## Contents

**Airway**

- Basic Structure of Upper Airway incl Larynx .................. 2
- Airway Assessment ................................................. 5
- NAP4 Findings .................................................... 9
- Summary Approach to Airway ................................. 10

**DAS**

- Unanticipated Difficult Intubation - Adults ................. 11
- DAS Extubation Guidelines ............................... 16
- Paediatric Guidelines ........................................ 17
- Obstetric Guidelines ......................................... 18

**ANZCA CICO** ......................................................... 21

**ANZCA Difficult Airway Algorithm** .......................... 23

**Management of Obstructed Airway** .......................... 24
Airway
Basic Structure of Upper Airway incl Larynx
Nerves of the Larynx

- Superior laryngeal nerve
  - Divides into:
    - Internal branch –
      - Sensory to:
        - Ipsilateral larynx from sup boundary to true cords
        - Pyriform sinus
        - epiglottis
    - External branch –
      - Motor
        - Cricothyroid muscle
      - Sensory:
        - Ant infraglottic larynx cricothyroid membrane
          - unilat paralysis ➞ failure of ipsilateral cord closure even with intact RLNs
  - Recurrent (inf) laryngeal nerve:
    - Motor:
      - All intrinsic mm of larynx on same side except cricothyroid mm (ext laryngeal from Vagus)
    - Sensory:
      - Ipsilateral mucosa below true cords
        - L RLN longer course, turing around aortic arch; R RLN turns around subclavian artery
        - paralysis of RLN ➞ paramedian vocl cord position due to adduction action of SLN (cricothyroid)
Airway Mnemonics

- Risk of diff BMV = rarely mnemonics offer much benefit:
  - R adiotherapy
  - M ale
  - O SA
  - M allampati III, IV
  - B eard

- Risk of diff SGA placement:
  - R restricted mouth opening
  - O abstracted airway
  - D disrupted airway
  - S tiff lungs

- Risk of diff surgical airway:
  - S urgery/disrupted airway
  - H aematoma/infection
  - O bese/access problem
  - R adiation
  - T umour
# Airway Assessment

## Intro
- Impt - 30% anaesthetic deaths caused by failure of airway management
- Most catastrophe due to unexpected difficult airway
- Prediction of difficult BMV or LMA as important as ETT placement
- Intubation =
  - difficult in 1:50
  - Impossible 1:2000 - ↑'ed to 1:200 for emergencies
- BMV =
  - Difficult 1:20
  - Impossible 1:1500
- CICO: 1:10,000
- Rescue techniques fail 1:20
- RFs for hypoxemia are important:
  - Pregnancy
  - Obesity
  - Children

## History
- Congenital airway difficulties:
  - Pierre Robin = micrognathia, small tongue, cleft palate
  - Klippel Feil = congen fusion of >2 Cx vertebrae ⟷ head displaced ant and inferiorly
  - Down Syndrome =
    - Very large tongue
    - Laryngomalacia = inward collapsing of tissues at laryngeal inlet
    - Tracheomalacia
    - Tracheal bronchus = bronchi come from trachea level
    - Bronchomalacia = collapsing of airways
- Inflammatory:
  - RA -
    - atlanto-axial subluxation (25%) due to deg of transverse ligament ⟷ types: ⟷ with risk spinal cord damage
    - Anterior - (80%)
      - C1 moves forward on C2 causing risk spinal cord compression by peg
      - Lat C spine - atlas to peg distance: >44yrs old = >4mm, <44yrs old = >3mm
    - Posterior (5%)
      - Lat extension views
      - Peg is destroyed
    - Vertical (10-20%)
      - Destruction of lat mass of C1 ⇒ peg through foramen magnum & compression cervico-medullary junction
    - Lat or rotatory = degen changes in C1/C2 facet joints ⇒ spinal nerve & vertebral artery compression
    - Subaxial subluxation - uncommon. Occurs below C2
    - Cricothytenoid joint involvement:
      - Dyspnkea, stridor, hoarseness, severe ⇒ upper airway obstruction
      - Laryngeal amyloidosis & rheumatoid nodules ⇒ obstruction of larynx
- TMJ joint involvement ⇒ difficult mouth opening

- Stills disease = (juvenile or adult onset)
  - polyarthritis with sore throat & high spiking fever & salmon pink rash
- Anky Spond
- Scleroderma - tight skin & mouth

• Infectious:
  - Epiglottitis
  - Submandibular abscesses or Ludwig’s Angina
    ↳ cellulitis of submandibular tissues
  - Retropharyngeal abscesses
• Endocrine
  - Acromegaly - hypertrophy of upper airway soft tissues
  - DM - generalised joint and cartilage damage
  - obesity
• Pregnancy
  - Upper airway oedema
  - Incr aspiration risk
• Trauma
  - Foreign bodies
  - Facial or neck trauma
• Iatrogenic Problems:
  - TMJ surgery
  - Cervical fusion
  - Oral/pharyngeal radiotherapy
  - Laryngeal.trachel surgery
• Reported previous anaesthetic problems - check notes, med alerts, databases

**Examination**

• Unusual anatomy:
  - Small mouth
  - Receding chin
  - High arched palate
  - Large tongue
  - Bull neck
  - Morbid obesity
  - Large breasts

• Acquired problems:
  - Head/neck burns
  - Tumours
  - Abscesses
  - Radiotherapy
  - Scars

• Mechanical limitation
  - ↓ mouth opening
  - ↓ Ant TMJ movement (protrusion)
  - Poor Cx movement
  - Poor dentition
  - External equipment ie halo traction, C collar, dental wiring
  - Unpatent nasal passages - for nasal intubation
Radiology
• Recent CT/MRI helpful
• Occipito-atlanto-axial disease is more predictive of difficult laryngoscopy than disease below C2
• Plain XRs not that useful:
  • Flex/ext views in RA may be helpful but poor correlation with risk

Predictive Tests for Intubation
• For intubation need:
  • Mouth opening
  • Ext upper Cx spine
  • Ability to create submandibular space
• Tests have statistical problems:
  • Low specificity & PPV ie large no of false +ves
    ⟷ <10% predicted difficult airways end up being difficult
  • Sensitivity ≈ 50%. Tests quoted high often in specific populations, not in routine practice
  • Combination of tests ⇒ ↑ specificity (↓ed false positives) BUT ↓’es sensitivity (miss more truly difficult airways)

Inter-Incisor Gap
• Distance between incisors with max open mouth
  • Affected by TMJ & upper Cx spine mobility
  • <3cm ≈ difficult intubation
  • <2.5cm ≈ LMA insertion difficult

Protrusion of Mandible
• Class A = lower incisors can protrude beyond upper
• Class B = lower reach margin of uppers
• Class C = lowers cannot reach uppers
  ⟷ class B & C ≈ difficulty

Mallampati Test

Class 1 Class 2 Class 3 Class 4

• Patient sitting upright, from opposite patient, open mouth maximally and protrude tongue without phonating
• gradings:
  • Class 1 = faucial pillars, soft palate & uvula visible
  • Class 2 = uvula tip masked by bass of tongue
  • Class 3 = soft palate only
  • Class 4 = soft palate not visible
• Class 3 & 4 ≈ difficult intubation BUT:
  • Inter-observer variation
  • Sensitivity 50%
Low specificity and positive predictive value - 90% false positive rate

**Extension of Upper Cx spine**
- <90° ≈ difficulty
- Methods:
  - 1:
    - Fully flex head on neck
    - Immobilising lower Cx spine with one hand, then fully extend head
    - A pointer on the forehead allows angle to be estimated
  - 2:
    - One finger on chin and one on occipital protuberance & extend head max
      - norm = chin finger higher; mod limitation = level fingers

**Thyromental distance (Patil test)**
- Neck fully extended, mouth closed: distance tip thyroid cartilage to tip of mandible
- Score:
  - Normal >7cm
  - <6cm ≈ 75% of diff laryngoscopies
  - Patil & mallampati tests combined (<7cm & gd 3-4) = specificity 97%, sensitivity 81%

**Sternomental Distance (Savva Test)**
- Neck fully extended, mouth closed: Upper border of manubrium to tip mandible
- <12.5cm ≈ difficulty (PPV 82%)

**Neck circumference**
- <40cm

**Wilson Score**
- 5 factors:
  - Weight
  - Upper Cx mobility
  - Jaw movement
  - Receding mandible
  - Buck teeth
- Each gets subjective score 0-2
- Score 2 or >2 ≈ 75% difficult intubations 12% false positives

**Predictive Tests for Difficult BMV**
- Age >55
- BMI > 26
- Snoring Hx
- Beards
- No teeth
- if have 2 of above >70% sensitivity & specificity
- Facial abnormality
- OSA
- Receding or marked progonathism
  - = marked jaw protrusion relative to skull

**Predictors of Problems with Back Up Techniques**

**LMA**
- Inability to open mouth >2.5cm
impossible if <2cm

- Intraoral/pharyngeal masses

**Direct Tracheal Access**

- If contemplating need for tracheal access:
  - Position of larynx & trachea
  - Accessibility of cricothyroid membrane & trachea
- Risk factors:
  - Obesity
  - Goitre
  - Other ant neck masses
  - Deviated trachea
  - Fixed neck flexion
  - Prev radiotherapy
  - Surg collar or ext fixator

**CL Laryngeal View Grades**

- Restricted = need bougie

- Grades
  - 1 = can see ant commisure
  - 2 = arytenoids & post commisure only
  - 3a = epiglottis away from post wall
  - 3b = epiglottis adherent to post wall
  - 4 = tongue only

**NAP4 Findings**

- NAP4 suggested:
  - serious complications: 1:22,000 GAs
  - death or brain damage 1:150,000 GAs
- reasons for problems:
  - poor judgement
  - poor Ax
  - poor strategy
  - AFOI not used
  - over-reliance on SADs
  - high failure rate cricothyroidotomy
  - high risk emergence
• commonest cause of death was aspiration

**Summary Approach to Airway**

• difficult airway is easy to miss, & hard to identify correctly

• Bedrock of approach to airway:
  • Pre assessment:
    - History - Airway, medical, surgical
    - Examination
  • Positionning
  • Preoxygenation
  • BMV
  • passive apnoea oxygenation
  • jaw thrusts
  • airway adjuncts
  • DL/VL
  • Infraglottic

• 4 pillars of approaching airway:
  • intubation
  • SGA
  • BMV
  • Subglottic access

---

**Appendix 1 Factors that predict problems with tracheal intubation, mask ventilation, insertion of a supraglottic airway device and front-of-neck airway access.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Body mass index &gt; 35 kg.m⁻²</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Neck circumference &gt; 50 cm</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Thyromental distance &lt; 6 cm</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Cricoid pressure [81, 82, 87, 88]</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mallampati grade 3-4</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Fixed cervical spine flexion deformity</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Dentition problems (poor dentition, buck teeth)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Miscellaneous factors (obstructive sleep apnoea, reduced lower jaw protrusion, airway oedema)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mouth opening &lt; 4 cm</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

SAD, supraglottic airway device.
DAS

• standardisation is impt

Unanticipated Difficult Intubation - Adults

Overview:

PreOp Assessment & Planning
• every one should have airway Ax
• should be discussed at breifing or prior to every patient
• ↓pH & gastric contents should be addressed

RSI
• fasiculations with sux may ↑O2 consumption ⇒ ↓apnoea time before desaturation
• cricoid:
  • cricoid has been shown to prevent gastric distension during BMV
  • gentle mask ventilation is an accepted technique for pts with poor resp reserve or high metabolic requirements
  • 10N force while awake
  • 30N when asleep
  • cause to ↓lower oesoephageal sphincter ⇒ ↑risk of regurgitation
  • may improve laryngoscopy view
  • poorly applied
Unanticipated:

2nd gen SGA not fully defined:
- improved cuff design
- gastric sport
- pre-formed bite block

Plan A
- NMB facilitates BMV & intubation
- every intubation attempt has potential to cause trauma & ↓s likelihood of next attempt success:
  - 3+1 attempts:
    - max 3 attempts at intubation by you
    - 4th attempt allowed by senior colleague
- position -
  - neck flexed & head extended at atlanto-occipital joint
  - in obese - use ramped position
- preoxygenate & denitrogenate until EtO2 0.87-0.9
  - obese: 20deg head up & CPAP
  - passive oxygenation using nasal cannulae with 15litres via nasal cannula useful in obese & difficult airway (NODESAT Nasal Oxygen During Efforts Secure A Tube)
  - transnasal humidified O2 up to 70litres/min also possible
  - nasal O2 is recommended in high risk patients
• Optimisation strategies:
  ‣ form strategy & share
  ‣ experienced operator
  ‣ Maintain O2 & minimise trauma
  ‣ NMB except trachy/laryngomalacia, FB, mediastinal mass
  ‣ OELM
  ‣ Best laryngoscope shape & length
  ‣ bougie or stylet
  ‣ Position: face aligned, ear lobe to sternal notch, head up

CICO in paralysed pt:

CALL FOR HELP
Continue 100% O₂
Declare CICO
Plan D: Emergency front of neck access
Continue to give oxygen via upper airway
Ensure neuromuscular blockade
Position patient to extend neck

Scalpel cricothyroidotomy

Equipment:
1. Scalpel (number 10 blade)
2. Bougie
3. Tube (cuffed 6.0mm ID)

Laryngeal handshake to identify cricothyroid membrane

Palpable cricothyroid membrane
Transverse stab incision through cricothyroid membrane
Turn blade through 90° (sharp edge caudally)
Slide coude tip of bougie along blade into trachea
Railroad lubricated 6.0mm cuffed tracheal tube into trachea
Ventilate, inflate cuff and confirm position with capnography
Secure tube

Impalpable cricothyroid membrane
Make an 8-10cm vertical skin incision, caudal to cephalad
Use blunt dissection with fingers of both hands to separate tissues
Identify and stabilise the larynx
Proceed with technique for palpable cricothyroid membrane as above

Post-operative care and follow up
• Postpone surgery unless immediately life threatening
• Urgent surgical review of cricothyroidotomy site
• Document and follow up as in main flow chart
• NMB:
  • if intubation difficult then full NMB must be established
    ⇔ helps with laryngeal reflexs, ↑ chest compliance ⇒ ↑ BMV
• ETT position:
  • L facing bevel may hold tube up at Arytenoids
  • Should rotate tube anticlockwise so bevel faces posterior
  • or use tubes with hooded or blunted tips eg Parker
• Bougie:
  • preshaping bougie can be helpful
  • Use for 2 or 3a view
  • blind bougie insertion in 3b or 4 not recommended due to risk of trauma
  • Hold up sign of deep bougie hitting small bronchi not recommended due to trauma
• Confirmation of tube intubation:
  • visual confirmation tube inbetween cords
  • bilat chest expansion
  • auscultation
  • chest expansion
  • EtCO2 = gold standard even in CPR

Plan B
= oxygenation using LMA or SAD
• successful SAD allows time to consider if should continue or wake patient
• have 3 attempts to place SAD with success:
  • x2 with 2nd gen SAD
  • x1 with an alternative
• 2nd gen SADs
  • Benefits:
    - ↑ ed 1st time placement
    - ↑ seal pressure
    - aspiration of GI & resp tracts
    - compatible with fibre optic devices
• cricoid & SAD:
  • cricoid ↓ s hypopharyngeal space & makes SAD insertion harder
  • remove - ITS SHIT ANYWAY
• 4 options post successful SAD placement:
  • wake pt
  • attempt intubation via SAD
  • proceed with SAD only
  • proceed to cricothyroidotomy
• intubation through LMA:
  • Blind intubation using ILMA now not recommended due to risk of trauma
  • use fibre optics:
    - tube over fibre optic
    - Aintree intubation catheter in fibre optic ⇒ ETT over AIC
Plan C
- if BMV successful ⇒ wake patient in all but exceptional circumstances
- if unsuccessful then ensure full mm paralysis & declare CICO & move to plan D

Plan D
- problems from NAP4:
  - delayed decision making
  - knowledge gaps - how equipment worked
  - system failure - equip not available
  - technical failures - failure to place cannula in airway
- DAS do not advocate a cannula technique ⇒ scalpel only!
  - cannula failure - kinking
  - cannula misposition
  - high pressure oxygenation through a narrow bore cannula is assoc with serious morbidity
  - cuff tube in trachea quickly provides best protection to lungs
  - simple commonly found equipment everywhere with less pre-assembly required
  - cannot monitor EtCO2 via cannula
- ↑ed success rate & quicker to provide oxygenation than using cannula
- must have complete NMB ie if sugammadex used must give alt NMB eg atrac or sux
- equip:
  - 10 blade scalpel
  - bougie with angled tip
  - cuffed size 6 tube
- procedure:
  - extend neck
  - laryngeal handshake:
    - non dom hand
    - palp laryngeal cartilage - stabilise with thumb & middle finger
    - move down to feel cricothyroid membrane with index finger
    - scalpel with horizontal stab incision
    - rotate sharp blade to caudad
    - swap hands
    - place bougie in
    - railroad tube over
  - if unsuccsessful ⇒ scalpeal finger bougie method:
    - 8-10cm vertical incision
    - blunt dissect down to identify larynx & stabilise with L hand
    - proceed with scalpel technique as above
- hold up with bougie at <5cm may mean bougie is pre-tracheal
DAS Extubation Guidelines

NAP 4: 1/3 event occurred at extubation

**Step 1: Plan extubation**
- Plan: Assess airway and general risk factors
  - Airway risk factors:
    - Known difficult airway
    - Airway deterioration (trauma, oedema or bleeding)
    - Restricted airway access
    - Obesity / OSA
  - General risk factors:
    - Cardiovascular
    - Respiratory
    - Neurological
    - Metabolic
    - Special surgical requirements
    - Special medical conditions

**Step 2: Prepare for extubation**
- Prepare: Optimise patient and other factors
  - Low risk:
    - Fasted
    - Uncomplicated airway
    - No general risk factors
  - ‘At risk’:
    - Ability to oxygenate uncertain
    - Reintubation potentially difficult and/or general risk factors present

**Step 3: Perform extubation**
- Low risk algorithm
- ‘At risk’ algorithm

**Step 4: Postextubation care**
- Recovery or HDU / ICU

**DAS Extubation Guidelines: Low risk algorithm**

**Step 1: Plan extubation**
- Plan: Assess airway and general risk factors
  - Low risk extubation:
    - Fasted
    - Uncomplicated airway
    - No General risk factors

**Step 2: Prepare for extubation**
- Prepare: Optimise patient and other factors
  - Optimise patient factors:
    - Cardiovascular
    - Respiratory
    - Metabolic / temperature
    - Neuromuscular
  - Optimise other factors:
    - Location
    - Skilled help / assistance
    - Monitoring
    - Equipment

**Step 3: Perform extubation**
- Select deep or awake extubation
- Deep Extubation:
  - Advanced technique
  - Experience essential
  - Vigilance until fully awake
- Awake Extubation:

**Perform: Awake Extubation**
- Preoxygenate with 100% oxygen
- Suction as appropriate
- Insert a bite block (e.g. rolled gauze)
- Position the patient appropriately
- Antagonise neuromuscular blockade
- Establish regular breathing
- Ensure adequate spontaneous ventilation
- Minimise head and neck movements
- Wait until awake (eye opening/obeying commands)
- Apply positive pressure, deflate the cuff & remove tube
- Provide 100% oxygen
- Check airway patency and adequacy of breathing
- Continue oxygen supplementation

**Step 4: Postextubation care**
- Recovery and follow up
  - Safe transfer
  - Handover / communication
  - O2 and airway management
  - Observation and monitoring
  - General medical and surgical management
Paediatric Guidelines

- essentially same as adult except:
  - still advocating x4 attempts at intubation
  - try nasal route if required
  - get ENT help if possible
  - cannula cricothyroidotomy is still advised up to 8yr old. Longitudinal incision still may be better
  - insufflation settings:
    - lowest possible pressure on pressure limiting device
    - declare Sats fail target as <80%
    - flowmeter with L/min matched to child's age & Y connector
Obstetric Guidelines

Summary
- as adults but:
  - RSI - use BMV with Pmax < 20 cmH2O
  - Laryngoscopy - 2+1 attempts
  - SAD insertion - max 2 attempts
  - SAD - always use 2nd gen device if possible
  - pretheatre: antacid prophylaxis & intrauterine resuscitation
  - if O2 not restored then proceed to perimortem C section
- Complex decision making on whether to proceed with surgery:

<table>
<thead>
<tr>
<th>Factors to consider</th>
<th>WAKE</th>
<th>PROCEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal condition</td>
<td>• No compromise</td>
<td>• Mild acute compromise</td>
</tr>
<tr>
<td>Fetal condition</td>
<td>• No compromise</td>
<td>• Compromise corrected with intrauterine resuscitation, pH &lt; 7.2 but &gt; 7.15</td>
</tr>
<tr>
<td>Anaesthetist</td>
<td>• Novice</td>
<td>• Junior trainee</td>
</tr>
<tr>
<td>Obesity</td>
<td>• Suprvmobd</td>
<td>• Morbid</td>
</tr>
<tr>
<td>Surgical factors</td>
<td>• Complex surgery or major haemorrhage anticipated</td>
<td>• Multiple uterine scars</td>
</tr>
<tr>
<td>Aspiration risk</td>
<td>• Recent food</td>
<td>• No recent food</td>
</tr>
<tr>
<td>Alternative anaesthesia</td>
<td>• No anticipated difficulty</td>
<td>• Predicted difficulty</td>
</tr>
<tr>
<td>After failed intubation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airway device/ventilation</td>
<td>• Difficult facemask ventilation</td>
<td>• Adequate facemask ventilation</td>
</tr>
<tr>
<td>Airway hazards</td>
<td>• Laryngeal oedema</td>
<td>• Stridor</td>
</tr>
</tbody>
</table>

Why Airway More difficult in Obstetrics
- maternal factors:
  - ↑ vascular & oedematous mucosa of upper airway
  - swelling ↑ ed by pre-eclampsia, oxytocin, IVF, valsalva during 2nd stage labour
  - ↓ FRC & ↑ O2 requirement ⇒ quicker desat
  - progesterone ↓ s lower oesophageal tone ⇒ ↑ reflux
  - pain & opioids ⇒ delay in gastric emptying
  - enlarged breasts
- fetus - urgency ⇒ poor preparation & planning
- situational - out of hours work
- surgical - ↓ ed GAs performed
**PreAssessment & Preparation**

- fasting & anaphylaxis:
  - gastric emptying returns to normal **18hrs** post partum
- elective CS:
  - H2 blocker night before & 2 hrs prior to surg +/- prokinetic
  - citrate given immed before induction (duration of action max 20mins)
- Planned vaginal delivery:
  - low risk women = allowed light diet
  - high risk women = clear oral fluids only & 6hrly H2 blockers
    ⊳ emerge LSCS then IV H2 blocker (if low risk) & citrate immed prior to RSI

**To Wake or To Proceed**

- fetal condition is likely to be maintained in the majority of cases
- rapid fetal decline predicted on cause for bradycardia:
  - irreversible = rapid decline:
    - abruption
    - fetal haemorrhage
    - ruptured uterus
    - umbilical cord prolapse
    - failed instrumental
  - reversible:
    - uterine hyperstim
    - hypotensoin post neuraxial
    - aortocaval compression
- see table 1 above
- overriding reasons to continue & not wake:
  - maternal compromise
  - fetal compromise likely results irreversible cause
- overriding reasons to wake:
  - periglottic airway swelling
  - airway obstruction on SAD or BMV
- NB GA is continued after most failed intubations in UK

**RSI**

- 20-30deg head up:
  - ↑ s FRC
  - removes breasts
  - improves view of laryngoscopy
  - ? ↓ s GORD
- pre-oxygenation:
  - 2min preoxygenation (rather than 3 min) is suitable
  - use apnoeic oxygenation on all patients
- cricoid - need to account for table tilt - otherwise same shit rationale is same as non-obstetric
- propofol fine - high incidence of awareness at induction in NAP5
- roc or sux
- recommend using BMV <20cmH2O
- use DL or VL as you prefer

**SAD**

- If SAD has cuff should inflate - not >60 cmH2O

**Waking Up**

- if Wake:
  - review urgency of surgery with obs team
- Intra uterine resus
- Options to continue:
  - Neuraxial in lateral position
  - AFOI via mouth prior to repeat GA
- 2 positions to chose from:
  - L lateral with head down:
    - adv: good if vomits
    - disadv: hard to turn heavy women, poor FM seal
  - supine with MUD

**Proceeding With Surgery on SAD**

- consider spont vent vs paralysis with roc & sugammadex
  - spont vent:
    - adv: ↓ airway risk
  - IPPV -done +/- NMBs:
    - NMB advs: no laryngospasm, ↓ PAP ↓ gastric insufflation, easier surgery
- hypoxaemia may occur via problems other than airway & VQ match/compliance may improve post delivery
  ↓ . . consider continuing with current SAD if ventilation adequate
- anticipate laryngospasm
- minimise aspiration risk:
  - keep cricoid until delivery - if not affecting ventilation
  - maintain vigilance for aspiration post delivery
  - empty stomach with gastric tube through 2nd gen SAD
  - minimise fundal pressure
  - give IV H2 blocker (if not already had)
  - most senior obstetrician to operate
  - consider TIVA - if concern about poor uterine contraction
- intubation via SAD must only be performed under direct vision with fibrescope

**Extubation**

- problems may be related to:
  - aspiration
  - airway obstruction
  - hypoventilation
- NAP4 30% anaesthetic problems occured at end of op
ANZCA CICO

- reasons for poor management of CICO:
  - clinical judgement - preAx
  - practice variation - eg different infraglottic techniques
  - incomplete supraglottic rescue
  - lack of technical skills
  - flawed decision making
  - cognitive & human factors:
    - poor team behaviour
    - poor situational awareness - time delay
    - sub optimal communication
  - organisational safety - lack of preparedness

- NAP4 CICO incidence 1:10,000 to 1:50,000 of routine GA's & perhaps x10 outside of theatre
- CICO death accounts for 25% anaesthesia related death
- RFs:
  - airway infections
  - malignancy
  - trauma
  - congenital deformities

Clinical Criteria for Infraglottic Rescue

- prevent CICO by good preOp Ax
- plans should include:
  - awake technique
  - back up plan SGA rescue
  - rehearsed procedure for infraglottic rescue
- CICO should be declared once all has occurred AND Sats falling or persistently low:
  - failed intubation - 3 attempts or fewer
  - failed BMV - using all adjuncts
  - failed SAD - 2 attempts with different sizes or types
  - can move through these in non sequential manner
- consider calling for help if one technique fails & mobilise other resources
- Upgrade concern if SpO2 <90%
- Allow cannulation of trachea prior to CICO being declared (wait for surgical approaches)

Human Factors

System Factors

- multifaceted program can ↓ latent organisational errors eg best practise guidelines, standard equipment & practise, checklists, cultivation of teamwork, QA & reporting of adverse events
- open assertive communication is vital against power gradients

Human Error

- impossible to eliminate all human error
- in crises situations:
  - experts decisions deviate from normal descriptive practise into contextually dependant patterns that are less well supported by checklists
  - cognitive errors increase due to task & sensory overload
- ∴ strategies needed to overcome this may include:
• cognitive aids - simple, should support whole team
• self awareness by clinicians of their vulnerability to errors & self monitoring to detect errors
• encouragement of team members to provide input & raise concerns
• pre-rehearse practices aimed at identifying evolving problems
• optimisation of physical environment to promote situation awareness

Team Behaviours
• team affects performance:
  • situational awareness
  • decision latency
  • task management
  • task completion time

Safety Culture
• elements:
  • low ranking personnel raise safety & challenge ambiguity regardless of hierarchy
  • calling for help is encouraged & occurs frequently
  • explicit comms is frequent
  • flat hierarchy - people are heard regardless of rank
  • people are rewarded for erring on side of safety even when their concerns turn out to be wrong
• key points of crisis resource management (Millers Anaesthesia):

1. Know the environment
2. Anticipate and plan
3. Call for help early
4. Exercise leadership and followership
5. Distribute the workload
6. Mobilise all available resources
7. Communicate effectively
8. Use all available information
9. Prevent and manage fixation errors
10. Cross (double) check
11. Use cognitive aids
12. Re-evaluate repeatedly
13. Use good teamwork
14. Allocate attention wisely
15. Set priorities dynamically

Cognitive Aids Evidence
• strong support for use of cognitive aids in difficult airway problems
• Aids should be distinguished between:
  • Emergency: those designed to be used in an emergency eg Vortex
  • Reference: those which intended to be used to support training eg DAS
• Emergency aids need to be simple, low content documents
• A lot of background info that i’ve omitted…
ANZCA Difficult Airway Algorithm

Transition from supraglottic to infraglottic rescue - Cognitive Aid

Notes

- optimal oxygenation options:
  - preoxygenation
  - CPAP
  - apneic oxygenation

- CICO should be declared if BOTH:
  - all 3 supraglottic techniques have been tried
  - low oxygenation ie <90%

  if these have not been fulfilled consider waking patient up

- they have not commented on their preference for infraglottic rescue plan/preferred technique
Management of Obstructed Airway

- Management based on level of obstruction:
  - Supraglottic - AFOI
  - Glottic -
    - Awake trachy - safest option
    - Spont vent induction - do not give any opioids/benzo’s:
      - 2 drug strategies:
        - Volatile - can take 30min+
        - TIVA - benefit of drug clearance even with fully obstructed airway
          \[\text{eg propofol 100-200mcg/kg/min (can add ketamine 5mg/ml into mix)}\]
        - (or combo)
      - signs ready to instrument airway:
        - Conjugate gaze
        - regular breathing pattern with loss of intercostal tone
        - no tachycardia
        - no reaction to jaw thrust
          \[\text{then topicalise}\]
  - Infraglottic -
    - Spont ventilation at all costs
    - rigid bronch on standby
    - if concerns do in centre with CPB facility