University of Washington School of Medicine
Division of Emergency Medicine

EM Clerkship: Airways

Objectives

- Explain anatomy and basic equipment used in airway management
- Describe proper sizing and insertion of airway adjuncts
- Explain potential indications for endotracheal intubation (ETI)
- Describe methods for predicting difficult airways
- Describe the steps one should take in preparation for intubation

THE HUMAN AIRWAY: A CONTINUUM…

- **Awake & Alert:** No Intervention
- **Inadequate?**
  - Positioning
  - Head Tilt / Jaw Thrust
  - Nasopharyngeal Airway
  - Oropharyngeal Airway
  - Bag Valve Mask Ventilation
  - Laryngeal Mask Airway
  - Endotracheal Intubation
- **"Impossible?"** → then one of the following…
  - Jet Insufflation
  - Surgical Airway: Cricothyroidotomy > **8-12 yo**

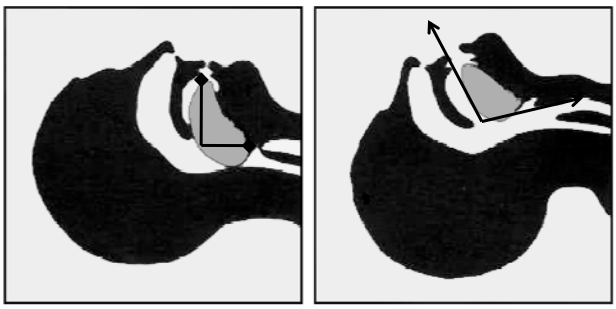
Positioning

- Extend the patient's head slightly ('sniffing position')
  - Do NOT do this with C-Spine precautions
- Jaw Thrust
  - OK to do this with C-Spine precautions

→ 'Head-Tilt Jaw-Thrust'

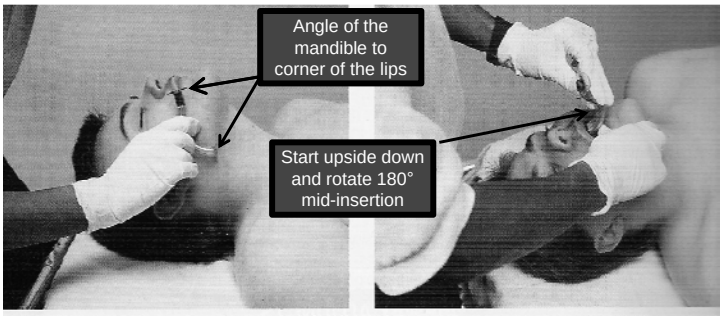
- *Optional or Adjunctive → Place towels under the patient's head (to position the ear level with the sternal notch)*

Bagging a Patient: Head-Tilt Chin Lift

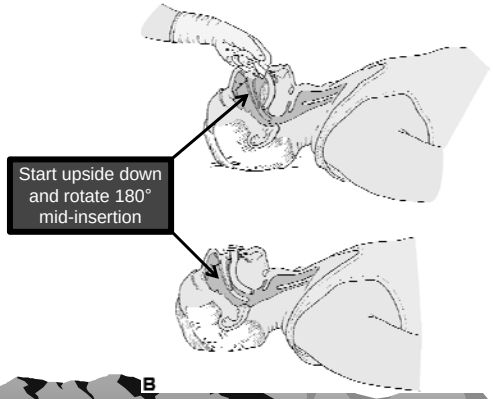


Bagging a Patient: Jaw Thrust

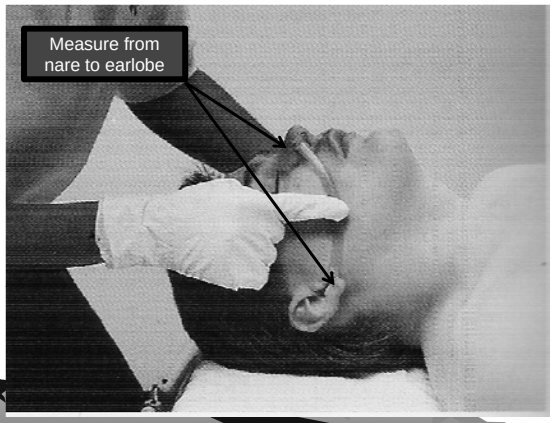
Sizing & Placing an Oral Airway:



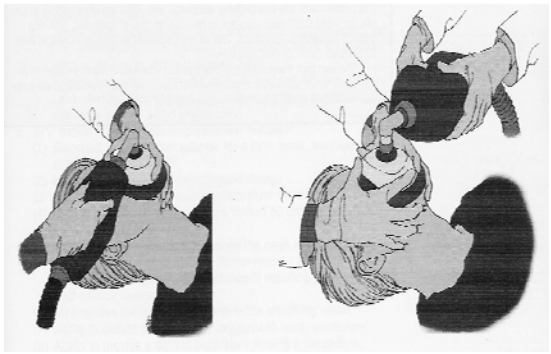
Sizing & Placing an Oral Airway:



Sizing Nasal Trumpet(s):



Bagging a Patient: 1 or 2 hands



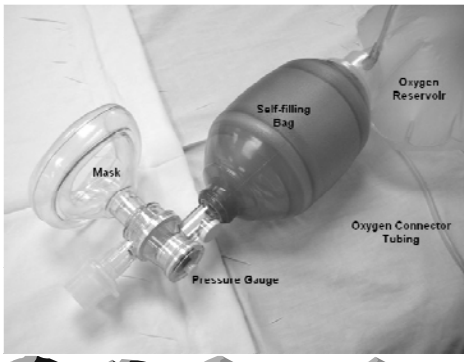
Bagging a Patient: 1 hand

Bagging a Patient: 1 hand

Bagging a Patient: 2 hands

Bagging a Patient: 2 hands

The Bag Valve Mask



Bagging a Patient: Equipment

- BVM with reservoir
- Oxygen connector tubing
- Oxygen source (turn it all the way up)
- Suction (check it!)
- Nasal pharyngeal airway (NPA = 'trumpet')
- Oral pharyngeal airway (OPA)

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Indications for Endotracheal Intubation (ETI)

- *Definitive Airway*: A tube secured in the trachea with cuff inflated
  - Surgical, Nasal and Oral Endotracheal Intubation
- Decision to intubate is based on clinical judgment not absolute criteria

Indications for Endotracheal Intubation

- Airway Compromise/ Inability to Protect Airway
- Predicted Airway Compromise
- Failed Oxygenation/ Ventilation
- Predicted Clinical Deterioration

Airway Compromise/ Inability to Protect Airway

- Functional versus Mechanical Obstruction:
  - Functional: Obtunded patient
  - Mechanical: edema, trauma, foreign body
  - If obstruction cannot quickly be reversed (narcan, removal of foreign body) ETI is indicated
- Depressed level of Consciousness: how do you assess whether airway reflexes are intact?
  - Gag Reflex? Unreliable, misleading.
  - Ability to Swallow: when present reassuring
  - GCS < 8: increased likelihood of aspiration

Predicted Airway Compromise

- Does the natural history of the injury or illness predict development of airway compromise? (penetrating neck injuries, epiglotitis, etc)
- Physical: expanding neck hematoma, stridor (predicts > 50% reduction of airway caliber) obvious tracheal disruption.

Indications for Endotracheal Intubation

- **Failure to maintain adequate oxygenation/ ventilation** with non-invasive measures (supplemental oxygenation, NPPV)
- **Predicted Clinical Deterioration?**
  - Agitated/ Intoxicated trauma patient requiring significant sedation for imaging/ procedures
  - Patients with shock requiring massive volume resuscitation

Difficult Airway Assessment

- Unless it is a “crash” intubation, one should always perform an airway assessment
- Identification of difficult airway features allows one to formulate plan to address potential problems
- What defines a difficult airway?: no consensus
- Best to think of difficult airways in terms of difficulty with: Bag Mask Ventilation, Laryngoscopy, Surgical Airway, and Extraglottic Devices (LMA, Combi-tube, etc)

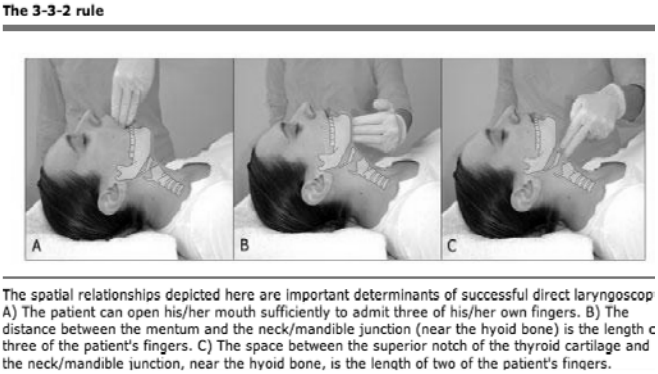
The Difficult Airway

Difficult BMV*	Difficult Laryngoscopy	Difficult Surgical Airway
• Beard • Elderly • Edentulous • Perioral trauma that affects mask seal • Mandible - Fracture • Obesity • Significant tongue trauma/ edema • Obstruction/ debris/ airway hemorrhage	• Reduced mouth opening • Receding chin • Obstruction (neck hematoma, stidor, tongue swelling) • Large tongue • Obesity • Reduced neck mobility (C-collar, Ankylosing Spondylitis)	• Obesity • Anterior neck hematoma • Surgical disruption (radical neck dissection, etc) • Neck irradiation • Overlying neck abscess

Difficult Airway Assessment

- Have a system for assessment and use it
- “LEMON” or “LEON”: common assessment tools
- L: Look Externally (beard, trauma, prominent incisors, etc)
- E: Evaluate 3-3-2 Rule (see next slide)
- M: Mallampati (of limited utility in ED)
- O: Obesity, signs of Obstruction
- N: Neck mobility (c-collar, RA, Ankylosing Spondylitis)

The 3-3-2 Rule



Preparing to Intubate: “The 7 Ps”

- Preparation:
  - Equipment Check: suction, monitor, pulse oximetry, range of ETT sizes, range of laryngoscopes, oral and nasal airways, patent IV
  - Back-up plan: alternative intubating device, rescue ventilation, surgical airway
- Pre-oxygenation: > 3 minutes FiO2 100%
  - Best achieved with sealed mask using Anesthesia bag or BMV
  - NRB masks? FiO2 of only 65 to 70%
  - Begin pre-oxygenation during preparation phase
  - Avoid BMV unless patient apneic or persistently hypoxic

The 7 Ps

- Pre-treatment
- Paralysis with Induction: careful consideration of induction agent and paralytic based on patient characteristics
- Positioning
  - Aligning the “airway axis”: sternal notch to tip of ear lobe
  - In - line stabilization for C-spine precautions
  - Sellick Maneuver
- Placement with Proof
- Post-Intubation Management

The Airway Axis

Special Circumstances Pediatrics

- Sizing
  - (Age in years + 16)/4
  - Diameter of patient’s little finger
- Cuffed vs Uncuffed Tubes
  - Generally uncuffed <8yo
  - High Volume, Low pressure cuffs available

Special Circumstances Trauma Patients

- Maintain in-line cervical spine immobilization
  - 1 person assigned to this role
- Avoid cervical hyperextension

Special Circumstances Trauma Patient

- May require special equipment
  - Video laryngoscopy (Glidescope/Stortz)
  - Eschmann/bougie

Cases

- 58 y/o male presents with lower extremity cellulitis and hypotension (60/p). He has received 5 liters of LR, and has become progressively tachypneic and hypoxic (SaO2 = 88% on 100% NRB)
- You are seeing this patient in a rural, 5 bed ED. You suspect a necrotizing soft tissue infection and will be transporting the patient by air to a tertiary care facility

Cases

- Should this patient be intubated? Why or why not?
- Is there further information you wish to know?
- Other options short of intubation?
- What indications are there that this patient could be a difficult intubation? Difficult BMV?
- How will you prepare for intubation?

Cases

- A 5 year old is hit by a car and is unconscious with bloody airway
  - What size endotracheal tube should be used
  - Discuss position and stabilization of patient during intubation

References

- Manual of Emergency Airway Management
  - RM Walls, MF Murphy, RC Luten. 3rd Edition, Lipponcott, Williams and Wilkins, 2008.