Tracheal Esophageal Combitube

The tracheal esophageal Combitube was developed from the concept of the esophageal obturator airway (ESO), which was introduced in 1968. The ESO consisted of a tracheal-like tube, 34 cm in length, with an inflatable cuff at its sealed, distal end. It was inserted blindly into the esophagus, so that the cuff lay at a level caudal and posterior to the tracheal carina. Sixteen holes communicating with the central lumen were positioned so as to be in the hypopharynx when inserted to the proper depth. A face mask at the proximal end was used to “seal” the airway. Ventilation was achieved by applying positive pressure to the proximal open aperture, where it emerged from the face mask. Unfortunately, significant problems/complications became apparent as the ESO came into common practice.

These shortcomings of the ESO were addressed by Dr. Michael Frass, a critical care physician in Vienna, Austria in 1986. The face mask of the ESO was replaced by an oropharyngeal balloon, sealing the upper airway and anchoring the device against the hard palate. As with the ESO, perforations at the hypopharyngeal level allowed egress of air near the level of the larynx. A second lumen, patent from proximal to distal end, without perforations was substituted for the blind esophageal tube of the ESO. As with the ESO, a cuff at the distal aspect of the esophageal lumen occludes the esophagus. This design, named the Tracheal Esophageal Combitube, is functional if introduced into the esophagus (ventilation being achieved through the esophageal lumen, via the hypopharyngeal perforations) or in the trachea (ventilation being achieved through the tracheal lumen, via the distal aperture). In either case, the proximal balloon seals both the oral and nasal passages, and the distal conventional tracheal tube cuff isolates the respiratory system from the gastrointestinal system. The device is available in two sizes: the 41Fr size is used for larger adults (height > 5.5 feet) and the 37Fr size is used for adults 4–6 feet tall. Though a single use device, Combitube reprocessing and reuse has been reported.

Use of the Esophageal Tracheal Combitube. The esophageal tracheal Combitube is inserted “blindly”. The operator lifts the lower jaw and tongue anteriorly with one hand, and the esophageal tracheal Combitube is inserted with a downward, caudad-curved motion until the proximal depth indicator (two black rings printed on the double lumen tube) come to rest at the level of the teeth. The oropharyngeal balloon is inflated with 100 ml of air through a blue plastic pilot balloon (85 ml in the small adult size) while the distal cuff is inflated with 5–15 ml (via a white pilot balloon). An Ambu bag or anesthesia circuit is attached to the proximal end of the esophageal lumen (constructed of blue polyvinyl chloride), and ventilation is confirmed by auscultation or other means. Because 90% of esophageal tracheal Combitube placements result in an esophageal position, ventilation occurs via this lumen’s hypopharyngeal perforations. If no breath sounds are auscultated and/or gastric inflation is noted, the esophageal tracheal Combitube has been positioned in the trachea. Without repositioning, ventilation is changed to the distal end of tracheal lumen (clear polyvinyl chloride). If no maneuver improves ventilation, the device is most likely in the esophagus, but has been advanced
too deeply, with the oropharyngeal cuff obstructing the airway. In this case, the cuffs should be deflated, the device withdrawn 2 cm and the ventilation sequence repeated.

Advantages of the esophageal tracheal Combitube include rapid airway control, airway protection from regurgitation, ease of use by the inexperienced operator, no requirement to visualize the larynx, and being able to maintain the neck in a neutral position, though cervical spine movement may be greater than that seen with the LMA, LMA-Fastrach and flexible fiberscope. It has been shown to be useful in the patient with massive upper gastrointestinal bleeding or vomiting, and as a rescue device in failed rapid-sequence induction or unanticipated difficult intubation. It is also useful in the morbidly obese, in acute bronchospasm, during cardiopulmonary resuscitation, and for prolonged ventilation after airway rescue. Several series have demonstrated the effectiveness esophageal tracheal Combitube in prehospital management of the airway. Urtubia et al., have used the esophageal tracheal Combitube for elective surgery with a high success, and low complication rate.

Techniques for exchange of the esophageal tracheal Combitube (after patient stabilization) for an endotracheal tube have been described.

Contraindications to use of the esophageal tracheal Combitube use include esophageal obstruction or other abnormality, ingestion of caustic agents, upper airway foreign body or mass, lower airway obstruction, height less than 4 feet, and an intact gag reflex. Since the esophageal tracheal Combitube includes latex in its construction, it should not be used in patients with latex allergy.

Complications associated with the esophageal tracheal Combitube have included lacerations to the pyriform sinus and esophageal wall resulting in subcutaneous emphysema, pneumomediastinum, pneumoperitoneum, and esophageal rupture. A device similar to the Tracheal Esophageal Combitube has been available in many parts of the world since 2003. The Easy Tube (EzT) (Rusch International, Kernen, German). It is distributed in two sizes, 41ch for patients above 130 cm in height and 28ch for patients 90 to 130 cm in height. Unlike the combitube, the distal lumen of the EzT is designed to resemble an ETT (including a Murphy eye). The pharyngeal aperture is designed to allow easy passage of a fiberscope (or suction catheter)). The EzT was designed for routine anesthetic as well as emergency and cannot intubate/cannot ventilate situations. Contraindications to EzT use are identical to those for the Combitube. Though it may be inserted blindly, it is designed to be used with a laryngoscope (much like a standard ETT). Unlike the combitube, it is latex free.