Mortality and tracheotomy*

Tracheotomy has become a common procedure in the intensive care unit (ICU) for patients requiring long-term mechanical ventilatory support. Current American College of Chest Physicians-sponsored Consensus statement favors tracheotomy for airway management if need for mechanical ventilation is anticipated to be >21 days. Furthermore, the 1989 Consensus Conference view recommended use of tracheotomy in patients requiring long-term ventilatory support (1). Benefits of tracheotomy have been the focus on intense study in recent years (2–14). In this issue of Critical Care Medicine, Dr. Combes and colleagues (15) present a retrospective review on tracheotomy, evaluating the effect of tracheotomy on ICU and hospital mortality in patients requiring >3 days of mechanical ventilation. The authors reviewed the charts of all patients admitted to their ICU over a 3-yr period. Over this 3-yr period, 506 patients required mechanical ventilation for >3 days, and 66 of these patients underwent tracheotomy after a mean of 12 days of translaryngeal intubation. The data revealed that patients who underwent tracheotomy had lower ICU and in-hospital mortality rates. However, they had longer ICU length of stay and more total days of mechanical ventilation. The total workload for managing patients with tracheotomy was higher; however, the per-day workload was lower for tracheotomized patients.

Previous studies have evaluated the benefits of tracheotomy vs. translaryngeal intubation in critically ill patients. Kollef et al. (2) conducted a prospective cohort study to evaluate clinical predictors and outcomes for patients requiring tracheotomy. The hospital mortality of patients with tracheotomy was 13.7% vs. 26.4% for patients not undergoing tracheotomy. Freeman et al. (3) conducted a large retrospective review of 43,916 patients who underwent tracheotomy for a variety of clinical reasons. In this study, median days of mechanical ventilation before patients underwent tracheotomy was 9 days. Data analysis showed tracheotomy was associated with improved ICU and hospital survival of 78.1% vs. 71.8%. Frutos-Vivar et al. (4) conducted a prospective observational cohort study evaluating the outcome of mechanically ventilated patients requiring tracheotomy. In this study, a mortality benefit was noted in the ICU (odds ratio, 2.22; 95% confidence interval, 1.72–2.86), but overall hospital mortality was unchanged. In summary, these three studies consisted of a diverse population of patients, utilized a nonrandomized study protocol, and the studies were not designed to reveal specific differences in mortality between tracheotomy and conventional translaryngeal intubation. Thus, the associated improved survival may have reflected selection bias of patients for tracheotomy to those expected to survive hospitalization as compared with those who would otherwise be expected to die or who were extubated. Interestingly, in the article by Dr. Combes and colleagues (15), no significant differences were noted between the two patient populations’ clinical characteristics at time of ICU admission or ICU day 3. An interesting but not reported variable would have been the clinical characteristics of the patient population on the day of tracheotomy.

Most studies designed to specifically address mortality benefits of tracheotomy as compared with translaryngeal airway management have focused on timing of tracheotomy. In this regard, well-conducted studies have shown improved mortality with early tracheotomy. Rumbak et al. (5) evaluated the benefits of early tracheotomy (within the first 2 days) vs. late tracheotomy (days 14–16) in critically ill medical patients. This study noted a statistically significant reduction in mortality with early tracheotomy (31.7% vs. 61.7%, respectively). Chintamani et al. (6) evaluated the benefits of early tracheotomy in patients with closed head injury. In this study, early tracheotomy was performed after an average of 2.18 days. Mortality in the early tracheotomy group was 36% compared with 58% in the late tracheotomy group. Boynton et al. (7) evaluated the mortality effect of tracheotomy timing in surgery and trauma ICU patients. Median timing of early tracheotomy was 4 days as compared with 14 days for the late tracheotomy group. This study showed decreased mortality in the early tracheotomy group. Although these three studies showed mortality benefit with early tracheotomy, several other well-designed studies addressing mortality benefits of tracheotomy have not shown any statistically significant benefit (8–12). Differences in the

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*See also p. 802.

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D’Amelio et al. (16) reported fewer days of mechanical ventilation with early tracheotomy: 6 vs. 20.6 days and 4.6 vs. 11.7 days, respectively. The important feature of these five studies is the study contrasted early vs. delayed tracheotomy as related to days of mechanical ventilation. The study designed by Dr. Combes and colleagues (15) compared tracheotomy with continued translaryngeal intubation. The data thus likely reflect selection of patients for tracheotomy as those deemed by clinicians most likely to survive and thus incurred more overall days of mechanical ventilation.

The authors quantified workload using the Omega score to estimate resource utilization. That the total increased workload as measured by Omega score was higher for tracheostomized patients likely relates to the total increased length of hospitalization, as the authors note lower per-day Omega scores for tracheostomized patients. In this regard, tracheotomy has several known benefits in regard to patient care. Benefits include a well-tolerated, stable airway, requiring minimal if any sedation, the potential for oral feedings, enhanced communication, early ambulation, and easier pulmonary toilet and oral hygiene.

In summary, tracheotomy continues to be a common procedure performed in the ICU. The benefits of tracheotomy in regard to mortality, incidence of pneumonia, length of hospital and ICU stay, and patient comfort continue to remain an area of active study. This article further supports the finding that tracheotomy offers mortality benefit as compared with continued translaryngeal airway management. In regard to timing of tracheotomy, data suggest that the earlier the patient undergoes tracheotomy, the more likely the patient will benefit from the procedure. Additional studies addressing long-term patient outcomes, patient characteristics defining likely need for prolonged mechanical ventilation, and resource utilization of these patients are needed.

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