DIFFICULT AIRWAY MANAGEMENT

When you can’t breath, nothing else matters

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IF YOU GET A CALL TO ATTEND THIS CASE

CHECK YOUR PULSE RATE
American society of Anesthesiologist (ASA) suggested *(difficult to ventilate)* that when signs of inadequate ventilation could not be reversed by mask ventilation or oxygen saturation could not be maintained above 90% or *(difficult to intubate)* if a trained Anaesthetist using conventional laryngoscope take’s more than 3 attempts or more than 10 minute are required to complete tracheal intubation.
PREVALENCE

- Even with proper evaluation only 15 to 50% of difficult airway were picked up.
- While difficult face mask ventilation in general is about 1:10,000 out of which again 15% proved to be the difficult intubation.
- While incidence of extreme difficult or abandon intubation in general surgery patients are 1:2000 but in obstetrics is 1:300.
DISCUSSION

- Causes of difficult intubation
- Basic airway evaluation (Lemon Law)
- Management plan for Anticipated difficult airway
  - Plan A, Plan B, Plan C
- Gallery of tools
- The Unexpected Difficult Airway
- ASA Difficult airway algorithm
CAUSES OF DIFFICULT INTUBATION

Anaesthetist

1. Inadequate preoperative assessment.
2. Inadequate equipments.
3. Experience not enough.
4. Poor technique.
5. Malfunctioning of equipment.
6. Inexperience assistance

Patient

1. Congenital causes
2. Acquired causes
Anatomical factors affecting Larangoscopy

1. Short Neck.
2. Protruding incisor teeth.
3. Long high arched palate.
4. Poor mobility of neck.
5. Increase in either anterior depth or Posterior depth of the mandible decrease in Atlanto Occipital distance
Basic airway evaluation in all patients

- Previous anaesthetic problems
- General appearance of the neck, face, maxilla and mandible
- Jaw movements
- Head extension and movements
- The teeth and oro-pharynx
- The soft tissues of the neck
- Recent chest and cervical spine x-rays
Dr. Binnions *Lemon Law*: An easy way to remember multiple tests...

- **L**ook externally.
- **E**valuate the 3-3-2 rule.
- **M**allampati.
- **O**bstruction?
- **N**eck mobility.
L: Look Externally

- Obesity or very small.
- Short Muscular neck
- Large breasts
- Prominent Upper Incisors (Buck Teeth)
- Receding Jaw (Dentures)
- Burns
- Facial Trauma
- Stridor
- Macroglossia
E-Evaluate the 3-3-2 rule

- 3 fingers fit in mouth
- 3 fingers fit from mentum to hyoid cartilage
- 2 fingers fit from the floor of the mouth to the top of the thyroid cartilage
M- Mallampati classification

**Class-1**
- soft palate, fauces; uvula, anterior and the posterior pillars.

**Class-11**
- the soft palate, fauces and uvula

**Class-111**
- soft palate and base of uvula

**Class-1IV**
- Only hard palate
Cormack & Lehane Grading

Grade I

Grade II

Grade III

Grade IV
# Validity of the Test (II)

<table>
<thead>
<tr>
<th>Mallampati class</th>
<th>Cormack Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gr. 1</td>
</tr>
<tr>
<td>Class 1 (73.8%)</td>
<td>59.5%</td>
</tr>
<tr>
<td>Class 2 (19%)</td>
<td>5.7%</td>
</tr>
<tr>
<td>Class 3 (7.14%)</td>
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Total 210 patients
O: Obstruction?

- Blood
- Vomitus
- Teeth
- Epiglottis
- Dentures
- Tumors
- Impaled Objects
N-Neck mobility - Measurement of Atlanto-Occepital Angle
**ThyroMental Distance**

- Measure from upper edge of thyroid cartilage to chin with the head fully extended.
- A short thyromental distance equates with an anterior larynx.
- Greater than 7 cm is usually a sign of an easy intubation.
- Less than 6 cm is an indicator of a difficult airway.
- Relatively unreliable test unless combined with other tests.
MANAGEMENT PLAN OF ANTICIPATED DIFFICULT AIRWAY
MANAGEMENT PLAN OF ANTICEPATED DIFFICULT AIRWAY

1. Discussion with colleagues in advance.
2. Equipment tested before.
3. Senior help backup.
4. Definite initial plan (A) for ventilation and intubation.
5. Definite plan (B) than option of awake intubation.
6. Ideal situation surgery team standby.
Anesthesiology 2001, 95: 754-759

Succinylcholine itself cannot save your account. (Esp. when you did not do good pre-oxygenation.)

Pre-oxygenation

Table 2. Recovery Times from Drug Injection until Spontaneous Breathing, Eye Opening, and Hand Squeeze, Lowest Oxygen Saturation, and Duration of Airway Support in 12 Volunteers

<table>
<thead>
<tr>
<th>Volunteer No.</th>
<th>Spontaneous Breathing</th>
<th>Eye Opening</th>
<th>Hand Squeeze</th>
<th>$Sao_2$ Low (Ear)</th>
<th>$Sao_2$ Low (Finger)</th>
<th>Airway Support (min)</th>
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<tr>
<td>1</td>
<td>4.0</td>
<td>5.0</td>
<td>5.0</td>
<td>99</td>
<td>99</td>
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<tr>
<td>2</td>
<td>5.0</td>
<td>7.0</td>
<td>8.0</td>
<td>79</td>
<td>100</td>
<td>CL (1)</td>
</tr>
<tr>
<td>3</td>
<td>4.3</td>
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<td>96</td>
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<tr>
<td>4</td>
<td>4.0</td>
<td>6.0</td>
<td>7.0</td>
<td>100</td>
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</tr>
<tr>
<td>5</td>
<td>3.5</td>
<td>6.0</td>
<td>7.0</td>
<td>95</td>
<td>96</td>
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</tr>
<tr>
<td>6</td>
<td>4.3</td>
<td>5.0</td>
<td>7.5</td>
<td>98</td>
<td>99</td>
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</tr>
<tr>
<td>7</td>
<td>8.0</td>
<td>6.0</td>
<td>12.0</td>
<td>70</td>
<td>99</td>
<td>AV (1)</td>
</tr>
<tr>
<td>8</td>
<td>9.0</td>
<td>6.5</td>
<td>11.0</td>
<td>79</td>
<td>73</td>
<td>AV (2)</td>
</tr>
<tr>
<td>9</td>
<td>7.0</td>
<td>7.3</td>
<td>9.0</td>
<td>70</td>
<td>72</td>
<td>AV (1)</td>
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<tr>
<td>10</td>
<td>4.5</td>
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<td>93</td>
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<td>5.0</td>
<td>7.8</td>
<td>87</td>
<td>82</td>
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</tr>
<tr>
<td>12</td>
<td>3.5</td>
<td>4.8</td>
<td>7.5</td>
<td>100</td>
<td>99</td>
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</tr>
<tr>
<td>Mean</td>
<td>5.2</td>
<td>5.7</td>
<td>7.7</td>
<td>89</td>
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<tr>
<td>SD</td>
<td>1.8</td>
<td>0.9</td>
<td>2.1</td>
<td>12</td>
<td>11</td>
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</tr>
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$Sao_2$ = oxygen saturation; CL = chin lift; AV = assisted ventilation.
Pre-oxygenation: How Much Is Enough?

Two techniques common in use:

1. Tidal volume breathing (TVB) of oxygen for 3–5 min
2. Deep breaths (DB) 4 times within 0.5 min

Both are equally effective in increasing arterial oxygen tension (Pao$_2$).

Anesth Analg 1981; 60: 313–5
Consider the merits and feasibility of Awake Intubation vs Intubation after induction of GA.

Non-Invasive technique for initial approach vs Invasive technique for initial approach.

Preservation of spontaneous Ventilation vs Ablation of spontaneous ventilation.
What are we going to do if we don’t get the Tube?

• Plans “A”, “B” and “C”
• Know this answer before you tube.
Plan “A”: (ALTERNATE)

- Different Length of blade
- Different Type of Blade
- Different Position
Plan “B”: (BVM and BLIND INTUBATION Techniques)

- Can you Ventilate with a BVM? (Consider two person mask Ventilation)
- Combi-Tube?
- LMA an Option?
What do we do when faced with a Can’t Intubate Can’t Ventilate situation?

- Plan “C”: (CRIC) Needle, Surgical,
Failure - Why does it happen?

- No critical discussion with colleagues about proposed management plan
- No request for experienced help
- Exaggerated idea of personal ability
- Ill-conceived plan A and/or plan B
- Poorly executed plan A and/or plan B
- Persisting with plan A too long, starting the rescue plan too late
- Not involving, and preparing, surgical colleagues
GALLERY OF TOOLS
1. Rigid laryngoscope blades of alternate design and size
2. Tracheal tube guides. (stylets, ventilating tube changer, light wands & GEB)
3. Laryngeal mask airways
4. Flexible fiberoptic intubation equipment
5. Retrograde intubation equipment
6. Noninvasive airway ventilation (esophageal tracheal Combitube, transtracheal jet ventilator)
7. Emergency invasive airways (Needle & surgical cricothyrotomy)
8. An exhaled CO2 detector
Rigid laryngoscope blades of alternate design and size

Macintosh

Magill

Miller

Polio
Bullard rigid fiberoptic laryngoscope
Stylette Devices

Endotracheal Tube Introducer

Lighted Stylette
GUM ELASTIC BOUGIE (GEB)

- First used in England
- Cheap
- Good in patients in whom only epiglottis is visualized
Supraglottic Airways

1. Combitube

2. Laryngeal Mask Airway (LMA) and Intubating LMA (ILMA)
The Esophageal-tracheal Combitube

- Useful as emergency airway
- Two lumens allow function whether placed in esophagus or trachea
- Esophageal balloon minimizes aspiration
LMA- Insertion
VARIANTS OF LMA

- LMA – classic (standard)
- LMA – flexiable (reinforced)
- LMA – unique (disposable LMA)
- LMA – Fastrach (intubating LMA)
- LMA – Proseal (gastric LMA)
LMA – Fastrach (intubating LMA)

- Rigid, anatomically curved, airway tube that is wide enough to accept an 8.0 mm cuffed ETT and is short enough to ensure passage of the ETT cuff beyond the vocal cords
- Rigid handle to facilitate one-handed insertion, removal
- Epiglottic elevating bar in the mask aperture which elevates the epiglottis as the ETT is passed through
- Available in three sizes, one size for children, two sizes for adults
LMA C-Trach

- Ventilation
- Visualization
- Intubation
LMA-Proseal

- High seal pressure - up to 30 cm H₂O - Providing a tighter seal against the glottic opening with no increase in mucosal pressure
- Provides more airway security
- Enables use of PPV in those cases where it may be required
- A built-in drain tube designed to channel fluid away and permit gastric access for patients with GERD
Fiber optic  HIGH FREQUENCY VENTILATION
DIFFICULT AIRWAY MANAGEMENT: Can’t Intubate

Retrograde Intubation
Advance the 18 gage sheath needle (attached to a 6 cc disposable syringe), in a cephalad direction through the cricothyroid membrane and into the trachea. Free flow of air aspirated into syringe will confirm positioning.

Remove the needle and syringe, leaving the sheath in place.
Advance the wire guide through the sheath in a cephalad direction, until the tip of the wire guide can be retrieved through the mouth or nose.

Remove the sheath, leaving the wire guide in place.

NOTE: Alternatively, after initial wire guide positioning, use of a fiberoptic bronchoscope may be employed for direct visualization of the endotracheal tube placement. Wire guide may be placed through suction port of fiberoptic scope.
TFE catheter: prevent the ET tube from redundancy over the guidewire → decrease trauma, increase success rate

Advance the 11.0 French black TFE catheter antegrade over the wire guide via the mouth or nose and into the trachea until resistance is met at the cricothyroid membrane.
With the TFE catheter in position, advance the endotracheal tube over the catheter and wire guide below the level of the vocal cords.

NOTE: Always maintain control and position of wire guide during advancement of the endotracheal tube.
Remove the wire guide and catheter. Advance endotracheal tube into correct position and inflate the balloon cuff. Verify position and secure in standard fashion.
The Unexpected Difficult Airway
The Unexpected Difficult Airway

• Experienced help may not be immediately available
• Special equipment may not be immediately available
• A general anaesthetic has usually been administered
• A long acting relaxant may have been given
• Backup airway management plans may be poorly thought out
Techniques for managing the unexpected difficult airway include

| Manipulation of the patients airway and position e.g. more or less pillows, laryngeal pressure, |
| Oral airways, nasal airways in a range of size |
| Different laryngoscopy blades |
| e.g. • Miller |
| • Magill |
| • Robershaw |
| • Mackintosh |
| Bougies and stylettes |
| Laryngeal mask airways |
| Combitube |
Difficult airway

- Not able to ventilate
- Not able to intubate
- or
- Not able to ventilate and Not able to intubate
Techniques for Difficult Airway Management

Techniques for Difficult Intubation

- Optimal external laryngeal manipulation
- Alternative laryngoscope blades
- Intubating stylet or tube changer
- Laryngeal mask airway as an intubating conduit
- Light wand (maximum of 2 attempts?)
- Alternative technique of intubation
  - Awake intubation
  - Blind intubation (oral or nasal)
  - Fiberoptic intubation
  - Retrograde intubation
- Invasive airway access

Techniques for Difficult Ventilation

Two-person mask ventilation

Supraglottic airways;
Oral and nasopharyngeal airways
- Esophageal tracheal Combitube
- Laryngeal mask airway

Subglottic invasive airways;
- Invasive airway access
- Transtracheal jet ventilation
1. Alternative

2. Alternative

3. Alternative

4. Alternative

Manipulation of airway different blade, bugie

LMA, ILMA, Combitube

Trantracheal Jet Ventilation

Cricothireotomy, Tracheostomy
Commercial Cricothyrotomy Kit

- If you are familiar with this kit, I suggest you try it first.
- Use Seldinger technique or knife cutting
- Direct connection to ventilator
DIFFICULT AIRWAY MANAGEMENT: Can’t Intubate, can’t ventilate

- Surgical Airway
  - Tracheostomy too slow
  - Cricothyroidotomoty quick and allows placement of 6.0 OET
Emergency airway

• Unorthodox method: not generally accepted, better than nothing

1. Connect the hub of the cath to the ventilator via a 3 mm ET tube adaptor.

2. Connect the hub of the cath to a 5-ml syringe then insert a 7.0 mm ET tube inside, inflate the cuff, then connect to the ventilator.

3. Connect the hub of the cath to a 3-ml syringe then insert an adaptor form a 7.5 mm ET tube inside, then connect to the ventilator.
Connect to a Traditional Ventilator

- Higher respiratory pressure required (mimic TTJV). → use $O_2$ flush button.
- Self-inflated reservoir bag can be used as well.
Intubation choices include use of different laryngoscope blades, LMA as an intubation conduit (with or without fiberoptic guidance), fiberoptic intubation, intubating stylet or tube changer, light wand, retrograde intubation, and blind oral or nasal intubation.
Take home message

• Be familiar with two alternative methods of intubating technique and use it regularly in your day today practice eg; LMA, GEB, FOI.

• So that you won’t fumble at the time of crisis
Difficult Airway Maxims

“It is preferable to use superior judgement – to avoid having to use superior skill”.

?’s
GOOD LUCK

Challenges may be
Waiting for you