

Ventilation before Paralysis

Crossing the Rubicon, Slowly



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*The idiom “Crossing the Rubicon” means to pass a point of no return, and refers to Julius Caesar’s army crossing the Rubicon river in 49 BC, which was considered an act of insurrection.**

IN this issue of the Journal, Ikeda *et al.* report their novel approach to examine the effects of neuromuscular blockade on the effectiveness of facemask positive pressure ventilation in adults at low risk for mask ventilation difficulty.¹ Their subjects received a propofol-opioid anesthetic, and the oral aperture was stented open with a 15-mm mouthpiece. Ventilation was evaluated by measuring achieved tidal volumes at a set peak inspiratory pressure. Administration of rocuronium had no effect, whereas succinylcholine transiently improved facemask ventilation during the fasciculation period, with a greater airflow increase observed through the oral route than through the nasal route. These results are consistent with several recent studies that demonstrated improved facemask ventilation after administration of neuromuscular blockade.^{2,3} The results will serve as additional supportive evidence for those who advocate discarding the traditional anesthetic induction sequence taught on day 1 of residency:⁴ induce unconsciousness, establish facemask ventilation, and then administer neuromuscular blockade. The rationale for this traditional, perhaps dogmatic approach of refraining from neuromuscular blockade before establishing mask ventilation includes fear that muscle paralysis might (1) worsen



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airway ventilation in a patient with an unapparent cause of difficult mask ventilation; or (2) in the case of a nondepolarizing neuromuscular blockade, eliminate the option of “waking the patient up” and permitting resumption of spontaneous ventilation as a rescue approach when ventilation is severely difficult.

The movement to abandon “ventilate before paralyze” appears to be primarily based on the absence of evidence supporting this traditional stance, bolstered by studies of clinical factors associated with difficult mask ventilation (DMV) soon after induction of general anesthesia. The studies of clinical factors include case-control analyses of recorded anthropomorphic and historical patient factors and prospective trials that, like Ikeda *et al.*, examined the effect of neuromuscular blockade on mask ventilation in patients at low risk for DMV.^{2,3} Case-control studies are often used as an initial approach to identify factors worth

examining more closely for potential causation. Unfortunately, many of these studies use language (*e.g.*, “independent predictors”)^{5,6} that prematurely suggest causal relationships between outcomes and associated factors. The low sensitivity and specificity of identified factors combined with the rarity of DMV currently preclude clinically useful prediction.^{7,8} Prospective examination of isolated elements of airway management in low-risk patients limits extrapolation to management of the population of interest—patients deemed difficult but not impossible, and of acceptable risk.^{1–3}

Photo: J. P. Rathbrell.

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* Wikipedia (<http://en.wikipedia.org/wiki/Rubicon>). Accessed May 28, 2012.

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◆ This Editorial View accompanies the following article: Ikeda A, Isono S, Sato Y, Yogo H, Sato J, Ishikawa T, Nishino T: Effects of muscle relaxants on mask ventilation in anesthetized persons with normal upper airway anatomy. ANESTHESIOLOGY 2012; 117:487–93.

We suggest that a full understanding of causation in DMV is unlikely to be discoverable using only quantitative approaches, and may require alternative qualitative methodology. In 350 cases of DMV,⁵ what really happened in each case? What was each proceduralist thinking, exactly, while moving forward, unaware of the challenging road just around the bend? What communication between supervising attending physicians, trainees, nurse anesthetists, nurses, and surgeons contributed to the outcomes? Is it at least possible that the outcome-determined assignment into the DMV group might have been different if a 15-mm bite block device had been used from the start? What if a more astute anesthesiologist had attended more carefully to clinical warning signs, or had been less affected by production pressure, or had insisted that a more senior proceduralist manage the airway? What if a different anesthesiologist had been assigned to the case? We have all observed easy airway management in patients whom others have previously deemed difficult.

Anesthesiologists use a host of information and knowledge, explicitly and implicitly, often with diagnostic biases⁹ to generate a course of airway management action. Although risk factors for DMV have been identified, most patients with these risk factors are not difficult to ventilate to a clinically significant degree (*e.g.*, requiring expert intervention). In the remaining small minority, DMV is less likely to be caused by patient-specific attributes than by a host of management factors.¹⁰

Qualitative methods are likely to help fill the large gap that has thus far prevented us from eliminating the persistent DMV problem. The usefulness of these methods is exemplified by the decades-long standard approach to evaluating and learning from causation of maternal mortality in the United Kingdom (Centre for Maternal and Child Enquiries).¹¹ The findings of this detailed triennial report have led to numerous national policies, guidelines, and training emphasis changes, and they have profoundly influenced clinical research agendas. The success of this approach is no surprise—it is consistent with current safety, quality, and error science.^{12–14} What if we took this approach to serious airway mishaps? Early results are promising. Of 184 major airway complications examined using case analysis methods similar to the Centre for Maternal and Child Enquiries, only 20% were due primarily to patient factors, the remainder involving 10 other categories of management factors deemed causal or contributory.¹⁰

We too advocate rejecting dogma, but we have not rejected the “ventilate before paralyze” approach completely. We cannot find evidence to support its wholesale abandonment, and it continues to be useful to us. On occasion, in

intermediate-risk patients, despite our full attention and optimization for success, the recognition of unexpected DMV after induction of unconsciousness but before paralysis allows us to change course, to consider preserving a way back over the bridge. Administering succinylcholine instead of the preferred nondepolarizing agent may improve mask ventilation, yet preserve the option to “wake the patient up” if needed. So, like others, we take a middle ground approach, selective ventilation before paralysis,² at least for now. More generally, we urge avoidance of “airway managementism”† in which old dogma is zealously replaced with approaches that resemble or suggest new dogma.⁴ The anesthesia community has approached airway management with quantitative rigor, but we believe that there are numerous key assumptions yet to be examined scientifically. We suspect that a knowledge gap is at the heart of our persistent inability to eliminate airway complications. Will it someday be possible to completely eradicate significant or life-threatening DMV, one of our specialty’s persisting diseases? Perhaps, but as with other cures, it will take a spectrum of scientific approaches, as exemplified by Ikeda’s elegant work. We eagerly look forward to modifying our approach more completely when a sufficient amount of evidence appears. In the meantime, we reject no options as we cross the bridge, slowly.

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† The food writer Michael Pollan¹⁵ wrote: “The first thing to understand about *nutritionism* ... is that it is not quite the same as nutrition. As the “ism” suggests, it is not a scientific subject but an ideology. Ideologies are ways of organizing large swaths of life and experience under a set of shared but unexamined assumptions. This quality makes an ideology particularly hard to see, at least while it’s exerting its hold on your culture.”

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