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Perspective

Clinical Approaches to Airway Management Strategies in Surgical and Critical Care

Thomas Baird*

Department of Perioperative Anesthesia and Critical Care, University of Glasgow, Glasgow, United Kingdom

DESCRIPTION

Airway management strategies form an essential component of perioperative and emergency medical care, ensuring adequate oxygenation and ventilation in patients undergoing surgical procedures or experiencing respiratory compromise. Effective handling of the airway requires systematic evaluation, proper selection of devices, and skilled execution of techniques adapted to patient condition, anatomical variation, and clinical urgency.

Initial assessment of airway status typically involves evaluation of facial structure, neck mobility, mouth opening, and presence of obstructions. Predicting difficulty in ventilation or intubation allows clinicians to plan alternative approaches in advance. Common indicators such as reduced thiopental distance, limited cervical movement, or history of obstructive conditions provide guidance for procedural preparation. Pre oxygenation is routinely performed to increase oxygen reserves and reduce the risk of hypoxia during airway instrumentation.

Basic airway maneuvers remain the first step in maintaining patency. Techniques such as head tilt, chin lift, and jaw thrust are applied to reposition soft tissues away from the pharyngeal airway. These methods are often supplemented with oropharyngeal or nasopharyngeal airways, which help maintain patency in patients with reduced consciousness or muscle tone. Bag-mask ventilation is frequently used as a temporary measure to support respiration while preparing for advanced airway access.

Endotracheal intubation is widely used for definitive airway control. It involves placement of a tube into the trachea to secure ventilation and protect against aspiration. Direct laryngoscopy has long been used for visualization of vocal cords, while video-assisted laryngoscopy provides enhanced visualization in difficult cases. Fiber optic techniques are also employed, especially when anatomical challenges or cervical spine precautions are present. Proper tube placement is confirmed through capnography, auscultation, and chest movement observation.

Rapid sequence induction is often applied in situations requiring immediate airway control while minimizing risk of gastric aspiration. This technique involves administration of sedative and neuromuscular blocking agents in quick succession, followed by prompt intubation. Pre-planned drug selection and timing are essential to maintain stability during the process.

In cases of anticipated difficult airway, awake intubation may be performed. This approach maintains spontaneous breathing while securing the airway under local anesthesia and mild sedation. Fiber optic bronchoscopy is frequently used in such scenarios to guide tube placement with minimal discomfort and reduced risk of airway collapse.

Post-intubation management includes ensuring appropriate ventilation settings, monitoring oxygenation and preventing complications such as tube displacement or blockage. Continuous capnography monitoring is used to confirm ongoing airway patency and ventilation efficiency. Sedation and analgesia are maintained to ensure patient comfort and synchrony with mechanical ventilation when required.

Complications related to airway management may include trauma to oral or pharyngeal structures, esophageal intubation, hypoxia, or aspiration. Careful technique, adequate preparation, and use of visualization tools reduce the likelihood of such events. Training and repeated clinical exposure significantly improve procedural success rates and decision-making under pressure.

Airway management in pediatric and geriatric populations requires special attention due to anatomical and physiological differences. Pediatric airways are smaller and more prone to obstruction, while elderly patients may present with reduced neck mobility and comorbid conditions affecting respiratory function. Adjustments in equipment size and technique selection are necessary in these groups.

Technological advancements have improved airway management practices, particularly through enhanced imaging systems and portable devices. Video laryngoscopes, portable ultrasound, and

Correspondence to: Thomas Baird, Department of Perioperative Anesthesia and Critical Care, University of Glasgow, Glasgow, United Kingdom. E-mail: thomas.baird@research.org

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disposable airway tools have increased accessibility and safety in both hospital and pre-hospital environments. Simulation-based training programs are also widely used to improve clinician preparedness and procedural confidence.

Ongoing development in pharmacology and device engineering continues to influence airway management practices. Improved sedative agents with rapid onset and short duration allow better control during airway procedures. Similarly, refined airway devices with improved ergonomics contribute to easier insertion and better sealing capabilities.

Airway management strategies remain a dynamic field requiring continuous learning and adaptation. Clinical judgment, technical skill, and preparedness for alternative approaches all contribute to effective patient care across surgical, emergency, and critical care settings.