Tracheostomy Update
When and How

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KEYWORDS

• Tracheostomy • Percutaneous dilational tracheostomy • Acute respiratory failure
• Intensive care units • Critical illness • Practice variation

KEY POINTS

- The presence of a tracheostomy identifies one of the most resource-intensive patient cohorts for which to provide care.
- Recent prospective trials have failed to demonstrate an effect of tracheostomy timing on outcomes, such as infectious complications, duration of mechanical ventilation, or intensive care unit (ICU) length of stay (LOS).
- Early tracheostomy is associated with greater patient comfort. Clinicians can defer tracheostomy placement for at least 2 weeks after the onset of acute respiratory failure to ensure need for ongoing ventilatory support.
- In appropriately selected patients, there are advantages of percutaneous dilational tracheostomy relative to surgical tracheostomy with respect to resource utilization and perioperative infection. These 2 techniques seem indistinguishable with respect to incidence of long-term complications (eg, tracheal stenosis).
- Tracheostomy practice varies substantially among disciplines, ICUs, and institutions. Use of protocols based on best evidence may be one strategy to lessen this variation.

INTRODUCTION

Tracheostomy is among the most commonly performed surgical procedures in patients with acute respiratory failure.[1–5] Although a minority of all individuals requiring respiratory support, tracheostomy patients place significant demands on ventilator, ICU, hospital, and posthospital discharge resources.[4,6–8] Financial expenditures to support the care of tracheostomy patients are among the highest of any diagnostic or procedural group.[9] Efforts to optimize tracheostomy practice may favorably affect both the quality of care provided this segment of the critically ill population and the resources expended delivering this care.[7,10]

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Although a large body of literature exists regarding benefits, risks, and technical aspects of this procedure, little consensus exists as to what constitutes best tracheostomy practice in the setting of acute respiratory failure.[11] The intent of this article is to formulate recommendations based on contemporary evidence.

TRACHEOSTOMY INDICATIONS AND RATIONALE

A difficult airway in a patient requiring prolonged mechanical ventilation constitutes one of the few absolute indications for tracheostomy.[12] Difficult airway patients include those with conditions, such as significant maxillofacial trauma, angioedema, obstructing upper airway tumors, and other anatomic characteristics that render translaryngeal intubation difficult to perform in the event of airway loss.[12] Difficult airway patients constitute a small fraction of all individuals undergoing tracheostomy in most ICUs.[8] It is more often the case that patients requiring prolonged ventilatory support undergo tracheostomy to facilitate care.[11,13,14] In theory, there are several reasons why tracheostomy may be more advantageous than translaryngeal intubation in this context. The presence of a tracheostomy may promote oral hygiene and pulmonary toilet, enhance patient comfort, and allow oral nutrition and speech.[13–15] Because of greater airway security, patients with tracheostomy may be more practical to mobilize (such as transferring from bed to chair) and more likely to engage in physical therapy and conditioning regimens. Furthermore, the presence of a tracheostomy has been postulated to facilitate weaning from mechanical ventilation due to several factors.[16] Resistance to airflow in an artificial airway is proportional to air turbulence, tube diameter, and tube length.[13,17] Air turbulence is increased in the presence of extrinsic compression and inspissated secretions.[13,17] Because of its rigid design, shorter length, and – in some models – a removable inner cannula (to allow for evacuation of secretions), airflow resistance and associated work of breathing may be less with tracheostomies relative to endotracheal tubes.[13,17] Such effects, however, have not been consistently demonstrated in patients after tracheostomy.[18–20] Furthermore, the presence of a tracheostomy may allow clinicians to be more aggressive in weaning attempts.[12] Specifically, if a patient with a tracheostomy tube in place does not tolerate liberation from mechanical ventilation, he or she may be reconnected to the ventilator circuit. In contrast, if a patient who is maintained with translaryngeal intubation does not tolerate extubation, he or she must be sedated and reintubated. Concern about the development of respiratory failure when mechanical ventilation is withdrawn may represent a barrier to extubation in patients who are of marginal pulmonary status.[21] These and related benefits of tracheostomy relative to prolonged translaryngeal intubation are either unproved or subjective. As a consequence, widely accepted criteria to guide patient selection for tracheostomy are lacking.[11] The absence of such criteria may underlie the variability in tracheostomy that exists in clinical practice.[5,7,8,22–25]

TRACHEOSTOMY TIMING

One of the most debated aspects of tracheostomy practice concerns whether timing of this procedure affects clinically important outcomes.[26–36] Many studies addressing this question have produced conflicting findings owing to small sample sizes, heterogeneity in populations enrolled, variation in the quality of study design, inconsistencies as to the endpoints examined, and lack of protocols to direct care.[36] Three recent studies reported in this area merit comment.[37–39] In a large, multicenter investigation, Terragni and colleagues[39] randomized 419 patients to percutaneous tracheostomy after either 6 days to 8 days or 13 days to 15 days of mechanical ventilatory support. Tracheostomy timing had no effect on the primary