

train-of-four stimulation. Anesthesia was maintained with desflurane in a mixture of oxygen and air using a closed circuit. The systemic use of fentanyl was limited to the induction, and intraoperative analgesia was performed with the epidural administration of bupivacaine 0.2% at a rate of 6 to 8 ml/h. Dr. Kendall is right when arguing that the anesthetic agents (opioids, halogenated anesthetics, anticholinergics) may influence lower urinary tract function. However, our postoperative urodynamic investigations were performed on postoperative day 2 or 3 depending on patient's ability to be mobilized more than 1 h (the average duration needed for urodynamic investigations). Because these drugs were only administered intraoperatively, as mentioned in our Results section,¹ their systemic impact is negligible. We previously demonstrated the clinically nonrelevant plasma concentration of epidurally administered fentanyl.⁴

We thank Dr. Kendall for his interest in our publication and hope we were able to clarify the issues addressed.

Competing Interests

The authors declare no competing interests.

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Airway Management: The Less Popular Skill of Bag-mask Ventilation

To the Editor:

As anesthesiologists, it is encouraging that recent attention has been paid to airway management improvements in and

out of the operating suites. Our goals of positive patient safety outcomes have led to many recent airway management publications. The most recent of which included the investigation of the temporal trends in difficult and failed intubations over a 14-yr period (2002 to 2015) by Schroeder *et al.*¹ in the March 2018 issue of *ANESTHESIOLOGY*.

Airway management outcomes have improved through enhanced education, better airway algorithms, and innovations in airway management. Mask ventilation, the precursor to intubation, has unfortunately received minimal attention over the same period. We contend that mask ventilation is as important as intubation, but it is commonly a less popular skill to teach and learn. As airway management experts, we believe it is our duty to educate the healthcare community on the importance of mask ventilation improvement strategies.

Skills required for bag-mask ventilation and endotracheal intubation are very different, although they are taught, at most times, simultaneously. As educators in airway management, we believe the primary focus should begin with mastery of mask ventilation before endotracheal tube insertion because it is not uncommon to encounter situations of both difficult ventilation and intubation that will ultimately call upon this much-needed skill.

Improvements in mask ventilation beyond the ergonomics of different masks and noninvasive strategies have been lacking, and recent studies further lend support to this need. The difficult intubation rates in the out-of-hospital setting have been reported to be between 9 and 11% both in the United States,² where emergency medical technicians and paramedics are the frontline, and in Europe, where anesthesiologists are present in the field. Because bag-mask ventilation is a skill that is equivalent to—if not more important than—intubation, our education should focus on greater implementation and training of this specific skill. Highlighting the importance of mask ventilation is a recent study by Jabre *et al.*,³ in the February issue of *JAMA*. The study saw similar neurologic outcomes with either airway modality of bag-mask ventilation or endotracheal intubation after out-of-hospital cardiopulmonary arrest,³ which supports the value in teaching, learning, and ultimately mastering this less noteworthy skill.

The education level of the practitioner is questioned by Lewis and Gausche-Hill⁴ regarding the study of Jabre *et al.*,³ Lewis and Gausche-Hill⁴ illustrate the differences between emergency response teams in Europe and America. In Europe, physicians are part of the ambulance care team and thus are the first responders who perform the intubations. Comparatively, in the United States, the emergency responders are largely paramedics, who often lack training in airway management proficiency compared with anesthesiologists, emergency physicians, and intensivists.

We applaud our colleagues for improvements in airway support over the past decade, but bag-mask ventilation is seldom a topic of research. Our airway management education begs for focus on improving our mask ventilation techniques to reproduce the results of Jabre *et al.*³ Most recent research

with bag-mask ventilation has relied on different hand placement, with greatest success attributed to the two-handed mask holding approach.

In our opinion, the anesthesiology community has maintained its integrity with regard to patient safety *via* airway management. However, the next step is to continue progressive strides and gain momentum on how we perform these skills. The attention should be on techniques to optimize ventilation, including mask seal and accurate mandibular advancement. In exploring alternative mask ventilation techniques, we believe innovation in education and equipment needs to be expanded and improved.

Competing Interests

Dr. Rosen is the founder of Oteg Medical LLC. The other authors declare no competing interests.

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In Reply:

We appreciate the response of Rosen *et al.* to our recent article, “Temporal Trends in Difficult and Failed Tracheal Intubation in a Regional Community Anesthetic Practice,”¹ including their highlighting the importance of the anesthesia community as subject matter experts in airway management. We concur with the authors’ assertion that mask ventilation, as the precursor to endotracheal intubation and a critical airway management skill, deserves a similar level of scrutiny and study. Mastery of the technical skill of

mask ventilation is absolutely critical to the safe practice of anesthesiology but also to emergency airway management in both pre- and in-hospital settings. Sadly, mask ventilation has historically received less attention in our clinical anesthetic documentation and, consequently, less rigorous investigation.

Rosen *et al.* highlight that mask ventilation and endotracheal intubation are separate entities with different predictors of difficulty and management strategies when complications arise. Despite the fact that these procedures are almost always taught in the same clinical encounter and are clinically proximate in time, it is also well known that they are distinct technical skills, each potentially life-saving and with distinct value. It is equally true that they should be studied independently.

As previously mentioned, our hypothesis addressed the incidence of difficult and failed endotracheal intubation, which we observed to decrease over the past decade and a half, evidenced by lowered rates of difficult and failed intubations documented in a quality-assurance database. Unfortunately, the quality of mask ventilation was not recorded in this database and, as such, was not accessible for our study.

Of interest when considering the points raised by Rosen *et al.* is the literature relating to out-of-hospital airway management in Europe and the United States; notably, such studies typically involve emergency physicians, paramedics, and other ambulance practitioners with varying levels of training and experience.² In addition, evolving recommendations regarding mask ventilation strategies in the setting of out-of-hospital cardiopulmonary resuscitation, as well as the introduction of supraglottic airways, have contributed significantly to published literature in this area.³ The importance of advancements in mask ventilation as they relate to the conduct of anesthesia care but also outside of the operating room should not be underestimated.

Nonetheless, the findings of our study are important; that the incidence of difficult and failed intubation by anesthesiologists has decreased over time, suggesting that management of endotracheal intubation has become safer. Further studies are required to confirm this occurrence in other populations and to explore potential causes. Unfortunately, at the present time, we believe that a similar study of mask ventilation is not possible given the lack of clinical documentation addressing this issue in most longitudinal quality-assurance databases.

Competing Interests

The authors declare no competing interests.

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