

# AIRWAY MANAGEMENT - SUPRAGLOTTIC AIRWAY DEVICES

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As anesthesiologists we spend a respectable part of our career maintaining the airway. Theoretically, every anesthesiologist should be familiar with, and well practiced in a variety of the airway techniques that are available, so that when an airway problem occurs, it can be managed with a solid armamentarium of information and experience. However, with the rapid advancements in airway management technology, many of the newer airway devices are foreign to most anesthesiologists.

In the last years a number of supraglottic airway devices have been introduced in the clinical practice of the airway management, trying to offer a simple and effective alternative to the endotracheal intubation.

**Supraglottic Airway Devices** are devices that ventilate patients by delivering anesthetic gases/oxygen above the level of the vocal cords and are designed to overcome the disadvantages of endotracheal intubation as: soft tissue, tooth, vocal cords, laryngeal and tracheal damage, exaggerated hemodynamic response, barotrauma, etc. The advantages of the supraglottic airway devices include: avoidance of laryngoscopy, less invasive for the respiratory tract, better tolerated by patients, increased ease of placement, improved hemodynamic stability in emergence, less coughing, less sore throat, hands free airway and easier placement by inexperienced personal. The American Society of Anesthesiologists' Task Force on Management of the Difficult Airway (1) suggests considering the use of the supraglottic airway devices (as Laryngeal Mask Airway and the Combitube) when intubation problems occur in patients with a previously unrecognized difficult airway, especially in a "cannot ventilate, cannot intubate" situation. The European Difficult Airway Society

suggests using the Laryngeal Mask Airway or the Intubating Laryngeal Mask, in an unanticipated difficult tracheal intubation (2).

## Laryngeal Mask Airway



The Laryngeal Mask Airway (LMA), originally described by Brain has been described as the missing link between the facemask and the tracheal tube and it has gained widespread popularity (3). The LMA consists of two parts, the tube and the mask. Made of medical grade silicone, it can be autoclaved and reused many times. It is designed to provide an oval seal around the laryngeal inlet. LMA was first used at Royal Hospital London, UK, in 1981 and since its introduction in clinical practice it has been used in more than 100 million patients worldwide with no reported death (4). Advantages of the LMA over the endotracheal tube include: increased speed and ease of placement, improved hemodynamic stability at induction and during emergence of anesthesia; minimal increase in intraocular pressure following insertion; reduced anesthetic requirements for airway tolerance; lower frequency of coughing during emergence; improved oxygen saturation during emergence; and lower incidence of sore throat in adults (5). LMA is not an ideal airway device because the low-pressure seal may be inadequate for positive pressure ventilation, and it does not protect the lungs from

gastric contents regurgitated into the pharynx. In an attempt to overcome these disadvantages the Proseal LMA was developed.

### Proseal Laryngeal Mask Airway



The Proseal Laryngeal Mask Airway (PLMA) is a new Laryngeal Mask Airway with a modified cuff designed to improve its seal and a drainage tube for gastric tube placement. These features are designed to improve safety of the LMA and broaden its scope especially when used with positive pressure ventilation (6). It is a reusable device, the cuff is made of a softer material than the LMA Classic and is designed to conform to the contours of the hypopharynx. While the LMA ProSeal may be used with spontaneously breathing patients, it is designed for use with positive pressure ventilation with and without muscle relaxants. The maximum airway seal pressure will vary between patients, but is on average 10 cm H<sub>2</sub>O higher than the LMA Classic or up to 30 cm H<sub>2</sub>O (7). However, it is more difficult to insert as the LMA, unless an introducer tool is used.

### Fastrach – Intubating Laryngeal Mask Airway



Fastrach, a modification of the LMA is in use from 1997; designed as a conduit for tracheal intubation it has a success rate for endotracheal intubation of approximately 93% (8). It has an

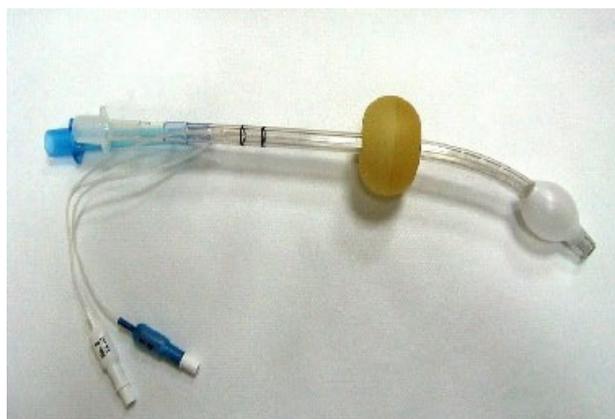
epiglottic elevator bar at the mask aperture and a rigid (stainless steel) anatomically curved shaft that follows the anatomical curve of the palate and the post pharyngeal wall.

### Portex Soft Seal Laryngeal Mask



The single use Portex Soft Seal Laryngeal Mask is a new supraglottic device similar to the single-use LMA –unique. The difference between the two devices consists in the design of the ventilation orifice of the Portex Soft Seal Laryngeal Mask, as well as its more elliptical cuff. The ventilation orifice of the Portex Soft Seal Laryngeal Mask is wider and it is characterized by the absence of mask aperture bars (9).

### Esophageal-Tracheal Combitube



The Esophageal-Tracheal Combitube (ETC) is an easily inserted double lumen/ double balloon supraglottic airway device, that allows for ventilation independent of its position either in the esophagus or the trachea. Blind insertion results in successful esophageal intubation in nearly all patients. The major indication of the ETC is a back-up device for airway management. It is an excellent option for rescue ventilation in both in and out of the hospital environment, as well as in immediate life threatening

cannot ventilate, cannot intubate situations. The advantages of the Combitube include rapid airway control without the need for neck or head movement, minimized risk for aspiration, firm fixation of the device after inflation of the oropharyngeal balloon and that it works equally well in either tracheal or esophageal position (10).

### EasyTube



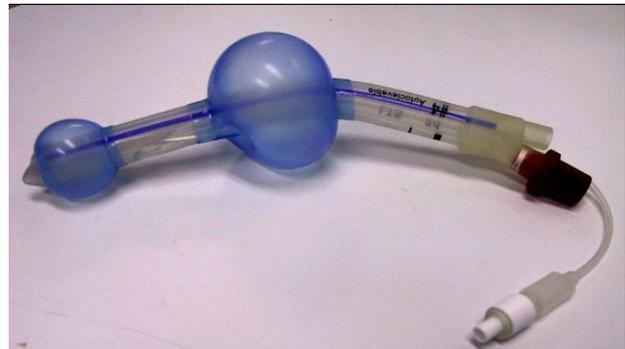
The EasyTube is new disposable, polyvinyl - chloride, double-lumen, latex-free, supra-glottic airway device. It has a close design to the Combitube, intended to be more friendly to use. Allows ventilation in either esophageal or tracheal position, however it is expected to enter the esophagus in most cases. However, the EasyTube had a better fiberoptic view and a shorter time to achieve an effective airway, with similar ventilatory performances with the ETC (11).

### Laryngeal Tube

The Laryngeal Tube (LT) is a multiuse, latex-free, single-lumen silicon tube and consists of an airway tube with an approximate angle of  $130^{\circ}$ , an average diameter of 1.5 mm and two low pressure cuffs (proximal and distal) with two oval apertures placed between them which allows ventilation. The distal balloon (esophageal balloon) seals the airway distally and protects against regurgitation. The proximal balloon (oropharyngeal balloon) seals both the oral and nasal cavity. When the LT is inserted, it lies along the length of the tongue, and the distal tip is positioned in the upper esophagus. During ventilation, air passes into the pharynx and from there over the epiglottis into the trachea, since the mouth, nose and esophagus are blocked by the balloons (12, 13). A new single use version of the LT has been recently introduced in the market.



### Laryngeal Tube Suction



The newly introduced Laryngeal Tube Suction is a further development of the Laryngeal Tube which allows better separation of the respiratory and alimentary tracts. The LTS is a latex-free, double lumen silicon tube wherein one lumen is used for ventilation and the other for decompression, suctioning and gastric tube placement (14).

### Perilaryngeal Airway – Cobra



The Perilaryngeal –Airway COBRA (PLA) is a single use, PVC made, latex free supraglottic airway device, designed to be positioned in the hypopharynx opposite to the laryngeal inlet. It has a breathing tube with a large inner diameter to increase air flow. In the proximal end it has a standard 15 mm connection and in the distal end a ventilatory hole which is surrounded by a novel head design. The novel head design facilitates ventilation through the slotted openings that prevents the soft tissue and the epiglottis to obstruct the ventilatory hole. Above the head, the device has a balloon surrounding the tube like a ring. This balloon when inflated closes the nasopharynx and pushes the roof of the tongue anteriorly, preventing air leakage. PLA offers a more effective seal, and a better fiberoptic score as the LMA (15).

### Slipa - Streamlined Pharynx Airway Liner

The SLIPA is a hollow, preformed, soft plastic, blow-molded, boot-shaped airway, which lines the pharynx. No cuff is necessary for the device to seal



in the pharynx because the shape of the SLIPA is similar to that of a pressurized pharynx (16).

### Elisha



The Elisha's uniqueness consists of its ability to combine three functions in a single device: ventilation, intubation (blind and/or fiberoptic-aided) without interruption of ventilation, and gastric tube insertion. It has three separate channels for ventilation, intubation, and gastric tube insertion. The ventilation channel (VC) and the intubation channel (IC) are side-by-side, whereas the gastric tube channel (GTC) has an outlet located in the distal end of the device. The VC and the IC have a partitioning wall between them, but join at the ventilation outlet situated in front of the laryngeal inlet. The VC has a standard 15 mm connector located on the proximal end of the device. The IC allows passage of an 8.0 mm ID endotracheal tube (ET) for blind or fiberoptic-guided intubation. The EAD has two high-volume, low-pressure balloons: a proximal balloon which seals the oropharynx and nasopharynx and a distal balloon which seals the esophagus. Both balloons are inflated through a single pilot port with 50 cc of air resulting in an intra-balloon pressure of approximately 70 cm H<sub>2</sub>O (17).

Acquiring the equipment is generally not the main problem: learning to use it is. Self-teaching, through reading product information literature and clinical

studies that critically evaluate the equipment, viewing instructional videotapes, attending specialized lectures and workshops, are a beginning, but each of these solutions has major limitations or deficiencies. They do not substitute for hands-on experience.

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