Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.JournalofSurgicalResearch.com

Association for Academic Surgery

Optimal timing of tracheostomy after trauma without associated head injury

Jeffrey E. Keenan, MD,[a] Brian C. Gulack, MD,[a] Daniel P. Nussbaum, MD,[a] Cindy L. Green, PhD,[b] Steven N. Vaslef, MD, PhD,[a] Mark L. Shapiro, MD,[a] and John E. Scarborough, MD[a,*]

[a] Department of Surgery, Duke University Medical Center, Durham, North Carolina
[b] Department of Biostatistics & Bioinformatics, Duke University School of Medicine, Durham, North Carolina

ARTICLE INFO

Article history:
Received 9 December 2014
Received in revised form
19 March 2015
Accepted 25 March 2015
Available online 31 March 2015

Keywords:
Trauma
Tracheostomy
Timing
Respiratory failure
National Trauma Data Bank

ABSTRACT

Background: Controversy exists over optimal timing of tracheostomy in patients with respiratory failure after blunt trauma. The study aimed to determine whether the timing of tracheostomy affects mortality in this population.

Methods: The 2008–2011 National Trauma Data Bank was queried to identify blunt trauma patients without concomitant head injury who required tracheostomy for respiratory failure between hospital days 4 and 21. Restricted cubic spline analysis was performed to evaluate the relationship between tracheostomy timing and the odds of inhospital mortality. The cohort was stratified based on this analysis. Unadjusted characteristics and outcomes were compared. Multivariable logistic regression was used to evaluate the effect of tracheostomy timing on mortality after adjustment for age, gender, race, payor status, level of trauma center, injury severity score, presentation Glasgow coma scale, and thoracic and abdominal abbreviated injury score.

Results: There were 9662 patients included in the study. Restricted cubic spline analysis demonstrated a nonlinear relationship between timing of tracheostomy and mortality, with higher odds of mortality occurring with tracheostomy placement within 10 d of admission compared with later time points. The cohort was therefore stratified into early and delayed tracheostomy groups relative to this time point. The resulting groups contained 5402 (55.9%) and 4260 (44.1%) patients, respectively. After multivariable adjustment, the delayed tracheostomy group continued to have significantly reduced odds of mortality (Adjusted odds ratio, 0.82, 95% confidence interval, 0.71–0.95, C-statistic, 0.700).

Conclusions: Among non–head injured blunt trauma patients with prolonged respiratory failure, tracheostomy placement within 10 d of admission may result in increased mortality compared with later time points.

© 2015 Elsevier Inc. All rights reserved.

This work was presented at the Clinical/Outcomes Research Plenary Session at the 10th Annual Academic Surgical Congress, February 3, 2015, Las Vegas, Nevada.

* *Corresponding author.* Department of Surgery, Duke University Medical Center, 1557 Duke South, Durham, NC 27710. Tel.: +1 919 684 3636; fax: +1 919 684 4392.

E-mail address: john.scarborough@dm.duke.edu (J.E. Scarborough).

0022-4804/$ – see front matter © 2015 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.jss.2015.03.072

1. Introduction

A tracheostomy offers several potential advantages over a translaryngeal airway in patients who suffer blunt trauma and subsequently require prolonged mechanical ventilation for respiratory failure. These benefits include increased patient comfort and mobility, lower airway circuit pressures, improved pulmonary hygiene, and enhanced ability to comply with aggressive ventilator weaning protocols [1]. When considering whether to proceed with tracheostomy placement, however, a clinician must balance these putative benefits with the potential risks of the procedure [2–4] as well as the possibility that timely liberation from mechanical ventilation may be accomplished in the absence of a tracheostomy.

Previous studies that have examined the impact of tracheostomy timing on subsequent patient outcomes are notable for their marked heterogeneity in the patient populations that are included for analysis, the outcome parameters that are assessed, and the definitions that are used to classify tracheostomy placement as being "early" or "delayed" [5–25]. Even if the import of such heterogeneity was assumed to be negligible, two recent meta-analyses have concluded that the weight of available evidence is insufficient to support early (ET) *versus* delayed tracheostomy (DT) placement [26,27]. In one of these studies, an analysis from the Cochrane collaboration, the authors state further that existing evidence comparing ET *versus* DT is of low quality, and further study is needed to better define patient characteristics that may portend better outcomes with either ET or DT [26]. Moreover, two recent well-designed randomized trials failed to demonstrate that ET compared with DT placement decreased the incidence of pneumonia [23] or the rate of mortality [28].

Given the lack of clear benefit with ET versus DT, it is not surprising that there is considerable variation in the timing of this procedure among critically ill trauma patients who develop prolonged respiratory failure [29]. Likely contributing to this variability are disparate opinions among trauma surgeons and institutions regarding the timing of the tracheostomy placement [10,29] as well as the heterogeneous characteristics of trauma patients who require a tracheostomy [29]. For example, trauma patients with significant head or neck injuries often require tracheostomy for prolonged airway maintenance regardless of whether there is concomitant respiratory failure. This may facilitate the decision for tracheostomy placement earlier in the hospital course [30] and may also result in decreased duration of mechanical ventilation and faster recovery in this subpopulation [14,15]. In contrast, it is more difficult to predict the need for tracheostomy in trauma patients with prolonged respiratory failure without significant head or neck injuries. Moreover, only a few small single-center studies have evaluated the benefit of ET versus DT placement in this patient group [8,18]. Therefore, in this study, we chose to specifically evaluate patients without significant head or neck injuries under the hypothesis that timing of the tracheostomy placement would affect mortality in this patient group. To address this hypothesis, we conducted an analysis of the National Trauma Data Bank (NTDB), a national data source, which has been commissioned by the American College of Surgeons (ACS) committee on trauma to serve as the principle repository for trauma center registry data from the United States and Canada [31].

2. Methods

2.1. *Patient population*

This retrospective cohort study was deemed to be exempt from approval by the Duke University Medical Center Institutional Review Board. Deidentified NTDB data sets from 2008–2011 were used to define a cohort of adult blunt trauma patients who were admitted to either the intensive care unit (ICU) or operating room from the emergency department and who underwent a tracheostomy placement (defined by International Classification of Diseases-9 codes: 31.2, 31.29, and 31.1) within 21 d of their injury. In an attempt to confine our analysis to patients without concomitant head or neck injuries who required tracheostomy for prolonged respiratory failure rather than primarily for airway stabilization or other reasons, we excluded patients from our study if they underwent tracheostomy before hospital day 4 or sustained injury to the head and/or neck (as defined by a head or neck injury scale [AIS] of $\geq$1). Patients with missing data for ICU length of stay, hospital length of stay, and duration of mechanical ventilation were also excluded.

2.2. *Analysis*

To examine the odds of mortality with respect to the timing of tracheostomy placement, we first conducted a restricted cubic spline analysis [32]. This analysis revealed a break in the linearity in this relationship after 10 d from the time of admission. The timing of tracheostomy was then converted to a binary variable to allow for a clinically meaningful and statistically adjusted comparison. Specifically, the study cohort was divided into ET and DT groups relative to whether tracheostomy was placed within or after 10 d, respectively.

Baseline demographics, injury characteristics, and outcomes were then summarized between the ET and DT groups using the median and interquartile range (IQR) for continuous variables and counts and percentages for categorical variables. The primary outcome of interest for our analysis was inhospital mortality. Secondary outcomes included the development of pneumonia, the duration of mechanical ventilation, the lengths of ICU and hospital stay, and the discharge disposition (home *versus* skilled nursing facility) of those patients who survived hospitalization. One-way analysis of variance or Wilcoxon rank-sum tests was used to compare continuous variables, whereas Fisher exact tests (cell counts $<$5) or Pearson chi-squared tests was used to compare categorical variables. Nonparsimonious multivariable logistic regression analysis was used to determine the association between tracheostomy timing and inhospital mortality after adjustment for patient age, gender, race and/or ethnicity, payor status, ACS trauma center verification level, injury severity score, thoracic AIS, abdominal AIS, and Glasgow coma scale (GCS) in the emergency department. A P value of $<$0.05 was used to indicate statistical significance. All

Download English Version:

https://daneshyari.com/en/article/4299733

Download Persian Version:

https://daneshyari.com/article/4299733

Daneshyari.com