An 8 year old 22 kg ASA 2 male with history of mandibular cancer at age 7 months presented for urgent appendectomy. Due to limited mouth opening, fiberoptic intubation was performed while sedated and breathing spontaneously. The carina was successfully visualized using both direct and LMA assisted approaches, but the ETT could not be advanced due to a very acute angle. Intubation was ultimately accomplished using a combined technique with fiberoptic, Truview, and a finger in the posterior pharynx directing the ETT.

What Comes After Fiberoptic Intubation?
Combining Advanced Airway Techniques in a Pediatric Difficult Airway
Peter Killoran MD, Gregory Opdahl MD, and Maria Matuszczak MD

Abstract
An 8 year old 22 kg ASA 2 male with history of mandibular cancer at age 7 months presented for urgent appendectomy. Due to limited mouth opening, fiberoptic intubation was performed while sedated and breathing spontaneously. The carina was successfully visualized using both direct and LMA assisted approaches, but the ETT could not be advanced due to a very acute angle. Intubation was ultimately accomplished using a combined technique with fiberoptic, Truview, and a finger in the posterior pharynx directing the ETT.

Learning Objectives:
1. Recognize indications for fiber optic intubation in children.
2. Describe techniques for sedation while performing fiber optic intubation in children.
3. Recognize the importance of flexibility, adaptability, and troubleshooting while managing a difficult pediatric airway.
4. Recognize the importance of combining different advanced airway techniques while managing a difficult pediatric airway.

Preoperative Assessment
History
- Urgent appendectomy for 8 year old male
- History of mandibular cancer resected at 7 months with adjuvant chemotherapy/radiation
- No residual disease

Examination
- Facial deformity
- Severely limited mouth opening (<2 cm)
- Prominent incisors

Plan
- Consent for fiberoptic intubation under sedation
- Possibility of emergency surgical airway
- Fiberoptic bronchoscope, Truview laryngoscope, LMA available
- Anesthesiologist, two senior residents, and surgeon present

Risk Factors for Difficult Airway
<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Description</th>
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<tbody>
<tr>
<td>History of malignancy*</td>
<td>Arched or narrow palate, locked TMJ</td>
</tr>
<tr>
<td>History of radiation therapy*</td>
<td>Stiff mandibular space</td>
</tr>
<tr>
<td>Interincisor distance &lt;3 cm*</td>
<td>Thyromental distance &lt; 3 finger breadths</td>
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<tr>
<td>Prominent incisors*</td>
<td>Short or &quot;thick&quot; neck</td>
</tr>
<tr>
<td>Prominent reversed overbite*</td>
<td>Limited neck extension</td>
</tr>
<tr>
<td>Limited jaw protrusion*</td>
<td>Mallampati class &gt; 3</td>
</tr>
</tbody>
</table>

ASAI Difficult Airway Taskforce 2003. Anesthesiology. 98(5):1269-1277

Induction
Sedation
- 2 mg midazolam
- Dexmedetomidine 1 mcg/kg over 10 minutes continued at 2 mcg/kg/hr
- Nasal cannula with 8% sevoflurane
- Reactive to oral airway
  - 1 mcg/kg fentanyl
  - 1 mg/kg propofol
  - Spontaneous ventilation

Unsuccessful Intubation
- 2 failed attempts by CA-2 to visualize cords with flexible bronchoscope
- CA-3 resident successfully visualized carina
- Resistance when 5.0 cuffed ETT advanced
- Additional pressure led to loss of view and esophageal intubation
  - Brief desaturation
  - Mask ventilation
  - Stomach decompressed
- Difficult, but successful, placement of LMA 2.5 with plan to use as guidance for bronchoscope.
- Carina visualized but again unable to advance ETT, despite downsizing
- Change of plan, LMA removed
- Truview inserted with difficulty and allowed for complete visualization of the vocal cords
- Unable to pass ETT through cords because 2 different stylets were not rigid enough for the very acute angle encountered

Successful Intubation
- While larynx visualized with Truview, FOB used to enter trachea
- Again ETT could not be advanced over FOB, FOB seen pulling back from trachea as pressure was applied to advance ETT
- Finger then inserted into back of posterior pharynx to further guide and support ETT and allow successful intubation

Conclusions
- Anticipation and preparation are critical
- Safe and successful management of the difficult pediatric airway must include:
  - Adequate sedation
  - Spontaneous ventilation
  - Access to equipment
  - Presence of sufficient personnel
  - Detailed plan that includes alternatives
- Easy fiberoptic laryngoscopy and/or bronchoscopy does not insure successful intubation
- When difficulty is encountered, an alternative technique should be employed
- Combination of different airway management devices may be required

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