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Emergency Department Clinical Guidelines

CCT Difficult Airway Guidelines

Clinical Context and Purpose

Critically ill patients presenting to the emergency department often require active airway management and a subset of these patients represent particularly difficult airway management from an anatomic and/or physiological perspective. The goal of this clinical guideline is to provide guidance in airway assessment, identifying a difficult airway, and a stepwise interdisciplinary approach to difficult and failed airway management in the Emergency Department.

Background

Difficult Airway: an airway which has been assessed to have anatomic attributes that predict technical difficulty with the steps of endotracheal intubation; and/or an assessment of overall physiological status which predicts difficulty with patient tolerance of sedative induction agents and transition to positive pressure ventilation. A difficult airway is anticipated.

Failed Airway: an airway for which the attempted technique of intubation has failed and a backup rescue plan must be initiated. A failed airway is encountered.

Patients are intubated for failure to oxygenate, failure to ventilate, failure to protect the airway, and/or in anticipation of any of these occurring during the clinical course. Patients can also be organized into acute airway pathology/obstruction, respiratory failure due to lung disease, circulatory shock and/or metabolic acidosis, and failure to protect the airway secondary to acute neurological emergencies. Organizing patients into these subsets can identify unique airway management and immediate pre and post-intubation considerations for each indication. In addition, patients themselves can have intrinsic features that make airway management anatomically difficult. Finally, patients may also be physiologically deranged e.g. in a circulatory shock state, and therefore be vulnerable to decompensation in response to sedative induction agents and transition to positive pressure ventilation. Identifying these difficult features allows for timely and appropriate planning. Difficult airway management starts with assessing the airway, identifying anatomic and/or physiologic difficulties, and planning appropriate initial and backup plans.

Difficult Anatomic Airway Assessment

Assessment for a difficult airway should begin with a directed history and physical examination. The main goal of identifying a difficult airway is to develop appropriate primary and backup plans to successfully manage the patient's airway. The following airway attributes should be assessed for potential difficulty:

- Difficulty with patient cooperation

- Difficult mask ventilation
- Difficult supraglottic device placement
- Difficult direct or video laryngoscopy
- Difficult endotracheal tube placement
- Difficult surgical airway access

Airway Examination Component	Nonreassuring Findings
Length of upper incisors	Relatively long
Relationship of maxillary and mandibular incisors during normal jaw closure	Prominent "overbite" (maxillary incisors anterior to mandibular incisors)
Relationship of maxillary and mandibular incisors during voluntary protrusion of mandible	Patient cannot bring mandibular incisors anterior to (in front of) maxillary incisors
Interincisor distance	Less than 3 cm
Visibility of uvula	Not visible when tongue is protruded with patient in sitting position (*e.g.*, Mallampati class >2)
Shape of palate	Highly arched or very narrow
Compliance of mandibular space	Stiff, indurated, occupied by mass, or nonresilient
Thyromental distance	Less than three ordinary finger breadths
Length of neck	Short
Thickness of neck	Thick
Range of motion of head and neck	Patient cannot touch tip of chin to chest or cannot extend neck

The following mnemonics are useful for several of the above assessments:

- Direct Laryngoscopy-LEMON
  Look externally, Evaluate 3-3-2 or 3-3-1 rule, Mallampati, Obstruction/obesity, Neck mobility
- Difficult Video Laryngoscopy-CRANE
  Contamination/Cormack Lehane 3-4 view, Radiation, Abnormal Anatomy, Neck mobility, Enlarged tongue/epiglottis
- Bag Mask Ventilation-MOANS
  Mask seal, Obstruction/obesity/OSA, Age, No teeth, Stiffness
- Supraglottic Device e.g. Laryngeal Mask Airway (LMA)-RODS
  Restriction, Obstruction/obesity, Distorted anatomy, Stiff lungs
- Front of neck access (FONA), surgical cricothyroidotomy-SMART
  Surgery, Mass, Anatomy, Radiation, Tumor

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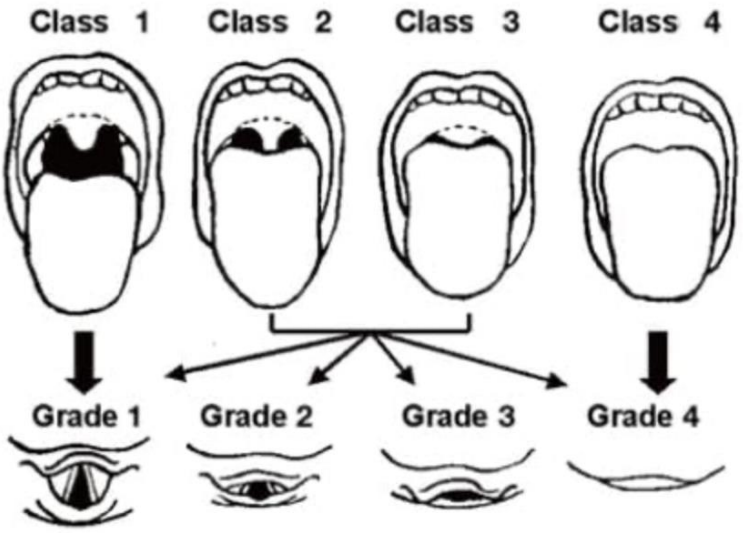

The Difficult Physiological Airway Assessment

The following are important physiological attributes to identify and appropriately address to optimize management of the difficult airway:

- Refractory hypoxemia
- Circulatory shock
- Metabolic acidosis
- Pulmonary Hypertension/RV Failure
- Neurologically Injured Patients
- Upper Gastrointestinal Bleed/Significant Emesis
- Obstetric Patient

Refractory Hypoxemia:

- Patients should be maximally preoxygenated prior to intubation attempts, achieved by providing high-flow oxygen for 3 minutes or 8 vital capacity breaths; ideally in an upright position when possible.
- Apneic oxygenation achieved by application of oxygen by standard or high flow nasal cannula throughout the apneic period may extend the safe apnea time.
- A tight-fitting non-invasive face mask or assisted spontaneous respirations with a BVM and PEEP valve can be used to preoxygenate patients if positive pressure is required to achieve adequate oxygen saturations, e.g. in the setting of significant shunt physiology or decreased functional residual capacity.
- Inhaled pulmonary vasodilators can be considered to improve VQ mismatch in severe hypoxemia.
- If agitation is preventing appropriate preoxygenation, a technique of delayed-sequence intubation using ketamine can be considered.

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Circulatory Shock:

- IV access should be obtained to facilitate IV fluid and/or blood product administration, in the setting of hypovolemic shock states, with fluids administered ideally prior to intubation to prevent hemodynamic collapse.
- When vasopressor agents are indicated and/or in anticipation of hemodynamic collapse, infusions or push doses should be administered prior to intubation when the setting permits.
- Hemodynamically neutral induction agents should be used.

Metabolic Acidosis:

- Prolonged apnea time can lead to clinical deterioration.
- Immediate post-intubation management should optimize the set ventilator respiratory rate and tidal volume (minute ventilation).

Pulmonary Hypertension:

- There is a significant risk of clinical deterioration in the setting of RV dysfunction/failure with the transition to positive pressure ventilation.
- Patients at risk for RV dysfunction/failure should have a right heart evaluation by bedside ECHO to properly identify patients who may benefit from fluids and/or vasoactive agents to optimize intubating conditions.
- Diuresis should be considered in the setting of RV volume overload.
- Inhaled pulmonary vasodilators can be considered to improve VQ mismatch in severe hypoxemia in this setting.
- Mean arterial pressure should be optimized to promote coronary perfusion pressure and hypercapnia should be avoided.
- Post-intubation management should target lower mean airway pressures.

Neurologically Injured Patients:

- Eucapnia should be maintained peri-intubation and patients should be positioned 30 degrees upright when possible.
- Hemodynamically neutral agents should be used.
- Post-intubation management should limit high PEEP to promote cerebral venous drainage.

Upper Gastrointestinal Bleed/Significant Emesis:

- Fluids, blood products, and/or vasoactive agents should be administered early in the resuscitation if there is hemodynamic instability.
- Maintain head of bed elevation and optimize gastric emptying with double set up suction, consideration to placement of nasogastric tube, and/or administering prokinetic agents e.g. metoclopramide.
- Avoid aggressive BVM to decrease the risk of gastric insufflation and aspiration.
- In the setting of a significantly soiled airway or vomitus, consider applying suction-assisted laryngoscopy airway decontamination technique.

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Obstetric Patient:

- The following should be anticipated in the obstetric patient: increased upper airway edema and vascularity; increased Mallampati scores as pregnancy progresses; decreased functional residual capacity and increased oxygen requirements; and decreased lower esophageal sphincter tone. These increase the risk for airway swelling and bleeding, potentially more difficult airway and glottic views, more rapid desaturation, and increased reflux with risk of aspiration.
- Positioning for preoxygenation, continued apneic oxygenation, and intubation should ideally be in the appropriately ramped up position.
- In this setting refer to Code 54 guidelines for activation of Code 54.

Summary

It is important to consider multiple aspects of the difficult airway assessment discussed above when developing a plan. If based on the above anatomic and physiological assessments, difficulty is predicted, steps should be taken directed at the cause for difficulty in order to increase the chances for successful intubation. In addition to the above assessments, on occasion awake nasopharyngoscopy, review of imaging, and bedside ultrasound can be utilized to augment the difficult airway assessment. Optimizing airway management when there is predicted difficulty includes but is not limited to the use of airway repositioning maneuvers, airway adjuncts e.g. oral and nasopharyngeal airways, optimal patient positioning, apneic oxygenation, non-invasive ventilation or high flow nasal cannula for pre-oxygenation, external laryngeal manipulation, gum-elastic bougie, supraglottic devices, video laryngoscopy and/or flexible intubating bronchoscope. In the rare event of a cannot intubate, cannot oxygenate patient, front of neck access via surgical cricothyroidotomy can be performed. During the management of the difficult airway, the primary and backup plans should be clearly communicated to the resuscitation team. Finally, difficult airway management may benefit from a collaborative interdisciplinary approach involving different subspecialists including but not limited to Emergency Medicine, Critical Care, Anesthesia, ENT, and General Surgery.

Resources/References

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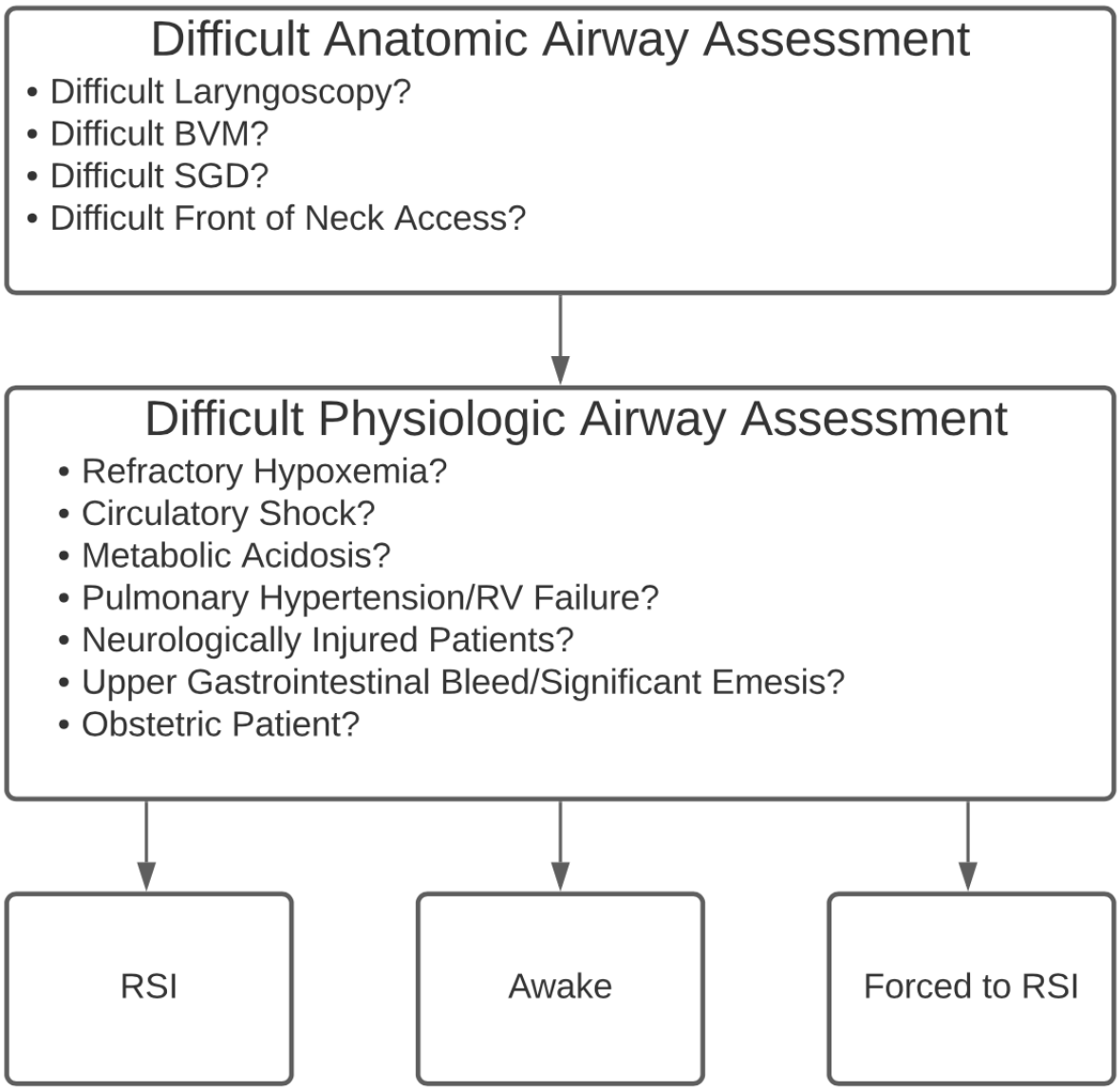
Effective Date:

Difficult and Failed Airway Algorithms



- Difficult airway management begins with an assessment of anatomic difficulty as well as physiologic difficulty. Together these assessments should prompt planning aimed at optimizing successful intubation based on the difficult attributes of the patient's airway.
- In the vast majority of cases, rapid sequence intubation (RSI) will be the optimal plan for intubation as long as methods aimed at addressing areas of predicted difficulty are implemented.

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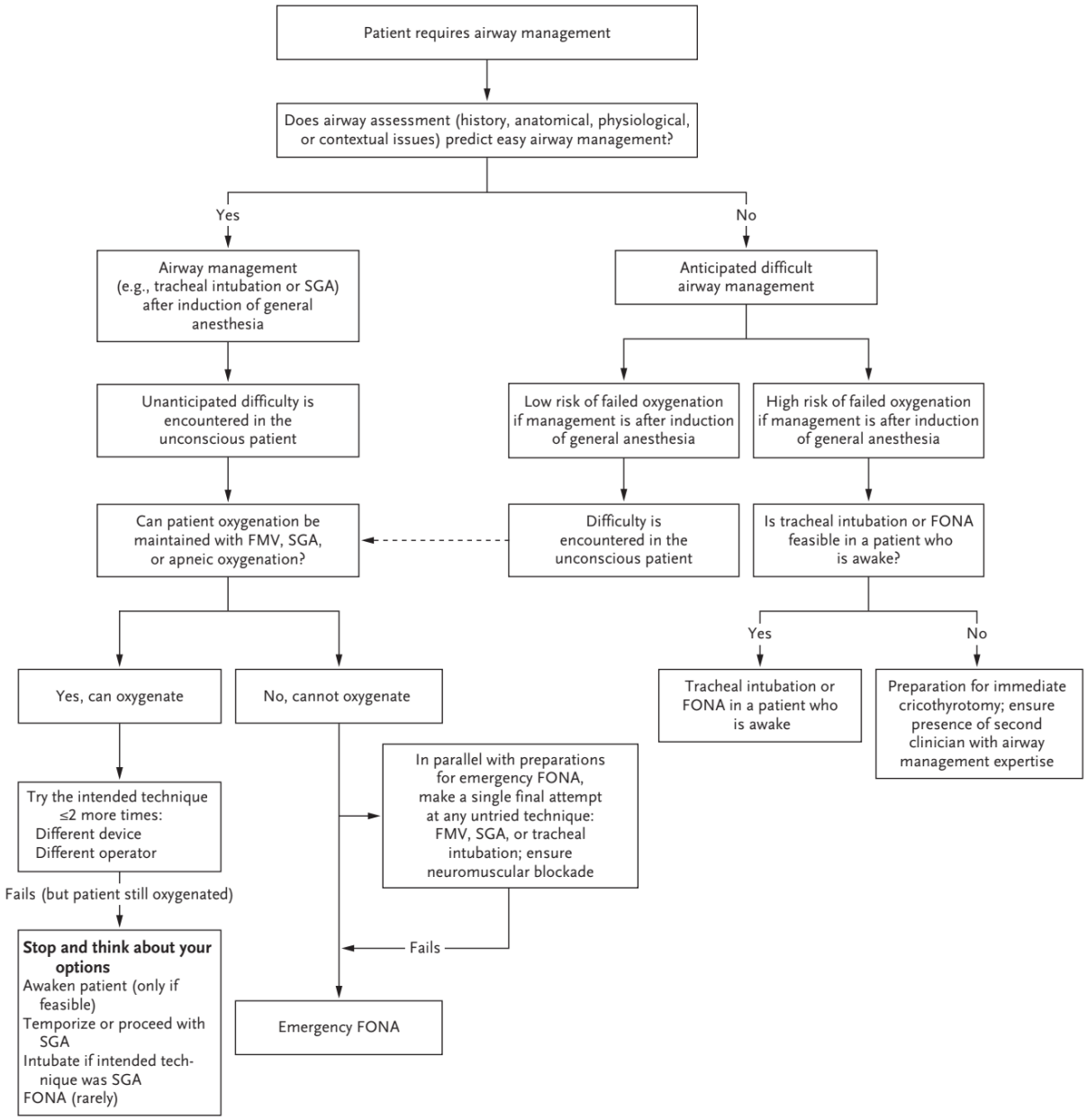
- If agitation is preventing appropriate preoxygenation, a technique of delayed-sequence intubation using ketamine can be considered.
- Patients with anticipated difficulty with intubation, BVM, placement of SGD, and front of neck access may benefit from awake intubation, however if the patient is in significant respiratory distress or in extremis, is hemodynamically unstable, and/or is uncooperative, attempted RSI may be necessary with a double set up for front of neck access.
- Rescue and backup plans should be based on what is predicted to fail in the initial plan.
- See algorithms below for managing unsuccessful initial intubation attempts:



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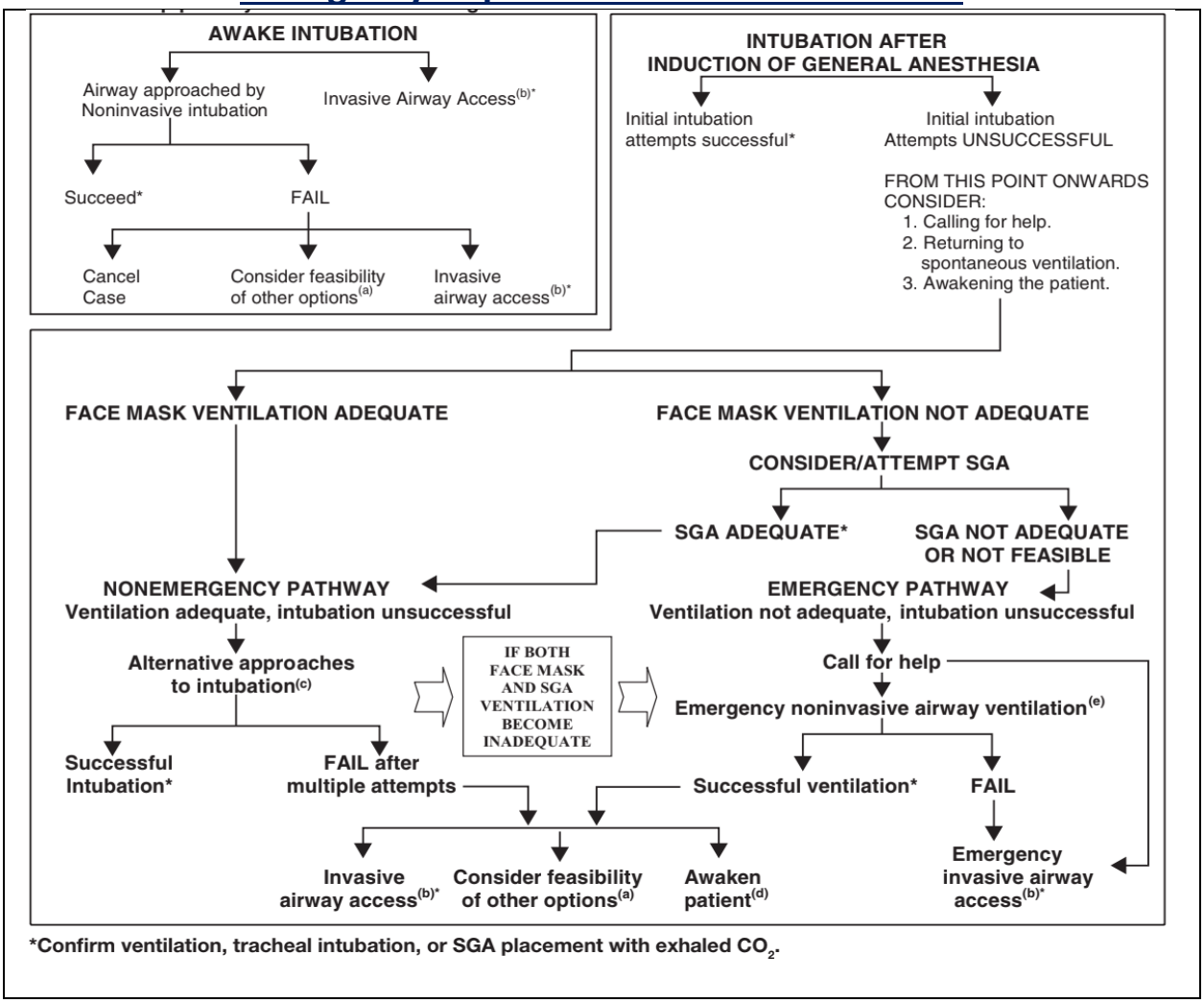

*Confirm ventilation, tracheal intubation, or SGA placement with exhaled CO_2.

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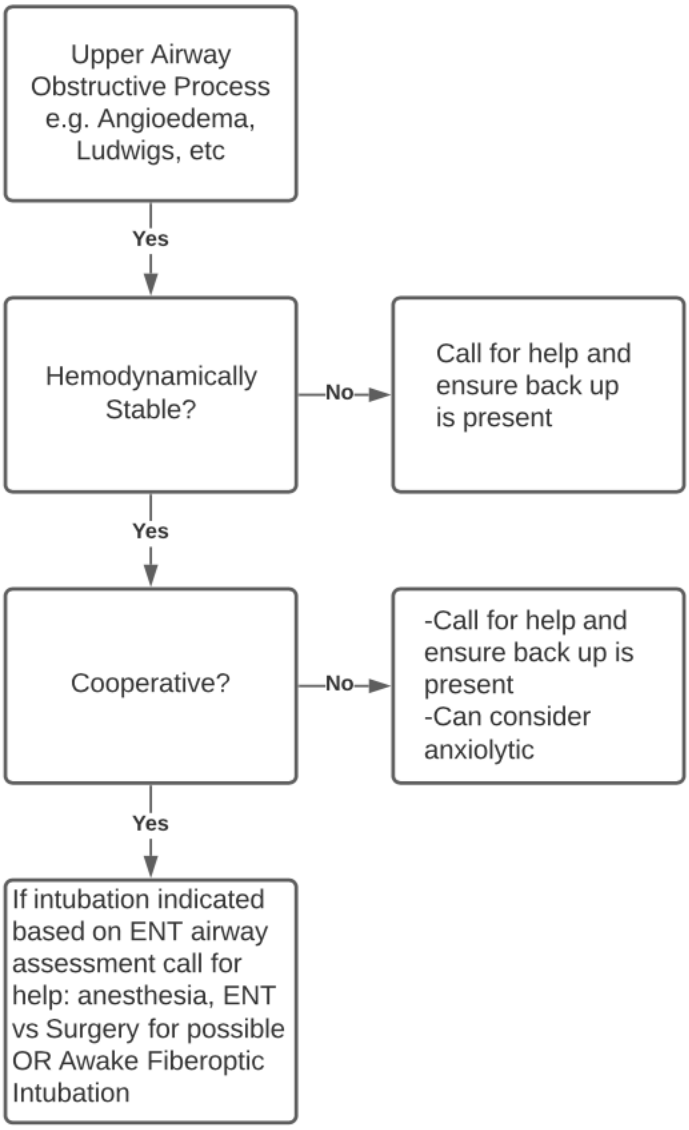
Upper Airway Obstruction Algorithm



- Calling for help may involve calling another emergency medicine attending, anesthesia for assistance and back up, or a Code 88 depending on the patient's stability and the urgency of the case, as well as ENT and/or Surgery.
- If the patient is in severe respiratory distress and in extremis and if the airway operator is forced to act, consider preparation with double set up and/or consider direct front of neck surgical airway.

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Disposable Bronchoscope Guidelines

When to consider BFlex Disposable Bronchoscope:

-Predicted and/or encountered difficulty with direct/video laryngoscopy (open package only when plan to use).
-Split Screen Feature of GlideScope Core can assist in facilitating intubation when difficult video laryngoscopy and intubation is encountered; requires two airway operators.
-In upper airway obstruction, consult with appropriate sub-specialty services e.g. Anesthesia, ENT and/or Surgery when Awake Fiberoptic Intubation is being considered and for help/back up with patients in extremis; ideally patient should be transferred to the OR while maintaining spontaneous ventilation for awake fiberoptic intubation.
-Important: use of the BFlex disposable bronchoscope does NOT equate with performing Awake Intubation

Appendix

GlideScope Core

CCT Airway Box