Rescue bronchoscopic intubation using Bentson floppy-tip guidewire via LMA

D. Cross, A. Nyman, P. James, B. Thiessen, A. Durward
• Incidence of unexpected difficult airway is low

• Theatre:
  • Difficult laryngoscopy 1.3% \(^1\)
  • Can’t Intubate Can’t ventilate: 0.045% \(^2\)

• PICU: 9% difficult intubations \(^3\)

• Techniques:
  • Standard and modified laryngoscope
  • Intubation adjuncts: bougie
  • Video laryngoscopy: Airtraq\textsuperscript{®}, GlideScope\textsuperscript{®}
  • Flexible fibreoptic bronchoscopy

• Difficult airway in elective environment:
  • Option to abandon procedure
  • Replan with difficult airway team

• Not possible in critically ill child requiring intubation
  • Rapid and reliable intubation
  • Non-traumatic
  • Preserve oxygenation and ventilation

… LMA + Standardised Length Floppy Wire technique
Evelina London Children’s Hospital

- 20 bed general and cardiac PICU (regional centre)

PICU-Based Airway Team

- 82% Elective vs 18% Emergency bronchoscopies

Retrospective study 2005 – 2015

1369 cases (65% PICU, 22% theatre)

Screened for difficult airway

- Known difficult airway
- Unanticipated difficult airway
Insert guidewire via bronchoscopy

Advance Cook catheter over guidewire

Advance ETT over Cook catheter

LMA in situ: Ventilate/Oxygenate during procedure
## EQUIPMENT

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>LMA Size</th>
<th>Max ETT through LMA</th>
<th>Length LMA (cm)</th>
<th>Tracheal length (cm)</th>
<th>Airway exchange cath. size (Fr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5</td>
<td>1</td>
<td>3</td>
<td>13</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>5 to 10</td>
<td>1.5</td>
<td>3.5</td>
<td>13</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>10 to 20</td>
<td>2</td>
<td>4.5</td>
<td>18</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>20 to 30</td>
<td>2.5</td>
<td>5</td>
<td>20</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>30 to 60</td>
<td>3</td>
<td>6</td>
<td>25</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>60 to 80</td>
<td>4</td>
<td>6.5</td>
<td>25</td>
<td>11</td>
<td>19</td>
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<tr>
<td>&gt; 80</td>
<td>5</td>
<td>7</td>
<td>30</td>
<td>12</td>
<td>19</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>&lt; 5</td>
<td>5 to 10</td>
<td>10 to 20</td>
<td>20 to 30</td>
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</tr>
<tr>
<td>Airway Exchange cath. length at adapter hub (cm)</td>
<td>20</td>
<td>21</td>
<td>27</td>
<td>31</td>
<td>38</td>
</tr>
</tbody>
</table>

Insertion lengths are for Marshall Medical LMA
OUTCOME MEASURES

- Ability to secure primary intubation
- Number of attempts

Complications
- Laryngeal trauma
- Pneumothorax
- Air leak
- Bleeding

- Complication rate with guidewires 11%  

• 11 patients requiring 13 bronchoscopic intubations
• Wt 9.5kg (IQR 7 to 11)
• Age in months 15.5 (IQR 12 to 24)
• PICU 40%, theatre 60%
• Emergency 50%
• 70% Grade 3 or 4 airway
## RESULTS

<table>
<thead>
<tr>
<th></th>
<th>1° LMA</th>
<th>Airway Grade 3 or 4</th>
<th>Clinical Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned Elective</td>
<td>3</td>
<td>3</td>
<td>Nil</td>
</tr>
<tr>
<td>Planned PICU</td>
<td>1</td>
<td>1</td>
<td>Nil</td>
</tr>
<tr>
<td>Urgent (theatre)</td>
<td>0</td>
<td>3</td>
<td>Hypoxic arrest x 2 Larynx trauma x 2</td>
</tr>
<tr>
<td>Urgent PICU</td>
<td>0</td>
<td>3</td>
<td>Larynx trauma with desaturation x 5</td>
</tr>
</tbody>
</table>

No complications following intubation
All intubations achieved on first attempt
- Pulmonary hypertension with PA bands

- Multiple intubation attempts
  - Standard approach
  - GlideScope®
  - Bonfils Intubation Fiberscope®

- Hypoxic cardiac arrest with CPR

- Bronchoscopy: trauma to larynx with bleeding

- Intubated within 30 seconds

- Survived
Advantages

• Ventilation and oxygenation preserved (LMA)
• Quick, effective, atraumatic
• Direct visual confirmation

Disadvantages

• Skilled operator
• Equipment – bronchoscope with suction lumen (2.8 mm)
• Requires LMA (adapt procedure if unable to insert)
• Not currently standard in paediatric literature
CONCLUSION

- Safe effective technique (low risk of pneumothorax)
- Operator dependent
  - Requires bronchoscopic skills
- Valuable in extreme clinical circumstances
- Standardised Operating Procedure across hospital