Difficult/Failed Airways
Introduction

- 61 yo wm transferred from Kentucky secondary to Upper GI bleed and severe blood loss.

- Pt had small amounts of hematemesis reported by the doctors in KY prior to transfer.
Gentleman was alert, conversant upon arrival to the MICU. C/o of need to clear throat as I interviewed him, and promptly produced 2 liters of bright red blood.

Within seconds of the first sight of blood, the patient was unresponsive and a code was initiated.
Intro

- Patient’s airway was secured with 7.0 mm ID ETT tube as suction was performed by two brave but shocked cohorts.

- Grade II airway was visualized and ETT passed through vocal cords with sustained ETCO2 and bilateral breath sounds.

- Pt’s rhythm was sinus tach with weak distal pulses, and hypotension responded to Levophed gtt.
Intro

- **PMH:**
  - chronic ETOH abuse w/ resultant liver failure
  - Hep C +
  - Hx of erosive esophagitis and prior UGI bleed
  - HTN
Intro

- Past Surgery: none
- All: NKDA
- Soc: +ETOH, + tobacco use
- Ros: orthostatic on arrival, recent RUQ pain, + N/V, + chronic dysphagia for 2 months (?), + R sided headaches for 2 months
Intro

- **PE:** Pt with poor dentition only about 4 teeth apparent, alert & oriented X 3
  - CV: rrr; no mrg
  - resp: ctab, no wheeze or rhonchi
  - Heent: Perrl, EOMI, NCAT, no JVD, dried blood in mouth
  - Abd: +hepatomegaly, +guarding at RUQ, no rebound, no asterixis
  - Ext: no edema, cyanosis
Intro

- LABS:
  - NA-140
  - Cl -107
  - BUN 32
  - ABG- 7.366/36.1/552/100% sat/ BE -5 on fi02 of 1
  - AST/ALT- 18/20
  - Lactic acid -8.2
  - Ptt-30.3
  - H/H = 9.3/27.6 platelets 220
  - WBC 15.5 ; this is after 2 units PRBC’s prior to arrival
  - K-5
  - HCO- 17
  - CR-1.4
  - 7.366/36.1/552/100% sat/ BE -5 on fi02 of 1
  - Amylase-28
  - lipase -13
  - PT-13.2
  - INR-1.29
Hospital Course

- Initial presentation was presumed massive upper GI bleed. Pt was given a total of 7 units of PRBCs, 6 Liters of Normosol, and 2 units FFP prior to GI coming by for endoscopic eval.

- Patient placed on octreotide gtt, and GI found nonbleeding ulcers in stomach, diffuse portal gastropathy, fundal varices, no esophageal varices, and GI made note irregular trauma to posterior oropharynx/hypopharynx.
Hospital Course

- During Interventional radiology eval for possible TIPS procedure, dye was noted to be leaking from R ICA. R External carotid artery had already clotted off; and it became apparent that this massive blood loss was from some type of injury to the R ICA with blood exiting through communication from R ICA into posterior oropharynx.
Hospital Course

- IR embolized the R ICA, and ENT came on board to eval for possible source for carotid bleed (aneurysm vs. pharyngeal CA ?)

- Pt gradually stabilized and remained on the vent for 14 days. Developed Pseudomonas VAP.
Hospital Course

- Pt was slow to wean from vent due to poor ability to clear secretions. But on 1/17 patient was successfully extubated and kept in MICU for 5 days for careful, thorough respiratory therapy.

- On 1/23, code called on the floor as the patient could not maintain O2 sats and was dyspneic. Report from nurses on the floor that patient was poorly clearing secretions.
Hospital Course

- This attempt at intubation was much more difficult.
- Dry blood clots and secretions with poor suctioning contributed to 2 unsuccessful attempts at intubation and sats were 82% on arrival and had dropped to 75% after the first two attempts.
- 3rd attempt was successful with change to Miller 2 blade and improved suctioning.
Hospital Course

- Pt finally had tracheostomy placed, and had NG feedings upon discharge to McCreary County Nursing Home.
- There he was to be evaluated for possible J-tube placement.
- Patient’s neurological status was at baseline compared to admission upon discharge!!!
Hospital Course

- Etiology of the R ICA fistula to the oropharynx is still uncertain. Ct of head/neck showed several calcified lymph nodes, but biopsy showed negative histiology. Patient did report traumatic experience with placement of R IJ while hospitalized briefly several months prior to admit at UTMCK.
The Difficult/Failed Airway

- Open wide!!!!!!!!
The Difficult/Failed Airway

- Definition of Difficult Airway from the Practice Guidelines for Management of Difficult Airways (www.asahq.com):
  the clinical situation in which a conventionally trained anesthesiologist experiences difficulty with face mask ventilation of the upper airway, difficulty with tracheal intubation, or both.
The Difficult/Failed Airway

- Definition of Failed Airway: unable to maintain O2 saturation greater than 90% and/or 3 failed attempts of intubation by a experienced provider.

- It is important to recognize the difference between the two (difficult and failed airway).
The Difficult/Failed Airway

- Magnitude of the Problem
  - Grade 3 or 4 laryngoscopy <20%
  - True Grade 4 view <5%
  - Failed intubation <1%

- However, emphasis should be on oxygenation/ventilation not intubation!!!
The Difficult/Failed Airway

- **Difficult airway** management can have a tremendous impact on patient outcome.

- The [ASA Closed Claims Project](#) created a supplemental **difficult airway** data collection form that focused on the principles of the ASA **difficult airway algorithm**. At present, there are 98 closed claims from 1987-95 involving management of a **difficult airway** for which this data form was completed.
The Difficult/Failed Airway

- **Airway** management comprises a significant aspect of professional liability to the anesthesiologist. **Difficult** intubation is the second most frequent primary damaging event leading to anesthesia malpractice claims.

- It is responsible for 6.4 percent of 4,459 claims in the closed claims database.
The Difficult/Failed Airway

- Not only does difficult intubation lead to a significant proportion of claims, the severity of outcome can be devastating. Brain damage or death was the outcome in 57 percent of the 283 claims involving difficult intubation, compared to an incidence of 43 percent in all other claims. (Miller, CG: Management of the Difficult Intubation in Closed Malpractice Claims. *ASA Newsletter* 64(6):13-16 & 19, 2000).
Techniques attempted in difficult airway claims regardless of predicted difficulty

<table>
<thead>
<tr>
<th>Management Strategy</th>
<th>Frequency</th>
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</thead>
<tbody>
<tr>
<td>Persistent nonsurgical attempts</td>
<td>77 percent</td>
</tr>
<tr>
<td>Surgical <strong>airway</strong> attempted</td>
<td>29 percent</td>
</tr>
<tr>
<td>Case canceled</td>
<td>13 percent</td>
</tr>
<tr>
<td>Return to spontaneous ventilation</td>
<td>12 percent</td>
</tr>
<tr>
<td>Patient awakened</td>
<td>11 percent</td>
</tr>
<tr>
<td>Proceed under mask GA</td>
<td>6 percent</td>
</tr>
<tr>
<td>Change to regional, local or MAC</td>
<td>2 percent</td>
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</tbody>
</table>
The most common management strategy was persistent nonsurgical attempts. Of note, closed claims reviewers considered most of these repeated attempts to be inappropriately persistent.

It should be noted that the LMA was not a common option when these claims occurred.
The Difficult/Failed Airway

- A significant proportion of claims resulting from difficult airway management had virtually no preoperative assessment. A preoperative airway history was not conducted in 25 percent of these claims.
The Difficult/Failed Airway

- Demographics of Airway Difficulty
  - Female
  - Obese
  - Elderly
  - Extremely sick
The Difficult/Failed Airway

- Preoperative Evaluation-
  - *Difficult Bag/Mask Ventilation “MOANS”*
    - Mask Seal
    - Obese (BMI >26)
    - Aged (loss of muscle tone leads to poor anatomy visualization/obstructed airway)
    - No TEETH (East TN)
    - Stiff lungs (pulmonary edema/asthma)
The Difficult/Failed Airway

- **Difficult laryngoscopy/Intubation “LEMON”**
  - Look externally at the neck
  - Evaluate 3-3-2 (recognizing the importance of geometry to a better laryngeal view)
  - Mallampati Class
  - Obstruction (tumor, neck mass)
  - Neck mobility

*Mandibular pronation also seems to have predictive value!*
The Difficult/Failed Airway

- **Difficult Extraglottic Device “RODS”**
  - Restricted mouth opening
  - Obstruction at larynx
  - Disruption/Distortion of neck and airway anatomy
  - Stiff (asthma/pulm edema)
The Difficult/Failed Airway

- **Difficult Cricothyrotomy “SHORT”**
  - Surgery/disrupted airway
  - Hematoma/infection
  - Obese/access problem
  - Radiation
  - Tumor
The Difficult/Failed Airway

- Consider all 4 aspects of the airway as you evaluate the patient.

- There is no one predictor that is perfect, but a combination of these above seem to increase predictive value.
The Difficult/Failed Airway

- Helpful hints (from advice given during Difficult Airway Course):
  - Problem clinically is usually not recognizing failure when it occurs, and not changing approach rapidly enough to deal with it.
The Difficult/Failed Airway

- Walls 2002 “The difficult airway is something you anticipate, the failed airway is something you experience”

- The advent of curare was 1942 and succinylcholine in the early 1950’s leading to an increase in airway disasters.

- Think Clinically two distinct ways
  - “Can’t Intubate/Can Ventilate (HAVE TIME!!!)
  - “Can’t Intubate/Can’t Ventilate (NO TIME!!!)
The Difficult/Failed Airway

- Have Plans for rescue if you find yourself in a difficult/failed airway.
- PLAN A, Plan B, and at least Plan C
- Pick at least two tricks of the trade in which you are proficient.
The Difficult/Failed Airway

- Which devices seem to work in certain situations:
  - (A) Can’t Intubate/Can’t Ventilate (NO TIME!)
    - Cricothyrotomy
    - Fastrach LMA
    - Combitube
    - King LTA
The Difficult/Failed Airway

- (B) Can’t Intubate/Can Ventilate (HAVE TIME!)
  - Trachlight/lightwand
  - Flexible/rigid scope
  - Retrograde intubation
  - WAKE UP!
Common Syndromes associated with Difficult Intubation

- **Syndrome**
  - Achondroplasia

- **Airway**
  - small nares/mouth
  - midface hypoplasia

**Associated anomalies**

- Hydrocephalus
- Atlantoaxial instability
Example of Achondroplasia
Example

- Apert-
  - small maxilla
  - narrow, possible cleft palate

**Associated Anomalies**

- Mental retardation
- Cardiac and renal anomalies
Example of Apert’s Syndrome
Example

- Beckwith-Wiedemann Syndrome

- Airway: large tongue, prognathism

- Assoc. anomalies: retardation, hypoglycemia
Example

- Crouzon Syndrome

Airway: small maxilla, large tongue, craniosynostosis

Assoc. Abn: Proptosis
Example
Example

- Down’s Syndrome

  Airway: Large tongue/small mouth, small mandible

  Assoc. abn: cardiac, atlantoaxial instability, hypotonia
Example
Example

- Goldenhar Syndrome

  Airway: small mandible and zygoma
  cleft palate

  Assoc. abn: cervical spine defects
- Klippel-Feil Syndrome

Airway: Short neck with limited extension

Assoc. Abn: Deafness, Ventricular Septal Defect
Example
Marfan’s Syndrome

Airway: Narrow face, narrow palate

Assoc. Abn: scoliosis, restrictive lung dz
Example
Example

- Pierre-Robin

Airway: micrognathia
Example

“the inverse Sherrer”
Example

- Treacher-Collins Syndrome

  Airway: Facial hypoplasia, receding chin, cleft palate, choanal atresia

  Assoc. abn: cardiac dz, cervical vertebral anomalies
Example

- Turner’s Syndrome

  Airway: Small, narrow maxilla, mandible, short neck

  Assoc. Abn: Coarctation, Hypertension
Example
OB & Difficult Airways

- Several physiologic and anatomic factors place OB patients at a higher risk for difficult airways.

- 1) Vascular engorgement of the respiratory tract leads to edema of the nasal/oral pharynx and trachea.

- 2) Weight gain—Large weight gain and uterine enlargement leads to decreased FRC and speeds clock to desaturation.
OB & Difficult Airways

- 3) Enlarged Breasts tend to interfere with attempts at intubation
- 4) Full dentition-Full set of teeth in the young pregnant patient and especially those with enlarged front teeth cause difficulty.
- 5) Rapid arterial desaturation during apnea: Increased metabolic requirements + decreased FRC= rapid rate of desaturation

(2)
OB & Difficult Airways

- Incidence of severe Grade III or Grade IV laryngoscopic view ranges from 0.05% to 0.35% of the population. The higher end of this range belongs to the obstetric population.

- Multiple studies have attempted to obtain positive predictive value in recognizing difficult airways.
OB & Difficult Airways

- Lewis et al. combined thyromental distance and Mallampati classification.
- Frerk used both these classifications finding 80% sensitivity and 98% specificity, respectively.
- Rocke et al. evaluated nine risk factors in 1500 obstetric patients finding four factors most predictive of difficult intubation-(Mallampati, short neck, receding mandible, protruding maxillary incisors)
OB & Difficult Airways

- In general, authors agree that multiple combinations of predictors improves specificity at the expense of sensitivity. (2)

- In addition, if mask ventilation is adequate after failed intubation in the OB patient; the presence of fetal distress plays a role in the decision tree.

- Most agree that **regional anesthesia** should be stressed in this patient population to avoid the above problems!
References

1) ASA Closed Claims Project
2) Obstetric Anesthesia, 3rd edition; Dr. David Chestnut M.D., pgs-541-550.
4) Basic of Anesthesia, 4th Edition; Robert Stoelting and Ronald Miller, Chapter 12
5) Difficult Airway Workshop/Course Manual
Special Thanks

- Dr. Langdon for direction and advice to make this case interesting!