Chapter 1 – Airway

NOTE: EPISODE CONTENT IS BASED ON ROSEN'S EMERGENCY MEDICINE (9TH ED.)

NOTE: Italicized text is quoted directly from Rosen's.

Key Concepts:

1. *Anticipating the clinical course of the patient's condition and assessing the likelihood of deterioration are crucial to the decision to intubate, especially if the patient is to leave the ED for a period of time (e.g., interfacility transfer, diagnostic testing).*
2. *Assessment of the patient for potential difficulty with intubation, bag-valve mask ventilation, ventilation using an extraglottic airway device (EGD), and cricothyrotomy is an essential step before a neuromuscular blocking agent is administered. The mnemonics LEMON, MOANS, RODS, and SMART can serve as useful aids.*
3. *In the absence of a crash patient (agonal, unresponsive to laryngoscopy) or a difficult airway, rapid sequence intubation (RSI) is the airway management method of choice for the ED patient.*
4. *Tube placement confirmation using end-tidal carbon dioxide is essential after intubation; failure to detect adequate quantities of exhaled carbon dioxide is evidence of esophageal intubation until proven otherwise.*
5. *Video laryngoscopy has transformed intubation by eliminating many traditional anatomic barriers to direct laryngoscopy. Practitioners responsible for emergency airway management should transition their routine airway management from direct to video laryngoscopy.*
6. *Cricothyrotomy is indicated in the can't intubate, can't oxygenate failed airway situation and should be performed without hesitation once this has been identified. Delays may increase the likelihood or severity of hypoxic injury to the patient.*
7. *Emergency airway management is evolving, and modern intubators should be aware of these fundamental changes. Video laryngoscopy is replacing direct laryngoscopy as the tool of choice for emergency airway management. Etomidate is used in 90% of all RSI's, and rocuronium use had been increasing. EGD's, such as laryngeal mask airways, are continually evolving, offering additional options for rescue oxygenation of the failed airway.*

Core Questions:

1. What are the indications for intubation?
2. List the components of an airway exam.
3. What are the predictors of difficulty in the following situations:
    a. Intubation (LEMON)

   b. Bag valve mask ventilation (MOANS)
   c. Extraglottic device (RODS)
   d. Cricothyroidotomy (SMART)
4. What are the physiologic predictors of difficulty?
5. What is rapid sequence intubation (RSI) and when is it used?
   a. List the 7 P's of RSI.
6. Describe an approach to the airway with no anticipated difficulty.
7. Describe an approach to the airway with anticipated difficulty.
8. Describe an approach to the crash airway.
9. Describe an approach to the failed airway.
10. How do you perform a surgical cricothyroidotomy?
11. List common induction agents and paralytics.

Wisecracks:

1. Describe an example airway plan. (Plan A, B, C, D…)
2. List maneuvers used to open the airway and maintain a patent airway.
3. What is a laryngeal mask airway (LMA) and when is it used? How are LMA's sized?
4. Does presence of a gag reflex correlate with ability to protect an airway?
5. How do you examine for airway obstruction? Spaced repetition from Q2. (the S's! https://canadiem.org/basic-airway-assessment-easy-1-2-3/)

Rosen's in Perspective

Airway management is perhaps one of the most important topics in Emergency Medicine. Clinicians in this field must be well-equipped with knowledge of airway anatomy, the physiologic changes occurring as a result of intubation, and the pharmacology of induction medications. We must be familiar with and competent in employing all manner of airway management devices, from oropharyngeal airways to cricothyrotomy set-ups. This episode should give you an adequate introduction to the topics relevant to airway management in the ED, giving you the tools and baseline knowledge to truly become an expert in this field.

Recognize that each question here is a potential podcast in its own right - this is meant to serve as a jumping point for further learning.

Core Questions:

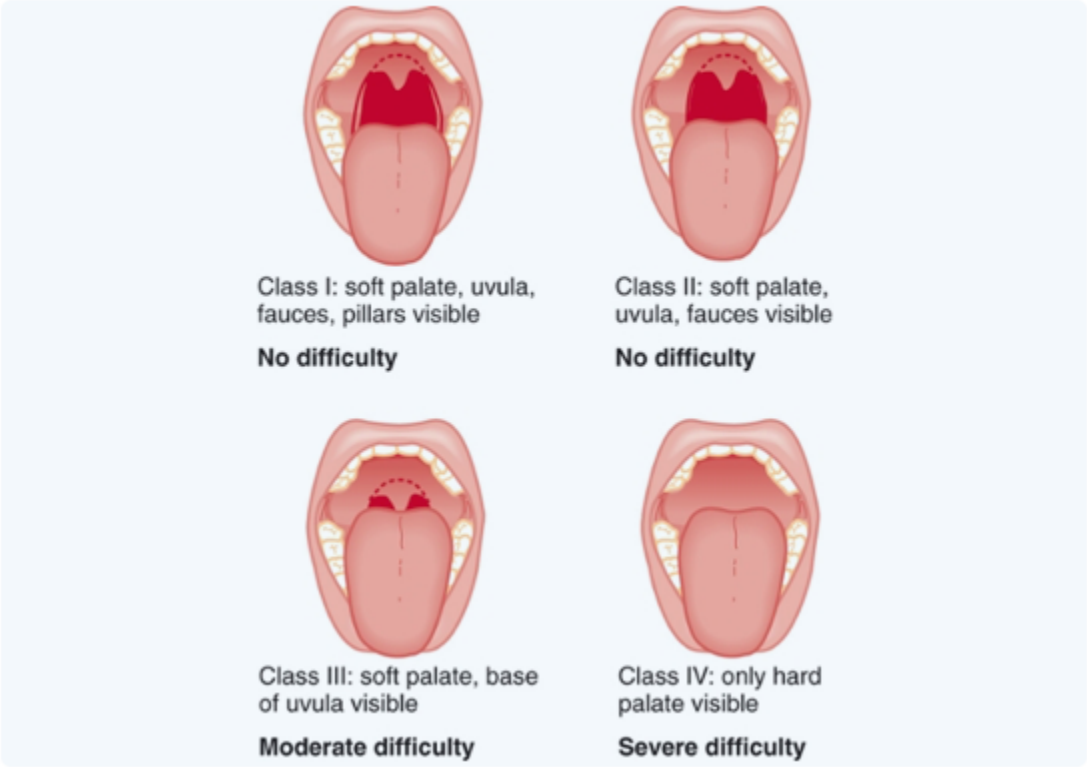
[1] What are the indications for intubation?

1. Failure to oxygenate
2. Failure to ventilate
3. Failure to protect the airway
4. Predicted clinical course

[2] List the components of an airway exam (LEMON).

We will explore this in depth in the next question. Some things to exam are:

- **Look externally:**
  - Body Habitus (obesity or pregnancy)
  - GCS/Altered LOC
  - Combative?
  - External signs of trauma or burns?
- **Evaluate 3-3-2**: Mouth opening (3 fingers), thyromental distance (3 fingers) and thyrohyoid distance (2 fingers).
  - Get the patient to extend their mandible outwards - bite upper lip with bottom teeth. (retrognathia + high riding larynx = difficulty tube!)
  - Dentition - caps, crowns, loose or missing teeth.
  - Does the patient have Dentures? Teeth in to ventilate, teeth out to intubate.
- **Mallampati** score (Figure 1.3)



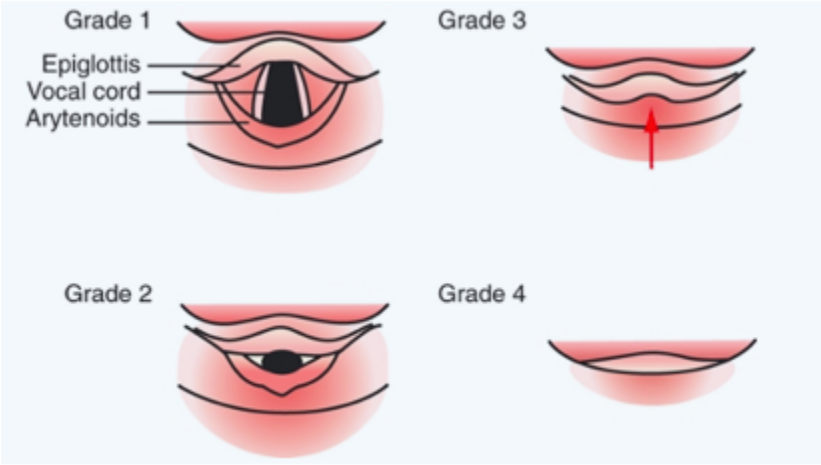
- **Obstruction/Obesity**
  - General assessment of body habitus
  - Pregnancy is a predictor of difficulty
  - Signs of airway obstruction (The S's)
    - Silent Chest, See-Saw Chest
    - Secretions

        - Snoring (tongue relaxation)
        - Smash (teeth/blood in airway)
        - Stridor
        - Singe/sputum (carbonaceous) - risk of airway burns
        - Stab/swelling (impending obstruction by hematoma)
        - Sleepy - low GCS (unable to protect the airway)
        - Angioedema/Ludwig's angina
        - Etc.
- **Neck Mobility**
    - C-spine precautions!

[3] What are the predictors of difficulty in the following situations:

- **Intubation (LEMON) - Box 1.1**
    - Look Externally
    - Evaluate 3-3-2
    - Mallampati
    - Obstruction/Obesity
    - Neck Mobility

Cormack Lehane System - Higher Grade = higher difficulty!



- Grade 1: Full view of the glottis
- Grade 2a: Partial view of the glottis with view of arytenoids and cords
    - First pass success drops significantly from 2a to 2b.
- Grade 2b: only the arytenoids are seen
- Grade 3: only epiglottis seen
- Grade 4: neither glottis nor epiglottis seen.

- **Bag valve mask ventilation (MOANS) - Box 1.2**
    - Mask seal (beard!)
    - Obesity/OSA/obstructed

    - Age >55y
    - No Teeth
    - Stiffness (resistance to ventilation)
- **Extraglottic device (RODS) - Box 1.3**
    - Restricted mouth opening
    - Obstructed/obesity
    - Distorted anatomy
    - Stiffness (resistance to ventilation)
- **Cricothyroidotomy (SMART) - Box 1.4**
    - Surgery
    - Mass (abscess/hematoma)
    - Access/anatomy problems (obesity, edema)
    - Radiation
    - Tumor

[4] What are the physiologic predictors of difficulty?

HOP: https://emcrit.org/emcrit/hop-mnemonic/

- **Hypotension** – peri-intubation hypotension can kill people - the switch to positive pressure ventilation often means the patient's BP will drop around the time of ventilation
- **Oxygenation** – pre-intubation hypoxia or inadequate preoxygenation
- **pH** - beware of ventilating a patient with severe metabolic acidosis (e.g., ASA overdose). Also, be aware that ventilation and pCO_2 changes can impact a patient with increased ICP.

[5] What is rapid sequence intubation (RSI) and when is it used? List the 7 P's of RSI.

Rapid Sequence intubation: *"RSI is the **cornerstone of modern emergency airway management** and is defined as the nearly simultaneous administration of a potent sedative (induction) agent and NMBA, usually succinylcholine or rocuronium, for the purpose of tracheal intubation. This approach provides optimal intubating conditions and has long been thought to minimize the risk of aspiration of gastric contents."*

This is a long question.

- **Essentially, this is the technique we use when we do not predict a difficult airway.**
- *The central concept of RSI is to take the patient from the starting point (e.g., conscious, breathing spontaneously) to a state of unconsciousness with complete neuromuscular paralysis, and then to achieve intubation without interposed assisted ventilation.*
    - **This minimizes the risk of aspiration of gastric contents** (risk thought to be highest during application of positive pressure ventilation (i.e. bagging, with no advanced airway).

Seven P's of Rapid Sequence intubation (Box 1.6)

1. Preparation
2. Preoxygenation
3. Pretreatment
4. Paralysis with Induction
5. Positioning
6. Placement of Tube
7. Postintubation management

We'll dive into each of these.

Preparation

We use the mnemonic STATICS

1. **Suction**
2. **Tube**
3. **Airway** (ETT/LMA)
4. **Tape** (to secure airway)
5. **Introducer** (Stylet)
6. **Circuit** (vent) or BVM and **Capnography**
7. **Scope** (laryngoscope)

There are formal airway checklists as well.
https://emcrit.org/wp-content/uploads/2013/02/emcrit-airway-checklist-2013-02-05.pdf

Preoxygenation

As per Rosen's: *Administration of 100% oxygen for 3 minutes of normal tidal volume breathing in a normal healthy adult establishes an adequate oxygen reservoir to permit 6 to 8 minutes of safe apnea before oxygen desaturation to less than 90% occurs.*

Obviously, if the patient strays from our stereotypical 70 kg healthy adult male, our time to desaturation lessens. Obesity, degree of illness, and a host of other factors will contribute to deoxygenation, so make sure to take those into account when planning a RSI.

Pretreatment

Box 1.5: Pretreatment Agents for RSI

1. Reactive airway disease: Albuterol, 2.5 mg, by nebulizer. If time does not permit albuterol nebulizer, give lidocaine 1.5 mg/kg IV (lidocaine should be considered optional as per Rosen's, lack of convincing evidence for benefit).

2. Cardiovascular disease: Fentanyl, 3 µg/kg, to mitigate sympathetic discharge
3. Elevated ICP: Fentanyl, 3 µg/kg, to mitigate sympathetic discharge and subsequent rise in ICP

NOTE: This is what Rosen's says. Practically, realize that 3µg/kg is a lot of Fentanyl, and that hypotension/hypoxia is something we avoid at all costs in the head injured patient… so take this table with a grain of salt. Lidocaine should be considered optional as there is a lack of evidence for benefit and may disappear from airway management algorithms completely in the future.

Paralysis with Induction

Administration of induction agent (commonly, propofol or ketamine) and NMBA (rocuronium or succinylcholine) 45-60 seconds after.

Positioning

NOTE: Aim for "sniffing position"

What is this - combination of flexion of the neck on the body and extension of the head on the neck.

- The "3 axis model" classically taught may not be accurate. An alternate "2 curve" model may be more accurate. See this post: https://behindthedrape.wordpress.com/2017/01/30/perpetuation-of-three-axis-alignment-theory-and-the-sniffing-position/
- **If not C spine precautions**, a rough guide is to ensure that ear lobe is aligned with patient's sternum or anterior aspect of shoulder.
- May need to use ramping for obese patients
- Bed up head elevated (BUHE)
    - May decrease complications and improve laryngoscopic views
    - Consider using in any patient with predictors of difficult airway with no overt circulatory shock or spinal injury.
    - Lying flat - a great way to kill someone from an airway perspective. Don't lay people flat if you can avoid it! https://hemscriticalcare.com/advanced-airway/buhe-position-decreases-intubation-complications

Placement of Tube

Pass the tube under direct visualization of cords. Depth: traditional teaching of 21cm in females and 23cm in males may over/underestimate tube depth in certain patients, and a height-based approach may be more accurate.

Height (inches)		Height (cm)	ETT depth	Female 6 ml	Female 8 ml	Male 6 ml	Male 8 ml
5' 0"	60	152	19	270	360	300	400
5' 2"	62	157	20	300	400	330	440
5' 4"	64	163	20	330	440	360	470
5' 6"	66	168	21	360	470	380	510
5' 8"	68	173	21	380	510	410	550
5' 10"	70	178	22	410	550	440	580
6' 0"	72	183	23	440	580	470	620
6' 2"	74	188	23	470	620	490	660
6' 4"	76	193	24	490	660	520	690

https://emcrit.org/pulmcrit/endotracheal-tube-depth/

Confirmation of placement

1. **$ETCO_2$ after 6 breaths** (if esophageal placement, ETCO2 will wash out in this time period).
    a. Colorimetric - Yellow = $ETCO_2$ present. Purple = no end tidal. “Purple nurple”
    b. *In patients in cardiopulmonary arrest, a CO_2 level greater than 2%, which is the threshold for color change on colorimetric capnometers, should be considered definitive evidence of correct ETT placement, but the absence of such, CO_2 cannot be used reliably as an indicator of esophageal intubation. Recent resuscitation guidelines have suggested continuous quantitative measurement of $ETCO_2$ during cardiac arrest to gauge the efficacy of cardiopulmonary resuscitation.[13] This circumstance arises in approximately 25% to 40% of intubated cardiac arrest patients.*
2. **Chest Rise**
3. **Auscultation**
4. **Tube Misting**
5. **Aspiration technique**
    a. The trachea is held patent by cartilaginous rings and thus is less likely to collapse when negative pressure is applied. Vigorous aspiration of air through the ETT with the ETT cuff deflated results in occlusion of the ETT orifices by the soft walls of the esophagus, whereas aspiration after tracheal placement of the tube is easy and rapid.
6. **POCUS?**
7. **Bougie technique**
    a. *A bougie that can be passed deeply through the tube, with little or no resistance, suggests an esophageal intubation because the bougie has likely passed beyond the tube and into the stomach. If the ETT is in the trachea, the tip of the bougie will become wedged after only a few inches, likely in the right mainstem bronchus, and a vibration from contact with the anterior tracheal rings may be transmitted to the operator’s fingertips.*
8. **Radiography**
    a. Cannot confirm tracheal intubation, but can detect esophageal intubation if clearly outside of shadow of trachea.

9. **Fiberoptic scope**
    a. A fiberoptic scope can be passed through the tube to identify tracheal rings.

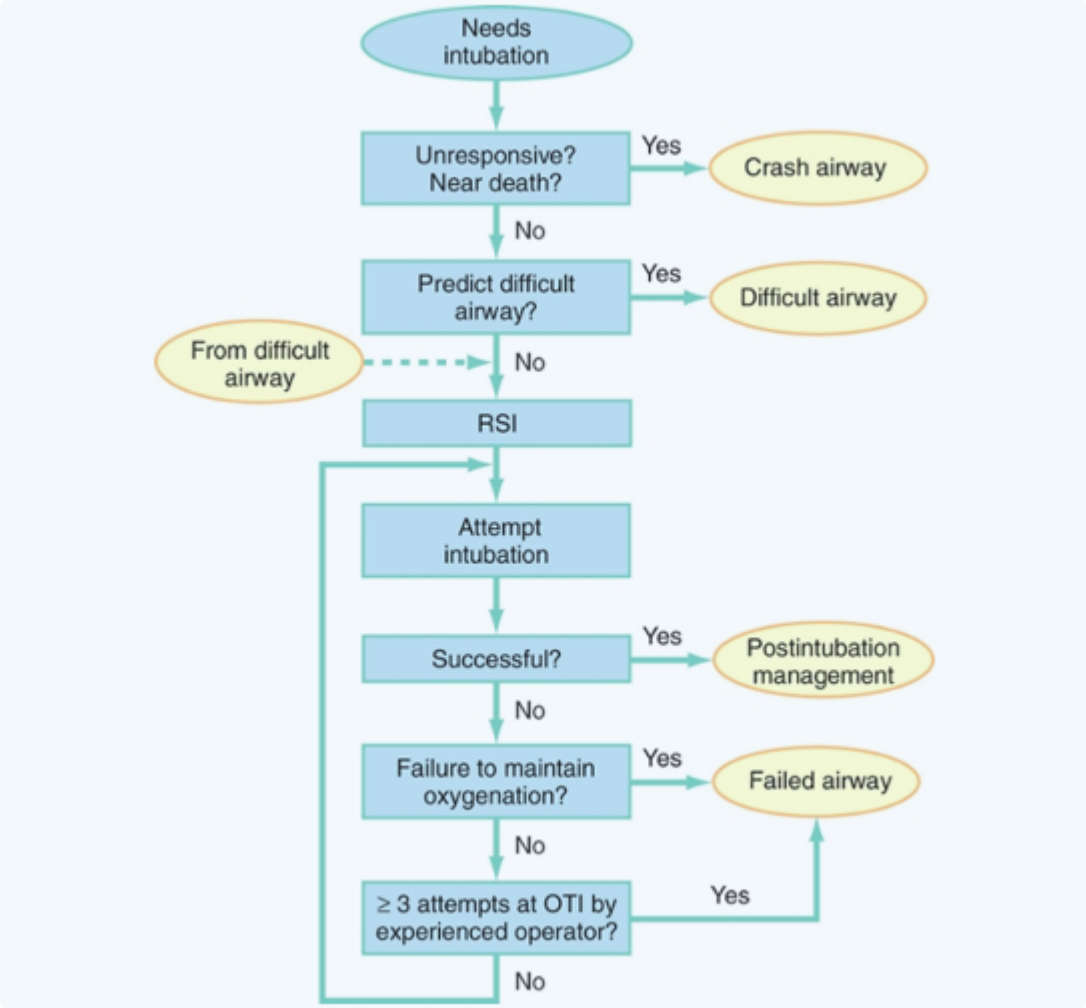
Postintubation management

1. Continuous ETCO2
2. Mechanical Ventilation
3. Chest radiograph
4. Postintubation sedation and analgesia

[6] Describe an approach to the airway with no anticipated difficulty.

We just talked about this! RSI is the cornerstone of emergency airway management in the absence of predictors of difficulty!

Figure 1.7



[7] Describe an approach to the airway with anticipated difficulty.

- Arguably, all emergency airways are “difficult.” The emergency patient requiring airway management is very different than, say, an elective surgery patient going for general anesthesia.
- This is an entire topic in itself. Again, use this podcast as a jumping off point - there are tons of good FOAM resources about this topic.
- Core principle of this approach is that **NMBAs should not be used** unless:
    - Intubation is likely to be successful
    - Oxygenation can be maintained with BVM or EGD if the patient desaturations during the attempt
    - A “Forced to Act” scenario exists (i.e. rapid deterioration towards arrest in a patient with predictors of a difficult airway - in this case, **RSI** is the way to go).

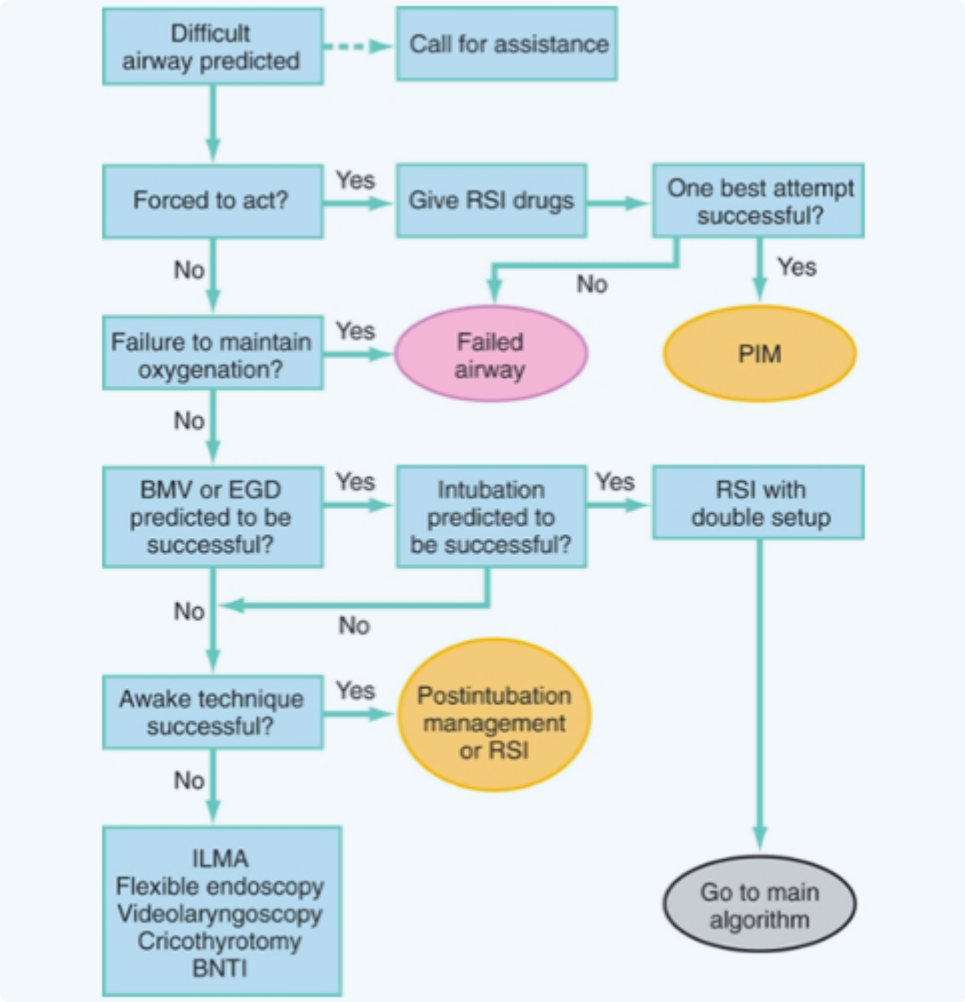


FIG. 1.9 Difficult airway algorithm. *BMV,* Bag-mask ventilation; *BNTI,* blind …

[8] Describe an approach to the crash airway.

As per Rosen's: *The first determination is whether the patient is in cardiopulmonary arrest or a state of near arrest and is likely to be unresponsive to direct laryngoscopy. Such a patient—agonal, near death, in circulatory collapse—is deemed a crash airway patient for the purposes of emergency airway management and is treated using the crash airway algorithm by an immediate intubation attempt without use of drugs; this can be supplemented by a single large dose of succinylcholine if the attempt to intubate fails, and the patient is thought not to be sufficiently relaxed (Fig. 1.8).*

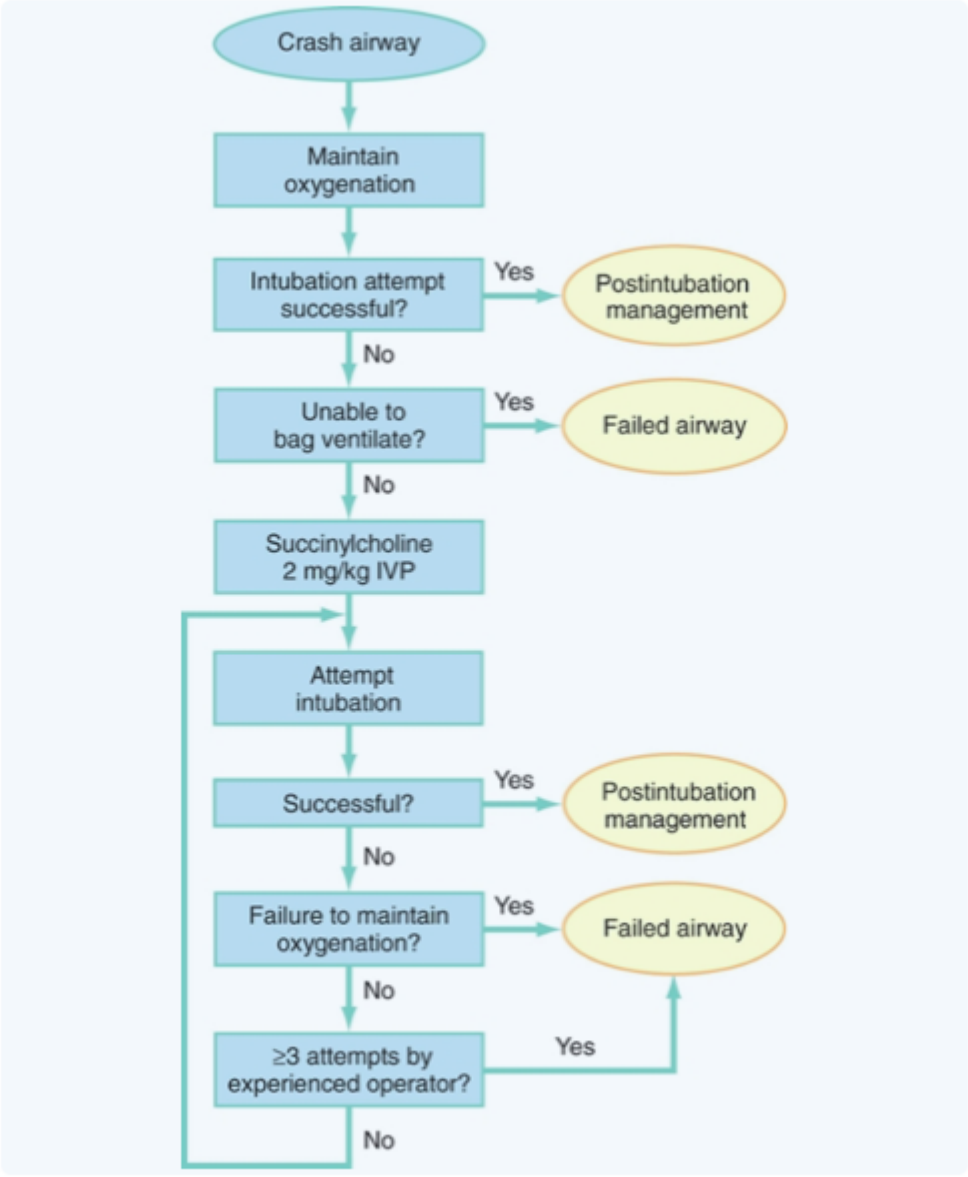


FIG. 1.8 Crash airway algorithm. *IVP,* Intravenous push. (Modified from Walls…

[9] Describe an approach to the failed airway.

Defined as:

- ≥3 intubation attempts by an experienced operator
- SpO_2 continuing to fall despite optimal use of BMV or EGD.
- "Impossible" intubation after a single attempt- i.e. grade 4 view- and no backup devices (VL, EGD) available
- **Can't Intubate, Can't ventilate? Time for a cric!**

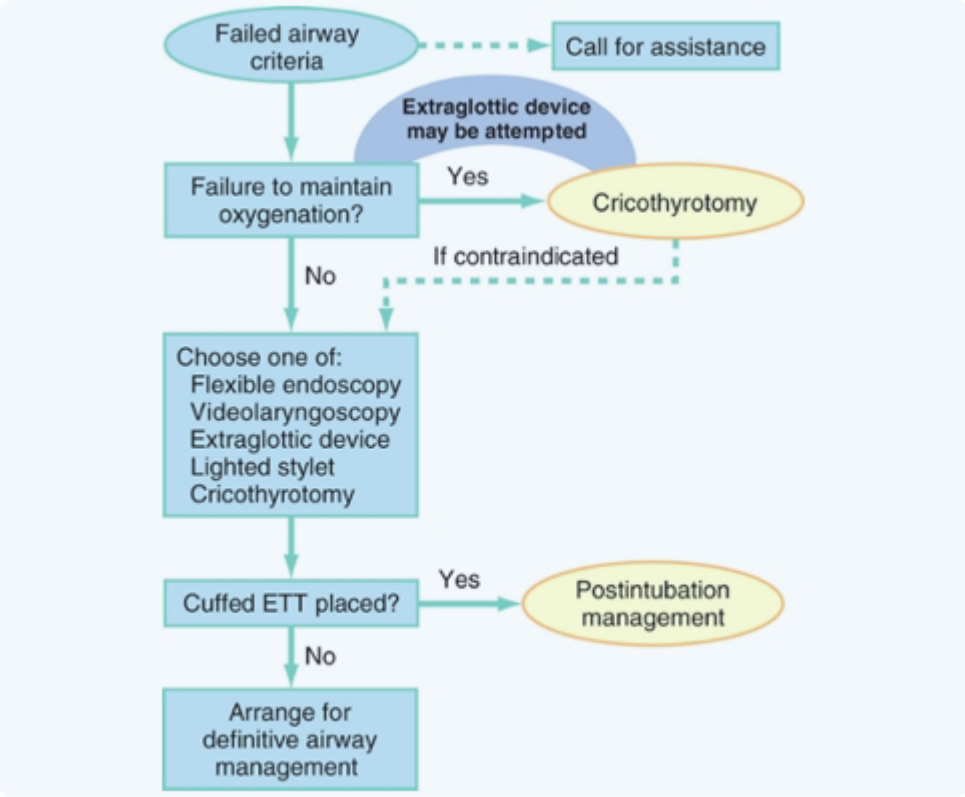


FIG. 1.10 Failed airway algorithm. *ETT,* Endotracheal tube. (Modified from W...

[10] How do you perform a surgical cricothyroidotomy?

Anatomy:

Landmarks: Cricothyroid membrane is below the thyroid cartilage and above the cricoid cartilage. These 2 landmarks are palpable on most patients.

Knife-finger-bougie approach (https://lifeinthefastlane.com/ccc/surgical-cricothyroidotomy/)

Equipment:

- Scalpel
- Artery forceps
- Bougie
- Size 6 ETT

Technique:

- Extend the neck to make anatomy easier to palpate ("laryngeal handshake")
- Stabilize thyroid cartilage with non-dominant hand.
- Hold scalpel with dominant hand, can rest on sternum for support.
- Make a 4cm vertical incision over cricothyroid membrane. (may extend from mandible to sternum if you can't palpate the anatomy)
- Palpate the cricothyroid membrane ± blunt dissect with forceps until membrane is visible.
- Make a horizontal incision through the cricothyroid membrane.
- Dilate with a gloved little finger
- Pass a bougie alongside the finger into the trachea
- Confirm bougie placement with finger (should also get holdup at the carina ± sensation of tracheal rings).
- Pass ETT over the bougie. May need to corkscrew the ETT to advance. Advance the ETT until the cuff is no longer visible.
- Hold the ETT in place and remove the bougie.
- Confirm placement with ETCO2 + adjunctive measures (CXR, misting, chest rise, etc).
- Connect to BVM!

[11] List common induction agents and paralytics.

There are a multitude of induction and paralytic agents available. We have elected to cover those agents that are most commonly used and those agents that are reviewed thoroughly in Rosen's.

Induction Agents:

- **Etomidate**
  - Imidazole derivative
  - Induction Dose: 0.3 mg/kg IV
  - Benefits:
    - Rapid onset and peak activity
    - Brief duration of action
    - Hemodynamically neutral agent; limited effects on blood pressure and heart rate after administration, making it an ideal agent to be used in the patient in shock
    - Diminished intracranial pressure (ICP), cerebral blood flow (CBF), and cerebral metabolic rate without diminishing blood pressure and cerebral

perfusion pressure (CPP), thus making it an ideal induction agent for the patient with elevated ICP
    - Downfalls:
        - Causes transient myoclonus (not typically an issue for rapid sequence intubation)
        - Causes transient adrenal suppression, diminishing cortisol levels and blunting adrenal response to ACTH
            - Argued that this could theoretically impact survival in the septic patient
            - Not been shown to have any mortality effect with one-time administration

- **Ketamine**
    - Phencyclidine derivative
    - Induction dose: 1-2 mg/kg
    - Benefits:
        - Reaches clinical effect rapidly within 30 seconds, nearing peak effects at 1-minute
        - Preserves protective airway reflexes and ventilatory drive
        - Hemodynamically neutral
        - Bronchodilatory effects in the asthmatic patient, making it the induction medication of choice in those requiring intubation in status asthmaticus
    - Downfalls:
        - Can increase cerebral metabolic rate, ICP, and CBF; this is controversial, however
        - Common to have patients have violent hallucinations and vivid dreams in the first 3 hours after waking; referred to as an “emergence reaction”
            - Administer a dose of benzodiazepine as a part of post-intubation management
- **Propofol**
    - Alkylphenol with GABA receptor stimulation activity
    - Induction dose: 1.5 mg/kg IV
    - Benefits:
        - Rapid onset of action
        - Brief duration of action
        - Diminished ICP and cerebral metabolic rate, making it ideal to use in the patient with head injuries
    - Downfalls:
        - Results in hypotension due to vasodilatory effects and direct suppression of the myocardium, making it a less ideal agent for the hemodynamically unstable patient
        - Has a soybean/lecithin vehicle, and as such, should be avoided in patients with allergies to those substances
            - Consider also avoiding if the patient has a history of anaphylactic reaction to eggs

        - Causes pain at site of administration
            - Can be limited by selecting large antecubital veins for administration and pre-treating with IV lidocaine, ketamine, or opioids

Paralytic Agents:

- **Rocuronium**
    - A competitive non-depolarizing neuromuscular blocking agent
    - RSI dosing: 1.0-1.2 mg/kg IV
    - Benefits:
        - Rapid onset of action
        - No absolute contraindications to rocuronium
        - Prolonged duration of action (approximately 50 minutes); as such, can be used post-intubation in patients who require long-term paralysis
    - Downfalls:
        - Prolonged duration of action, which would require the intubator to bag mask ventilate a patient for quite some time if intubation fails
- **Succinylcholine**
    - A non-competitive depolarizing neuromuscular blocking agent
    - Combination of two acetylcholine molecules
    - RSI dosing: 1.5 mg/kg
    - Benefits:
        - Rapid onset of action (paralysis with 45 seconds of rapid IV administration)
        - Brief duration of action (6-10 minutes in most patients)
        - Reliably produces paralysis in most patients
        - Limited common serious side effects
    - Downfalls:
        - Succinylcholine is a negative chronotrope, and can cause a self-limiting sinus bradycardia (particularly in children) that is responsive to atropine
        - Often causes widespread fasciculations that can result in myalgias after administration
        - Has multiple contraindications, most of which are due to its propensity to cause hyperkalemia
            - See Table 1.2 in Rosen's
            - Contraindicated for:
                - Burns >10% BSA
                - Crush Injury
                - Denervation Injury (CVA, SCI)
                - Neuromuscular Disease (ALS, MS, MD)
                - Intra-abdominal sepsis
        - Can cause masseter spasm
        - Can precipitate an episode of malignant hyperthermia

Wisecracks:

[1] Describe an example airway plan.

The key here is to have a clearly outlined plan that has been vocalized to the room (or to your examiner). An example airway plan for an RSI might look something like this (assuming you have gone through and gathered your equipment, chosen your induction agent/NMBA, preoxygenated the patient, etc.):

- Plan A: Attempted direct laryngoscopy ± bougie assist
- Plan B: Video laryngoscopy
- Plan C: LMA and call for additional assistance
- Plan D: if failed airway with a can't intubate, can't ventilate situation exists, surgical cricothyroidotomy.

Obviously, this would vary depending on the clinical situation!

[2] List maneuvers used to open the airway and maintain a patent airway.

Maneuvers that one can use to open the airway or maintain airway patency:

1. Head Tilt, Chin Lift
    a. This strategy can be used in the patient without a suspected or proven cervical spine injury who is displaying signs of airway compromise. To achieve this positioning, place one hand on the patient's forehead, directing force posteriorly. With your other hand, use your index a middle fingers to bring the chin anteriorly. These actions will do much to eliminate any airway obstruction and will place the patient in the ideal "sniffing position" for potential intubation.
2. Jaw Thrust
    a. This strategy can be used in the patient with suspected or proven cervical spine injury. Using your middle and index fingers on either hand, put pressure on the angle of the mandible bilaterally. This will bring the patient's tongue into a more anterior position, diminishing upper airway obstruction.

[3] What is a laryngeal mask airway (LMA) and when is it used? How are they sized?

What are they?

- Laryngeal mask airways (LMA's) are a type of extraglottic airway device that are readily used in both the in hospital and prehospital setting. These devices are typically ovoid in shape and are designed to be inserted blindly into the oropharynx of an anesthetized patient. They form a seal above the glottis and allow for ventilation through a centralized channel. Although it is designed to diminish the potential for gastric insufflation, it cannot

completely prevent some degree of it. Additionally, typical LMA's are not able to protect the patient from aspiration.

When are they used?

- LMA's are typically used in elective anesthesia cases that are of short duration. However, given their ease of use, they can be used as a backup airway in the case of a failed intubation and can be used as a temporizing measure that could be used in place of traditional bag valve mask ventilation to bridge someone to definitive airway control. LMA's can also be used in the prehospital setting to better control the airways of EMS patients.

How are they sized?

- LMA's are sized by the body weight of the patient. LITFL has a wonderful chart summarizing the sizes. We have included it below:

https://lifeinthefastlane.com/ccc/laryngeal-mask-airway-lma/

Mask Size	Weight (kg)	Age (yr)	LMA length (cm)	LMA Cuff Vol (mL)	Largest ETT (mm)
1	<5	<0.5	10	4	3.5
1.5	5-10	<1	10	5-7	4
2	6.5-20	1-5	11.5	7-10	4.5
2.5	20-30	5-10	12.5	14	5
3	30-60	10-15	19	15-20	6
4	60-80	>15	19	25-30	6.5
5	>80	>15	19	30-40	7

[4] Does presence of a gag reflex correlate with ability to protect an airway?

Answer: No.

It is important to note that the gag reflex is actually absent normally in approximately 25% of adults. The fact that it is not present does not indicate that an individual is unable to protect their airway. To truly assess an individual's capacity to protect their airway, consider the following factors:

- The patient's ability to voluntarily swallow
- The patient's ability to handle secretions
- The patient's level of consciousness
- The patient's ability to phonate in response to voice commands

[5] How do you examine for airway obstruction?

Remember, this is spaced repetition. We suggest using the "S's of Airway Pathology" exam suggested in this article to examine for airway obstruction: https://canadiem.org/basic-airway-assessment-easy-1-2-3/

Step One: Look for evidence of airway obstruction

- Ask yourself: is obstruction complete or partial?
- For complete obstruction, look for **silence** without chest rise
    - You can see typical see-saw respirations here, with the chest moving downward and the abdomen moving upward with attempted respiration
    - Remember, if you see this, you need to act immediately, as the patient is likely to arrest within seconds
- For partial obstruction, listen and look for **stridor**, **secretions**, **snoring**, **or smash (trauma)**
    - Stridor can be indicative of airway swelling or compression by hematoma
    - Secretions, typically blood or saliva, can cause airway obstruction
    - Snoring can be indicative that there is oropharyngeal relaxation
    - Smash (trauma) should raise your suspicion that teeth or blood are in the airway
- If there are any of the above S's found on examination, intervene by:
    - Jaw thrust
    - Suctioning
    - Placing an OPA
    - Providing supplemental oxygen
    - Ventilating with BVM

Step Two: Assess to see if there is a risk of anticipated airway obstruction

- Look for **singe** or **sputum** (carbonaceous) - risk for delayed airway swelling airway burns or inhalation injuries
- Look for **stab** wounds or **swelling** in the neck - assessing for risk of airway compression from a rapidly expanding hematoma or neck mass
- If any of the above S's are found on examination, intervene by:
    - Frequently reassessing
    - Intervening early
    - Consulting airway experts early

Step Three: Assess to see if there is risk of aspiration in the patient who is failing to protect their own airway

- Look for the **sleepy** patient
- The old adage "less than 8, intubate" is a decent guide, but as listed above, there are multiple factors in assessing whether someone is failing to maintain their own airway:
    - GCS
    - Accumulation of secretions in oropharynx
    - The ability of an individual to phonate
    - The ability to an individual to swallow spontaneously or on command
- If the patient seems to be failing to protect their airway, you must intervene by:
    - Addressing reversible causes of diminished LOC
    - Intubating if the patient is deteriorating, not easily roused despite interventions to address underlying pathology, or to facilitate further investigations