Airway Management

Teeradej Kuptanon, MD
Outline

Anatomy
Detect difficult airway
Rapid sequence intubation
Difficult ventilation
Difficult intubation
Surgical airway access
ICU setting

Intubation
Difficult Intubation
Exit procedure
Pulmonary hemorrhage
Neck mass
Resuscitation

A Airway

B Breathing

C Circulation

A Airway

B Breathing

C Circulation
Anatomy
Assess

History

Physical Examination

Film airway

( Pediatricradiology.com)
Mallampati Airway classification
DIFFICULT AIRWAY ALGORITHM

1. Assess the likelihood and clinical impact of basic management problems:
   A. Difficult Ventilation
   B. Difficult Intubation
   C. Difficulty with Patient Cooperation or Consent
   D. Difficult Tracheostomy

2. Actively pursue opportunities to deliver supplemental oxygen throughout the process of difficult airway management.

3. Consider the relative merits and feasibility of basic management choices:
   A. Awake Intubation vs. Intubation Attempts After Induction of General Anesthesia
   B. Non-Invasive Technique for Initial Approach to Intubation vs. Invasive Technique for Initial Approach to Intubation
   C. Preservation of Spontaneous Ventilation vs. Ablation of Spontaneous Ventilation

4. Develop primary and alternative strategies:
   A. AWAKE INTUBATION
      Airway Approached by Non-Invasive Intubation
      - Succeed*
      - FAIL
      Cancel Case
      Consider Feasibility of Other Options(a) vs. Invasive Airway Access(b)*
   B. INTUBATION ATTEMPTS AFTER INDUCTION OF GENERAL ANESTHESIA
      Initial Intubation Attempts Successful*
      Initial Intubation Attempts UNSUCCESSFUL
      FROM THIS POINT ONWARDS CONSIDER:
      1. Calling for Help
      2. Returning to Spontaneous Ventilation
      3. Awakening the Patient
         FACE MASK VENTILATION ADEQUATE
         CONSIDER / ATTEMPT LMA
         LMA ADEQUATE*
         LMA NOT ADEQUATE OR NOT FEASIBLE
         EMERGENCY PATHWAY
         Ventilation Not Adequate, Intubation Unsuccessful
         Call for Help
         Emergency Non-Invasive Airway Ventilation(c)
         IF BOTH FACE MASK AND LMA VENTILATION BECOME INADEQUATE
         Emergency Non-Invasive Airway Ventilation(c)
   C. FACE MASK VENTILATION NOT ADEQUATE
      NON-EMERGENCY PATHWAY
      Ventilation Adequate, Intubation Unsuccessful
      Alternative Approaches to Intubation(c)
      - Successful Intubation*
      - FAIL After Multiple Attempts
      Invasive Airway Access(b)* vs. Consider Feasibility of Other Options(a)
      Awaken Patient(c)
      Successful Ventilation*
      FAIL
      Emergency Invasive Airway Access(b)*
Airway management

Position
Oropharyngeal Airway
Nasopharyngeal airway
Endotracheal tube
Tracheostomy tube
Airway management

Head tilt, Chin lift

Triple maneuver

Head tilt

Jaw thrust

Open mouth

C-spine injury

Supplement oxygen
Head tilt, Chin lift
Triple maneuver
C spine injury
Sniffing position

Oropharynx
Pharynx
Larynx
Oropharyngeal Airway
Nasopharyngeal airway
Indication for intubation

RCA Retraction, Respiratory rate
Conscious change, Cyanosis
Air entry, Apnea
Endotracheal Intubation

Put ETT (Uncuff, cuff, Tech)

Uncuff     Age/4  +  4
Cuff       Age/4  +  3.5

Check

Off ETT
Endotracheal Intubation

Position
Blades
Stylet
Sellick’s maneuver
Alternative airway management devices

- Laryngoscopes -

Handles

Blades

McCoy laryngoscope
Alternative airway management devices

- Laryngoscopes -

Flexiblade

Bullard laryngoscope

Wu scope

Upsher laryngoscope
Endotracheal tube exchanger

Bougie
Stylet
Sellick’s maneuver
Rapid sequence intubation

The induction of a state of unconsciousness with complete neuromuscular paralysis to achieve intubation

Minimize risks of gastric aspiration
Rapid Sequence intubation (RSI) = “7P”
Prepare for Intubation

Pre intubation check “SOAPME”

Suction
Oxygen
Airway
Pharmacy/Personnel
Monitoring
Equipment
Expedient intubation requires preparation

- Direct laryngoscope (all sizes, types)
- Magill forceps
- Endotracheal tube (all sizes)
- Ambu bag, Suction, stylet, O2 source
- Facemask, nasopharyngeal/oropharyngeal airway
- Supraglottic airway device
- Videolaryngoscope
- Emergency surgical airway kits
- Emergency resuscitation medications
Preoxygenation

- After 2 minute; 95% of nitrogen replaced by $O_2 \rightarrow$ increasing $O_2$ reserve

- Avoid!! PPV in patient who is spontaneously breathing
## Pretreatment

<table>
<thead>
<tr>
<th>Medications</th>
<th>Dose</th>
<th>Indication</th>
<th>Consideration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lidocaine</td>
<td>1-2 mg/kg/dose</td>
<td>Head injury, TBI, elevated ICP</td>
<td>Can protect IICP during intubation</td>
</tr>
<tr>
<td>Atropine</td>
<td>0.02 mg/kg/dose min 0.1 mg, max 1 mg</td>
<td>&lt;1 yr old, 1 to 5yr who receive succinylcholine, and anyone with risk of bradycardia</td>
<td>Prevent reflex bradycardia</td>
</tr>
<tr>
<td>Medications</td>
<td>Dose</td>
<td>Advantage</td>
<td>Disadvantage</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------</td>
<td>------------------------------------</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>1-4 mcg/kg</td>
<td>Easily reversible and short acting</td>
<td>Risk of chest wall rigidity</td>
</tr>
<tr>
<td>Midazolam</td>
<td>0.1-0.4 mg/kg</td>
<td>Status epilepticus</td>
<td>Hypotension</td>
</tr>
<tr>
<td>Etomidate</td>
<td>0.2-0.4 mg/kg</td>
<td>TBI, hypotension</td>
<td>Adrenal insuff. May precipitate seizure</td>
</tr>
<tr>
<td>Ketamine</td>
<td>0.5-2 mg/kg</td>
<td>Hypotension, asthma</td>
<td>Increased ICP, hypersecretion, glaucoma</td>
</tr>
<tr>
<td>Propofol</td>
<td>1-2 mg/kg</td>
<td>Rapid onset, status epilepticus</td>
<td>Hypotension Hypersensitivity to soy/egg</td>
</tr>
</tbody>
</table>
## Paralysis medications

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dose (mg/kg)</th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Succinylcholine</td>
<td>1-2  (&lt;10 kg) 1-1.5 (&gt;10 kg)</td>
<td>Rapid onset, short duration, IM use</td>
<td>Bradycardia, hypotension, arrhythmias, pulm edema, rhabdomyolysis</td>
</tr>
<tr>
<td>Rocuronium</td>
<td>0.6-1</td>
<td>Quick onset, stable No significant contraindication</td>
<td>Increased HR</td>
</tr>
</tbody>
</table>
Nasotracheal intubation
Tracheostomy tube
Technique for difficult Ventilation

Oral/ Nasal Airway

Two-person mask ventilation

Laryngeal Mask Airway (LMA)

Esophageal-tracheal combitube

Surgical airway access
2 person mask ventilation
Laryngeal Mask Airway (LMA)
<table>
<thead>
<tr>
<th>Size</th>
<th>Recommended Patient Weight in Textbook (kg)</th>
<th>Range of Patient Weight Based on Our Formula (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt;5</td>
<td>-5</td>
</tr>
<tr>
<td>1.5</td>
<td>5–10</td>
<td>5–11.25</td>
</tr>
<tr>
<td>2</td>
<td>10–20</td>
<td>11.25–20</td>
</tr>
<tr>
<td>2.5</td>
<td>20–30</td>
<td>20–31.25</td>
</tr>
<tr>
<td>3</td>
<td>30–50</td>
<td>31.25–45</td>
</tr>
<tr>
<td>4</td>
<td>50–70</td>
<td>45–80</td>
</tr>
<tr>
<td>5</td>
<td>&gt;70</td>
<td>80–125</td>
</tr>
</tbody>
</table>

Anesthesiology 2000;92:631
Combitube
Difficult intubation

Position ดี ?
ยก blade ถูกต้อง ?
External laryngeal manipulation ?
Jaw thrust ?
Technique for Difficult Intubation

Fiberoptic intubation

Blind intubation

Alternative laryngoscope (Mc Coy)

Video-assisted laryngoscope

Illuminating stylet

Retrograde intubation

Surgical airway access
Fiberoptic tracheal intubation

Indication

History of difficult intubation
Compromise airway
Extension of the neck is not possible
Awake intubation with tropical anesthesia
Video-assisted laryngoscope

Good laryngeal view; glottis is seen in the center of the upper third of video display.
Illuminated stylet
Retrograde intubation
Surgical Airway Access

Cricothyroidotomy
Tracheostomy
Cricothyroidotomy

When attempts at intubation or ventilation have failed, cricothyroidotomy is considered the procedure of choice.
Emergency cricothyrotomy
Mini-tracheostomy

Seldinger technique (safer than blind)

Aspirate air with the needle and syringe to check placement, cut with scalpel

Remove syringe, insert wire into needle, remove needle

Thread dilator with airway already loaded onto wire

Remove wire
Exit Procedure

Healthy Baby

Baby with Neck Mass
Pulmonary hemorrhage
Treatment

Specific treatment cause of bleeding
Correct bleeding tendency and coagulopathy
Paralyze patient with muscle relaxant and sedative drug
Ventilator support to maintain oxygenation and ventilation
Emergency management for massive hemoptysis

- Unilateral intubation or Double lumen ETT
- Rigid bronchoscope with epinephrine
- Vasopressin drip
- Selective bronchial arteriography with embolization
- Lobectomy
Neck mass Lymphoma
Thank you for your attention