



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.”
 - Apfelbaum JL, et al. Practice Guidelines for Management of the Difficult Airway: An updated report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. *Anesthesiology* 2013;118:251-70. PMID: 23364566
- 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.
 - Hillel AT, et al. A novel role for otolaryngologists in the multidisciplinary difficult airway response team. *Laryngoscope* 2015;125(3):640-4. PMID: 25251732.
- 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.
 - Frerk C, et al. Difficult Airway Society guidelines for management of unanticipated difficult intubation in adults. *Br J Anaesth.* 2015 Dec;115(6)827-48. PMID: 26556848

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%.



- Mark L, et al. Difficult Airway Response Team: A Novel Quality Improvement Program for Managing Hospital-Wide Airway Emergencies. *Anesth Analg*. 2015 Jul;121(1):127-39. PMID: 26086513.
- 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.
 - O'Dell, K. Predictors of difficult intubation and the otolaryngology perioperative consult. *Anesthesiol Clin*. 2015 Jun;33(2):279-90. PMID: 25999002.
- Limitations to the awake techniques due to mental retardation, intoxication, noncooperation, or in pediatric populations can make airway management complex.
 - Mark L, et al. General considerations of anesthesia and management of the difficult airway. In: Flint PW, editor. *Cummings otolaryngology - head and neck surgery*. 6th edition. Philadelphia: Saunders; 2015.
- 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.
 - Mushambi MC, et al. Obstetric Anaesthetists' Association and Difficult Airway Society guidelines for the management of difficult and failed tracheal intubation in obstetrics. *Anaesthesia*. 2015 Nov;70(11):1286-306. PMID: 26449292.
- 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*.
 - Frerk C, et al. Difficult Airway Society guidelines for management of unanticipated difficult intubation in adults. *Br J Anaesth*. 2015 Dec;115(6):827-48. PMID: 26556848

Indications

- Difficult airway management is 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.

- Cook TM, Woodall N, Frerk C. Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 1: anaesthesia. *Br J Anaesth*. 2011 May;106(5):617-31. PMID 21447488
- 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.
 - Mark L, et al. General considerations of anesthesia and management of the difficult airway. In: Flint PW, editor. *Cummings otolaryngology - head and neck surgery*. 6th edition. Philadelphia: Saunders; 2015.

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.
 - Artime CA, Hagberg A. Is there a gold standard for management of the difficult airway?. *Anesthesiol Clin*. 2015 Jun;33(2):233-40. PMID: 25998999.
- 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.
 - Roth D, et al. Airway physical examination tests for detection of difficult airway management in apparently normal adult patients. *Cochrane Database Syst Rev*. 2018 May 15;5. PMID: 29761867.
- 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.

- O'Dell, K. Predictors of difficult intubation and the otolaryngology perioperative consult. *Anesthesiol Clin.* 2015 Jun;33(2):279-90. PMID: 25999002.
- 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.
 - Frerk C, et al. Difficult Airway Society guidelines for management of unanticipated difficult intubation in adults. *Br J Anaesth.* 2015 Dec;115(6):827-48. PMID: 26556848.
- 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.
 - Gilchrist DJ. The Medic-Alert foundation - a non-profit health organization which protects and saves lives. *Int J Risk Saf Med.* 1990;(1):53-5. PMID: 23511506.
- 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.
 - Mark L, Lester L, Cover R, Herzer K. A Decade of Difficult Airway Response team. *Crit Care Clin.* 2018 Apr;34(2):239-251. PMID: 29482903.

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.
 - Apfelbaum JL, et al. Practice Guidelines for Management of the Difficult Airway: An updated report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. *Anesthesiology* 2013;118:251-70. PMID: 23364566.



- 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.
 - Malpas G, et al. The use of extracorporeal membrane oxygenation in the anticipated difficult airway: a case report and systematic review. *Can J Anaesth.* 2018 Jun;65(6):865-97. PMID: 29497994.
- 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.
 - Cook TM, MacDougall-Davis SR. Complications and failure of airway management. *Br J Anaesth.* 2012 Dec; 109. PMID: 23242753.
 - Mark L, Lester L, Cover R, Herzer K. A Decade of Difficult Airway Response team. *Crit Care Clin.* 2018 Apr;34(2):239-251. PMID: 29482903.