SUPRALARYNGEAL AIRWAYS

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Airway Teaching case of the month

The LMA original purpose was to provide greater control than the face mask, without the invasiveness of an ETT. Look at what has become of that original concept now more than 20 years later! It is estimated that there have been over 150 million safe uses of the device worldwide.

Alternative Airway Devices currently so popular they are challenging the “gold standard” of Endotracheal Intubation.

THE LMA IS CONSIDERED THE GRANDFATHER OF ALL SUPRALARYNGEAL AIRWAY DEVICES

ASA PRACTICE GUIDELINES FOR THE MANAGEMENT OF THE DIFFICULT AIRWAY

Many patients continue to be difficult to intubate with conventional laryngoscopy. One of the main advantages of Supralaryngeal Devices is the fact that they do not rely on direct visualization of the larynx. A major step in the development of these devices came in 1993 when the LMA was incorporated in the “practice guidelines for the management of the difficult airway. Today only two devices are recognized by the ASA D.A algorithm as rescue devices: The LMA and the Combitube. In the coming years it is predicted that more devices will be endorsed by the ASA, and perhaps their role might change and some maybe consider no just as rescue devices. Some consider this present era of airway management as the ERA of Supralaryngeal Airways. There are currently #10 different kind of products derived just from the original Classic LMA and produced by the same company. That is not taking in to account devices produced by other companies that share many similarities with the original LMA.

The LMA is now endorsed by the AHA, NASA, ASA, and the European Resuscitation Council. There are over 2500 scientific publications about the LMA.
CURRENT ROLE OF SUPRALARYNGEAL DEVICES

Currently - although we need to keep in mind that newer devices are being developed and “older” devices are being modified - there are four main uses of Supralaryngeal Airways:

a) As definite airway devices
b) As rescue airway devices
c) As conduits for intubation
d) As a method for assisted extubation.

CLASSIFICATION OF SUPRALARYNGEAL DEVICES

There is currently no uniform method of classifying Supralaryngeal airways. In fact the term “supralaryngeal” is not universally accepted and some use the term “extraglottic”, “periglottic”, or “supraglottic”, others use the term “epipharyngeal, “perilaryngeal”, “hypopharyngeal” and still other authors call them “laryngopharyngeal” devices. If that does not lead to much confusion the current classification might: some classify them based on type of use into Re-usable and non re-usable devices, others based on route of insertion into oral and nasal airways, others based on mechanism of seal in to cuffed and un-cuffed devices and still others classify them based on anatomical location of the device.

In 2004 Brimacombe (Anesthesiology 2004:101(2) pp 559) proposed the following classification but as of today it has not been widely accepted and many devices have emerged as well:

<table>
<thead>
<tr>
<th>Classification of Extraglottic Airway Devices by</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence/ Absence of a Cuff</td>
<td>1961</td>
</tr>
<tr>
<td>Oral/Nasal Route of Insertion</td>
<td>1962</td>
</tr>
<tr>
<td>Anatomical location of the Distal Portion</td>
<td>1987</td>
</tr>
</tbody>
</table>

Uncuffed, orally-inserted laryngopharyngeal airways

Williams airway intubator

Patt oral airway

Oral pharyngeal fiberoptic intubating airway

Combined oropharyngeal airway and dental pack

Modified Cournell airway

Cuffed, orally-inserted laryngopharyngeal airways

McIntosh’s cuffed oropharyngeal airway

Cuffed oropharyngeal airway

Uncuffed, nasally-inserted laryngopharyngeal airways

Variable flange nasopharyngeal airway

Cuffless, nasopharyngeal airway

Cuffed, nasally-inserted laryngopharyngeal airways

Bohmer’s cuffed nasopharyngeal airway

Cuffed, orally-inserted hypopharyngeal airways

Classic LMA

Flexible LMA

Intubating LMA

Disposable LMA

ProSeal LMA

Glotic aperture seal airway

Streamlined pharynx arm intem

Soft Seal laryngeal mask

Laryngeal tube airway

Laryngeal tube suclonit

Airway management device

Pharyngeal airway express

Cobra pharyngeal lumen airway

Uncuffed, cuffed nasopharyngeal airways

Tracheo-laryngeal airway

Cuffed nasally-inserted esophageal airways

Pharyngeal tracheal lumen airway

Esophageal tracheal combitube

LMA of North America

Many of the newer inventions we hear about are just basically a modification of an original idea by a pioneer predecessor who most likely has unfortunately been forgotten over time.

Leech’s Pharyngeal Bulb Airway as described and studied in 1937.

Any resemblance with today’s devices? Congratulations to the people that figured this device out.

How things change overtime

The American Patent for the LMA was filled in 1985 as you can see from the picture above; it was not until 1991 that the FDA allowed the device to be released in the U.S.A, but with one main restriction: “it could NOT replace endotracheal tube placement for airway management.”

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Classification II

In 2004 as well Miller in Anesth Analg 2004:99:1553-9 proposed the following classification and scoring system for Supraglottic devices (see below):

Sealing Mechanism Classification

Cuffed perilyngeal sealers
- Nondirectional sealing (e.g., Laryngeal Mask Airway [LMA™])
- Directional sealing (e.g., ProSeal™ LMA)
- Cuffed pharyngeal sealers
  - Without esophageal sealing (e.g., Cuffed Oropharyngeal Airway [COPA™])
  - With esophageal sealing (e.g., Combitube®)
- Cuffless anatomically preshaped sealers (e.g., Streamlined Liner of the Pharynx Airway [SLPA™])

His review remains one of the best and most referenced articles on the subject and a recommended reference for all readers interested in the subject. As we can see there are now more devices than ever imagined and the list and interest on the subject keeps growing. There is as we can see a need to come up with a definite and simple classification to allow us to fully compare different devices and further more to allow us to come with specific indications and contraindications of these devices. Right now there is no agreement among experts. While some authors and experts specifically from European countries are more liberal in the use of these devices, other countries and I include the United States in this group are more conservative in their use.

Right now there are many still unanswered questions, hopefully newer evidence will shed some light with some controversial issues such as:

References:

Assessment of Airways for Routine Use

<table>
<thead>
<tr>
<th>Variable</th>
<th>LMA-Classic™</th>
<th>LMA Unique</th>
<th>Combitube®</th>
<th>Laryngeal Tube</th>
<th>Pharynx</th>
<th>Laryngeal Mask Airway</th>
<th>LMA-Standard</th>
<th>LMA-Wedge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intubation conduit</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>Easy insertion</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
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<td>First insertion successful</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>Reliable hands-free</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>Seals for IPPV</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Minimal aspiration risk</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Single use</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>No routine side effects</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Routine score</td>
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<td>3</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

For each variable and airway device, a score has been assigned. A score of 0 means that the device is ideal for the purpose. A score of 1 for any variable would suggest that there is satisfactory performance, but that there could be improvement. A score of 2 would suggest that there is a vulnerable issue that clearly could do with improvement. Where there are insufficient objective data or incomplete data, no scores have been assigned. The routine score total pertains to routine airway management.

LMA = Laryngeal Mask Airway; PLM = ProSeal™ Laryngeal Mask Airway; ILM = Intubating Laryngeal Mask Airway; Go = Glottic Aperture Seal Airway; LT = Laryngeal Tube®; AMD = Airway Management Device; COPA = Cuffed Oropharyngeal Airway; PAX = The PAXpress™; Cobr = Cobra Laryngeal Airway; SLPA™ = Single-Use Liner of the Pharynx Airway; IPPV = intermittent positive pressure ventilation.