Optimising Airway management for Trauma: comorbidity and difficult patients

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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

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

Sakles JC, Laurin EG, Rantapaa AA, Panacek EA. Airway management in the emergency department: a one-year study of 610 tracheal intubations. Ann Emerg Med 1998; 31: 325–32
Nolan JP, Kelly FE. Airway challenges in critical care. Anaesthesia 2011; 66: 81–92

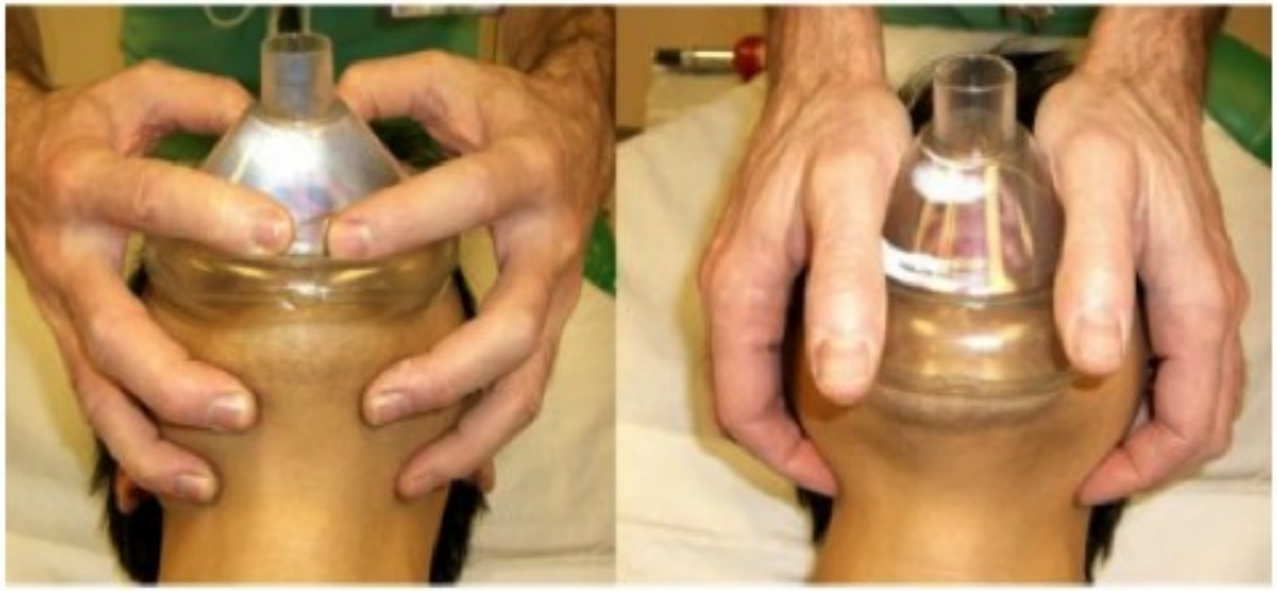
What constitutes a difficult airway?

- 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

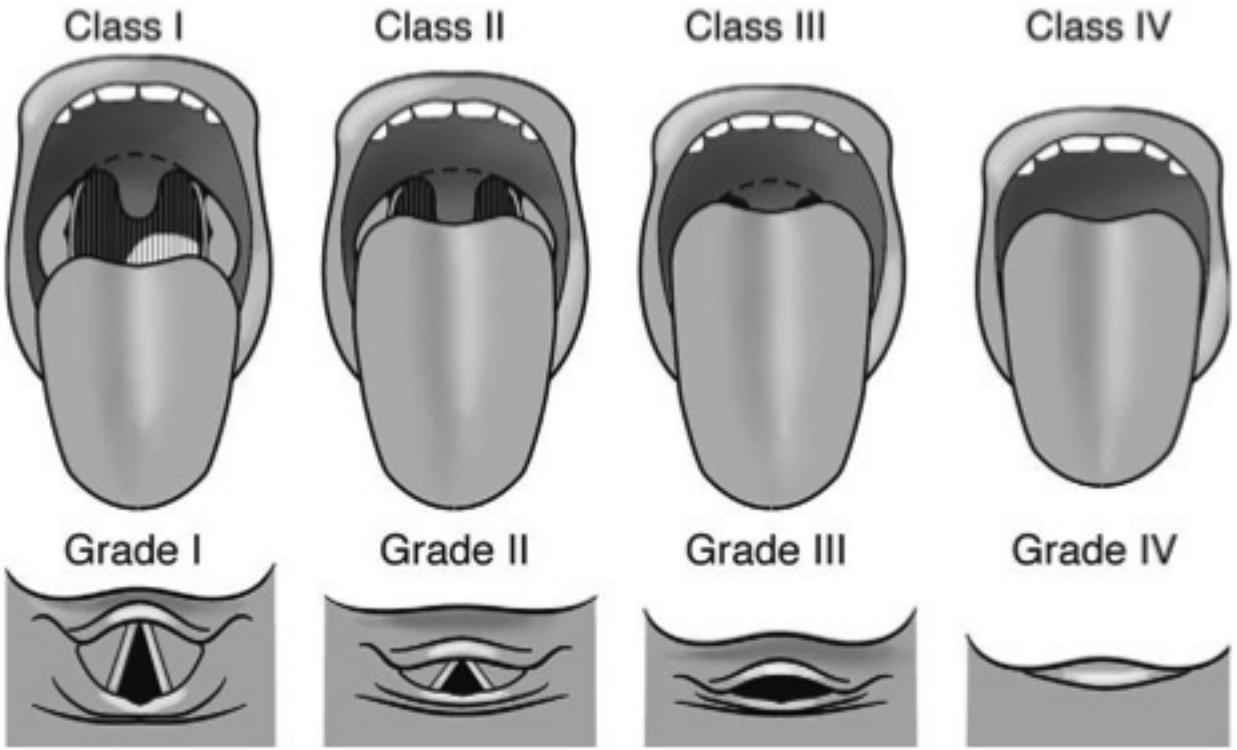
BOOTS: - Difficult BMV

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

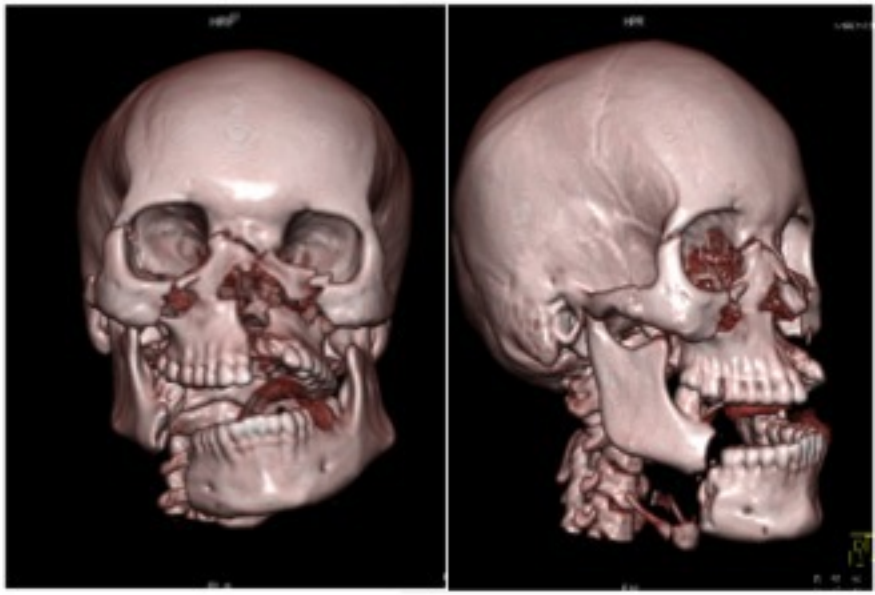
- Do not delay airway management for concern about about c-spine control
  - Manual Inline Spinal Motion Restriction is best
  - Remove the C-collar for manipulation
- These are difficult airways on the basis of "difficult laryngoscopy"
  - Direct laryngoscopy is usually still best
- Neck haematoma – 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
      - Cricothryroidotomy relative contra-indication

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



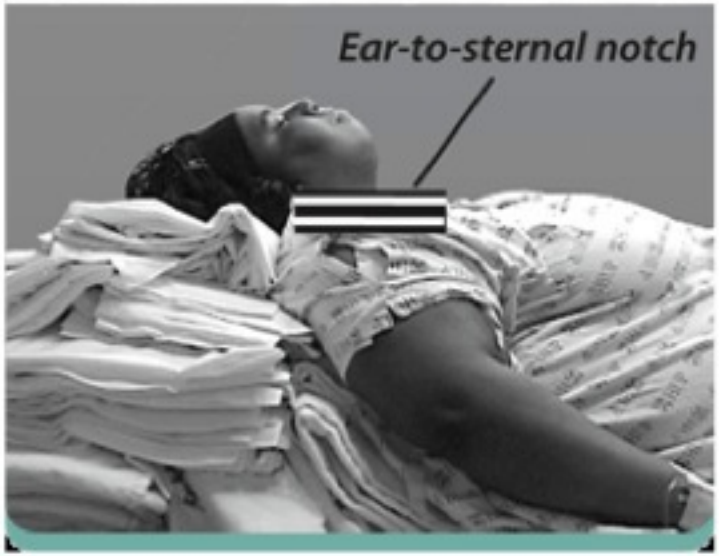
TBI

- 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

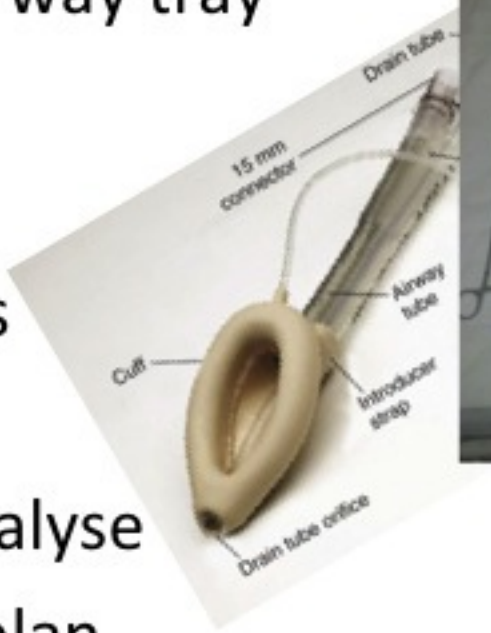
"The canaries" – rare problems

- 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, Jeffry L 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.

Longer-term airway issues

Early tracheostomy has benefits

- When performed around Day 3
- Decreased ventilator days and ICU stay

Timing of tracheostomy

Design	Patient population	Number of patients	Group/patient number	Results in early tracheostomy group: ICU LOS	Hospital LOS	Duration of MV	↓ pneumonia	Reference
Prospective randomized	Trauma	74	E = 8-4 (34) L = 14 (40)	N/A	N/A	N/A	↔	[3]
Prospective randomized	Trauma	100	E ≤ 7 (51) L > 7 (55)	↓	↓	↓	↓	[5]
Retrospective observational	Trauma	101	E ≤ 4 (32) L > 4 (69)	N/A	N/A	↓	↓	[8]
Retrospective observational	Trauma	157	E ≤ 8 (62) L > 8 (95)	↓	↓	N/A	↓*	[9]
Retrospective observational	Trauma	31	E < 7 (21) L > 7 (10)	↓	↓	↓	N/A	[10]
Prospective observational	Trauma	503	E < 7 (29) L = > 7 (107)	↓	↔	↓	N/A	[20]
Prospective observational	Trauma	62	E = 5-6 (31) L = > 6 (31)	N/A	N/A	↓	↔	[21]
Prospective randomized multicenter	Trauma (139) Non-trauma (18)	157	E = 6-8 (127) L = 10-14 (28)	↔	N/A	N/A	↔	[62]

Bench-to-bedside review: Early tracheostomy in critically ill trauma patients

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