propofol with narcotics. Airways were secured with orotracheal intubation after induction of general anesthesia. If a difficult intubation was anticipated due to laryngeal pathologies, an awake intubation or awake tracheostomy was performed under local anesthesia at the beginning of the surgery. Muscle relaxation was not continued due to the accessory nerve monitoring during neck dissection. A radial arterial line was placed in each patient, and the arterial pressure was continuously

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