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ORIGINAL ARTICLE

Preadmission tracheostomy is associated with better outcomes in patients with prolonged mechanical ventilation in the postintensive care respiratory care setting

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KEYWORDS

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Background: Prolonged mechanical ventilation (PMV) is the most common situation where tracheostomy is indicated for intensive care unit (ICU) patients. However, it is unknown if this procedure confers survival benefits on PMV patients in a post-ICU setting.

Methods: Patients who were admitted to the specialized weaning unit from 2005 to 2008 and received PMV were included in this study. On admission, data pertaining to patient characteristics, physiologic status, and type of artificial airway (tracheostomy vs. no tracheostomy) were obtained. Outcomes of tracheostomized and nontracheostomized patients were evaluated using multivariate Cox proportional hazards and propensity score-matching models. The primary outcome of interest was 1-year survival.

Results: A total of 401 patients (mean age 74.4 years, 204 male) were identified. In multivariate analyses, higher Acute Physiology and Chronic Health Evaluation II score [hazard ratio (HR) = 1.061, 95% confidence interval (CI) = 1.016–1.107] and presence of comorbidities, including congestive heart failure (HR = 1.562, 95% CI = 1.119–2.181), malignancy (HR = 1.942, 95% CI = 1.306–2.885), and liver cirrhosis (HR = 2.373, 95% CI = 1.015–5.544), were independently associated with 1-year mortality. An association between having

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tracheostomy and a better 1-year outcome was observed (HR = 0.625, 95% CI = 0.453–0.863). The matched cohort study also demonstrated a favorable 1-year survival for tracheostomized patients, and these patients had significantly lower in-hospital mortality (24% vs. 36%, $p = 0.049$) and risk of ventilator-associated pneumonia (10% vs. 20%, $p = 0.030$) than nontracheostomized ones.

Conclusion: Preadmission tracheostomy may be associated with better outcomes of PMV patients in a post-ICU respiratory care setting. The findings suggest that this procedure should be recommended before PMV patients are transferred to specialized weaning units.

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Introduction

Tracheostomy is one of the most commonly performed surgical procedures in the intensive care unit (ICU), and anticipated prolonged mechanical ventilation (PMV) is probably the most common reason for patients to undergo tracheostomy.¹ Although the evidence-based guidelines recommend that tracheostomy be considered after an initial period of stabilization on the ventilator when it becomes apparent that the patient will require prolonged ventilator assistance,² the optimal timing for tracheostomy remains a subject of debate and continued investigation.

Most studies assessing the impacts of early (generally ≤ 10 days of mechanical ventilation) versus late (generally > 10 days of mechanical ventilation) tracheostomy on clinical outcomes were conducted in the ICU, and recent reviews and meta-analyses concluded that there is no strong evidence for real differences between early and late tracheostomy in the outcome of mortality.^{3–5} Two recent large-scale randomized trials also showed consistent findings that early tracheostomy is not associated with improved survival.^{6,7} Moreover, the trials found that a significant proportion of patients experience adverse events related to tracheostomy procedures,⁷ and the ability of physicians to predict which patients require extended ventilatory support is limited.⁶

Advances and improvements in treating critically ill patients have resulted in more patients requiring PMV, which is associated with increased healthcare expenditure and workload of healthcare providers.⁸ This specific patient population has clearly different needs and resource utilization patterns when compared with ICU patients, and specialized venues and management strategies are required. The majority of PMV patients have the tracheostomy procedure performed in the ICU to facilitate comfort, communication, and transfer to the post-ICU respiratory care facility,⁸ and a recent study suggested that tracheostomy may increase the likelihood of in-hospital survival in PMV patients.⁹ However, it remains uncertain whether tracheostomy improves longer-term clinical outcomes for these patients.

Thus, we conducted this study to assess the impact of tracheostomy performed prior to transfer to the specialized weaning unit on the long-term outcome of PMV patients. The primary outcome of interest was 1-year survival.

Methods

Setting

National Taiwan University Hospital, Yun-Lin Branch, is a university-affiliated teaching hospital containing 51 ICU beds and a 12-bed specialized weaning unit. The specialized unit was established based on the regulations of the Taiwan National Health Insurance Bureau as an intermediate respiratory care unit to accommodate patients with high probability of PMV. Patients were eligible for admission if they fulfilled the requirements as follows: stable hemodynamic status, no use of vasoactive medications, low oxygen requirements (fraction of inspired oxygen concentration [FiO_2] of $\leq 40\%$), no active hepatic or renal failure and no requirements for surgical intervention, or if the primary physician regarded it beneficial for the patient to be taken care of at the specialized weaning unit. If the patients could not be weaned from mechanical ventilation within 6 weeks of stay at this unit, they had to be transferred to an extended respiratory care facility. This study was approved by the Research Ethics Committee of the National Taiwan University Hospital and the need for informed consent was waived.

Study population

All patients admitted to the specialized weaning unit from January 2005 to December 2008 were identified from a respiratory care database. Patients were included if they had been placed on mechanical ventilation for ≥ 21 days at the time of admission. Patients who had undergone tracheostomy prior to the episode of respiratory failure were excluded from this study. When the patients had two or more admissions, only the first one was selected for inclusion.

Data collection

The clinical information of the patients was obtained from the respiratory care database and medical records. The following data were retrieved on admission to the specialized weaning unit: demographics (age, sex, residency prior to hospitalization), body mass index, consciousness level [modified Glasgow Coma Scale score], comorbidities, type

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