

Airway: Rapid Sequence Intubation



EMERGENCY MEDICINE

**UNIVERSITY OF MANITOBA,
CANADA**

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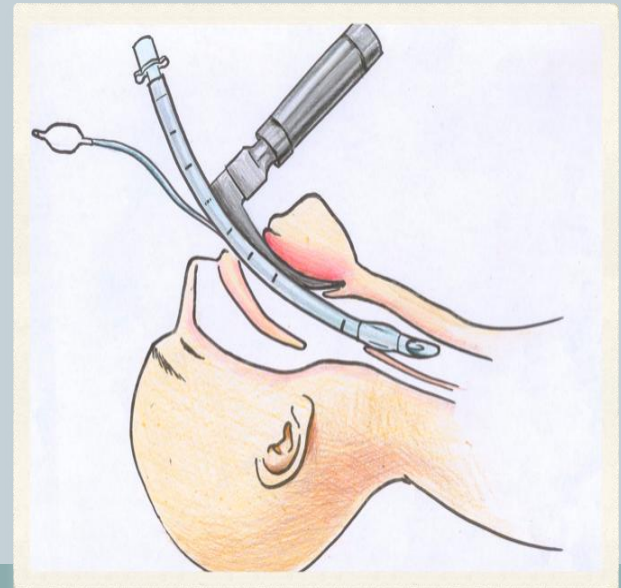
CHKV Medical Mission 2011



Objectives

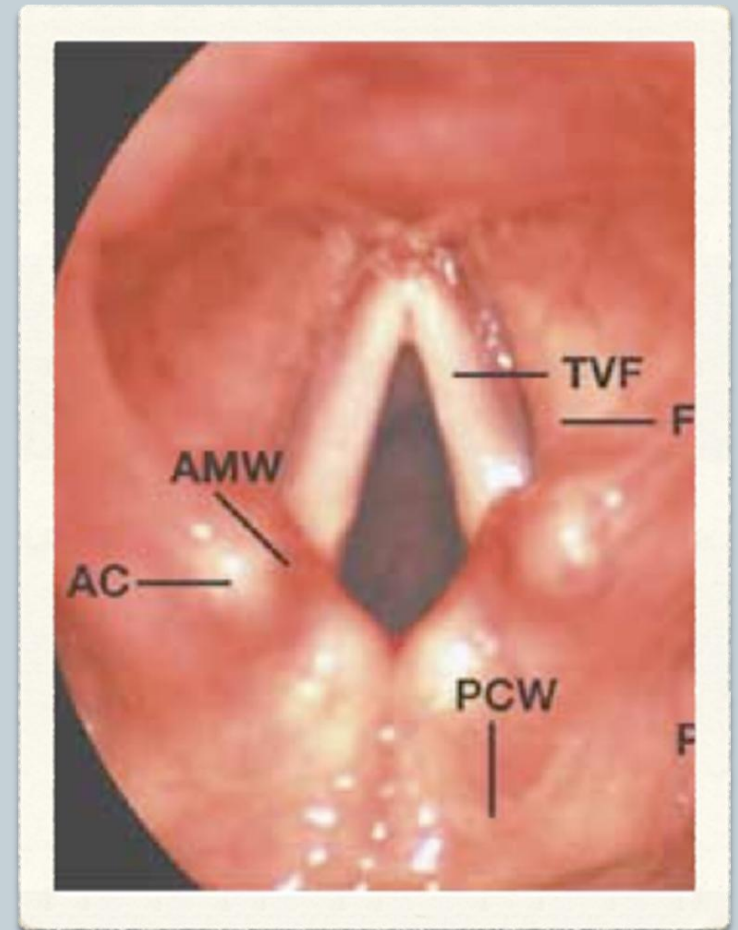


- Indications for intubations
- Assessment for potential difficulty with bag-mask ventilation (BMV), intubation, extraglottic device placement, & cricothyrotomy
- Rapid Sequence Intubation (RSI) and the evidence
- RSI: 7 P's
- Airway Algorithms



Indications for Intubation

1. Failure to maintain or protect airway
 - GCS < 8
 - Loss of gag reflex, inability to handle or swallow secretions, etc.
2. Failure to maintain oxygenation or ventilation
 - ↓ SO_2 , clinical status
3. Anticipated clinical course
 - Ex. TCA O/D, significant multiple trauma, penetrating neck trauma



Pre-intubation Assessment



- Difficult intubation - with laryngoscopy
- Difficult BMV (bag-mask ventilation)
- Difficult ventilation with EGD (extraglottic device)
 - Ex. LMA, combitube
- Difficult cricothyrotomy



Avoid RSI w/ paralysis

Double Setup and Anesthesia Backup

Difficult Direct Laryngoscopy: LEMON

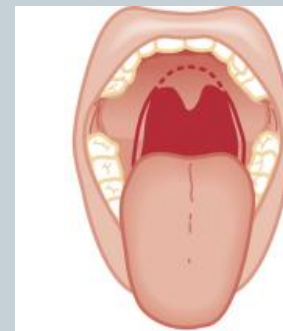
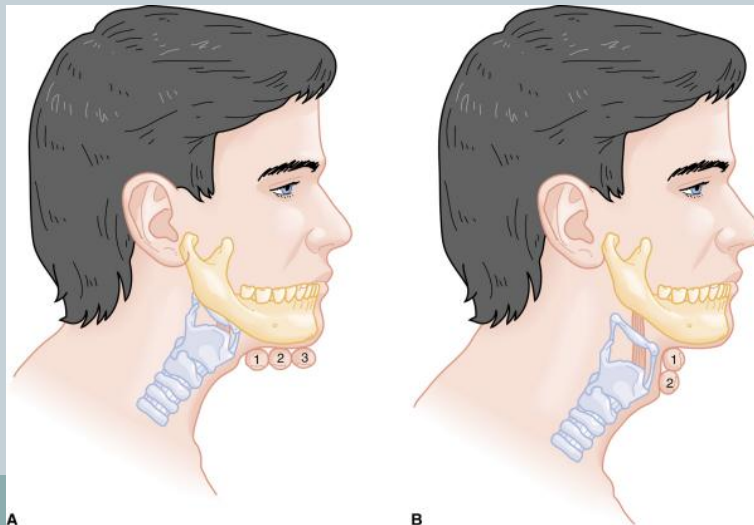
Look externally for signs of difficult intubation

Evaluate the “3-3-2 rule”

Mallampati

Obstruction/**O**besity

Neck Mobility



Class I: soft palate, uvula,
fauces, pillars visible

No difficulty



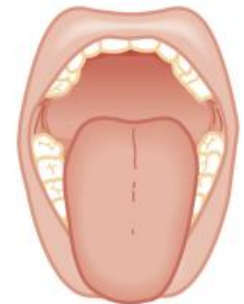
Class II: soft palate,
uvula, fauces visible

No difficulty



Class III: soft palate, base
of uvula visible

Moderate difficulty



Class IV: hard palate
only visible

Severe difficulty

Difficult BVM: BOOTS



Beard

Old age

Obstruction or Obesity

Toothless

Stiffness (resistance to ventilation – sleep apnea, asthma, COPD, RLD)



Difficult EGD Placement: RODS



Restricted mouth opening

Obstruction or obesity

Distorted anatomy

Stiffness (resistance to ventilation)

- Placement of EGD converts “can’t intubate, can’t oxygenate” → “can’t intubate, can oxygenate”

Difficult Cricothyrotomy: SHORT



- **Surgery:** prior neck surgery
- **Hematoma:** anatomic disruption, edema, SC air
- **Obesity**
- **Radiation:** scarring
- **Tumor**



Rapid Sequence Intubation (RSI)



- Virtually simultaneous administration of sedative (induction) agent and paralytic
- Rapidly create ideal intubating conditions
- Minimize complications (ie. aspirations)
- Facilitates successful endotracheal intubations (complete muscle relaxation)
- Permits pharmacologic control of physiologic responses to laryngoscopy & intubation (ex. \uparrow ICP)
- 1980s: RSI taught at ACEP
- 1990s:
 - ACEP RSI policy
 - Residency Education
 - CME: The airway course

RSI: The Evidence



- ED and anesthesia literature demonstrate higher success & lower complications in NMBA facilitated intubation
 - Li J, et al: Complications of emergency intubation with and without paralysis. Am J Emerg Med 1999; 17:141
 - Kirkegaard-Nielsen H, et al: Rapid tracheal intubation with rocuronium. Anesthesiology 1999; 91:131.
 - Alexander R, et al: Comparison of remifentanyl with alfentanil or suxamethonium following propofol anaesthesia for tracheal intubation. Anaesthesia 1999; 54:1032
- Literature begins to reflect practice and define RSI as standard of care
 - Sakles J, et al: Airway management in the emergency department: A one-year study of 610 tracheal intubations. Ann Emerg Med 1998; 31:325.
 - Ma O, et al: Airway management practices in emergency medicine residencies. Am J Emerg Med 1995; 13:501
 - Tayal V, et al: Rapid-sequence intubation at an emergency medicine residency: Success rate and adverse events during a two-year period. Acad Emerg Med 1999; 6:31.

RSI: 7 P's



- 1. Preparation**
- 2. Preoxygenation**
- 3. Pretreatment**
- 4. Paralysis with induction**
- 5. Positioning**
- 6. Placement of tube**
- 7. Postintubation management**

1. Preparation



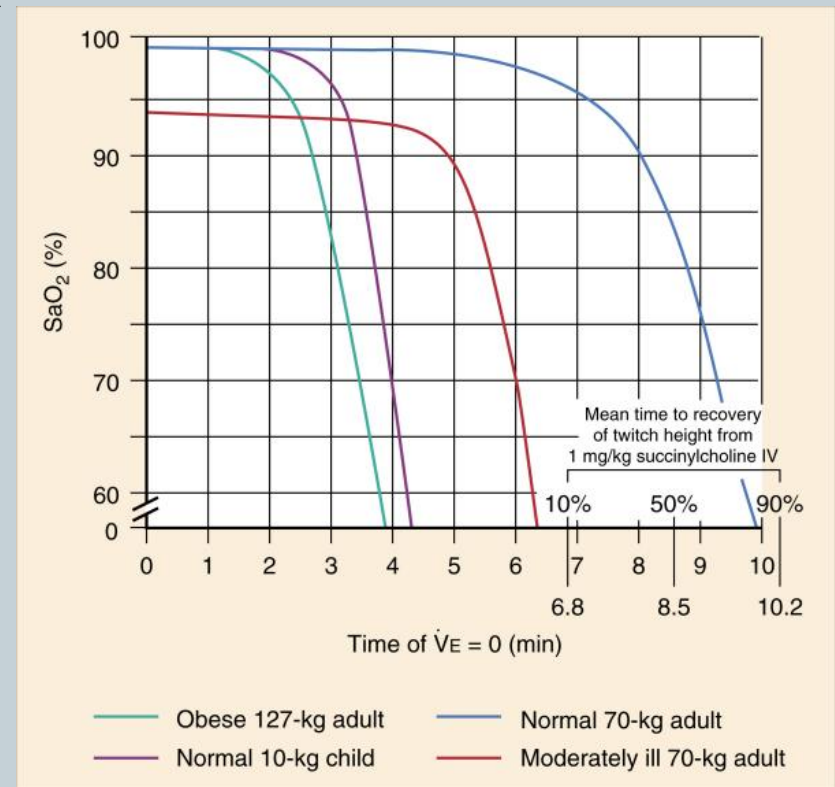
- Assess for intubation difficulty and prepare equipment
- STOP IC BARS
 - Suction
 - Tube
 - O₂
 - Pharmacotherapy (drugs)
 - IV
 - Cardiac monitor
 - Bougie
 - Alternate airways (glidescope, fiberoptics)
 - Rescue airways (EGD)
 - Surgical airways (cricothyrotomy)

2. Preoxygenation



- 100% O₂ x 3 min in normal healthy adult → apneic time = 8 min (S_O2 > 90%)
- Apneic time ↓ in children, obese adults, pregnancy, & patients with significant comorbidity.
- Consider 5L O₂ NP to ↑ apneic time in obese patients or difficult a/w

○ *J Clin Ana 2010;22:164-168*



3. Pretreatment



- **Reactive airway disease:**
 - Lidocaine (1.5mg/kg IV) “*may*” mitigate bronchospasm
 - Ventolin 2.5mg neb (if time permits)
- **Cardiovascular disease (AoD & IHD):**
 - Fentanyl (3ug/kg IV) to mitigate sympathetic reflex
- **Elevated ICP:**
 - Fentanyl (3ug/kg IV) to mitigate sympathetic reflex & rise in ICP
 - Lidocaine (1.5mg/kg IV) “*may*” mitigate ICP ↑ in response to airway manipulation
 - ✦ Clinical controversy (Ann Emerg Med 2007)
 - ✦ Avoid in hypotensive patients (may be harmful)
- **Atropine no longer recommended routinely for kids <10 getting Sux to prevent bradycardia**

4. Paralysis with Induction



- Etomidate (0.3mg/kg): acts in <1min, lasts 10-20min
 - Hemodynamically stable – an ER favourite
 - May cause myoclonus jerking, hiccups, N/V
 - Adrenal suppression in septic shock patients?
 - ✦ Systematic Review in Ann Emerg Med 2010
 - ✦ “...no studies to date have been powered to detect a difference in hospital, ventilator, or ICU LOS or in mortality”
- Ketamine (1-2mg/kg): acts in 30sec; lasts 10-15min
 - Potent bronchodilator
 - Hemodynamically stable
 - ↑ ICP (controversy) – avoid in head injuries
 - ✦ Critical review of literature in Anesth Analg 2005
 - ✦ No negative effects & may possible improve cerebral perfusion
 - Emergence phenomenon



- Benzo (Versed 0.2mg/kg): acts in 30sec; lasts 15min
 - Use with caution in hemodynamically compromised pts. & elderly (↓ 0.05-0.1 mg/kg)
- Fentanyl (2-3ug/kg)
 - Use with caution in hemodynamically compromised pts.
- Propofol (1-2mg/kg)
 - Can cause myocardial depression

4. Paralysis with Induction



- **Succinylcholine (1-2 mg/kg)**
 - Acts in 45 sec, lasts 5-10 min)
 - Better paralytic agent than Roc (Meta-analysis in AEM 2002)
 - Complications:
 - ✦ Bradyarrhythmias
 - ✦ Fasciculations
 - ✦ Hyperkalemia (still agent of choice in RSI in acute burn, trauma, stroke, SCI, & intra-abdominal sepsis if **< 5 days**)
 - ✦ ↑ IOP
 - ✦ Masseter spasm – primarily in children
 - ✦ Malignant hyperthermia in genetically predisposed pts. - ↑ temp, trismus, rhabdo
- **Rocuronium (1mg/kg)**
 - Acts in 1-3min; lasts 45 min
 - Best agent for use in RSI when Sux is contraindicated

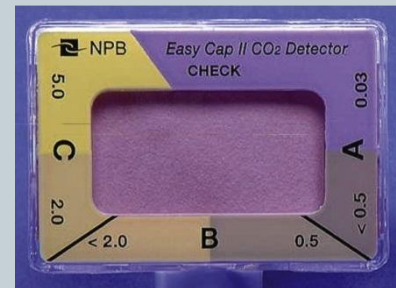
5. Positioning



- “Sniffing” position – head extension with flexion of neck
- Sellick’s maneuver (“cricoid pressure”) – optional!
 - To minimize risk of passive regurgitation / aspiration
 - New evidence:
 - ✦ May cause airway obstruction – reduced tidal volumes or prevented ventilations (Anesthesia 2000)
 - ✦ Obscure laryngeal view (Ann Emerg Med 2007)
- BURP technique (backward, upward, rightward pressure)
 - Bring glottis into view

6. Placement of Tube

- Passing the endotracheal tube & inflating the cuff
- “Failed airway” after 3 attempts by most experience operator
- Each attempt should be different: position, blade, suction, etc.
- Be prepared to use an alternative device or surgical airway
- Confirm placement of tube:
 - *Direct visualization*
 - Auscultation over chest and stomach
 - Fogging of tube
 - ET CO₂ detector – 6 manual ventilations



7. Postintubation Management



- CXR – for tube placement
- Sedation and analgesia to improve patient comfort & decrease sympathetic response to the ETT
 - Benzo (Versed 0.1-0.2 mg/kg IV)
 - Opioid analgesia (Fentanyl 3-5ug/kg IV or Morphine 0.2-0.3 mg/kg IV)

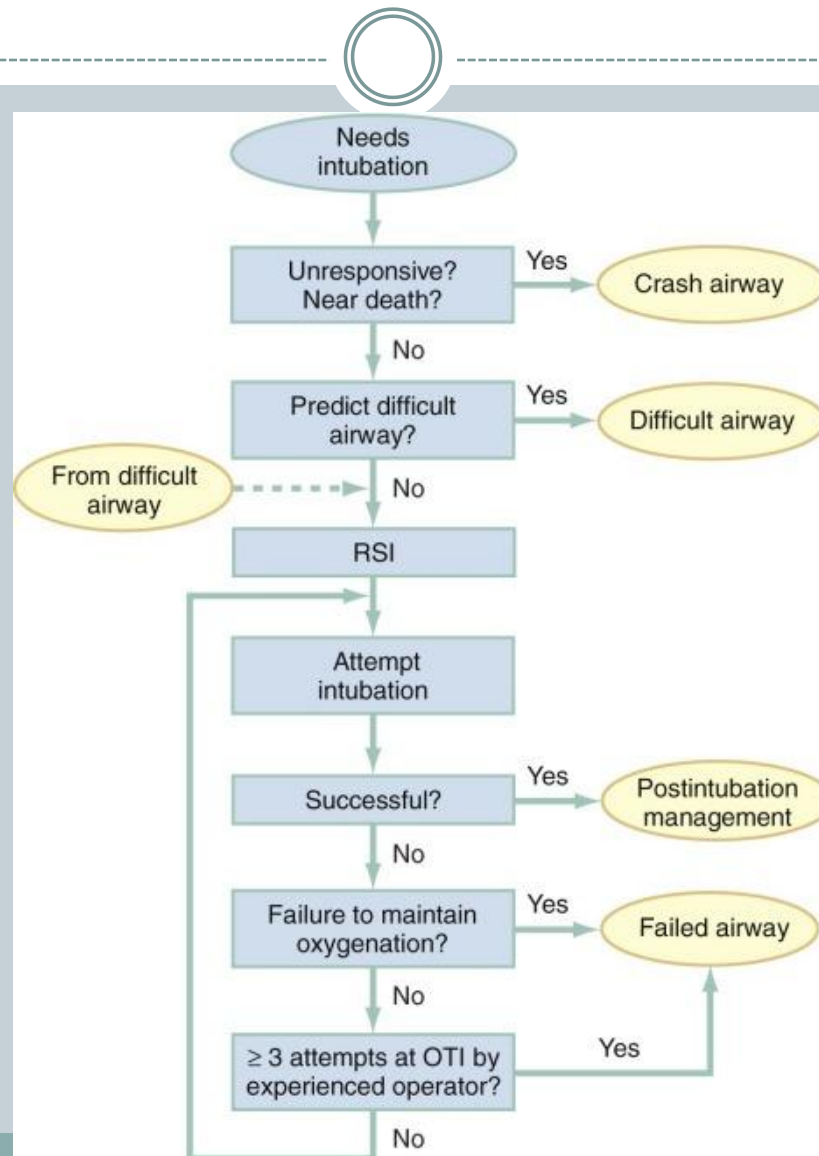


Current Airway Algorithms

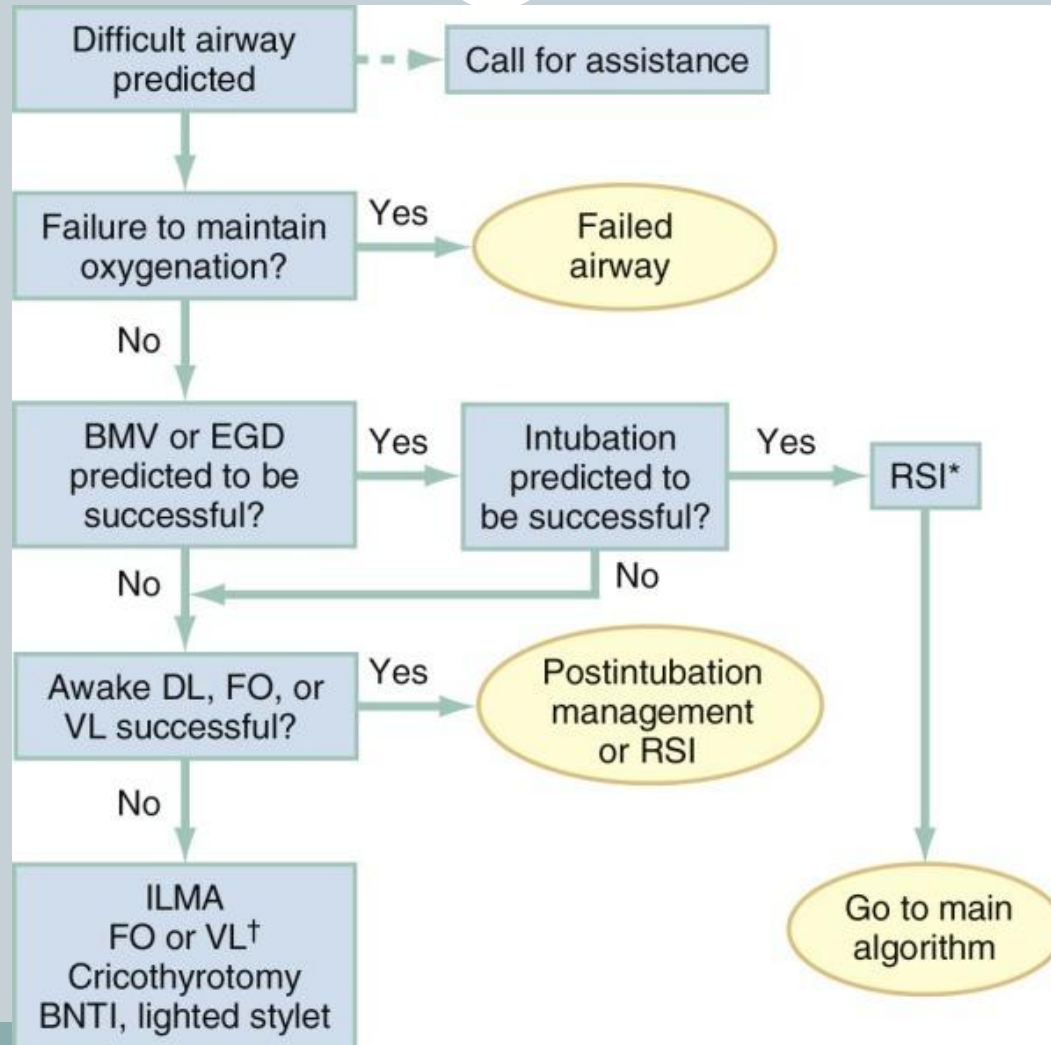


- Standard Airway → RSI
- Difficult Airway → Awake intubation
- Crash Airway (no drugs) → crash intubation
- Failed Airway → rescue techniques with EGD, fiberoptic, glidescope, lighted stylet, *cricothyrotomy*

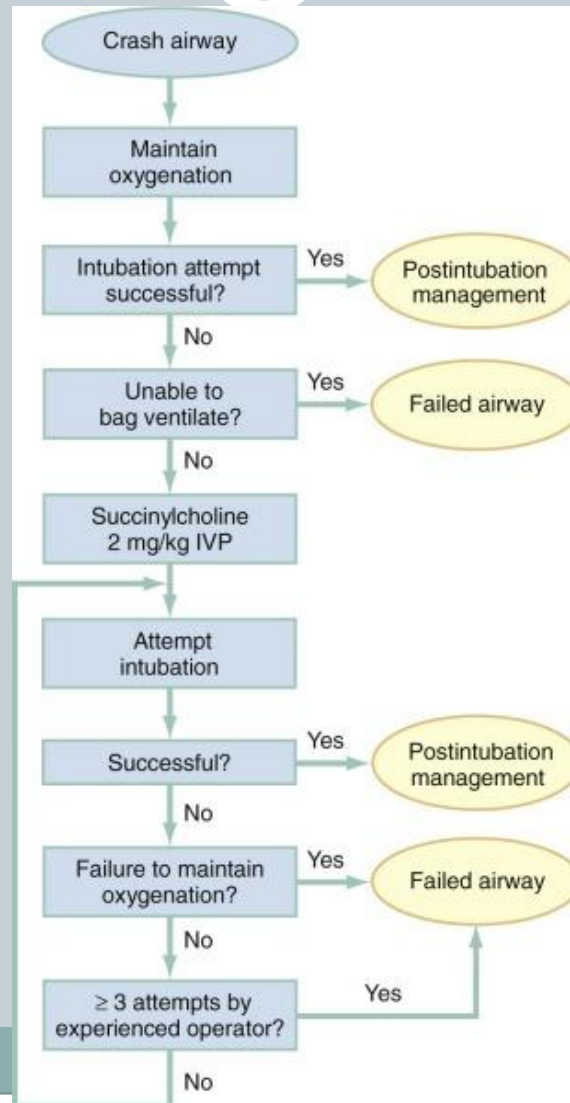
Main ER Airway Management Algorithm



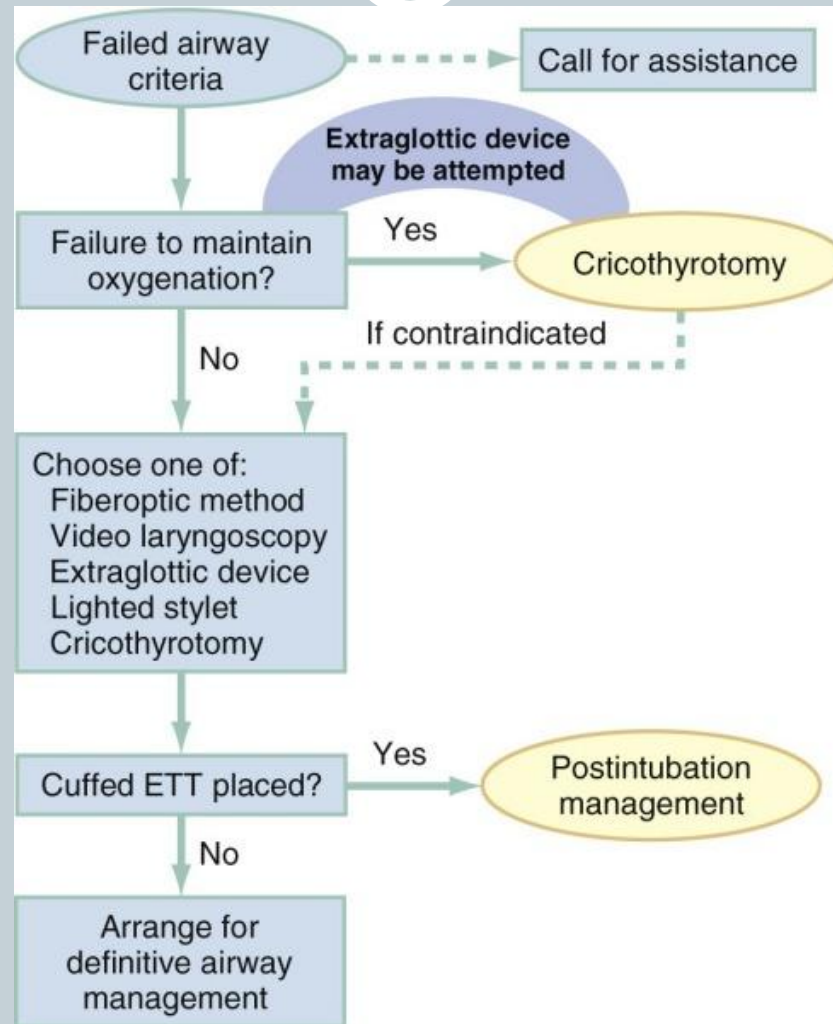
Difficult Airway



Crash Airway Algorithm



Failed Airway Algorithm



Future of RSI



- New drugs: “Speedy” curonium (Phase III trials)
 - Anesth Analg 2007
 - Rapid reversal agents for competitive NMBAs (**Sugammadex**)
 - Mean time to complete recovery from Roc = 1 min
- New drugs: awake/asleep intubation
 - Ultra-short acting (**Remifentanil** – half life 3 min)
 - Cooperative, allow intubation but maintain respiration
- New toys:
 - Leaders in airway management predict no laryngoscopes in practice in 10 year
 - Fiberoptics and video devices (ie. Glidescopes) will take over
 - Refinement of blind devices (ie. Intubating LMAs)

Questions?

