

Coronavirus Disease 2019 Tracheostomy Candidacy, Ceteris Paribus Assumptions, and Tracking Survivorship Data

To the Editor:

We read with great interest the recently published article by Angel et al (1) in *Critical Care Medicine*. This propensity-matched study of tracheostomy in patients with coronavirus disease 2019 (COVID-19) respiratory failure provides long-awaited insights into the relationship among tracheostomy and ventilator dependence, hospital length of stay, and patient survival. In demonstrating the safety and improved patient outcomes associated with early tracheostomy, the authors provide clarity that can help guide tracheostomy teams in navigating the present pandemic and potentially future ones. Furthermore, their novel percutaneous technique may reduce risk of viral transmission and apnea-induced derecruitment.

The findings reinforce data previously reported in this Journal (2) and more recent multi-institutional studies from the United States (3) and Spain (4); but findings diverge from observations of the recent Italian multicenter COVID-19 WeanTrach study regarding improving survival (5). There are lingering uncertainties shared by all these studies, relating to limited number of patients, lack of power analyses or sample size calculation, inability to establish causality, and limited quality-of-life data collected. Although propensity matching adjusts for potential confounders, it has limitations. Nearest neighbor matching removes outliers and cannot correct for unknown influences—including the judgment of skilled clinicians whose ability to discern prognosis and modify decisions is incompletely controlled for by calculated scores.

Presumptive evidence for baseline differences between the groups is suggested by the impressive spread in survival between the patients who underwent early tracheostomy versus no tracheostomy. Patients not offered tracheostomy were likely sicker. Although early tracheostomy should not be arbitrarily delayed (6), lack of blinding, bias by indication, and immortal time bias may also skew outcomes. The assumption of Ceteris Paribus, “other things held constant” may not hold in this and similar studies. The well-executed analysis mitigates bias by controlling for covariates, but equivalency between the groups cannot be confirmed. In the absence of randomization, unrecognized intervening factors may persist.

Given the potential benefits associated with early tracheostomy, careful tracking of quality-of-life outcomes, long after tracheostomy, may offer a fuller picture of patient experience. For ICU survivors, residual barriers to resuming a meaningful life can be linked to cumulative effects of sedation, acquired neuromuscular weakness or dementia, and prolonged rehabilitation (7). The rationale for tracking longer term survivorship outcomes is thus compelling. Earlier tracheostomy reduces duration of invasive mechanical ventilation and can expedite speech, ambulation, and swallowing. Early tracheostomy may also

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reduce the morbidity of translaryngeal intubation or lessen cognitive and emotional impairment. We congratulate the authors on their valuable contribution and look forward to longer term outcomes.

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The authors reply:

We read the letter to the editor by Brenner et al (1) in response to our article (2) with great interest published in *Critical Care Medicine*. We appreciate the comments made by the letter's authors, and we would like to address their main points:

- 1) We agree that clinical bias was present in the selection of candidates for this procedure given the overall circumstances and the inability to conduct a large randomized study; therefore, the propensity score matching was the best available option to minimize bias as much as possible.
- 2) We acknowledge that long-term effects of critical illness and ICU care including mechanical ventilation, neuromuscular blockade, sedation...etc and their effects on quality of life in coronavirus disease 2019 (COVID-19) survivors are the most major endpoints to be followed. These data continue to be tracked, and we are planning on following with a long-term survivorship outcome study in the near future to answer these questions.
- 3) We hope that our novel percutaneous tracheostomy approach along with further cumulative data from other centers will help guide current practices in early tracheostomy for COVID-19 respiratory failure and provide a blueprint for potential future pandemics given the demonstrated safety to staff and reduced risk for apnea-induced de-recruitment for patients.

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