Airways

1. Airway Lecture with Questions

1.1 Airway Management

1.2 Topics to discuss

• Airway assessment
  ▪ Airway Anatomy
  ▪ Different ways to assess airway
• Bag masking
• Intubating Patients
• Supraglottic Airways
1.3 Airway Anatomy Review

1.4 Airway Assessment

- An airway exam should be performed before entering the OR
- Airway exams should help to determine patients who may present difficulties to the clinician in:
  - Mask Ventilation
  - Intubation
1.5 Airway Assessment

Airway Assessment

The basic examination of an airway before rendering a patient unconscious includes:

- External airway assessment
- Mouth opening
- Mallampati scoring
- Thyromental distance
- Neck Mobility
- Neck circumference

1.6 “LEMON” Mnemonic

“LEMON” Mnemonic

- L - Look externally
- E - Evaluate the 3-3-2 rule
- M - Mallampati scoring
- O - Obstruction
- N - Neck mobility
1.7 External Airway Assessment

External Airway Assessment

The goal is to recognize any findings that may indicate difficulty with airway...

1.8 Looking at External Airway Assessment

Looking at External Airway Assessment

- Facial trauma
- Abnormal growths or masses
- Facial Hair
- Enlarged/protruding tongue
- Obesity
- Sunken cheeks
- Enlarged incisors
- Small mouth
1.9 Evaluate 3-3-2 rule

Evaluate 3-3-2 rule

- Patients should be able to fit 3 fingers between their incisors
- The mandible should be 3 fingers from hyoid bone to the chin
- The thyroid cartilage to floor of mouth should be 2 fingerbreadth's
- Any deviation from these are abnormal and more likely to result in difficult intubation

1.10 Mouth Opening

Mouth Opening

- You don’t need to actually stick your fingers in the patient’s mouth
- If they can open their mouth roughly greater than 3cm, they meet criteria
1.11 Thyromental Distance

1.12 Hyoid bone to Thyroid Cartilage
1.13 Mallampati Scoring

Mallampati Scoring

Increasing intubation difficulty with increasing Mallampati class

- Class I: Soft palate, uvula, fauces, pillars
- Class II: Soft palate, uvula, fauces
- Class III: Soft palate, base of uvula
- Class IV: Hard palate only

Source: http://webmds.cms.gov/ncg/aspx/taxa0221

1.14 Obstruction

Obstruction

Upper airway pathology

- Peritonsillar abscess
- Epiglottitis
- Retropharyngeal abscess
- Swelling from trauma/burns
- Neck Circumference
1.15 Neck mobility

**Neck Mobility**

- Look for full range of spinal motion without restriction
- Identify any paraesthesias or abnormal sensations with neck motion
- Potential for neck immobility devices to be used
  - Neck brace after trauma
  - Halo prior to spinal surgery

1.16 Difficult Mask Ventilation

**Difficult Mask Ventilation**

- **Overweight**
- **Bearded**
- **Elderly**
- **Snoring**
- **Edentulous**
1.17 Mask Ventilation

Mask Ventilation

- Mask Ventilation may be the most important airway skill
- It is an emergency technique for failure to adequately ventilate or oxygenate
- It is the back-up for failed intubations

1.18 Mask Ventilation Equipment

Mask Ventilation Equipment

- Oxygen source
- Ideally suction should be available
- Either a bag valve mask or Mapleson
1.19 Mask Ventilation

Mask Ventilation

- The patient is placed at a comfortable position for the provider
- The mask is placed ensuring to cover the mouth and nose
  - If the mask extends beyond the chin, then consider a smaller mask
  - If the mask does not fully cover the nose and mouth, consider a larger mask

1.20 Holding the mask

Holding the Mask

One Handed Technique:
- Usually utilizing the left hand the mask is held with an E-C position
  - The E is made by the fingers around the mandible lifting the mandible toward the mask
  - The C is made with the thumb and index finger over the top of the mask causing downward pressure on the mask
1.21 Holding the mask

Holding the Mask

Two Handed Technique:

- This technique is when another provider is available and is helpful in difficult to mask situations
- Essentially a two handed E-C technique can be used or a technique where the thumbs hold the mask on the face while the other fingers pull the mandible toward the mask

1.22 Untitled Slide
1.23 Mask Ventilation

Mask Ventilation

- As the mask is held, ensuring adequate seal the provider compresses the bag to ensure adequate chest rise
- The respiratory rate should be roughly 12 breaths per minute
- Allow inhalation over approximately 1-2 seconds
- Allow exhalation over approximately 3 seconds

1.24 Masking adjunct devices

Masking Adjunct Devices

Nasopharyngeal airway

- Nasal trumpet
- Assists in bypassing obstructed airway
- Should be avoided in patients who may have facial fractures, basilar skull fractures, recent transphenoidal surgery
- Appropriate size should be long enough to reach from external nare to earlobe before placement intranasally

Source: http://orthopedia.com/education/procedures/nasopharyngeal-airway/
1.25 Masking airway adjuncts

**Masking Airway Adjuncts**

Oropharyngeal Airway
- Prevents tongue from obstructing epiglottis
- Stents airway open
- May induce gagging in awake patient
- Tongue blade may help in successful placement

1.26 Position

**Position**

Appropriate positioning can help with aligning the airway for intubation:
- “Sniffing” Position
- Simple extension
1.27 “Sniffing” Position

“Sniffing” Position

- 3 Axis (es)
  - Oral
  - Pharyngeal
  - Tracheal
- Manipulate to align
  - Pillow
  - +/- head extension
- Trachea level of sternum

1.28 Untitled Slide
1.29 Untitled Slide

1.30 Intubations

Intubations
1.31 Airway Assessment

**Airway Assessment**

Remember the “LEMON”
- Look externally
- Evaluate 3-3-2
- Mallampati classification
- Obstruction?
- Neck Mobility

1.32 Laryngoscopes

**Laryngoscopes**

MacIntosh Blade  Millor Blade
1.33 Laryngoscope

- Hold with Left hand
- Insert in the Right corner of mouth
  - May need to turn perpendicular to end direction
- Sweep tongue to Left with phalange
- “Walk” the blade down with Macintosh
  - vs. full insertion with Miller

1.34 Mac and Miller Blade are used Differently

MacIntosh and Miller Blades are used Differently
1.35 Untitled Slide

MacIntosh Blade lifting while in vallecula

1.36 Untitled Slide

Miller Blade lifting the epiglottis
1.37 The Goal: Grade 1 view

The Goal: Grade 1 View

1.38 Endotracheal tube

Endotracheal tube

- Hold Ett with Right hand
- Place Ett through Cords directly
  - Appreciate initial depth
  - Hold tight until stylet removed
- Small breaths until confirmation
  - Chest rise - ETT condensation - EtCO2
  - Palpate balloon and cuff
1.39 Cormack-Lehane Classification

Grade 1 View: Full glottic opening seen
Grade 2 View: At best (2a) ½ glottic opening seen, at worst (2b) only posterior glottic opening seen
Grade 3 View: Only epiglottis visualized
Grade 4 View: No glottic structures seen

Source: http://anestesia.ru/jem-anesth/53-diff-tr-art

1.40 Video Laryngoscopy

Multiple video or indirect laryngoscopy devices have been developed:

- GlideScope
- C-Mac
- Macgrath
- Airtraq
- And more...
1.41 Supraglottic Airway

Supraglottic Airway

- Several supraglottic airway devices exist:
  - Laryngeal Mask Airway (LMA)
    - Most common with multiple different variants by many different manufacturers
    - Utilized frequently for operative anesthesia
    - Is not a protected airway
      - The risk of aspiration is very low in fasted individuals without risk factors (i.e. gastroparesis, GERD, etc.)
  - King Airway or Combitube
    - More commonly utilized “in the field” by EMS
    - Insertion of device blindly into esophagus (or trachea) with a port for ventilation of trachea

1.42 Laryngeal Mask Airway

Laryngeal Mask Airway (LMA)

- Invented in 1981
- First commercially available in 1986 (UK)
- First commercially US availability 1992
- By 1995 it had been used in over 100 million patients
- Incorporated as an early “rescue” device in the ASA Difficult Airway Algorithm
1.43 LMA Types

LMA Types

LMA Classic  LMA Supreme  ProSeal LMA

Fastrac LMA  iGel  Air-Q

And More

1.44 ASA Difficult Airway Algorithm

ASA Difficult Airway Algorithm
1.45 LMA Contraindications

LMA Contraindications

- No absolute except complete obstruction or not able to open mouth at all
- Relative (very relative, case by case basis)
  - Increased risk of aspiration
  - Expectation for prolonged ventilation
  - Morbid obesity
  - 2nd or 3rd trimester pregnant mother
  - Non-fasted individual
  - Active GI bleeding
  - Suspected or known abnormalities of supraglottic anatomy
  - Need for high airway pressures (though some LMAs have higher seal pressures and may tolerate this)

1.46 Inserting LMA

Inserting LMA

- Choose appropriate LMA for case and appropriate size
- Check LMA for cuff leaks/tears, partially inflate
- Apply lubricant to posterior surface of LMA
- Position Patient
  - Similar position to intubation, although can have good success with heads in neutral position
- Preoxygenate
- Sedate
- Insert
  - Advance LMA along hard palate, advance into hypopharynx until meeting resistance
  - Fill cuff with air
  - Check with each individual device to avoid overinflation
  - Check for adequate ventilation/seal
- Secure Device
  - Some devices are rigid enough to not need bite block
1.47 Inserting LMA

1.48 Awake Intubations

Awake Intubations

- Occasionally a patient may need to be intubated “awake”
  - Frequent Indications:
    - Non-reassuring airway preoperative exam
    - Anticipated problems with ventilation due to pathologic changes of:
      - Pharynx
      - Larynx
      - Neck
      - Mediastinum
    - Congenital abnormalities of upper airway
    - Morbid Obesity
    - Malformation of jaw
    - Inflammatory swelling of mouth or pharynx
    - Scar tissue from burns or prior operations of head/neck, or radiation to area