

## Early Tracheostomy or Prolonged Translaryngeal Intubation in the ICU: A Long Running Story

Since the beginning of intensive care in the 1950s until today, tracheostomy has been in permanent play. Successive epochs may be differentiated through several periods.<sup>1</sup> The first period started in August 1952, when Bjorn Ibsen, facing a huge polio epidemic so deadly that about 80% of the patients were dying in Copenhagen from the respiratory form, he performed tracheostomies and delivered continuous intermittent positive-pressure ventilation with a hand balloon, for as long as necessary, from days to months. The same procedure was used until the epidemic ended in December, and the results were stupendous, lowering the mortality rate to 20%.<sup>2</sup> That was the “birth certificate” of ICUs, which rapidly spread throughout Europe and the United States.<sup>3</sup> Mechanical ventilation took charge in neurologic diseases, post-surgical complications, severe infectious diseases, and respiratory failures due to lung diseases, almost exclusively via tracheostomy.

The second period occurred in the 1970s, when the routine performance of tracheostomy diminished, in comparison to intubation. Tube improvement and awareness of risks associated with tracheostomy increased the preference for translaryngeal intubation.<sup>4</sup> Although that did not mean the end of tracheostomy, its selection rests as an option for the medical team.

The third period started in the mid-1980s, and was highlighted by the refinement of the tracheostomy technique, using percutaneous approaches that are currently completely accepted in the ICU community, rather than the open surgical procedure, explaining a renewed interest in tracheostomy.<sup>5</sup>

Today both approaches are available for artificial airways in the ICU, and they are prolonged translaryngeal intubation or early tracheostomy, which could be used exclusively. Conversely, it is tempting to draw conclusions on the advantages of each medical procedure with the clear objective to gain important clinical benefits. The advantages of intubation are easy and rapid initial placement, low cost, and avoidance of acute and late surgical complications. The advantages of tracheostomy are reduced orolaryngeal damage, less risk of sinusitis and need for sedation, better oral hygiene, more patient comfort, communication capacity almost unaltered, swallowing, glottis competence, safety of reinsertion, and easier weaning from mechanical ventilation. From a theoretical point of view it is reasonable to propose the following: for the

short duration, mechanical ventilation by intubation is used exclusively until extubation, but in case of prolonged mechanical ventilation, tracheostomy becomes preferable. So, 3 questions require answers. What time span should be considered a short duration for intubation? Is it possible to anticipate the putative mechanical ventilation duration for individuals? What medical evidence do we have on hand?

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In this issue of *RESPIRATORY CARE*, 2 papers concern tracheostomy in the ICU. The first is from Shan and colleagues,<sup>6</sup> in China, who conclude that early tracheostomy, between the third and seventh day after intubation, decreases mortality, reduces recovery time in the ICU, and shortens mechanical ventilation time in ICU patients. Shan et al conducted a meta-analysis of 6 retrospective series encompassing 2,037 patients. Even though the meta-analysis technique appears perfect, the random selection without commonality of the patients prevents us from having full confidence in the conclusions.

The second study comes from Freeman and colleagues,<sup>7</sup> in the United States. From a large administrative database from 102 university-affiliated hospitals, coding all the characteristics of each patient with a billing objective, Freeman et al extracted data on 44,124 patients presenting with acute respiratory failure requiring invasive mechanical ventilation (4,776 tracheostomies). Besides the main conclusion, “We were unable to demonstrate a positive relationship between resource expenditure and outcome in acute respiratory failure patients managed with tracheostomy,” it appears from the univariate analysis that tracheostomy positively influenced survival, but this was not confirmed with the multivariate analysis with logistic regression (odds ratio 0.99, 95% CI 0.92–1.06). Since that study is also totally uncontrolled, it is not possible to conclude in favor or disfavor of tracheostomy.

In the mid-2000s it was recognized that early tracheostomy in patients who undergo  $\geq 14$  days of ventilation has important benefits, including reduced mortality, lower frequency of pneumonia, and fewer ventilator and ICU days.<sup>8,9</sup> More recently, other randomized controlled trials have not

found such positive results.<sup>10–13</sup> According to those studies, early or late tracheostomy (or prolonged intubation) produces the same effect on the main end points: mortality, ventilator-associated pneumonia, and hospital stay. A further meta-analysis of 7 trials found that early tracheostomy did not significantly reduce mortality, ventilator-associated pneumonia, duration of mechanical ventilation, ICU stay, sedation, or complications.<sup>14</sup> Data from those trials do suggest that tracheostomy is associated with greater comfort and decreased sedation, so the theoretical approach would be to perform early selective tracheostomy in cases where mechanical support is mandatory for “a long duration.” But in clinical practice the definition of prolonged invasive ventilator support varies, according to the physician’s belief, from days to weeks. More importantly, the prediction of prolonged need for ventilation is uncertain, as evidenced by the fact that only about 50% of the patients randomized for late tracheostomy ultimately underwent it.<sup>10,13</sup>

The story of tracheostomy in the ICU will continue to run, looking for more conclusive results. Until new data arise, one may recommend either early tracheostomy or prolonged translaryngeal intubation. In both cases, do it as you please, but do it perfectly. Finally, all roads still lead to Rome, or so they say!

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