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.

Intro

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

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/hypopharnyx.

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

Management Strategy	**Frequency**
Persistent nonsurgical attempts	77 percent
Surgical **airway** attempted	29 percent
Case canceled	13 percent
Return to spontaneous ventilation	12 percent
Patient awakened	11 percent
Proceed under mask GA	6 percent
Change to regional, local or MAC	2 percent

The Difficult/Failed Airway

- 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 — Airway

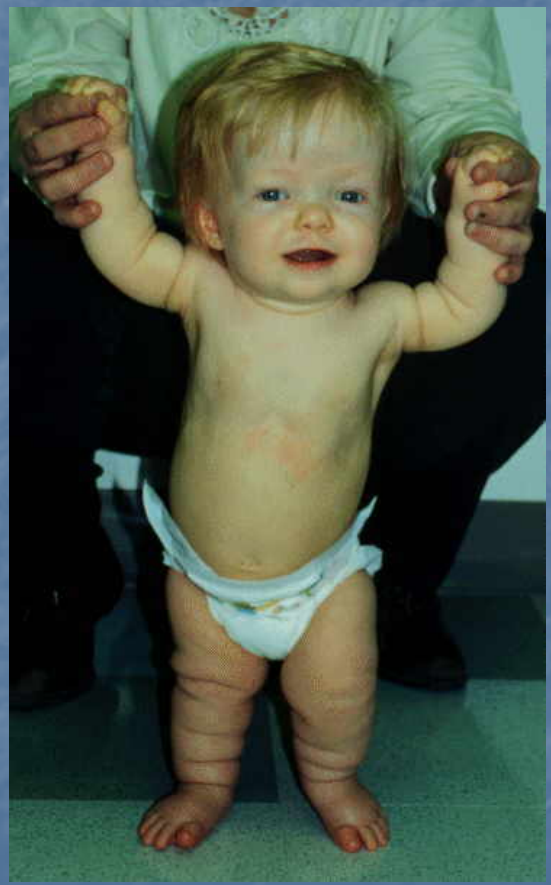
  Achondroplasia — small nares/mouth
  midface hypoplasia

  Associated anomalies

  Hydrocephalus

  Atlantoaxial instability

Example of Achondroplasia



Example

- Apert- small maxilla
  narrow, possible cleft palate

Associated Anomalies

Mental retardation

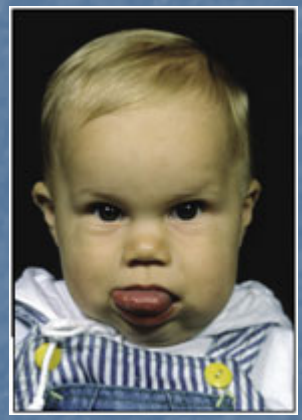
Cardiac and renal anomalies

Example of Apert's Syndrome

Example

- Beckwith-Wiedemann Syndrome
- Airway: large tongue, prognathism
- Assoc. anomalies: retardation, hypoglycemia

Example



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

Example

- Klippel-Feil Syndrome

  Airway: Short neck with limited extension

Assoc. Abn: Deafness, Ventricular Septal Defect

Example

- Marfan's 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

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.
- 3)**Principles of Anesthesiology** Author(s): Longnecker, David, Brown, David, Newman, Mark, and Zapol, Warren. Pgs. 647-648.
- 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!