

Ideal Airway Management: New Evidence and Strategies Are Still Needed

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This issue of the *Journal of Anesthesia and Perioperative Medicine (JAPM)* focuses on the airway management.

An adequate airway management plan is essential for patient safety. Thirty years ago, anesthesiologists had to rely entirely on bag-mask ventilation and/or tracheal intubation with direct laryngoscopy to oxygenate the patient. In 1990, a closed claims analysis conducted by the American Society of Anesthesiologists concluded that a leading cause of anesthesia-related injury was the inability to intubate the trachea and secure the airway (1). Since then, many efforts have been made to reduce the morbidity and mortality related to the airway management during anesthesia and perioperative period. First, the mandatory use of pulse oximetry and end-tidal carbon dioxide measurement enhances recognition of an unsecured airway. Second, a number of supraglottic airway devices and intubating aids have been introduced in the routine practice, specifically for use in the patients with difficult airways. Third, the societies for airway management are founded and the guidelines about difficult airway management have been formulated (2-6). Because of these efforts, the incidence of complications related to airway management has declined, but still remains one of the main causes of perioperative morbidity. Furthermore, the incidence of difficult intubation with a conventional direct laryngoscope seems to remain the same. The recent Fourth National Audit Project (NAP4) of the Royal College of Anaesthetists and the Difficult Airway Society (7) shows that difficult intubation still is the most common factor related to serious airway complications during anesthesia; namely, difficult or delayed intubation, failed intubation and 'cannot intubate, cannot ventilate' situations account for 39% of

events during anesthesia. These adverse events make the anesthesiologists and airway management experts to recognize that the current strategies for airway management are still not ideal and the key evidence for decision-making of appropriate airway management are still needed.

In this special issue, most of the published articles highlight some areas for improvement in the management of routine and difficult airways. For example, management of a pediatric airway can be a challenge, especially for anesthesia providers with limited pediatric experience, who may find the normal airways of younger children difficult to manage. So far, there is no structured algorithms for an unexpected difficult pediatric airway (8). During the last decade, several new videolaryngoscopes have been proven useful in clinical practice of adult airway management, but only five of them are currently available in sizes that may be used in children younger than 2 years of age: Airtraq[®] optical laryngoscope (Prodol Meditec, Vizcaya, Spain), GlideScope[®] videolaryngoscope (Verathon, Bothell, WA, USA), the Storz DCI[®] videolaryngoscope (Karl Storz, Tuttlingen, Germany), UEscope (UE Medical Corp, Zhejiang, China) and Truview PCD[®] infant laryngoscope (Truphatek, Netanya, Israel) (9). Unfortunately, most of these devices are only downsized to accommodate smaller patients rather than be customized for pediatric airway anatomy. Thus, co-ordinated efforts to collect clinical data about the use of videolaryngoscopes in pediatric airway management would help to guide implementation of these new devices. In the paper by Olomu and colleagues (10), they attempted to assess the performance of the GlideScope[®] Cobalt AVL Video Baton as a tool for orotracheal intubation in pediatric patients weighing less than 10 kg sched-

uled for surgery and demonstrated a high first-attempt intubation success rate, regardless of user experience. In this study, intubation times of less than 30 seconds and improved glottic views with GlideScope® videolaryngoscope were also shown. However, this is a single-arm observable study and does not compare performance of GlideScope® videolaryngoscope with direct laryngoscope. In addition, pediatric patients with difficult airway were also excluded from the study. As a result, an important question that remains unanswered in this study is whether GlideScope® videolaryngoscope equals or surpasses direct laryngoscopy in the management of a normal or difficult airway. Here, I would like to remind the readers that the available literature may provide the evidence for above question. A recent meta-analysis of 14 randomized controlled trials comparing pediatric videolaryngoscopes (GlideScope®, TruView, Storz, Bullard, and Airtraq) versus direct laryngoscope demonstrates that videolaryngoscopes are associated with improved laryngeal views in children either with normal airways or with potentially difficult airways. With videolaryngoscopes, however, the intubation time is prolonged and the incidence of failed intubation is increased significantly (11). Thus, the clinical studies to address the role of videolaryngoscope in pediatric airway management are still needed.

In 1983, introduction of the laryngeal mask airways, the first generation supraglottic airway devices, is a milestone that has significantly influenced clinical practice of airway management. Recently, the second generation supraglottic airway devices have been designed specifically to prevent gastric insufflation during anesthesia and positive pressure ventilation. For example, the single-use laryngeal mask airway Supreme has a curved rigid airway tube and a centrally positioned drainage tube and is now available in pediatric sizes (8). In a retrospective audit of clinical practice, Tran and colleagues (12) evaluated the use of the laryngeal mask airway Supreme in routine clinical practice in a tertiary pediatric hospital and showed that this device was highly successful in the hands of various cadres of anesthesia providers and performed reliably well. Furthermore, their data revealed many areas of potential improvement for use of the la-

ryngeal mask airway Supreme in the pediatric population. Considering that this is a single-center retrospective study, however, we believe that the large randomized, controlled studies to validate their findings are still needed.

The recent outbreak of Ebola virus disease has resulted in the new challenge to the healthcare providers. Although Ebola is not commonly associated with respiratory conditions, a number of patients require intubation during the recent epidemic. Anesthesiologists, due to their training in the management of the critically illnesses, may be called upon to assist in the management of these patients, especially airway management (13). Included in this special issue is a review by Ellard and colleagues (14), who gives an overview of the clinical features and management of patients with Ebola virus disease, with the special emphasis on respiratory symptoms, airway management, staff protection and avoidance of transmission of virus to healthcare workers. It is out of question that the above knowledge will help to improve anesthesiologists' skill and safety when airway management is carried out in Ebola virus disease patients.

Videolaryngoscopes are a new category of intubating devices that allow to 'see around corners'. They incorporate a video camera or coherent fiberoptic bundle mounted on a blade (15). There are now a large number of videolaryngoscopes available, with the number constantly increasing and many existing devices being modified. Recently, videolaryngoscopy-assisted tracheal intubation has been used widely in patients with normal and difficult airways (16). Furthermore, the Difficult Airway Society 2015 guidelines recommend that all anesthetists must be trained in videolaryngoscopy and that all anesthetists have immediate access to a videolaryngoscope at all times (5). It must be pointed out that videolaryngoscopes have been shown as the potential roles in managing normal and difficult airways, but it is still not clear which videolaryngoscopes are more suitable than others (17, 18). In fact, the current evidence has mainly focused on comparing videolaryngoscopy with direct laryngoscopy, and there is few high-quality evidence regarding the relative performance of different videolaryngoscopes. By reviewing the articles comparing the functionality of diverse vide-

olaryngoscopes published in the last decade, van Zundert et al. (19) concluded that the Pentax-Airway Scope was the best of the channelled videolaryngoscopes and the Karl Storz C-MAC device was the best of the non-channelled videolaryngoscopes. Moreover, the C-MAC videolaryngoscope is the most versatile as it can be used for direct and indirect laryngoscopy. In addition, van Zundert and colleagues emphasize that at this moment, no videolaryngoscope can offer a solution for all problems. In fact, each particular videolaryngoscope's features may offer advantages or disadvantages, depending on the situation the anesthesiologist has to deal with (15). That is, suitable videolaryngoscopes may differ in patients with different causes of difficult airways

(20) and the videolaryngoscope must be selected according to indication (21). Most importantly, moreover, experience and competence with any of the videolaryngoscopes are critical for their successful use in any clinical setting (22).

In conclusion, there is no single best approach to the difficult airway, but it is important to acquire skill sets and experience with a number of available tools in order to tailor an optimal approach to each individual patient (17, 18). I believe that the articles published in this special issue will improve our knowledge in several aspects of clinical airway management. I sincerely hope that it will facilitate further research in this very important area of practice to reduce morbidity and mortality related to airway management.

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