Optimising Airway management for Trauma: comorbidity and difficult patients

T Hardcastle
Trauma Surgeon
Durban – South Africa
Disclaimer

• All images are from my own practice at either IALCH or previously Tygerberg hospital unless otherwise mentioned.
• Opinions are not necessarily those of my employer, SA Department of Health.
Overview

Airway is more than ET-tube or Surgical Crico

– Airway challenges in trauma
– The patient with comorbidities
– The obese patient
– RSI versus other drug assisted airway procedures
– Dealing with difficult laryngoscopy view
  • Tools, tips and tricks for the surgeon-intensivist
– Rescue devices
– Surgical airway options.
Epidemiology of Difficult Airway

- Average 2-5% of all emergency airways
  - Higher in trauma
  - Higher in comorbid group

<table>
<thead>
<tr>
<th>Reasons for difficulty</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior larynx</td>
<td>38</td>
<td>40.9</td>
</tr>
<tr>
<td>Neck immobility</td>
<td>22</td>
<td>23.7</td>
</tr>
<tr>
<td>Secretions and blood</td>
<td>14</td>
<td>15.1</td>
</tr>
<tr>
<td>Small mouth &lt; 3 fingerbreadths</td>
<td>13</td>
<td>14.0</td>
</tr>
<tr>
<td>Obesity</td>
<td>10</td>
<td>10.8</td>
</tr>
<tr>
<td>Incomplete frontal dentition</td>
<td>8</td>
<td>8.6</td>
</tr>
<tr>
<td>Airway oedema</td>
<td>8</td>
<td>8.6</td>
</tr>
<tr>
<td>Oral obstruction (tumour, mechanical obstruction)</td>
<td>7</td>
<td>7.5</td>
</tr>
<tr>
<td>Maxillofacial trauma</td>
<td>4</td>
<td>4.3</td>
</tr>
<tr>
<td>Combativeness</td>
<td>2</td>
<td>2.2</td>
</tr>
</tbody>
</table>


What constitutes a difficult airway?

- Problematic ventilation using a face mask
- Inability to deliver necessary tidal volume via face mask utilizing nasal or oral airway
- Incomplete laryngoscopic visualization
- Cormack and LeHane grade 3 or 4
- Difficult Intubation with standard airway equipment
- Requiring external laryngeal manipulation
- Greater than 3 attempts at intubation
- Requiring nonstandard equipment
Examples in Trauma
BOOTS: - Difficult BMV

Beard – Obesity – Obstruction – Toothless - Stridor
Bad view - LEMON

- Local trauma: Look
- 3:3:1 Rule
- M-scores
- Obstruction
- Neck stiff
The combative patient

- Danger to self and staff
- Makes c-spine care more difficult
- Need to chemically sedate
  - Options include Haloperidol or Lorazepam
  - The proceed to RSI if the reason for the combative nature is TBI

The combative patient is hypoxic till proven otherwise
The patient with neck trauma

- Do not delay airway management for concern about c-spine control
  - Manual Inline Spinal Motion Restriction is best
  - Remove the C-collar for manipulation
- These are difficult airways on the basis of "difficult laryngoscopy"
  - Direct laryngoscopy is usually still best
- Neck haematoma – relative contra-indication to RSI – best to try awake intubation
  - Most can be orally intubated
  - Consider flexible scope
Airway injury

• Pitfall
• Mechanisms:
  – Penetrating: Direct airway injury
    • C-spine injuries very rare
    • Consider intubating past the injury or into the open airway wound
  – Blunt:
    • Direct blow to larynx / trachea
    • “Clothesline injury”
    • VERY careful intubation or awake tracheostomy
      – Cricothyroidotomy relative contraindication
Facial bone fractures

- Le Fort III type and mandible fractures
  - Posterior soft tissue displacement
  - Bleeding
- Difficult BMV – often easy intubation
- Treat in position found
  - Awake sitting intubation
  - Sponge-forceps on tongue
  - Foley catheter tamponade
TBI

- Hypoxia and Hypotension kill
- Don’t be fixated on GCS level
- RSI using cardiostable drugs is best
  - Ketamine and Etomidate equivalent
    - Both can suppress adrenal function
  - Suxccnycholine and Rocuronium equivalent
  - Avoid hyperventilation
  - Use routine ETCO2 monitoring
The obese patient

- Risk for difficult BMV
- Difficulty for tracheal intubation controversial
  - Position is everything
  - Obscured landmarks
- If also DM-type II
  - TM joint and neck joints stiffen due to glycosylation

- Physiological and pharmacological issues:
  - Reduced FRC
  - Reduced safe apnoeic time (50%)
  - Drug doses best based between IBW and TBW estimate

Keep dentures in for BMV and remove for laryngoscopy
Ramp up = neutral spine
Bed = 30’ Reverse Trendelenberg
Cardio-respiratory disease

- COPD is common, especially among smokers
  - Apnoeic time is reduced
  - Desaturate rapidly
  - Still need OXYGEN
  - NIV is a useful option if GCS 15/15
  - Allows sufficient exhalation to avoid stacking

- IHD
  - Use cardiostable agent – ketamine rel-C/I
“The canaries” – rare problems

- Congenital syndromes
  - Common:
    » Pierre Robin
    » Beckwith-Weideman
    » Cornelia de Lange
    » Trisomies (esp. 21)
  - Rare: many others <1:20 000
- In general: Difficult laryngoscopy / intubation
Tools, Tips and Tricks

Have gadgets on the airway tray
- Vaseline
- Bougie
- Swab holding forceps

Think before you do
If in doubt – do not paralyse
Always have a backup plan
- LMA / LTA

Don’t forget to have a scalpel handy
- Surgical airway is a viable option
What about tracheostomy?

- Severe facial fractures
- Severe head trauma
- Suspect prolonged ventilation

- Open technique – if going to the OR or if risky features
- Percutaneous – safe, but more long-term complications
Technique

Open technique: Recommend the “RCS” technique

- Transverse incision
- Divide muscles and split isthmus
- Cranio-caudal midline slit with holding sutures
- Tube placed under vision, skin not sutured

One Thousand Bedside Percutaneous Tracheostomies in the Surgical Intensive Care Unit: Time to Change the Gold Standard

Lucy Z Kornblith, MD, Clay Cothren Burlew, MD, FACS, Ernest E Moore, MD, FACS, James B Haenel, RRT, Jeffrey I. Kashuk, MD, FACS, Walter L Biffl, MD, FACS, Carlton C Barnett, MD, FACS, Jeffrey L. Johnson, MD, FACS

CONCLUSIONS: BPT in the surgical intensive care unit is a safe procedure, even in high-risk patients. We believe BPT is the new gold standard for patients requiring tracheostomy for mechanical ventilation. (J Am Coll Surg 2011;212:163–170. © 2011 by the American College of Surgeons)
Longer-term airway issues

Early tracheostomy has benefits
- When performed around Day 3
- Decreased ventilator days and ICU stay

Bench-to-bedside review: Early tracheostomy in critically ill trauma patients
Nehad Shirawi1 and Yaseen Arabi2

1Associate consultant, Intensive Care Department, King Abdulaziz Medical City, Riyadh, Kingdom of Saudi Arabia
2Consultant and Deputy Chairman, Intensive Care Department, Assistant Professor, King Abdulaziz Bin Saud University, King Abdulaziz Medical City, Riyadh, Kingdom of Saudi Arabia

Critical Care 2006, 10:201 (doi:10.1186/cc3828)