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)
Sizing & Placing an Oral Airway:

Angle of the mandible to corner of the lips

Start upside down and rotate 180° mid-insertion

Sizing Nasal Trumpet(s):

Measure from nare to earlobe

Bagging a Patient: 1 or 2 hands

Bagging a Patient: 1 hand
**Bagging a Patient: 2 hands**

**The Bag Valve Mask**

- 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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**The Human Airway: A Continuum…**

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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

Predicted Airway Compromise

- Does the natural history of the injury or illness predict development of airway compromise? (penetrating neck injuries, epiglottitis, 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)

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

The Difficult Airway

<table>
<thead>
<tr>
<th>Difficult BMI?</th>
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<tbody>
<tr>
<td>- Beard</td>
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<tr>
<td>- Edentulous</td>
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<tr>
<td>- Fracture</td>
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<td>- Spondylitis</td>
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<td>- Overlying hemorrhage</td>
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<th>Difficult Laryngoscopy</th>
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<td>- Radial mouth opening</td>
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<td>- Radial head</td>
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<td>- Omobronchial dissection</td>
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<td>- Reduced neck mobility (C-spine, Asphyxiation, Spinal Flexibility)</td>
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<th>Difficult Surgical Airway</th>
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<tr>
<td>- Obesity</td>
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<td>- Amoxicillin</td>
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<tr>
<td>- Surgical dissection</td>
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<tr>
<td>- Neck immobilization</td>
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<tr>
<td>- Overlying neck masses</td>
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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

- 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)

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