The Difficult Airway Algorithm:
What's New and What's Not so New

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Objectives

Difficult Airway Algorithm 2022

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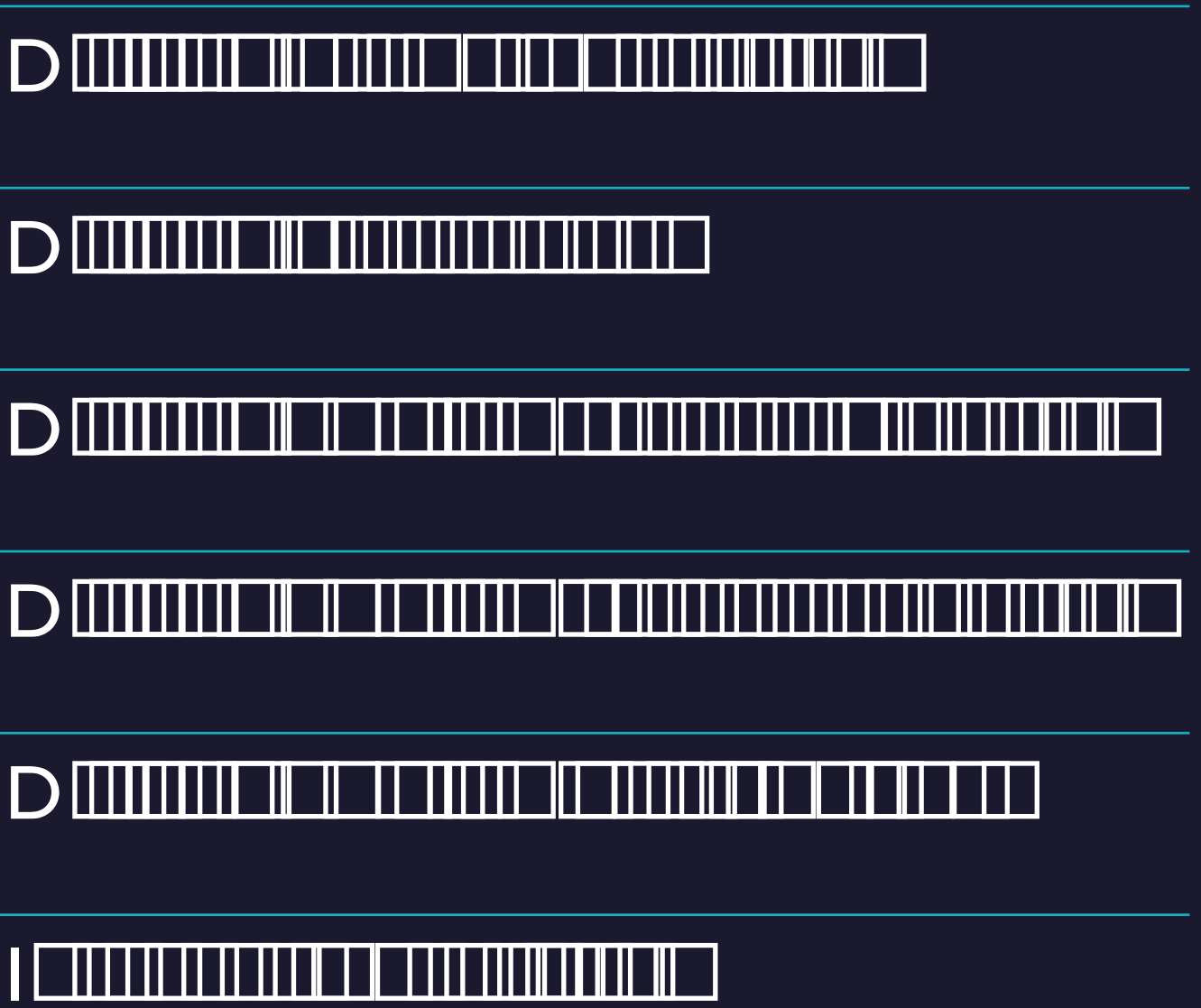
How a difficult airway is defined



Recommendations for Evaluation of the Airway

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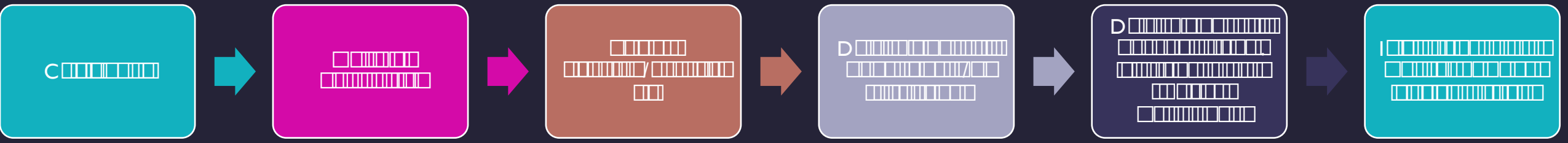
Recommendations for Preparation for Difficult Airway

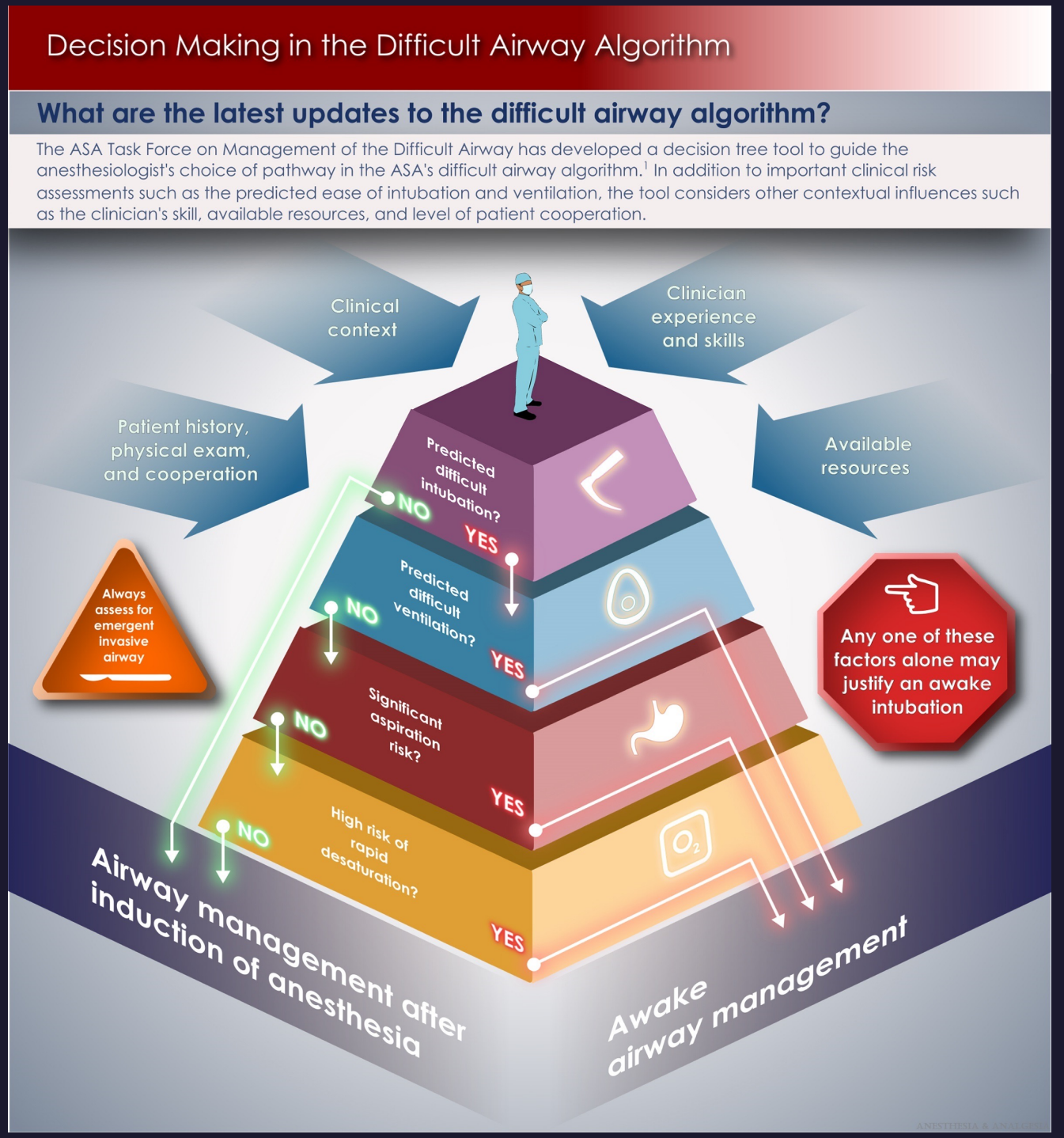
Recommendations for Anticipated Difficult Airway

- Have pre-formulated strategy for management
  - Dependent on sx, pt condition, cooperation etc)
  - Awake intubation
  - Invasive vs. non-invasive approach
- Be aware of passage of time, number of attempts and SPO2
- Test mask ventilation between attempts

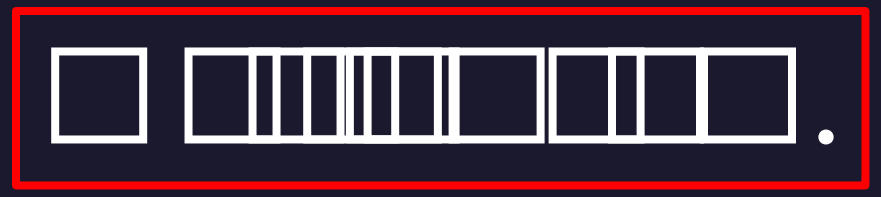
Unanticipated and Emergency Difficult Airway Management



What are the changes to the DAA



Nathan, Naveen MD. Decision Making in the Difficult Airway Algorithm. Anesthesia & Analgesia 134(5):p 909, May 2022. | DOI: 10.1213/ANE.0000000000006004



ASA DIFFICULT AIRWAY ALGORITHM: ADULT PATIENTS

Pre-Intubation: Before attempting intubation, choose between either an awake or post-induction airway strategy. Choice of strategy and technique should be made by the clinician managing the airway.[1]

Suspected difficult laryngoscopy?

- Yes → Suspected difficult ventilation with face mask/supraglottic airway?
  - Yes → Significant increased risk of aspiration?
    - Yes → Increased risk of rapid desaturation?
      - Yes → Suspected difficult emergency invasive airway
        - Yes → Proceed with intubation attempt
        - No → Always evaluate for emergency invasive airway
      - No → Always evaluate for emergency invasive airway
    - No → Always evaluate for emergency invasive airway
  - No → Always evaluate for emergency invasive airway
- No → Proceed with intubation attempt

Any one factor alone (assessed difficulty with intubation, ventilation, or aspiration or desaturation risk) may be clinically important enough to warrant an awake intubation

Other patient factors may require an alternative strategy

OPTIMIZE OXYGENATION THROUGHOUT[2]

INTUBATION ATTEMPT WITH PATIENT AWAKE

- Awake Intubation[3]
  - SUCCESS
  - FAIL → Consider other options[4]
    - FAIL → Postpone the case
- Airway electively secured by invasive access[5]

INTUBATION ATTEMPT AFTER INDUCTION OF GENERAL ANESTHESIA

- FAIL → **LIMIT ATTEMPTS** Consider calling for help
- SUCCESS

MASK VENTILATION ADEQUATE AS CONFIRMED BY CO_2

→ **NON-EMERGENCY PATHWAY**

Ventilation adequate/Intubation unsuccessful

LIMIT ATTEMPTS AND CONSIDER AWAKENING[8] THE PATIENT

Consider alternative intubation approaches,[7] invasive access[4] or the feasibility of other options[9]

- SUCCESS
- FAIL or deteriorating ventilation → **EMERGENCY PATHWAY**

MASK VENTILATION NOT ADEQUATE

CONSIDER/ATTEMPT SUPRAGLOTTIC AIRWAY[6]

- SUPRAGLOTTIC AIRWAY VENTILATION ADEQUATE → **NON-EMERGENCY PATHWAY**
- SUPRAGLOTTIC AIRWAY NOT ADEQUATE (Cannot intubate, cannot ventilate) → **EMERGENCY PATHWAY**

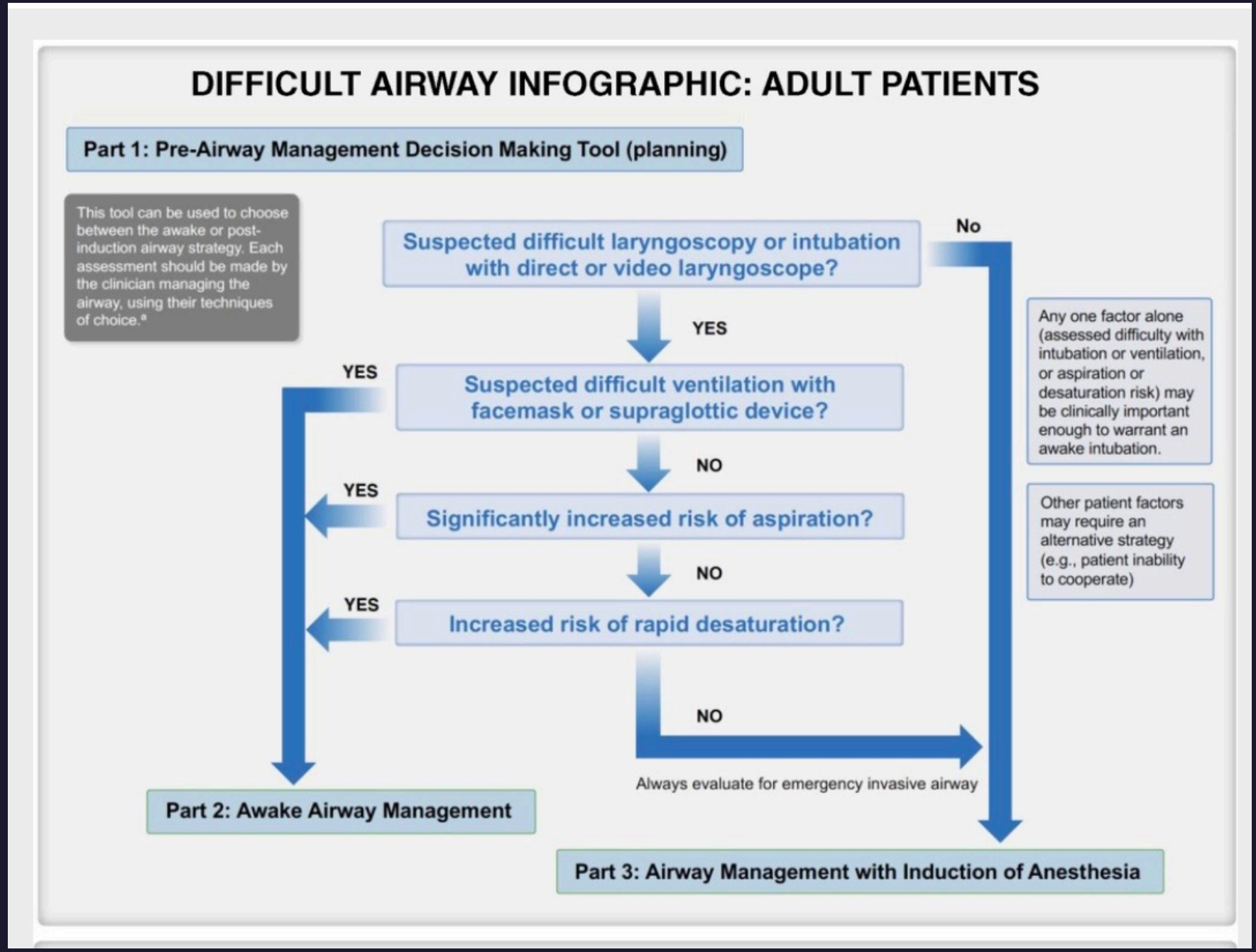
EMERGENCY PATHWAY

LIMIT ATTEMPTS AND BE AWARE OF THE PASSAGE OF TIME

CALL FOR HELP / FOR INVASIVE ACCESS

Attempt alternative intubation approaches[7] as you prepare for emergency invasive airway[5]

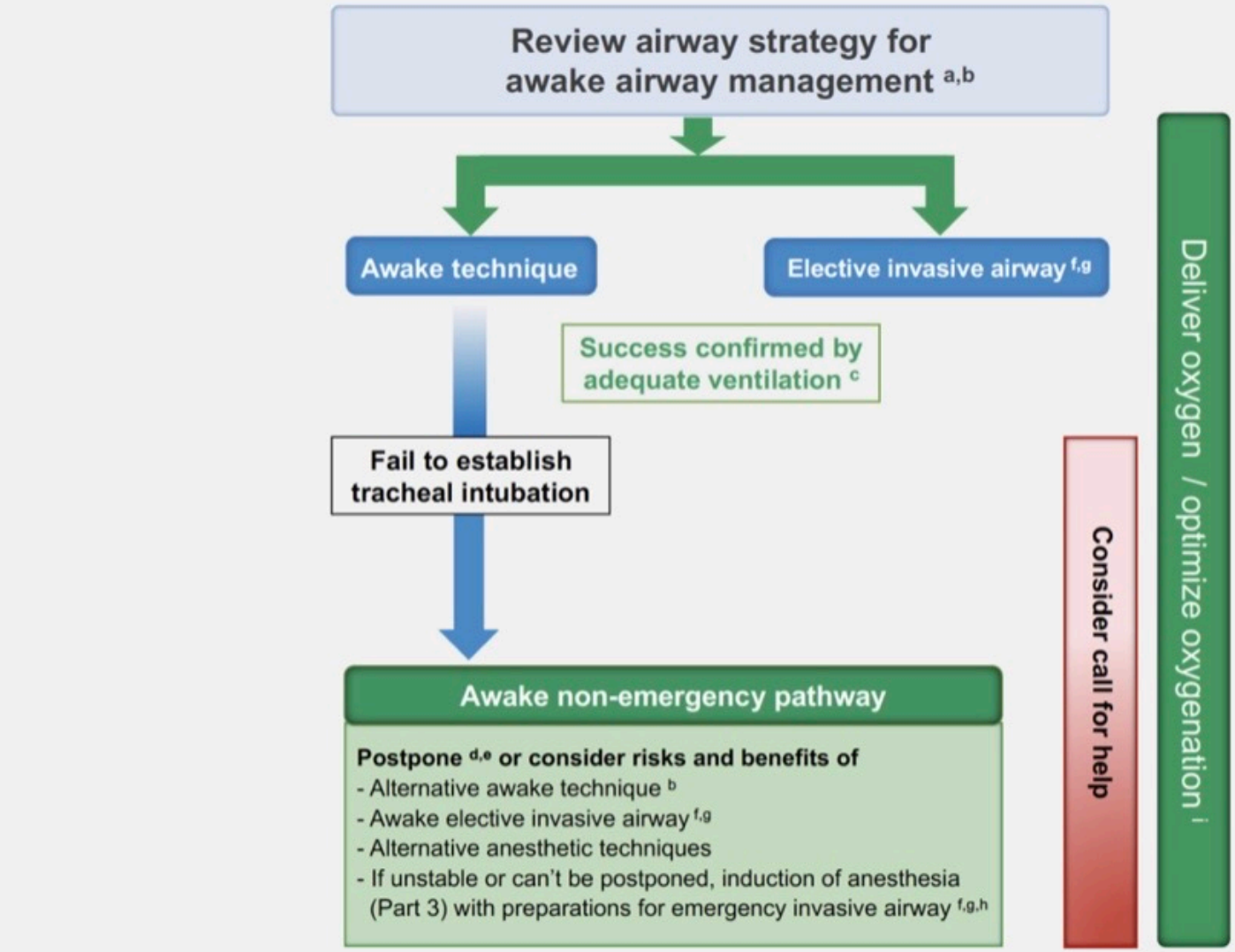
- FAIL → Emergency invasive airway[5]
- SUCCESS


DIFFICULT AIRWAY INFOGRAPHIC: ADULT PATIENTS
Part 1: Pre-Airway Management Decision Making Tool (planning)
This tool can be used to choose between the awake or post-induction airway strategy. Each assessment should be made by the clinician managing the airway, using their techniques of choice.[a]
Suspected difficult laryngoscopy or intubation with direct or video laryngoscope?
No
YES
Suspected difficult ventilation with facemask or supraglottic device?
YES
NO
Significantly increased risk of aspiration?
YES
NO
Increased risk of rapid desaturation?
YES
NO
Any one factor alone (assessed difficulty with intubation or ventilation, or aspiration or desaturation risk) may be clinically important enough to warrant an awake intubation.
Other patient factors may require an alternative strategy (e.g., patient inability to cooperate)
Always evaluate for emergency invasive airway
Part 2: Awake Airway Management
Part 3: Airway Management with Induction of Anesthesia

C

2

Part 2: Awake Airway Management



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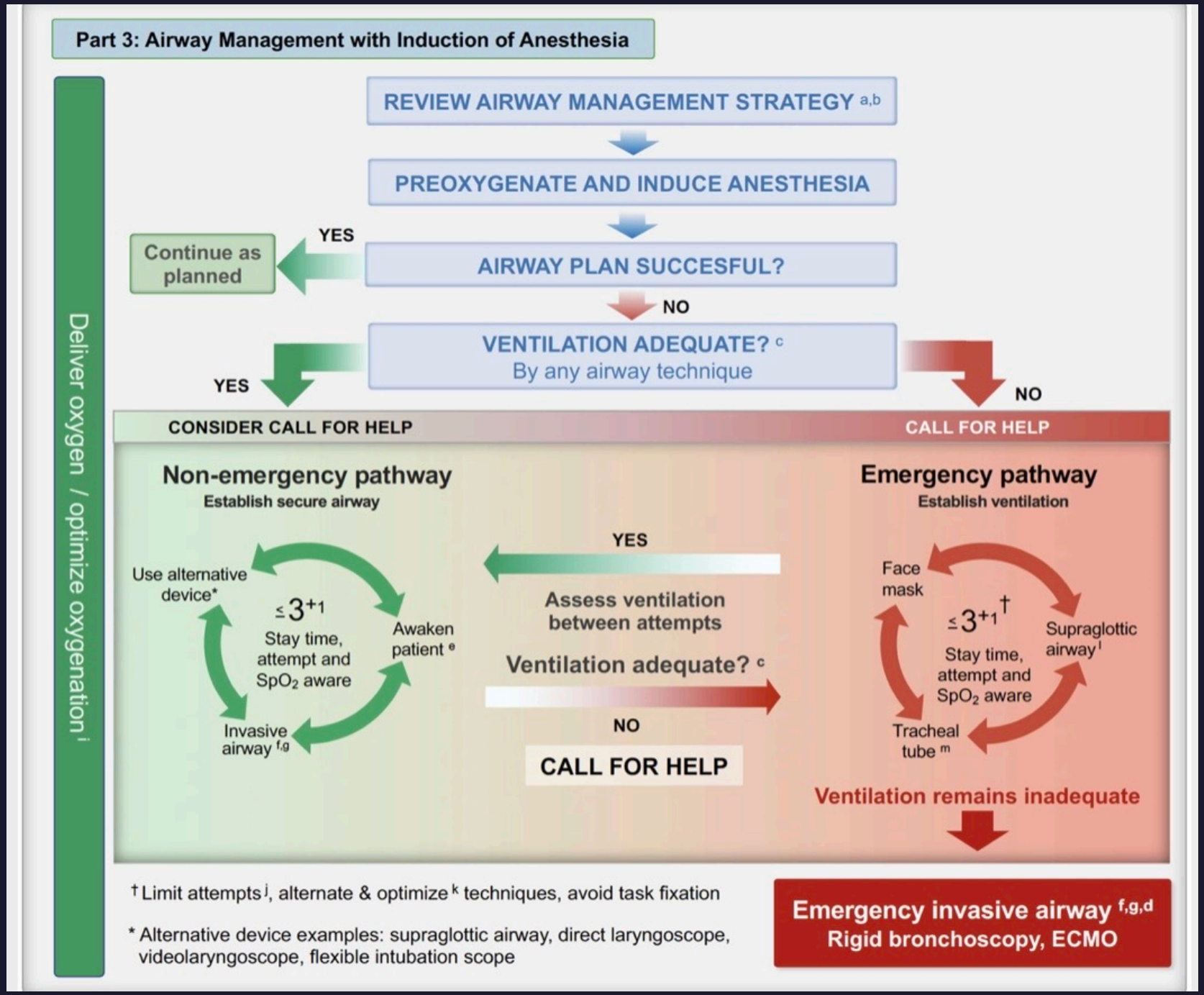


Awake intubation

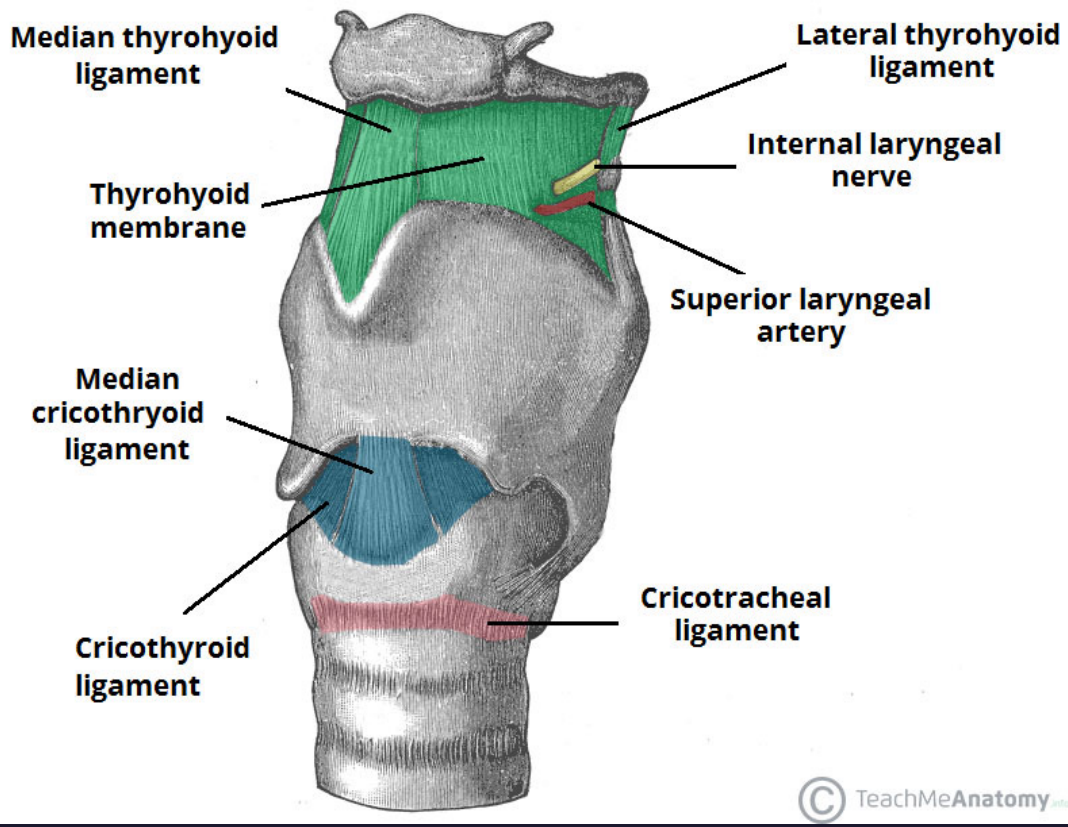
A

A

5
2%
B

A

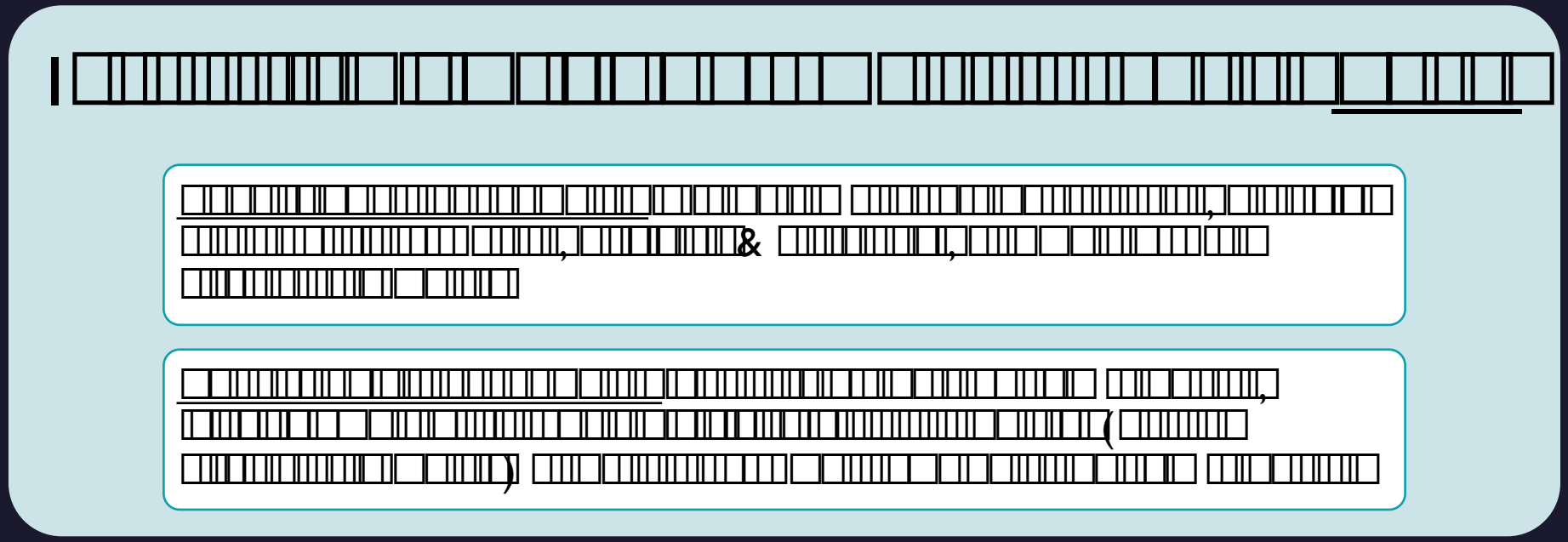
23 5 2%
A .



Quick Anatomy Review

- Thyrohyoid membrane connects thyroid cartilages with hyoid bone
- Superior laryngeal arteries are on the lateral sides of thyrohyoid membrane
- Thickened posteriorly = lateral thyroid ligament
- Thickened anteriorly = median thyrohyoid ligament
- Cricotracheal ligament connects the cricoid to 1st tracheal ring

Laryngeal Anatomy



Blood Supply & Drainage

- Super and Inferior Thyroid Arteries
- Superior, Middle and Inferior Thyroid Veins

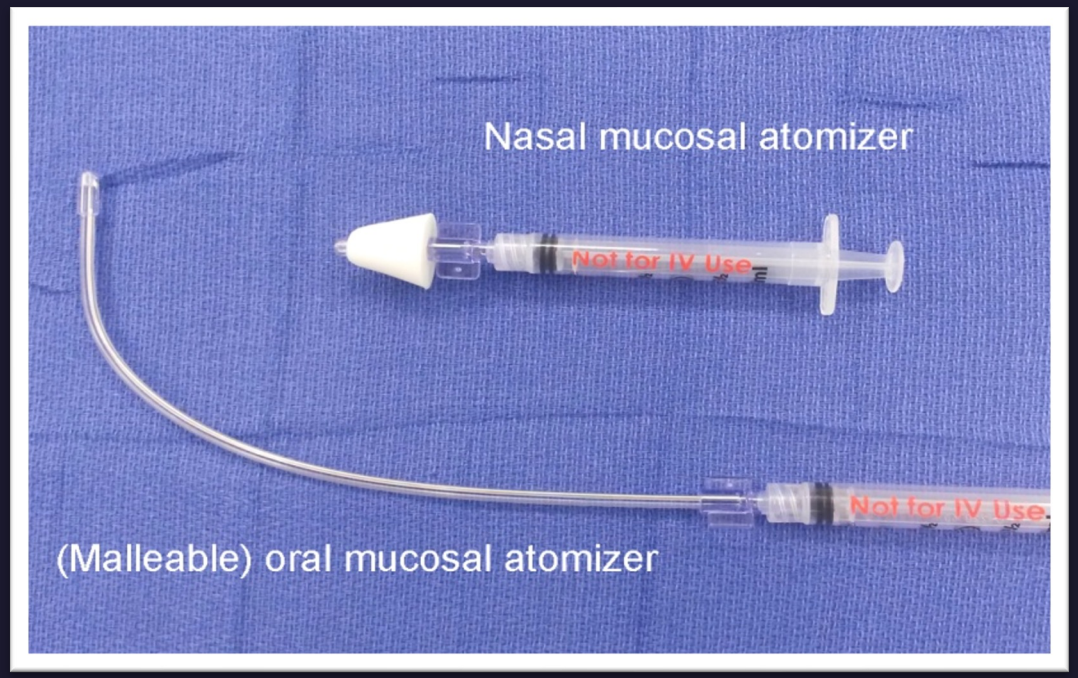
The Effects of Laryngeal Nerve Injury on the Voice

□E□□E	EFFEC□ □F □E□□E □□□□□□
Superior Laryngeal Nerve Unilateral Bilateral	 Minimal effects Hoarseness, Tiring of Voice
Recurrent Laryngeal Nerve Unilateral Bilateral Acute Chronic	Hoarseness Stridor, Respiratory Distress Aphonia
Vagus Nerve Unilateral Bilateral	 Hoarseness Aphonia

Airway Topicalization

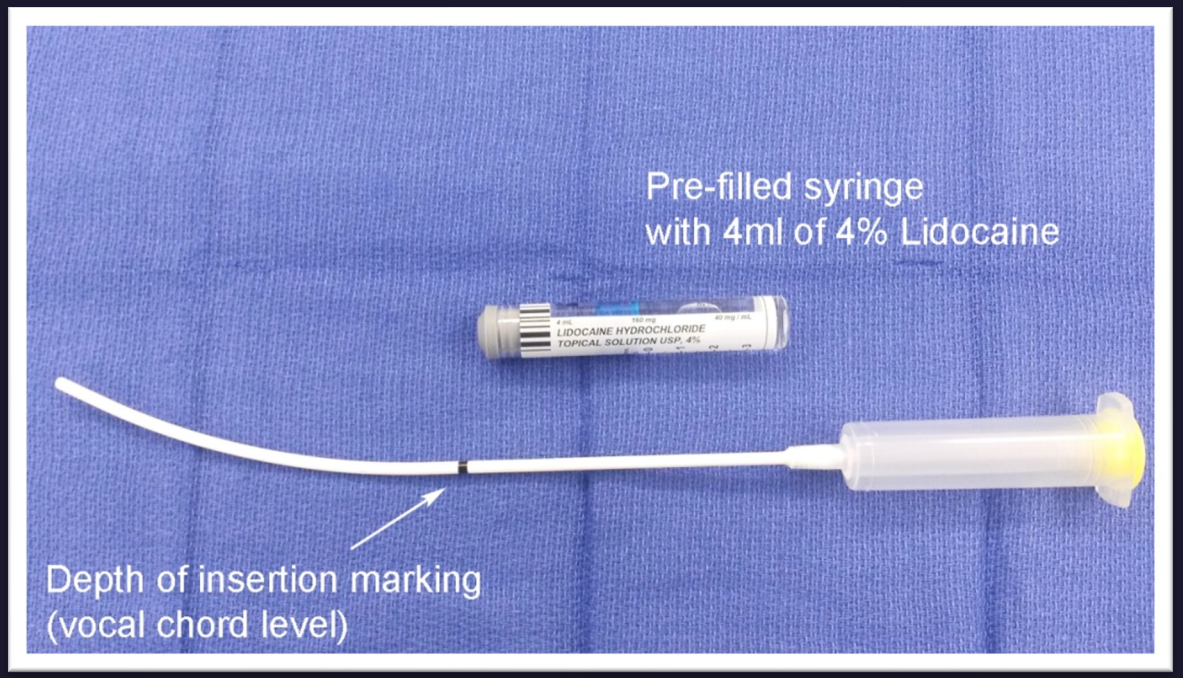
- Suppress coughing, gagging and laryngospasm
- 4% Lido (total dose of 3-4mg/kg to avoid LAST
- Nebulized lidocaine
    - Higher risk of pulmonary bronchi absorption leading to LAST
- Cetocaine spray
- 4% lidocaine jelly on OPA

Topical Airway Anesthesia Devices



Mucosal Atomizer

- Prep for awake and asleep fiberoptic nasal intubation
- Nasendoscopy

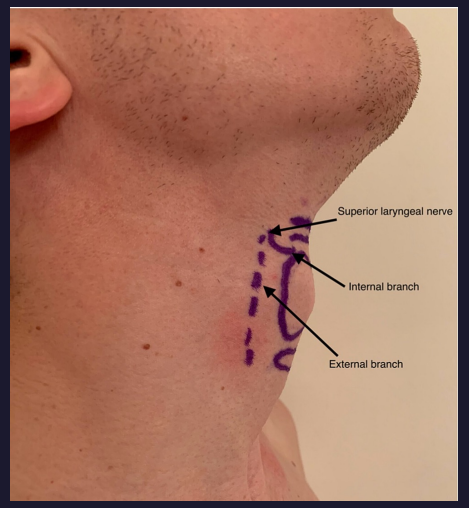


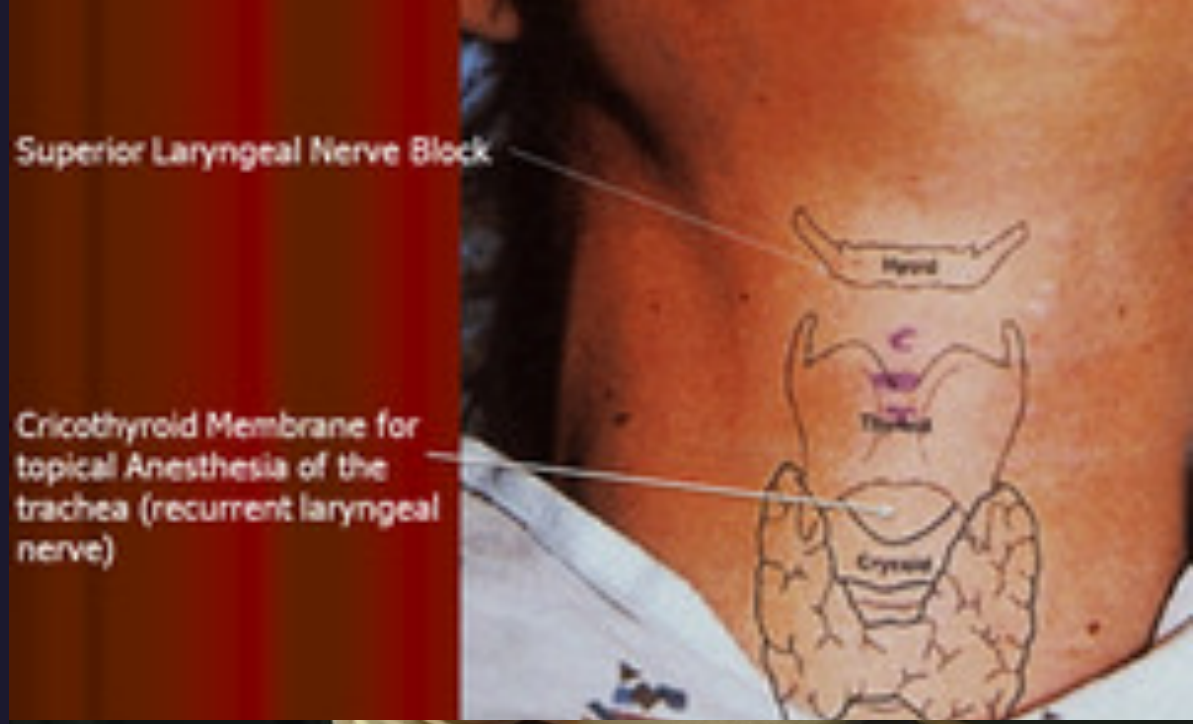
Laryngotracheal Topical Anesthesia (LTA) Kit

- Advance past vocal cords into trachea
  - NO further than BLACK MARK
- Placed under DIRECT VISION via Laryngoscopy

Airway Blocks - SLN

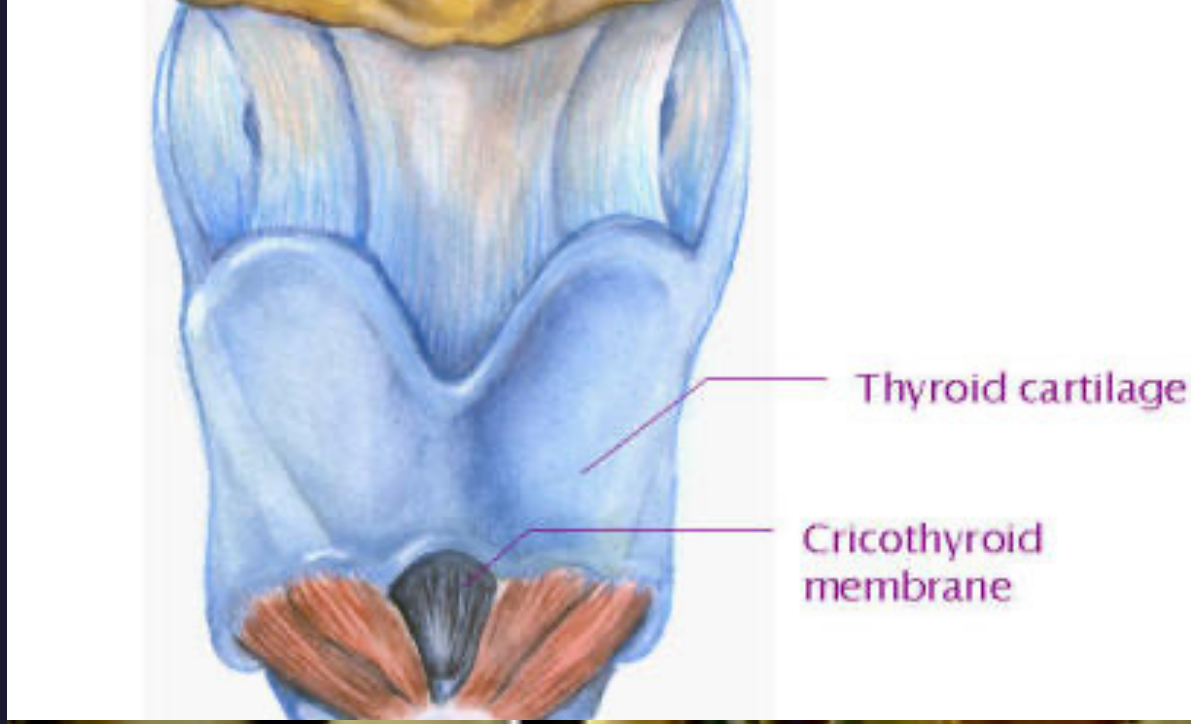
- Dense block for supraglottic region
- Hyoid bone
  - Inferior border of the cornu
  - Needle perpendicular to skin
    - 0.25 inch caudad
    - 0.25 inch medially
    - Feel "bounce" on thyrohyoid membrane: 1-2ml of 2% lido
    - "Pop" into membrane and give 1-2 ml of 2% lido
    - Aspirate: air = too far





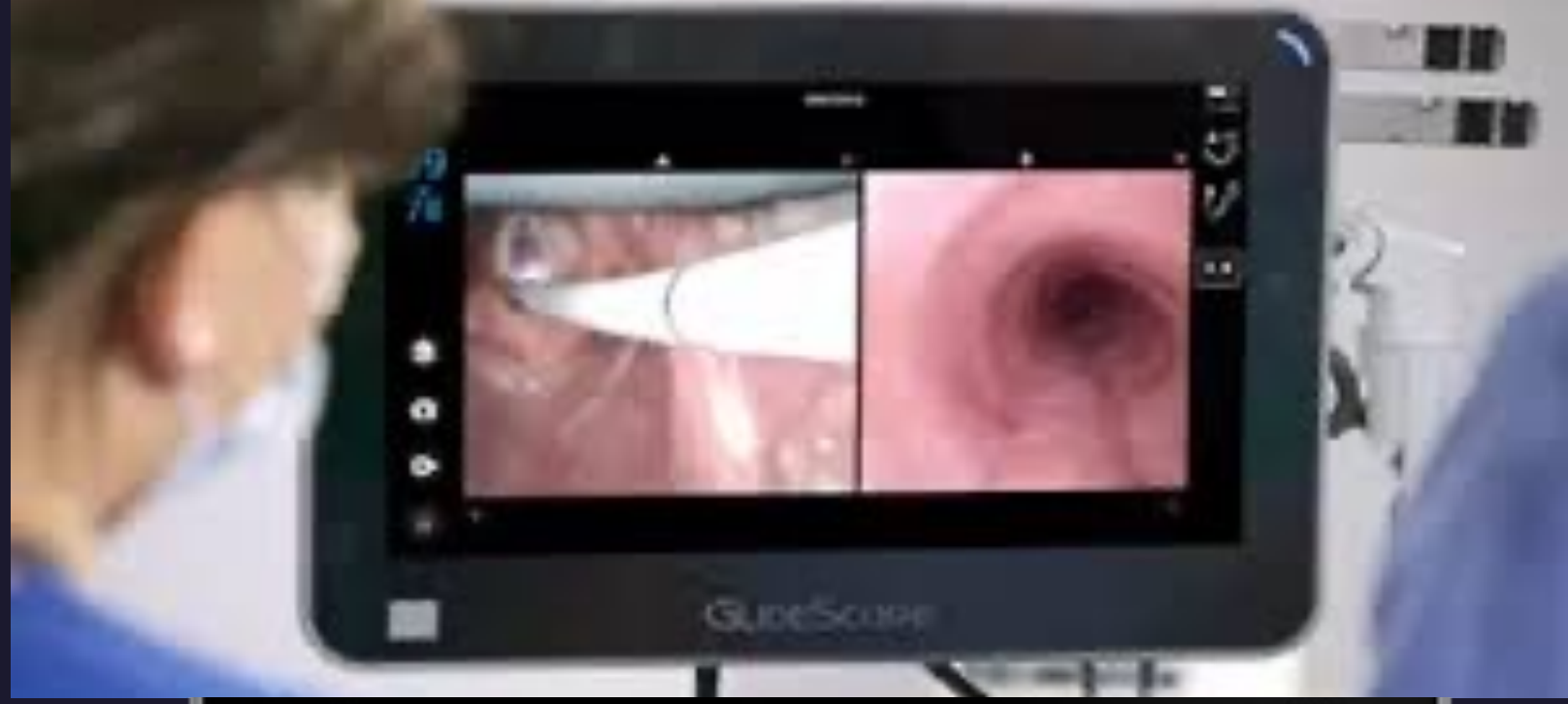
Airway Block – RLN/Transtracheal

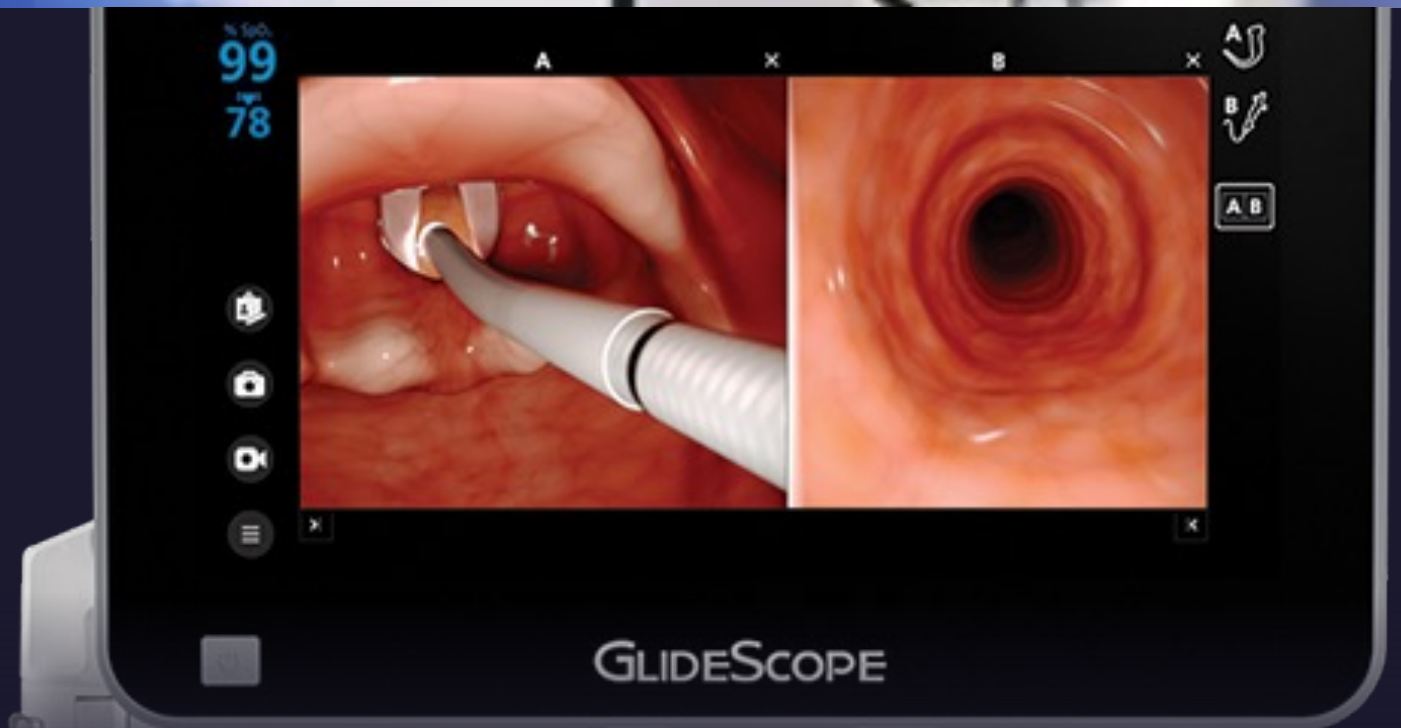
- Needle is advanced in caudal direction as it penetrates cricothyroid membrane
    - 22-20g on a 10ml syringe with 4ml of 4% lido
- Aspirate air
- Before injection, pt should take a deep breath
- During inspiration, 3-5 mL of loca is injected into tracheal lumen
- Pt will cough and LA will spread up through cords



Flexible Laryngoscopy

- Indications:
  - Pts neck cannot be manipulated
  - Limited mouth opening
  - Inability to visualize vocal cords (tumor/abscess, trauma etc)
- Awake vs. Sedation vs. General Anesthesia
- Contraindications
  - Presence of blood/significant soft tissue trauma
  - Edema





Videoscopes

Fastrach LMA

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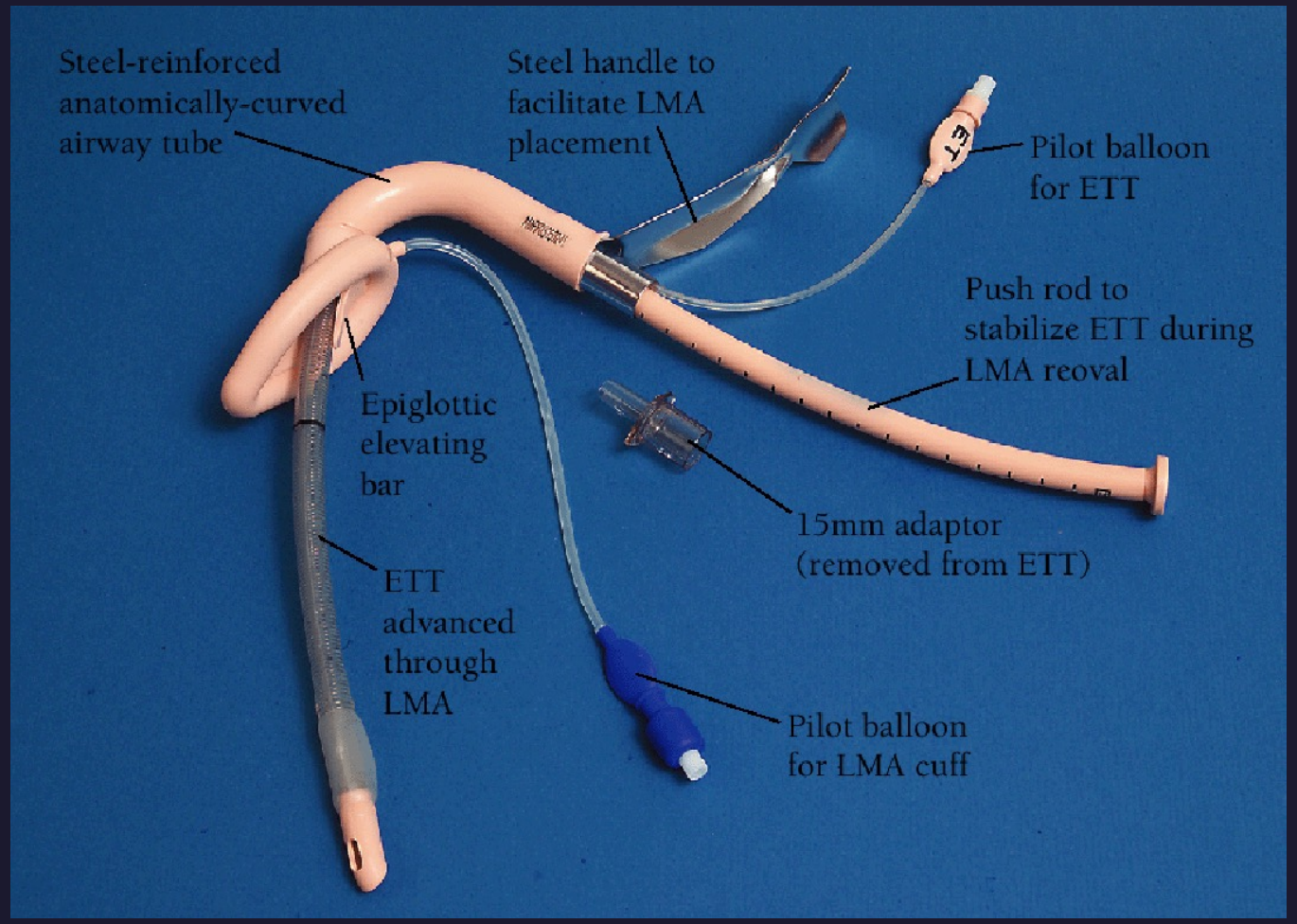
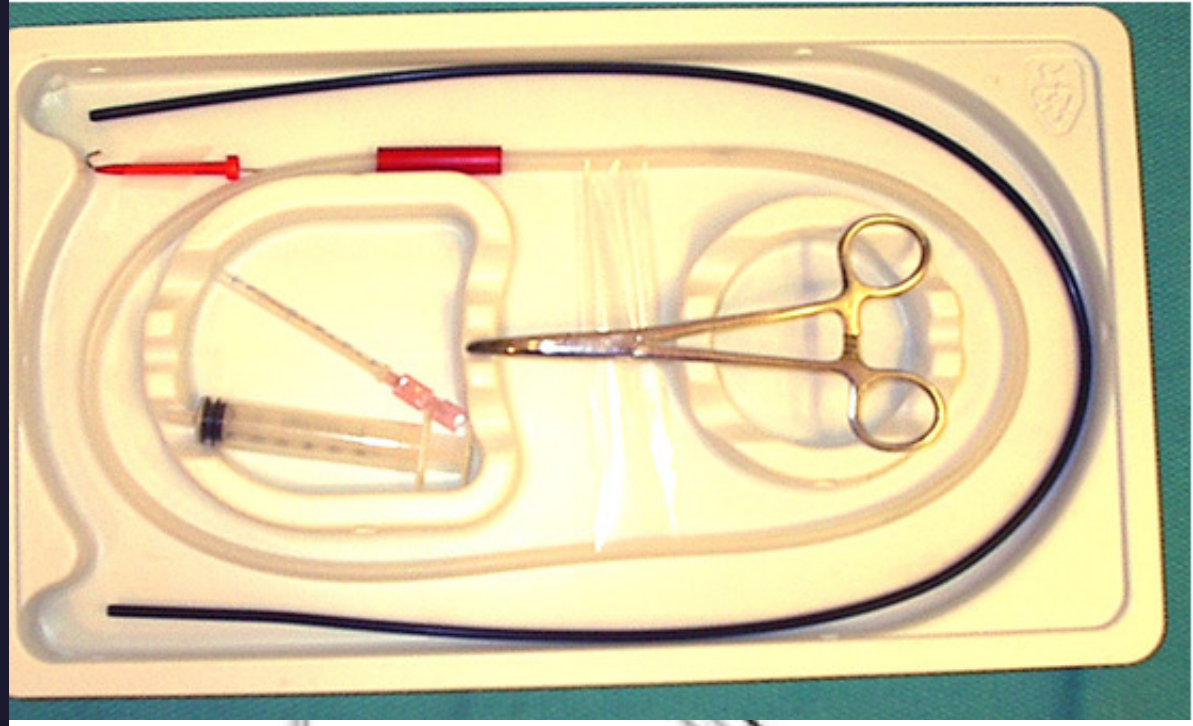


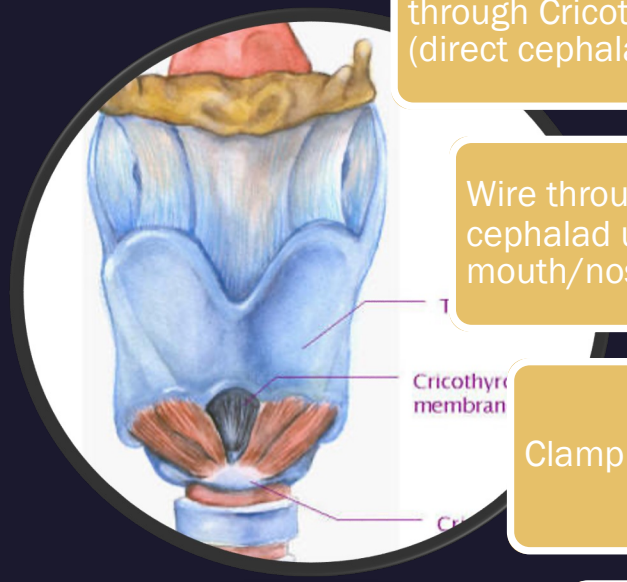
I[illegible]A → I[illegible]E[illegible] → I[illegible] → D[illegible] [illegible]A → [illegible] → I[illegible]

Retrograde Intubation

- Safe, effective and fast ***if*** familiar technique
- Indications:
  - Anatomic limitations that limit glottic opening
    - Pathology
    - Upper airway trauma
- Performed in CAN VENTILATE situations
  - Unstable cervical spine (most common reason)
  - Upper airway bleeding (can't visualize the glottis)
  - Should be done in pts that can be ventilated but intubation has failed
    - Experienced person takes 5-7 minutes
  - Can be done on awake



Retrograde Intubation



14g to 18g IV or Cook Needle through Cricothyroid membrane (direct cephalad)...aspirate air

Wire through needle passed cephalad until seen through mouth/nose

Clamp Distal end of wire

Catheter over wire into trachea; remove wire

ETT over catheter

C

C

Lightwand/ Lighted Stylet

- Battery handle
- Inserted blindly
- Copper stylet covered in white plastic
- Enters trachea → transilluminated light is brightly seen below cricoid cartilage
  - If in esophagus light not easily seen
- Tube is threaded and guided through
- Used when mask ventilation is easy
- Light blinks after being in for 30 seconds for time elapse awareness and minimize heat production
- Deceptive in pediatrics due to thinner neck and glow looking bright

Trachlite/Lighted Stylet

A

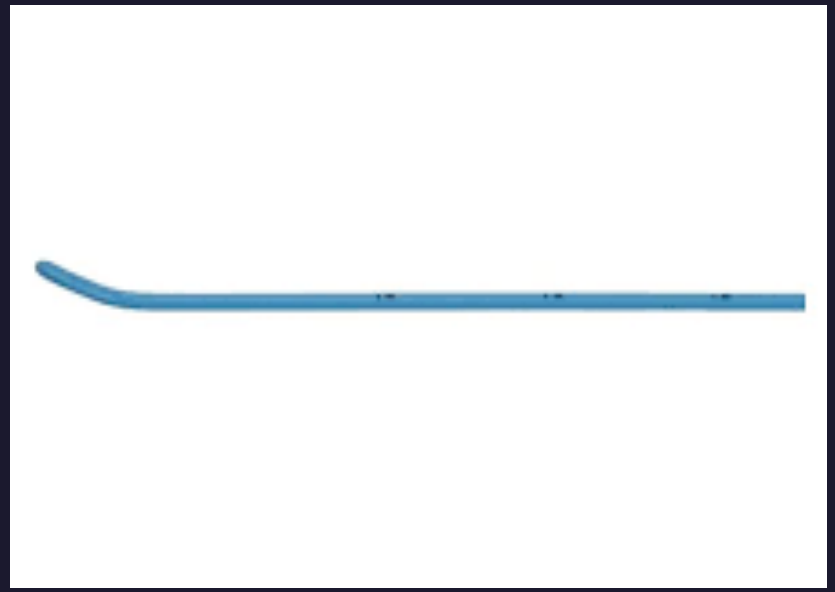
-
-
-
  - G
-
- C

D

- D
-
-

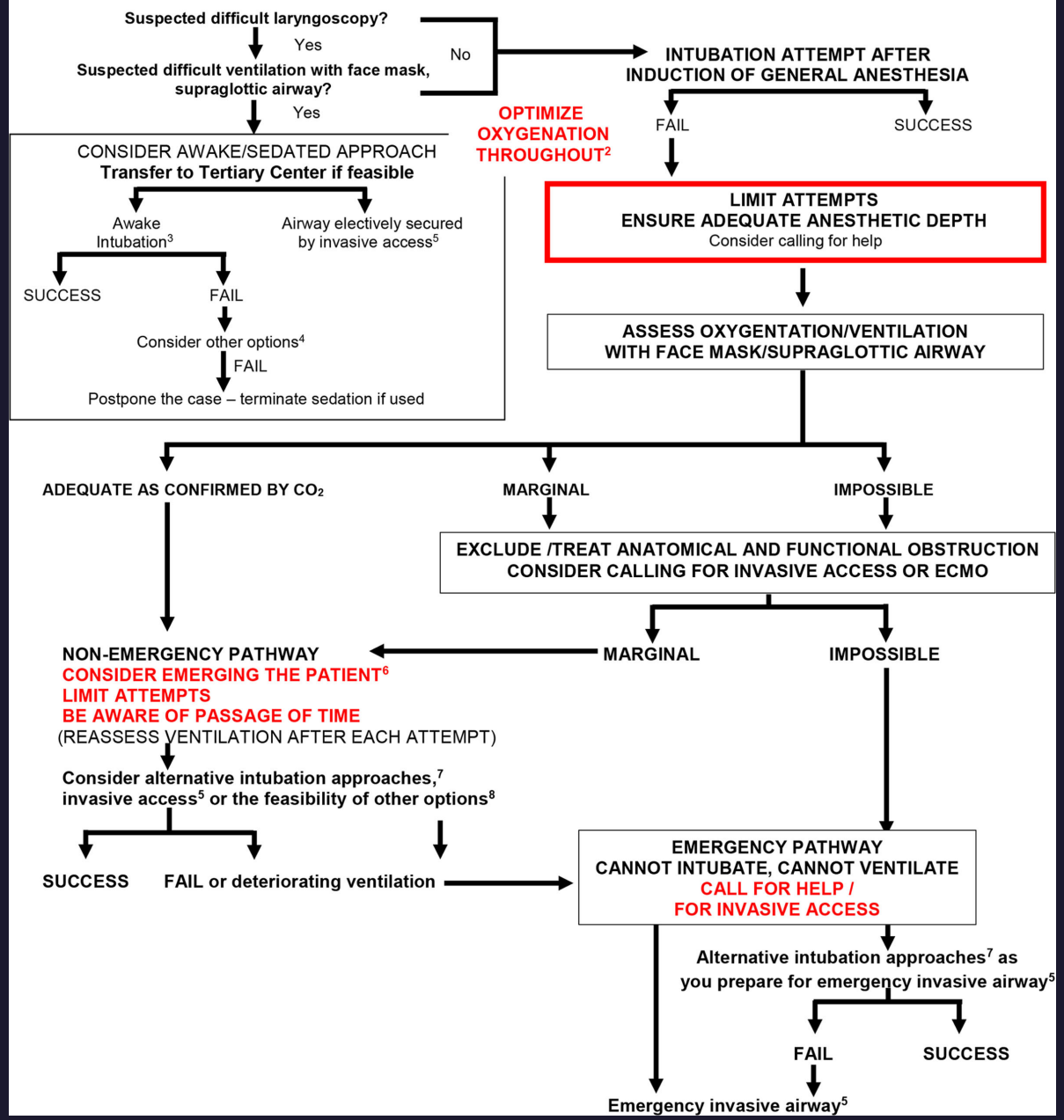
Eschmann and Cook Catheter

- **Eshmann Catheter – aka "Bougie"**
  - Flexible stylet with bent tip
    - Useful for accessing glottic opening that is difficult to visualize/anterior
  - How to use:
    - Angled tip under epiglottis; advance into trachea 23-5cm
    - "clicking"
- **Cook Catheter (Airmann)**
  - Flexible tubing used to exchange ETT or place hold for trial extubation
  - Can use auxiliary O2 or ventilate through



ASA DIFFICULT AIRWAY ALGORITHM: PEDIATRIC PATIENTS

Pre-Intubation: Before attempting intubation, choose between either an awake or post-induction airway strategy. Choice of strategy and technique should be made by the clinician managing the airway.[1]



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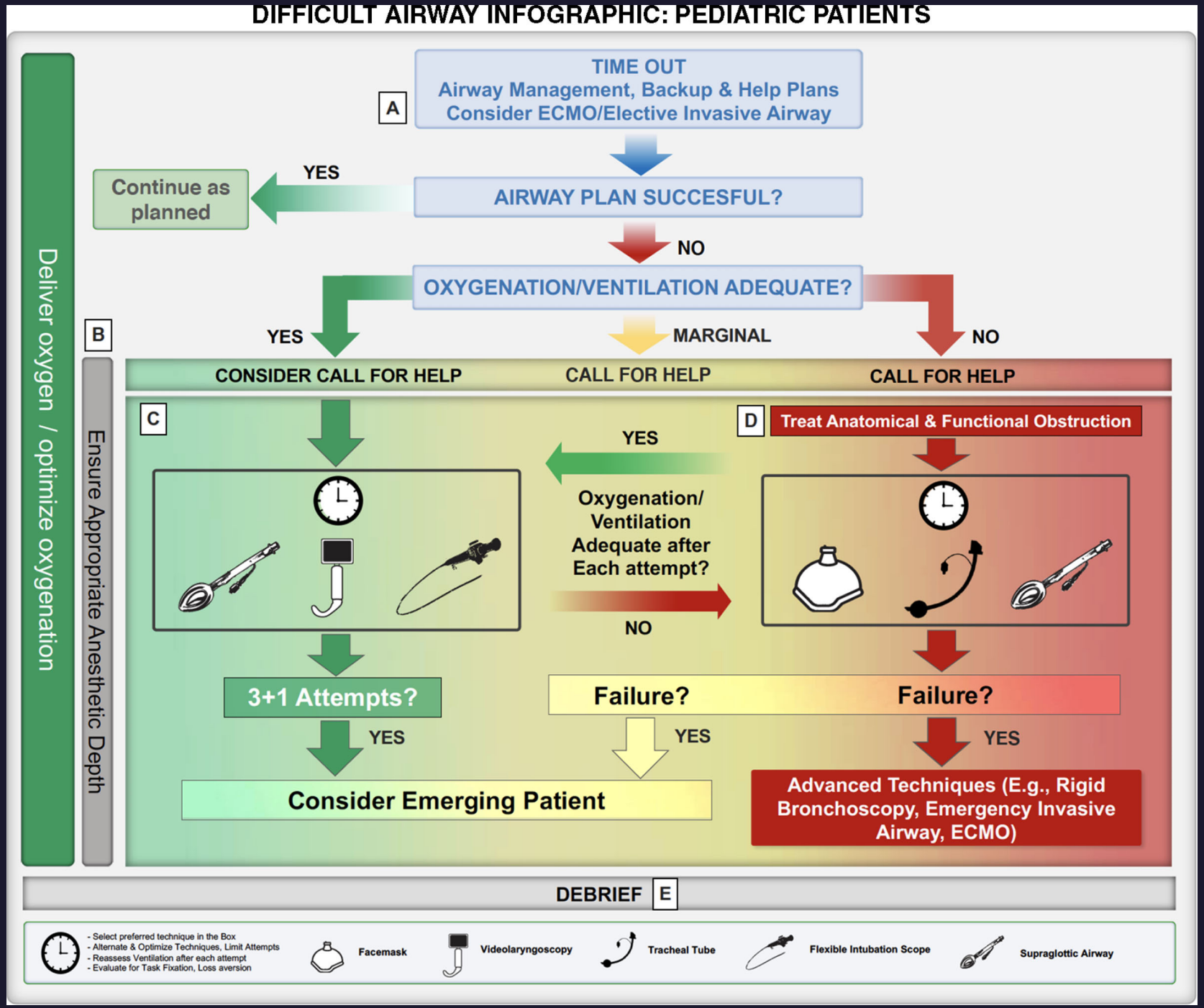

Extubation of the Difficult Airway

- Preformulated strategy
- Extubation criteria
- Feasibility of airway exchange catheter or supraglottic airway for expedited reintubation
    - Minimize use of an airway exchange catheter with pedi pts
- Evaluate risk of elective tracheostomy
- Evaluate risk of awake extubation vs. prior to return of consciousness
- Use supplemental O2

Case Study #1

- 67 yo male s/p esophagectomy x 2 weeks
- ICU for sepsis secondary to leaks at anastomosis
  - Awake with full ventilatory support via trach
  - Levophed drip
  - NGT noted with semi continuous bilious drainage
- Trach x 2 days leaking at site; **surgery wants to replace the trach and calls you to sedate the patient**
- **How do you want to proceed?**

Case Study #2

- 48 yo male for oral surgery (hospital setting)
- s/p jaw fracture x 5 years ago; current TMJ dysfunction with mouth opening x 1.5-2 fingerbreadths
  - OMFS discussion in preoperative holding that jaw will not open any additional amount with anesthesia
- What is your plan?

Reference:

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