Management of the Difficult Airway

Introduction

- Currently there is no standardized definition of the difficult airway. The American Society of Anesthesiologists (ASA) Task Force on Management of Difficult Airway defines a difficult airway as “the clinical situation in which a conventionally trained anesthesiologist experiences difficulty with facemask ventilation of the upper airway, difficulty with tracheal intubation, or both.”
  

- Hillel A, et al., discuss the otolaryngologist’s role in difficult airway using their unique set of skills and knowledge that can be critical in management of difficult airways. Presence of an otolaryngologist is associated with decreased rate of cricothyroidotomy using specialized techniques specific to their field.
  

- While the incidence of difficult airway complications are low, rates of morbidity, mortality due to delayed oxygenation and ventilation are high and can result in anoxic brain injury, severe harm, and death. Difficult airway complications are associated with higher rates of litigation.
  

Pathophysiology

- Difficult airway arise due to the interactions between patient factors, human factors, available resources, and the practitioners’ skills both during intubation and extubation. Emergency airway management outside of the operating room has higher rates of difficult intubation 9-12% and higher complication rates of 4.2-28%.
  ○ O'Dell K identified patient factors contributing to difficult airway as previous history of difficult intubation, head and neck radiation, obstructive sleep apnea, obesity, cervical spine, neck mass, congenital malformations, and obstructing airway disorders.
  ○ Limitations to the awake techniques due to mental retardation, intoxication, noncooperation, or in pediatric populations can make airway management complex.
  ○ Pregnancy can contribute to difficult airway management due to rapid hypoxemia after induction, difficult mask ventilation, airway edema, increased aspiration risk, and risk of airway bleeding.
  ○ The National Audit Project (NAP4), a comprehensive review of major airway complications in the United Kingdom, identified human factors contributing to adverse outcomes in 40% of difficult airways identifying “failure to plan for failure” as the most common problem. These factors include: lack of clarity of team structure, poor leadership, failures of communication, failures to cope with stressful environment, failure to formulate, communicate and implement backup plans, fixation error.

Indications
  ○ Difficult airway management in indicated for all patients with known or anticipated difficult airway during both intubation and extubation inside and outside of the operating
room. A review of US airway litigations reveals higher litigation and complication rates during extubation over intubation/induction.


- Difficult airway management also applies to the unanticipated difficult airway which accounts for 1-3% of all intubations with even higher rates outside of the operating room.

**Treatment Method**

- Anesthesiologists in many countries have developed evidence-based practice guidelines through anesthesia societies and within institutions including the ASA guidelines in the United States. However there is no accepted gold standard for management of the difficult airway. It is important to be familiar with the institutional algorithms and airway resources, to conduct a thorough airway evaluation, and to develop a multi-disciplinary airway plan including a back-up plan for failed intubation.

- According to a 2018 Cochrane review, all bedside airway examination tests had relatively low sensitivities with high variability and higher specificities making them poor screening tests. The upper lip bite test was the most favorable diagnostic test for a difficult airway.

- There are many available tools to obtain tracheal intubation to provide adequate oxygenation and ventilation including, but not exclusively, direct laryngoscopy, video laryngoscopy, supraglottic airway, bronchoscopy, suspension laryngoscopy (e.g. Dedo, Hollinger laryngoscopes), tracheostomy, cricothyroidotomy, and awake intubations. The
2013 ASA and 2015 DAS difficult airway guidelines include pathways to cancel elective case/intubation or waken the patient to prevent morbidity and mortality.


  - Adequate knowledge and technical skills with airway equipment, intubation, fiberoptic techniques, and surgical airways are necessary to appropriately apply difficult airway guidelines. This requires appropriate technical training and education for all provider levels.


- The Medic-Alert Foundation is a non-profit organization created to help with preparedness by providing identification bracelets and a database with the patients’ in depth airway histories and previous airway management plans.


- Mark L, et al., report that many complications occur during emergency airway management outside of the operating room. Implementation of a difficult airway response teams is associated with decreased rates of airway-related adverse events and morbidity.


Management of Complications

- Complications in difficult airway are rare but can become significantly morbid and fatal: aspiration, major airway trauma, hypoxia, cardiopulmonary arrest, anoxic brain injury, and death. Emergency airway access (e.g. cricothyroidotomy) should not be considered a complication in itself.

Extracorporeal membrane oxygenation (ECMO) and cardiopulmonary bypass (CPB) has been demonstrated to be a safe alternative for airway management in the elective setting. Malpas G, et al. review of 45 cases where ECMO and CPB was delivered safely in patients with complex airway disorders.


Multi-disciplinary, evidenced-based preparedness and management is critical for avoidance of airway complication through institutional and individual preparedness, careful assessment, good planning and judgement, good communication and teamwork, knowledge and use of a range of techniques and devices, and a willingness to stop performing techniques when they are failing. Difficult airway teams provide a cost effective strategy for management of emergency airways outside of the operating room.