The Difficult Airway: Case Studies in Trauma Airway Management

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Introduction
Introduction

- COMMON National Emergency Airway Registry: third of airways were trauma
- Inadequate airway management a leading cause of preventable mortality
- Airway manager part of a team
- DIFFICULT airways more common
Difficult Airway Algorithms: ASA

- Recognized
  - Proper Preparation
    - Awake
      - Intubation Choices
        - Succeed
        - Fail
          - Regional Anesthesia
        - Sti Airway
          - Regroup
        - Confirm
          - Extubate Over Jet Stylet
    - Fail
      - Intubation Choices
        - Succeed
        - Fail
          - Mask Ventilation
          - LMA, Combitube, TTJV
            - No emergency pathway
            - Awaken
            - Surgical Airway
            - Confirm
              - Extubate Over Jet Stylet
Approach to the Emergency Airway

Decision to intubate

Near death? Unresponsive?

Difficult Airway?

Rapid Sequence Intubation

Crash Airway

Failed Airway

Difficult Airway Techniques

Decision to Intubate

- Airway maintenance
- Oxygenation
- Ventilation
- Facilitate therapy
- Expected course
Decision to Intubate: Modifiers

- Operator experience
- Setting
- Potential for a difficult airway

*Never take away what you cannot replace*
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Decision to intubate

Crash Airway? Cricothyrotomy?

Difficult Airway?

RSI

Considerations: Surgical airway Pneumothorax

Considerations: Awake Intubation Intubating LMA® King LT Bougie Video-laryngoscope Fiberoptics Cricothyrotomy

Considerations: Elevated ICP Shock C-spine

Approach to the Trauma Airway

Case 1

High speed rollover MVC, 48 yo M

Head injury, decreasing LOC

Hypotensive at the scene

GCS 8, 100/60, P 90, RR 20, O2 %100

Scalp lac, nasal fracture, left trunk abrasions and open fracture
AIRWAY

Decision to intubate?
AIRWAY

Decision to intubate

Crash Airway? Cric?
AIRWAY

Decision to intubate

Crash Airway? Cric?

Difficult Airway?
The Difficult Airway

“SAKLES’ TRIANGLE”
The Difficult Airway

DIFFICULT BAG AND MASK VENTILATION

DIFFICULT LARYNGOSCOPY AND INTUBATION

DIFFICULT CRICOThYROTOMY

“SAKLES’ TRIANGLE”
Assessment of Difficult BVM
Assessment of Difficult BVM

- Consider potential difficulty of BVM ventilation before RSI
- Beware the full stomach
- Equipment out and ready
- Five predictors of difficult BVM: facial hair, obesity, adentulous, elderly, snoring *

Assessment of Difficult BVM: MOANS

- Mask seal
- Obesity
- Aged
- No teeth
- Stiffness
“LEMON” Law

L ook externally
E xamine (3-3-2)
M allampati grade
O bstruction
N eck mobility

Adapted from: Walls RM, Ed. The Manual of Emergency Airway Management

LEMON: Look

Simple visual inspection often reveals obvious potential difficulties
LEMON: Examine 3-3-2

Assess oral opening - 3 fingers
Measure the mandible - 3 fingers
Position of larynx - 2 fingers
LEMON: Examine 3-3-2

Assess oral opening – should be able to accommodate 3 fingers
LEMON: Examine 3-3-2

Measure the mandible - should be able to fit 3 fingers between the mentum and the hyoid bone
LEMON: Examine 3-3-2

Assess position of larynx – should get 2 fingers between the thyroid cartilage and the mandible
LEMON: Mallampati

Class I: soft palate, uvula, fauces, pillars visible.

Class II: soft palate, uvula, fauces visible.

Class III: soft palate, base of uvula visible.

Class IV: only hard palate visible.
LEMON: Obstruction?

1) Location?
2) Fixed or mobile?
3) Speed of progression?
LEMON: Neck Mobility

- Can the patient flex and extend the neck?
- Actively assess in the non-trauma obtunded patient.
- Cervical spine immobilization - remove anterior collar while c-spine is immobilized.
“LEMON” Law

Look externally
Examine (3-3-2)
Allampati grade
Obstruction
Neck mobility
Decision to intubate

Crash Airway? Cric?

Difficult Airway?

RSI
Clinical Issues: C Spine Injury

- Assume all have the injury
- DO NOT WAIT for radiography if airway management required
- RSI with immobilization presumed safe in the patient with cervical injury (no controlled studies)
Clinical Issues: Brain Injury

- Early airway management essential
- Single episode of hypoxia or hypotension increases mortality 150%
- Assume autoregulation is lost
- Shock should be avoided at all costs
- Pre-medicate to attenuate associated rise in ICP from laryngoscopy
Brain Injury RSI

Pre-meds

• Reflex sympathetic response
  * Fentanyl

• Direct reflex ICP response
  * Lidocaine
Brain Injury RSI

Induction

• **Etomidate** drug of choice in trauma
• Sodium thiopental only if isolated head injury
• **Ketamine** possible choice, being reconsidered as favorable in head injury
Clinical Issues

• Penetrating neck trauma
  – Is there an indication for intubation now?
  – What about in 30 minutes?
• Difficult intubation v. worsening vascular injury
• Consider awake intubation
Video Laryngoscopy
LMA CTrach

Key Features of the LMA CTrach™

- The LMA CTrach™ Viewer weighs less than eight ounces, and is totally wireless and portable. The Viewer provides controls for focusing and image adjustment. The battery provides 30 minutes of uninterrupted viewing and is rechargeable in a dedicated cradle.
- A dedicated ET tube with an atraumatic tip is designed to enter the trachea at the correct angle through the LMA CTrach™.
- Magnetic latch connector correctly positions and secures the viewer to the LMA CTrach™.
- Two fiberoptic bundles emerge at the distal end of the airway tube, under the modified Epiglottic Elevating Bar, which optimizes the light source and enables uninterrupted image transmission to the viewer, while protecting the airway tube from obstruction.
- Anatomically curved airway tube with integrated fiberoptic technology.
- Airway is fully Autoclavable.
Glidescope
Case 3
Case 3

• Approach and “worst-case scenario”
• Management of traumatic airway obstruction
• Transportation issues
Clinical Issues: Airway Injury

- Intubate early *before* the patient develops prominent symptoms
- Essential to secure the airway before transport
- The approach must be individualized
- Consider awake technique if a difficult airway is anticipated
Airway alternatives

Supraglottic:

Infraglottic:

Zone of Increasing Sphincter Tone

Retrograde TTJV Cricothyrotomy

BVM BNTI Bougie Intubating LMA® King LT Combitube Video laryngoscopy Fiberoptics

ZIST
Rescue Devices

- Most require oral access
- Most are designed to deal with high anterior cords
  - I-LMA, King LT
  - Intubating stylet (bougie, frova, etc.)
  - Video-laryngoscopy
Case 4

42-year-old woman set herself on fire in her car.

Uncooperative, yelling “let me die”.
70-80% burns, mostly 3°, to face, trunk, anterior arms and thighs.
Unable to get a BP or O2 sat.
Intubating Stylet/Bougie
Clinical Issues: Agitated Patient

- Assessment of the difficult airway – beware ego, fear, urgency
- The agitated or violent trauma patient
  - Haldol, Droperidol, Midazolam, Ketamine
Clinical Issues: Burn Victims

• Pulse oximetry may overestimate oxygenation in presence of carboxyhemoglobin
• Consider cyanide toxicity
• Upper airway obstruction progresses for 12 to 24 hours – intubate early
• Pulmonary burn, injury, may further impair gas exchange
Clinical Issues: Succinylcholine

• Hyperkalemic response – rarely an issue in the acute setting
• Not an issue in acute burns (<48 hours)
• Most cases are undiagnosed pediatric myopathies, used with halothane
Case 5

32-year-old construction worker falls from scaffolding and the lower half of his face is sheared open on an upright piece of sheet metal.
Surgical Cricothyrotomy
Surgical Cricothyrotomy
No landmarks?

- The **tongue** is your friend – find it and follow it to the glottis
- **Suction**, suction, suction…
- **4-finger rule** for the cricothyroid membrane
Cricothyroid membrane under the 4th finger
Consider surgical airway early
Summary

- Assess for the difficult airway
- MOANS for BVM
- LEMON for laryngoscopy
- “Worst Case Scenario” plan ahead
- Prepared to perform a surgical airway