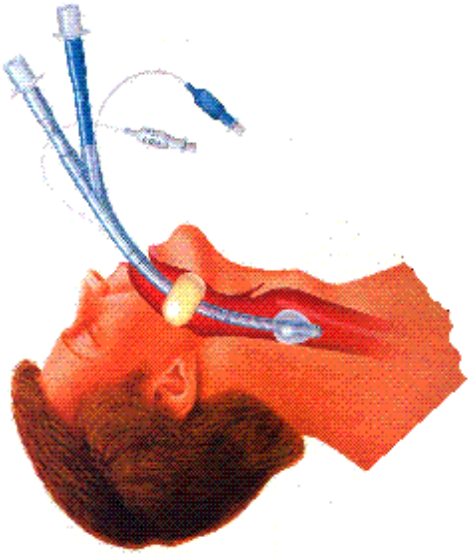
Pittsburgh EMS Pre-Hospital Care Monograph



COMBITUBE

Center for Emergency Medicine
OF WESTERN PENNSYLVANIA

DEDICATION

This monograph is dedicated to the men and women of the City of Pittsburgh EMS System who have provided outstanding prehospital care in the City of Pittsburgh for over two decades.

This monograph was created by the Medical Directors of Pittsburgh EMS with the assistance of the City of Pittsburgh, EMS Training Division.

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A special thanks to John Cole, MD and Jeff Reim, EMT-P for developing and writing this module. The Combitube represents an additional tool for securing the airway in an unresponsive victim. The Combitube does NOT replace endotracheal intubation but provides a new option for securing the airway when endotracheal intubation has been unsuccessful or in a few unique situations where endotracheal intubation is not possible.

As with all airway adjuncts, it is critical that paramedic “know where the tube is” and confirm the tube placement by multiple methods. Make sure that you understand the anatomy of the Combitube and the way to confirm it’s location in the esophagus or trachea.

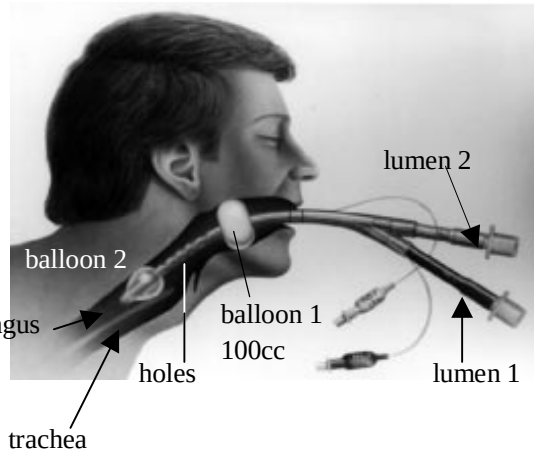
Ron Roth, MD-2
June 1998

The Combitube - Overview

Introduction

Although endotracheal intubation is the preferred method of airway maintenance in critically ill patients, it is not always possible to intubate every patient that requires definitive airway control. The ideal adjunctive airway would provide adequate ventilation and oxygenation of patients while preventing aspiration. The Esophageal Obturator Airway (EOA) was plagued with problems of accidental tracheal placement, poor mask seal, and poor ventilation and oxygenation in some studies.

The Esophageal Tracheal Combitube is a dual lumen tube with two balloon cuffs. The tube is inserted blindly, and ventilation can be achieved with either tracheal or esophageal placement. The Combitube is placed in the esophagus 85% of the time. A large proximal balloon that seats itself behind the hard palate surrounds the dual lumen tube. This balloon displaces the soft palate posteriorly and occludes the airway proximal to the larynx. The smaller distal balloon provides a cuff for the distal end of the tube.



Lumen #1 is sealed at the end but contains fenestrations (holes) distal to the pharyngeal balloon. Lumen #1 is used to ventilate the patient when the tube has been blindly inserted into the esophagus, approximately 85% of the time. Lumen #2 ends beyond the small cuff balloon similar to an endotracheal tube. Lumen #2 is used to ventilate the patient when the tube has been blindly inserted into the trachea.

Ventilation studies have shown that the Combitube can be used for extended periods of time while providing adequate oxygenation and ventilation as documented by arterial blood gases. The Combitube provides adequate oxygenation and this has been

documented in the ICU, operating room, and during CPR. In a prehospital study, resistance on insertion was the most common reason for failed insertion. No major complications have been reported as common occurrences. In a study of 1200 prehospital patients, only two esophageal lacerations occurred.

The Combitube can only be used in the unresponsive patient without a gag reflex or patient's in cardiac arrest. After checking the balloons and lubricating the tube, the paramedic uses his/her non-dominant to lift the tongue and jaw. Release cricoid pressure that may have been applied during BVM ventilation. The dominant hand is used to slide the tube GENTLY along the roof of the mouth. Advance the tube until the upper teeth or gums are aligned between the two black rings. The Combitube should never be forced. If resistance is met, withdraw the tube, reposition the head and re-attempt. If you are unable to place the tube within 30 seconds, hyperventilate patient for 1 - 2 minutes and re-attempt. If the tube will not pass on the second attempt, ventilate with a BVM and notify Command. Limit to 2 attempts prior to contacting Command.

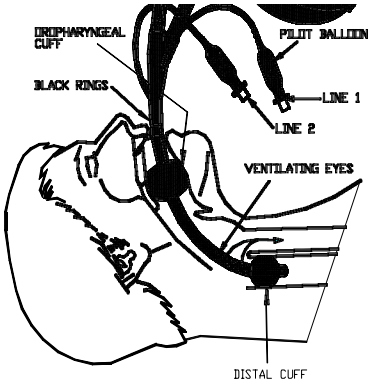
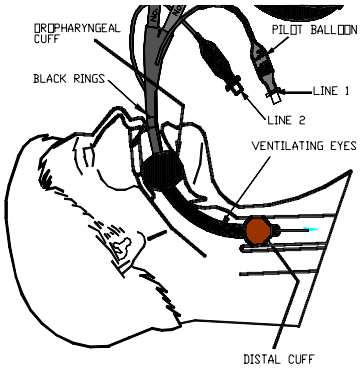
Once the tube is in place, inflate large pharyngeal balloon (blue #1 cuff) with 100 cc air. Then inflate distal balloon (white #2 cuff) with 15 cc. Begin ventilating through the longer blue tube (#1).

Assess placement of the tube by:

- Observing the chest rise and fall.
- Listening for bilateral lung sounds.
- Listening over epigastrum for air gurgling in stomach.
- Watch for color change of CO2 detector. (*remember that the detector may not change colors in cardiac arrest patients who are not generating CO2)

Do **NOT** use the Esophageal Detector Device (Bulb) with the Combitube.

Identifying the location of the tube is the most critical step in the use of the Combitube. Remember that the tube may be in 1) the esophagus, 2) the trachea, 3) too far down the esophagus, or 4) somewhere else. (See chart on the next page)

Assessment	Location	Action
bilateral lung sounds - **present** stomach sounds - **absent** *CO2 detector - **changes** chest rise - good	esophageal placement  	Continue ventilating with 100% oxygen through the #1 tube.
lung sounds - **absent** stomach sounds - **present** (hear gurgling in the stoma *CO2 detector - **no chang**	tracheal placement  	Switch the bag valve to the shorter tube (#2), and reassess placement as above. If there are bilateral lung sounds, absent stomach sounds, and good chest rise while ventilating through the #2 tube, this indicates tracheal placement. Continue using #2 tube
lung sounds - **absent** stomach sounds - **absent** *CO2 detector - **no chang** *remember that the detector may not change colors in cardiac arrest patients who are not generating CO2		Deflate balloon #1, pull back the tube 2-3 centimeters , re-inflate the balloon and reassess placement as above. If there are bilateral lung sounds present, absent stomach sounds, and good chest rise, *CO2 detector change the tube is in place. Continue ventilating with 100% oxygen through the #1 tube. If lung sounds are absent, absent stomach sounds, and no *CO2 detector change remove the tube and ventilate with a BVM and oral airway.

Once the position of the tube is confirmed, secure tube with a tube holder and monitor the patient's condition. Use pulse oximetry in the non-cardiac arrest patient. Low readings may indicate ineffective ventilations. Falling readings may indicate that the incorrect tube lumen is being used. Direct visualization with laryngoscope can be used to confirm tube position, however the large balloon (#1) must be deflated to visualize the posterior pharynx.

If the device is placed in the esophagus, the #2 tube can be used to relieve gastric distention using the stomach catheter provided. If the tube is in the trachea, ventilation will occur through tube #2. Drugs may be administered though this tube.

To prevent accidental use of the incorrect tube lumen once the tube position has been identified, place a piece of tape over the lumen not being used. Make sure that all crew members and the physician are aware of the location of the tube (esophagus vs. trachea) and which tube lumen is in use (#1 vs #2).

Upon arrival at the medical facility, the large syringe should be brought into the ER to facilitate deflation of the pharyngeal balloon (#1).

The Combitube should not be removed in the field unless:

- Patient regains consciousness and no longer tolerates the tube (begins to gag).
- Ventilation is inadequate.
- Tube placement cannot be determined.

Before removing the tube, have suction equipment ready. Log roll the patient to the side. Then, deflate pharyngeal balloon #1 with the large syringe followed by distal balloon #2. Make sure that both balloons are completely collapsed prior to removing the tube. While suctioning the airway, gently remove the Combitube.

Endotracheal intubation with a laryngoscope can be performed with the Combitube in place.

If the Combitube is in the esophagus, completely deflate pharyngeal balloon #1 with the large syringe. Use the laryngoscope blade to sweep the tube and tongue to the left. Visualize the cords and intubate the trachea. Confirm proper positioning of the endotracheal tube. Deflate balloon # 2 and carefully remove the Combitube while securing the endotracheal tube.

If the Combitube is in the trachea, hospital personnel may elect to change the tube over a “tube changer” or remove the tube and intubate in standard fashion.

Since some hospital personnel may not be familiar with the Combitube, please assist them with it’s use.

The Combitube

Advantages

- Effective ventilation and oxygenation with moderate protection against aspiration.
- Blind insertion without the need for light, laryngoscope, or direct visualization of vocal cords.
- Posterior pharyngeal balloon solves the problem of poor mask seal often encountered when using an EOA.
- Gastric contents can be aspirated through lumen #2 when the device is in the esophagus (85% of the time).
- Pharyngeal balloon may be independently deflated to allow direct visualization for endotracheal intubation.

Disadvantages

- Medications can not be administered through the Combitube when it is in the esophageal position (85% of the time).
- The trachea cannot be suctioned when the Combitube is in the esophageal position.

Indications

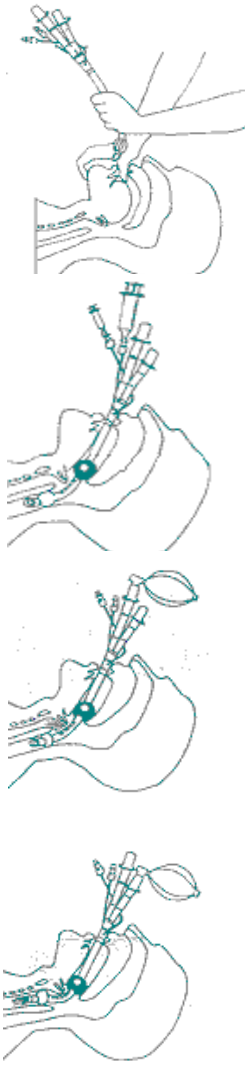
- *Unresponsive patients without a gag reflex*
- Three (3) unsuccessful attempts at endotracheal intubation
- Limited access to patient's head, i.e. entrapped patient
- Potential c-spine injury with inability to visualize vocal cords

Contraindications

- Conscious or unconscious patient with a gag reflex
- Known esophageal disease (cancer, varices, or stricture)
- Caustic oral ingestion
- Patent tracheotomy
- Patient height less than 5 feet
- Patient age less than 16 years (unless greater than 5 feet tall)

Combitube Procedure

- Ensure adequate ventilation with high flow oxygen and cricoid pressure if possible
- Check Combitube balloons and lubricate distal end of tube
- Lift patient's jaw and tongue forward with non-dominant hand. Discontinue any cricoid pressure.
- Gently insert Combitube in midline of mouth following natural curvature of the pharynx
- Insert Combitube until the teeth or alveolar ridge are between the black lines on the tube. Stop if resistance is felt during insertion.
- Inflate blue pilot balloon (#1) with 100cc of air using provided syringe.
- Inflate white balloon (#2) with 15cc of air using provided syringe.
- Attach end-tidal CO2 detector to Blue tube (#1) and ventilate with Bag-valve.
- Confirm tube placement by auscultation over epigastrium and lungs as well as end-tidal CO2 color change. If bilateral breath sounds are present and epigastic sounds are absent, continue ventilating through tube #1 (blue tube)
- If gastric sounds are heard or if no lung sounds are heard, or if no color change is seen on the end-tidal CO2 detector, immediately switch to ventilating the clear tube (#2) with the bag-valve.
- Repeat auscultation of epigastrium and lungs and attach end-tidal CO2 detector. If bilateral breath sounds are present and epigastic sounds are absent, continue ventilating through tube #2 (clear tube).
- If ventilation is not adequate and no breath sounds and no gastric sounds are heard the Combitube may be advanced to far, immediately deflate balloon #1 and move the Combitube out 2-3 cm out of the patient's mouth. Reinflate balloon #1 with 100cc of air and attempt to ventilate. If auscultation of breath sounds is positive and auscultation of gastric insufflation is negative, continue ventilation.
- If ventilation is not adequate then deflate both balloons and remove the tube.
- Ventilate patient with bag-valve mask until a definitive airway is established at the hospital.

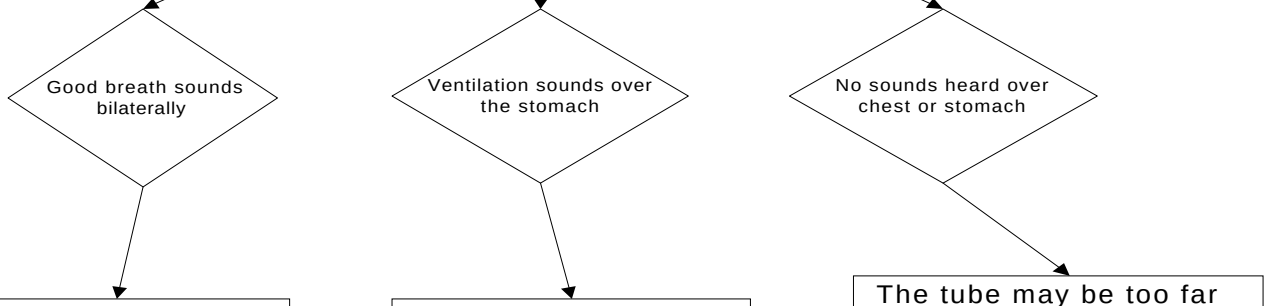


Combitube Airway

- Check both cuffs for integrity
- Lubricate tube
- Insert tube until teeth are between black lines
- Inflate Balloon #1 with 100cc of air using the 140ml syringe
- Inflate Balloon #2 with 15cc of air using the 20ml syringe

Attach CO_2 detector to BVM and begin ventilation via tube #1 (Blue Tube)

- Auscaltate chest and gastric area



Continue ventilation via Blue Tube

-May use clear tube for suctioning stomach
-No drugs down the tube

Switch to tube #2 (Clear Tube)

-Begin ventilation and confirm good breath sounds bilaterally, CO_2 detector change and no breath sounds over the stomach.
-May put drugs down the tube

The tube may be too far in the pharynx

-Deflate Balloon #1, withdraw the tube aprox. 2-3cm.
-Reinflate Balloon #1 and ventilate via tube #1 (Blue Tube)
-Reassess breath sounds over chest and stomach
-If good breath sounds are heard over chest, continue ventilation via Blue Tube
-If breath sounds are not heard over chest, remove tube and ventilate with BVM