

This month we are pleased to publish the papers from the Journal Conference, "Adult Artificial Airways and Airway Adjuncts." We are grateful to the conference co-chairs Charles G. Durbin, Jr, and Carl F. Haas, and the faculty, for making this conference a success.

Davies et al address approaches to manual ventilation. Often simple airway maneuvers can achieve a patent airway and airway adjuncts can help in situations where airway maneuvers may not be sufficient. Bag-mask ventilation (BMV) plays a vital role while preparations are made for endotracheal intubation. Anticipation and early recognition of situations where BMV may be difficult allows clinicians to quickly make adjustments or to employ another intervention to avoid delays in establishing adequate ventilation.

As presented by co-chair Durbin and colleagues, endotracheal intubation is a commonly performed operating room (OR) procedure that provides safe delivery of anesthetic gases and airway protection during surgery. The most common intubation technique, with infrequent difficulty, is direct laryngoscopy with orotracheal intubation. Careful patient evaluation, advanced planning, equipment preparation, system redundancy, use of checklists, familiarity with airway algorithms, and availability of additional help has resulted in exceptional success and safety. Airway difficulties during intubation outside of the controlled environment of the OR are more frequent and more serious. Translating the intubation processes practiced in the OR to intubations outside the peri-operative setting should improve patient safety.

The paper by Collins presents a brief background regarding the development and practice of laryngoscopy and examines the equipment and techniques for both direct and indirect methods. Patient evaluation during the airway exam is discussed as are predictors for difficult intubation. Laryngoscope blade design, newer intubating techniques, and a variety of indirect laryngoscopy technologies are reviewed as is the learning curve for these techniques and devices.

Fiberoptic intubation (FOI) is an effective technique for establishing airway access in patients with both anticipated and unanticipated difficult airways. The paper by Blank and Collins reviews the pertinent technology, clinical techniques, indications for, and complications of its use. The role of FOI in airway management algorithms is discussed. Evidence is presented comparing FOI to other techniques with regard to difficult airway management. The literature on training processes and skill development in FOI is also reviewed.

As discussed by Mechlin and Hurford, performing emergency endotracheal intubation necessarily means doing so under less than ideal conditions. Rates of first time success are lower than intubation performed under controlled conditions in the OR. Some factors associated with improved success are predictable and can be modified to improve outcome. Factors discussed in this paper include the initial decision to perform endotracheal intubation in out-of-hospital settings, training of providers performing intubation, the technique selected for advanced airway management, and the use of sedatives and neuromuscular blocking agents.

The ideal timing and techniques for tracheostomy are debated. Cheung and Napolitano review general issues regarding tracheostomy, with review of the literature regarding appropriate timing of tracheostomy tube placement. It is reasonable to wait at least 10 days to be certain that a patient has an ongoing need for mechanical ventilation before consideration of tracheostomy. Percutaneous tracheostomy with flexible bronchoscopy guidance is recommended. New tracheostomy tubes for percutaneous dilatational tracheostomy and new percutaneous techniques are described. Tracheostomy teams and tracheostomy hospital services with standardized protocols for tracheostomy insertion are associated with improved outcomes.

Supraglottic airway devices (SADs), as used to keep the upper airway open for unobstructed ventilation, are reviewed by Ram-

achandran and Kumar. First generation SADs rapidly replaced endotracheal intubation and facemasks in more than 40% of general anesthesia cases. Second generation devices have further improved efficacy and utility by incorporating design changes; these allow more dependable positive pressure ventilation, are made of disposable materials, have integrated bite blocks, are better able to act as conduits for tracheal tube placement, and have reduced risk of aspiration. They provide successful rescue ventilation in more than 90% of patients for whom BVM or tracheal intubation is impossible.

Conference co-chair Haas and colleagues review the development and evolution of the endotracheal tube (ETT). Over the years, modifications have been made to the ETT to minimize gross aspiration, to isolate a lung, to provide a clear facial surgical field during general anesthesia, to monitor laryngeal nerve damage during surgery, to prevent airway fires during laser surgery, and to administer medications. Increasingly it is appreciated that the ETT itself is a primary causative risk for developing ventilator-associated pneumonia, because oral and gastric secretions leak past the inflated ETT cuff into the lungs. Bacteria within the ETT also create a biofilm. Modifications to reduce the role of the ETT in ventilator-associated pneumonia include an adequate cuff pressure, changing the material and shape of the cuff, and aspirating the secretions above the cuff. Antimicrobial coating of the ETT and mechanically scraping the biofilm from within the ETT have also been used.

Tracheostomy tubes are used to administer positive pressure ventilation, to provide a patent airway, and to provide access to the lower respiratory tract for airway clearance. As described by Hess and Altobelli, differences in dimensions between tubes of the same inner diameter from different manufacturers may have important clinical implications. Tracheostomy tubes can be cuffed or uncuffed, may be fenestrated, and some are designed with an inner cannula. The optimal frequency of changing a chronic tracheostomy tube is controversial. Speech can be facilitated in patients with a tracheostomy tube who are breathing spontaneously by use of a speaking valve. In mechanically ventilated patients with a tracheostomy, the use of a talking tracheostomy tube, using a deflated cuff technique with a speaking valve, and using a deflated cuff technique without a speaking valve can be used to facilitate speech.

Management of the artificial airway is described by Branson et al. Important are adequate humidification and appropriate airway suctioning. Cuff pressure management is important for preventing aspiration, assuring adequate ventilation and preventing mucosal damage. The respiratory therapist should be familiar with these devices and understand the appropriate application and management.

As discussed by Artime and Hagberg, tracheal extubation is not only an important milestone for patient recovery, but also a procedure that carries a considerable risk of complication or failure. Extubation failure and subsequent reintubation is associated with an overall increase in the duration of mechanical ventilation, increased mortality, a greater need for tracheostomy, and higher medical costs. These risks demand that the process of extubation be managed by practitioners with a detailed understanding of the causes of extubation failure and the potential complications. A pre-established extubation plan with considerations made for the possible need for reintubation is of the utmost importance.

Pacheco-Lopez and colleagues review the impact of endotracheal intubation on airway injury. These include nasoseptum injury, tongue injury, dental injury, mucosal injury, vocal cord immobility, laryngotracheal stenosis, tracheomalacia, and tracheoinnominate or tracheoesophageal fistulas. The proposed mechanisms of tissue damage that relate to each are reviewed as well as the most common clinical manifestations and the diagnostic and management options. This article also includes a review of complications of airway management pertaining to videolaryngoscopy and SADs.