Airway Maintenance & Emergency Airway Management in the
Sedated Dental Patient

Anthony S. Feck, DMD and Michael D. Silverman, DMD

Airway Maintenance

Rationale: The practice of dentistry involves treatment in and around the oral
cavity, the initial segment of the anatomical airway. Given the necessity of a
patent airway to normal ventilation and sustaining life processes, the critical
importance of protecting the airway at all times is obvious. When we consider
that we often recline our patients to a supine position, have impaired access and
visibility due to the inherent nature of the oral cavity, reduce sensory innervation
with local anesthetics, and work with and generate small foreign bodies, it is even
more apparent that airway maintenance is our number one safety concern in
dentistry. A sedated patient, with the accompanying depression of the central
nervous system, is at even more risk due to decreased conscious awareness
and obtunded reflexes. Therefore, the primary concern of the sedation team
should be at all times the maintenance and protection of a patent airway.

Protecting the Airway of the Sedated Patient

Proper Position: The upper airway is surrounded by soft tissue that has the
potential to result in partial or total obstruction. In the absence of swelling of the
soft tissue lining the oral cavity, oropharynx, and laryngopharynx, the anatomical
structure most likely to cause obstruction is the tongue. Fortunately, the tongue
is connected to the mandible, so that during times of normal muscle tone, the
forward position of the mandible will prevent the tongue from occluding the
oropharynx. However, when our patients are reclined and sedated, muscle tone
is relaxed, and the tongue is capable of airway obstruction (see Figure 1).

Figure 1.
Therefore, it is essential that the mandible be positioned forward (chin is raised). This is most easily accomplished by the use of a chair pad that allows the patient’s head to fall back and be cradled into a notch located at the head of the pad (see Figure 2).

**Figure 2.** A chair pad with separate head rest is shown here. The head rest shown is not used to facilitate proper head position.

**Vigilant Monitoring:** The sedation team must continually observe the position of the patient’s airway, as well as looking and listening for:

- The rise and fall of the chest (depth and rate of respiration) – normal respiratory rate in adults is 12-16/min., in children 18-22/min.
- The expansion and contraction of a reservoir bag if being used – as long as the mask or tube creates a good seal, the rise and fall of the reservoir bag is a good indication of respiration.
- Breathing sounds (with or without a stethoscope) – normal breath sounds are a smooth, barely audible “whoosh”. Abnormal sounds include snoring, gurgling, wheezing, or crowing.
- The patient’s skin and mucosa color – hypoxia gives skin and mucosa colors a bluish tint. This is usually a very late sign in the oxygen desaturation process.

In addition, the sedation team must be trained in the use and interpretation of monitoring equipment designed to measure the oxygenation of the blood (oxygenation) as well as the expiration of carbon dioxide (end-tidal CO2, capnography, and capnometry).

The saturation of available hemoglobin sites with oxygen to a level of 90% as measured by the pulse oximter is an indication of at least adequate oxygen saturation. The significance of the 90% level is explained by the Oxyhemoglobin Dissociation Curve.
End-tidal CO₂ reflects actual ventilation, and is a more immediate indication of the delivery and use of oxygen for cellular metabolism, and is usually reserved for deeper levels of central nervous system depression (deep sedation and general anesthesia).

**Avoiding Over-Sedation:** The central nervous system has complete or partial control of most physiological functions, including respiration. Sedative drugs can alter the fine balance that normally insures the respiratory system responds appropriately to oxygen needs of the body. As has already been pointed out, sedative drugs also impact muscle tone, resulting in greater likelihood of airway obstruction by soft tissues. Therefore, the risk of airway compromise and respiratory depression increases proportionately with the depth of sedation (See Figure 3).

**The Depth of Sedation vs. Risk to Airway Management**

![Figure 3](image)

If the patient can respond readily to verbal and physical stimulation, in other words they subscribe the level of consciousness defined by light or moderate levels, then they should be able to independently and continuously maintain their own airway. Despite this, all precautions such as proper positioning and monitoring are still adhered to.

**Patient Selection:** Risk to the airway is also dependent on individual patient characteristics. Patients who are: obese; have chronic obstructive pulmonary disease (COPD); smoke; and or have asthma or obstructive sleep apnea (OSA), are at greater danger of developing an airway emergency. Obese and OSA patients have airway obstruction issues. Patients who smoke or have COPD
have compromised gas exchange mechanisms. Patients with asthma are more likely to experience bronchospasm.

Even in the absence of these medical conditions, the anatomy of the upper airway can certainly clue the practitioner to the possibility of airway compromise during sedation as well as make emergency airway management more challenging. Examination of the position and quantity of the soft palate and uvula when the patient opens wide and sticks out their tongue without phonating is the basis for the Mallampatti classification used by anesthesiologists to grade the difficulty of intubation (See Figure 4). This same classification can be utilized by those not intending to use intubation for anesthesia to evaluate the degree of potential soft tissue impingement of the airway.

![Figure 4. Mallampatti Classification.](image)

The age of the patient also is a factor in the risk to airway maintenance and management. Generally speaking, because of the anatomy of the less mature airway, the likelihood of both airway obstruction as well as complicated emergency airway management is greater in the child than in the adult.

Children have relatively large heads, short necks, large tongues and soft tissue, and narrow nasal passages, which are readily blocked by secretions or edema. Many of the structures of the upper airway exhibit differences in location and texture. In the lower airway, the angles of the right and left mainstem bronchi with the trachea are equal. Pediatric patients have fewer lung alveoli. The 20 million present at birth increase to 300 million by age 8.

A higher metabolic rate in infants and children results in a proportionally greater alveolar ventilation (100 to 150 ml/kg/min) than in adults (60 ml/kg/min). Since the metabolic demand for oxygen is 60% greater than in the adult, hypoxemia develops rapidly in the pediatric patient (see Figure 5).
Physical Barriers: Protection of the airway from foreign objects is not only accomplished through careful handling and skillful suctioning, but through the use of physical barriers between the oral cavity and the oropharynx. When possible, the use of rubber dams, the Iso-Lite®, or gauze packing should be used to prevent unintended entry of foreign bodies into the airway.

Securing Loose Objects: When possible, small objects (eg. Rubber dam clamps, implant wrenches) should be secured by dental floss when used in the oral cavity. Crowns and veneers can be delivered with devices designed to use suction or tacky materials to prevent dislodgement into the airway.

Airway emergencies, like all emergencies can be prevented with careful attention to detail. This involves training of the doctor and all auxiliary personnel, patient selection, proper patient positioning, monitoring, avoiding deeper than intended levels of sedation, and using physical barriers and securing loose objects to prevent foreign body obstruction. When the airway emergency occurs, emergency airway management must be initiated promptly and skillfully.
Emergency Airway Management

Skillful airway management is the first step in the successful resuscitation of a compromised patient. When faced with an unsecured airway, the clinician has little margin for error. Neurologic damage caused by hypoxia occurs within minutes.

Airway Basics

Anatomy – A thorough understanding of airway anatomy is necessary to understand both the origin of the airway emergency as well as the steps to control it. The airway can be divided into two basic categories, the upper and lower portion. The upper portion is the area most likely to be involved with dental procedures and is the source of emergency intervention (see Figure 6).

Figure 6. Anatomy of the Upper Airway
As indicated in Figure 6, the normal path of air travels into the nasal cavity, through the nasopharynx, past the oropharynx and hypopharynx, and through the larynx and vocal cords and into the trachea. All along this path the airway is lined by soft tissue which is normally covered and bathed in body secretions (mucus, saliva, etc.). During normal physiologic function, the body maintains airway patency throughout this passageway by both autonomic and somatic control. However, during an airway crisis, some or all of this control is blocked or lost, and the practitioner must be prepared to take over for these functions so that oxygen containing air can continue to reach vital organs and the cells that constitute them.

**Airway Management Common To All Emergencies**

Common management to all airway emergencies is the P – A – B – C – D protocol where:

- **P** = Positioning
- **A** = Airway
- **B** = Breathing
- **C** = Circulation
- **D** = Definitive Care (Including Drugs, Defibrillation, and Delivery to Advanced Care Personnel)

**Positioning**

The significance of airway positioning has already been covered relative to airway maintenance. Likewise, when managing the unconscious patient, the airway must be supported by lifting the mandible. This can be accomplished by several methods including the following:

**Head Tilt / Chin Lift** (see Figure 7)

- Most effective for opening the airway
- No evidence of trauma
- Dentures do not need to be removed, they help maintain normal contour of the mouth
- Good for rescue breathing

**Technique**

- Place one hand on the forehead of the patient and tilt the head backward
- Place fingers of the other hand under the patient’s jaw and tilt upward
Figure 7. Head Tilt/Chin Lift Maneuver.

**Jaw Thrust Technique** (see Figure 8)
- Grip the angles of the mandible with both hands
- Pull forward, while at the same time tilting the patient’s head backward

Figure 8. Jaw Thrust Technique.

**Modified Jaw Thrust**
- Method of choice when cervical spine injury is suspected
- No extension of the neck
- Technique is to put forward traction on the mandible without heal tilt

**Triple Airway Maneuver** (see Figure 8)
- Place fingertips of each hand on the angles of lower jaw
- Displace the jaw forward
- Use thumbs to retract patient’s lower lip
Figure 9. Triple Airway Maneuver.

**Mandibular Displacement** (see Figure 10)

- Effective with spontaneous breathing edentulous patients
- Dangerous for the rescuer if the patient has teeth

Technique –
- Steady the head
- Place thumb in patient’s mouth
- Fingers underneath the chin
- Pull upward

Figure 10. Mandibular Displacement
Airway
During an airway emergency, positioning alone may not be enough to result in spontaneous respiration. In such cases, an airway support device is useful to open the airway and/or allow supplemental or positive pressure oxygen (at 21% - 100%) to be delivered to the lungs. There are numerous devices available for these purposes. The choice of device will be dependent on consideration of the advantages/disadvantages inherent in each option, as well as the training and personal preference of the practitioner. Five such devices will be considered here:

Oropharyngeal Airway
Nasopharyngeal Airway
Laryngeal Mask Airway
Combi-Tube
King L-TD Airway

Oropharyngeal Airway
The oropharyngeal airway (see Figure 11) may be used to maintain airway patency after proper positioning is achieved. It may relieve soft tissue obstruction of the airway by displacing the tongue anteriorly, providing a patent airway. Placement of an oral airway may precipitate vomiting, laryngospasm, or aspiration if placed in a semiconscious patient.

Figure 11. Oropharyngeal Airways of different sizes.

Of all the airway devices, the oropharyngeal airway (OPA) is perhaps the easiest device for a dentist with limited training and experience to insert.
**Insertion Technique**

1. Insert airway with the concave side toward roof of the mouth (see Figure 12).
2. When the tip of the airway reaches the back of the tongue (past the soft palate), rotate the airway 180° so the tip end of the airway is pointing down toward his throat. If the airway is difficult to insert or rotate, grasp the patient’s tongue with the fingertips of the hand not holding the airway and gently pull the tongue forward. Advance the airway until the flange rests against the patient’s lips (see Figure 12).
3. The airway must be positioned posterior to the tongue displacing the tongue away from the posterior pharyngeal wall (see Figure 13). To test placement, the tip of the tongue may be pulled anteriorly to confirm correct placement of airway.

![Figure 12. Oropharyngeal Airway Insertion.](image)
Figure 13. Correct positioning of the Oropharyngeal Airway.

**Indications**
- Unconscious patients without a gag reflex
- Breathing or nonbreathing patients
- Used as a bite block in seizures and with endotracheal tube in place

**Contraindications**
- Presence of a gag reflex
- Severe maxillofacial injuries

**Oropharyngeal Airway Advantages**
- Allows air to pass around and through the device
- Helps prevent obstruction by teeth and lips
- Helps manage unconscious patients who are breathing spontaneously or need mechanical ventilation
- Makes suctioning of the pharynx easier
- Bite block during seizures and ET protection

**Oropharyngeal Airway Disadvantages**
- Does not isolate the trachea
- Cannot be inserted when teeth are clenched
- May obstruct the airway if not inserted properly
- Can be dislodged easily
- Should never be inserted in a conscious or semiconscious patient with a gag reflex
- May precipitate vomiting and laryngospasm
**Nasopharyngeal Airway**

A nasopharyngeal airway is similar in basic design to the oropharyngeal airway and may be placed through a nostril into the posterior oropharynx. In this position it may relieve soft tissue obstruction of the posterior pharynx (see Figure 14). Nasal airways tend to be less stimulating than in oral airways in an awake patient, but may cause epistaxis. Nasopharyngeal airways are contraindicated in patients with known or suspected basilar skull fractures and thus probably should be avoided in the head-injured patient.

![Figure 14. Nasopharyngeal Airway.](image)

**Contraindications**
- Nasal obstructions
- Patients prone to nosebleeds
- Head injuries (basilar skull fractures)

**Advantages**
- Can be easily and rapidly inserted
- It bypasses the tongue
- May be used when a gag reflex is present

**Disadvantages**
- Does not isolate the trachea
- Smaller than the oropharyngeal airway
- Difficult to suction through
- Can cause severe nosebleeds
- Can cause pressure necrosis of nasal mucosa
- Difficult to insert if nasal damage is present
Laryngeal Mask Airway - Laryngeal mask airways are used in anesthesia and in emergency medicine for airway management. They comprise a tube with an inflatable cuff that is inserted into the pharynx (see Figure 15). They cause less pain and coughing than an endotracheal tube, and are much easier to insert. However, a standard laryngeal mask airway does not protect the lungs from aspiration, making them unsuitable for anybody at risk of this complication.

The device is useful in situations where a patient is trapped in a sitting position, suspected of trauma to the cervical spine (where tilting the head to maintain an open airway is contraindicated), or when intubation is unsuccessful.

The device sits tightly over the top of the larynx. It avoids tracheal intubation and can be used with spontaneous respiration or artificial ventilation. However, it may not protect the airway from the aspiration of regurgitated material. Patients who have been treated with the laryngeal mask airway claim it does not irritate the throat as intubation typically does.

Figure 15. Laryngeal Mask Airway (LMA) inserted.

Combi-Tube - The Esophageal Tracheal Combitube was developed in the early eighties with the intent to allow for a quick and easy method securing the patient’s airway and adequately ventilating the lungs (see Figure 16).

The invention of the Combitube aimed to enter either the esophagus or the trachea and allowing ventilation and oxygenation in both positions. This aim was achieved by designing a double lumen tube, one lumen resembling a tracheal tube, the other an esophageal obturator type tube with a distal blocked end and perforations at the pharyngeal level.
Indications:
- Ventilation in normal and abnormal airways
- Failed intubations
- Airway management in trapped patients

Contraindications:
- Patients with intact gag reflexes
- Patients with known esophageal pathology
- Use in patients under 5 feet with standard Combitube, under 4 feet with Combitube SA (small adult)

Advantages:
- Requires minimal training
- May be more useful in non-fasted patients
- Successful passage and ventilation in many patients via esophageal route
- Portable, useful in remote setting
- Functions in either the trachea or esophagus

Disadvantages:
- Mostly adult sizes
- Potential for esophageal trauma
- Problems maintaining seal in some patients

Figure 16. Combitube Placement.

King LT-D Airway - The KING LT-D is a disposable supraglottic airway created as an alternative to tracheal intubation or mask ventilation (see Figure 17). The KING LT-D is designed for positive pressure ventilation as well as for
spontaneously breathing patients, thereby allowing maximum versatility as an airway management tool.

It has quickly gained favor among emergency medical personnel because it is easy to insert and results in minimal airway trauma. It is considered by many to be the Safest and most reliable disposable supraglottic airway tool for emergency ventilation when direct laryngoscopy is not feasible. The KING LT-D is 100% latex free and is provided sterile for single patient use.

Figure 17. King LT-D Airway.
Positive Pressure Oxygen with a Bag-Valve Mask Assembly

After placement of an airway device, check again for adequacy of ventilation. If needed, assist with positive pressure ventilation with a Bag-Valve-Mask Assembly (see Figure 18). This should be done with a source of high-flow oxygen attached to a bag-valve device consisting of a self-inflating bag, non-rebreathing valve, and no pressure release valve. This bag-valve device has standard 15 mm/22 mm fittings that allow it to be connected to a mask or an endotracheal tube. Experience and practice in maintaining proper mask fit will increase efficiency of air movement.

Figure 18. Bag-Valve-Mask Assembly for delivery of positive pressure oxygen.

Advantages

- Delivers oxygen or room air to a patient who cannot breath independently
- Hyperexpands lungs, improving alveolar ventilation
- Prevents hypoxia
- Contains self-inflating bag, one way valves, reservoir, and transparent face mask
- Available in various sizes and each practitioner should have ALL the sizes

The office portable emergency oxygen supply must be ready at all times for immediate use. In order to insure this, someone on the clinical team should be accountable for verifying a full supply of oxygen, and that all accessories are attached to the apparatus.

Bag-Valve Concentrations

- Without oxygen - 21%
- With oxygen, no reservoir - 60%
- With oxygen and reservoir - 90 to 95%
- With demand valve attachment - 100%
**Carbon Dioxide Detector**
These simple to use and read devices fit between the mask and bag valve assembly (see Figure 19). They detect end tidal CO2 (the most accurate determination that ventilation is taking place) through a color change scale. The pale lavender color indicates carbon dioxide levels below 0.03%, whereas the pale yellow color is an indication of favorable CO2 expiration levels of up to 5.0%.

![Figure 19. Carbon Dioxide Detector](image)

**Demand Valve**
Another commonly available alternative to the use of the manual Ambu Bag for sufflation of air is the Demand Valve (see Figure 20):

![Figure 20. Demand Valve](image)

**Demand Valve Advantages**
High-pressure tubing connected to oxygen supply and activated by push button or lever
Delivers 100% oxygen
Easy to operate, manual trigger button
Often equipped with inspiratory release valve which allows patient to breath

Demand Valve Disadvantages
- Does not provide a feel for chest compliance
- Barotrauma and gastric distention can be caused by overventilation
- Oxygen tanks quickly drain
- Should not be used with intubated patients

Circulation
If the emergency patient has a pulse, then circulation support in the form of external cardiac compressions or defibrillation need not be provided. However, it is important to have the ability to provide both in the patient with an airway emergency as cardiovascular events often accompany airway emergencies.

Airway Emergencies Most Likely To Be Encountered

Soft Tissue Obstruction (Including Laryngospasm and Anaphylaxis) – Soft Tissue Obstruction has already been covered in detail. The practitioner must appreciate that this is the most common cause of an obstructed airway, and is also the easiest to correct with proper positioning.

However, occasionally the soft tissue obstruction is not amenable to simple positioning alone. Such as is the case with edema of the soft tissue surrounding the airway as can occur with anaphylaxis, as well as the spasm of the vocal cords, termed laryngospasm.

Anaphylaxis is an acute systemic (multi-system) and severe Type I Hypersensitivity allergic reaction. Anaphylaxis occurs when a person is exposed to an allergen, to which they have already become sensitized. This can be a life-threatening event because of rapid constriction of the airway, often within minutes of onset, which can lead to respiratory failure and respiratory arrest. Brain and organ damage rapidly occurs if the patient cannot breathe.

Treatment involves administration of epinephrine IM (or IV infusion in severe cases), Benadryl IM, steroids such as Decadron, IV Fluid administration and in severe cases, pressor agents (which cause the heart to increase its contraction strength) such as Dopamine for hypotension, administration of oxygen and intubation during transport to advanced medical care. In severe
situations with profuse laryngeal edema (swelling of the airway), a cricothyroidotomy may be required to maintain oxygenation.

Laryngospasm is an uncontrolled/involuntary muscular contraction spasm of the laryngeal cords. The condition typically lasts less than 30 or 60 seconds, and causes a partial blocking of breathing in, while breathing out remains easier. It may be triggered when the voice box or the area of the windpipe below the voicebox detects the entry of water or other substance. It is characterized by a high pitched scream-like sound, and might be frightening for some to witness. Some people suffer from frequent laryngospasms, whether awake or asleep.

Laryngospasm is treated by hyperextending the patient's head and administering mechanical ventilations with 100% oxygen. In more serious cases it may require intubation. If orotracheal intubation is not possible a cricothyroidotomy is done to create an airway.

**Foreign Body Obstruction** - Foreign bodies may cause acute airway obstruction. Recognition of the obstruction is the first step. An appropriate verbal response to questions indicates a patent airway in the awake patient. If the patient is unconscious, determine if there is air movement with respiratory effort, snoring, gurgling, or stridorous noises indicative of obstruction. If foreign body obstruction is the problem, techniques such as the **Heimlich maneuver** or suctioning of debris from the airway may be needed.

**Physical Findings**
- Patient cannot speak or breathe
- Patient makes the universal sign for choking
- Marked agitation
- May become unconscious (within 1 minute) unless the airway is re-established
- Death may result within 4-6 minutes without oxygenation

**Treatment**
- Positioning:
  - Conscious – sitting upright, or turned to the right side
  - Unconscious - supine
- Attempt Heimlich Maneuver
- Encourage patient to cough to dislodge obstruction

If unconscious:
- Use abdominal thrusts
- Activate EMS
General Considerations

- Minimize risks of swallowing objects by tying dental floss:
  - Rubber dam clamps
  - Bite blocks
  - Gauze, cotton rolls
  - Small removable appliances and instruments

If a patient is only partially obstructed, and the patient is coughing or wheezing, and actively trying to dislodge the object DO NOT INTERVENE!

- Sit them up and encourage them to cough!
- Use the Heimlich Maneuver to attempt to dislodge the obstruction if coughing does not improve the situation
- If this is unsuccessful and the patient has lost consciousness, a cricothyrotomy may be a procedure of last resort to save the patient

If a patient is unconscious and the chest is moving, do not assume the obstruction has been removed - REPOSITION via chin-lift, head-tilt to alleviate tongue and soft-palate obstruction.

CNS Depression – The natural rhythmic breathing pattern can be disrupted by a depression of the ventilatory drive normally controlled centrally within the medulla. This depression can be the result of sedative drugs, trauma, or other phenomenon such as a cardiovascular or cerebrovascular event.

The fundamental airway management of these patients is no different from most emergency events in that the P – A – B – C – D protocol is followed. The one important difference is that when the possibility of respiratory depression from the administration of sedative drugs such as those from the opiate or benzodiazepine class exists, then the use of the reversal agents, naloxone and flumazenil respectively, is indicated.

Bronchospasm – Bronchospasm is a temporary narrowing of the bronchi (airways into the lungs) caused by contraction of the muscles in the lung walls, by inflammation of the lung lining, or by a combination of both. This contraction and relaxation is controlled by the autonomic nervous system. Contraction may also be caused by the release of substances during an allergic reaction.

The most common cause of bronchospasm is asthma, though other causes include respiratory infection, chronic lung disease (including emphysema and chronic bronchitis), anaphylactic shock, or an allergic reaction to chemicals.

Treatment involves the administration of Beta2-agonists such as albuterol, which relax airway smooth muscle and may modulate mediator release from mast cells and basophils. Beta-agonist inhalers (bronchodilators) act
to ease symptoms of asthma by relaxing muscles surrounding the walls of the bronchial tubes. In severe cases, epinephrine may be administered IM or IV as well.

**Definitive Airway Management**

Although the above methods have their uses, a definitive airway will be required in an emergency situation. This is usually accomplished by Emergency Medical Technicians (EMTs). Definitive **airway management** enables the caregiver to control ventilation, administer high levels of oxygen, and to some degree protect against aspiration. There are three major methods of obtaining a definitive airway: (1) orotracheal intubation, (2) nasotracheal intubation, and (3) a surgical airway. In choosing between the nasal and oral routes of intubation, the clinician’s skills and experience and the status of the patient should be taken into account.

**Orotracheal Intubation**

This method of establishing a definitive airway uses a laryngoscope to place an endotracheal tube directly into the trachea. Once in place, a bulb is inflated near the distal tip of the tube to help secure it in place and protect the airway from blood, vomit, and secretions (see Figure 21).

![Figure 21. Orotracheal Intubation.](image)

**Nasotracheal Intubation**

An alternative to orotracheal intubation, nasotracheal intubation is similar except the endotracheal tube is inserted through the nose and nasopharynx instead (see Figure 22).
Surgical Airway
Given the higher likelihood of foreign body obstruction in the dental sedation patient versus the general population, as well as the possibility that the foreign body will be lodged below the position of the vocal cords, and given the critical element of time in which a patent airway must be established, every practitioner should have a working knowledge of the surgical airway technique. The surgical technique easiest to perform with less accompanying post-surgical complications is the cricothyroidotomy (see Figure 23).

There are two basic types of cricothyroidotomy: Needle Cricothyroidotomy and Surgical Cricothyroidotomy. In a needle cricothyroidotomy, a syringe with a needle attached is used to make a puncture hole through the cricothyroid membrane that overlies the trachea. After the needle has reached the trachea, a catheter is passed over the needle into the windpipe and attached to a bag-valve device. In a surgical cricothyroidotomy, the doctor or other emergency worker makes an incision through the cricothyroid membrane into the trachea in order to insert a piece of tubing for ventilating the patient.
Positive Pressure Oxygen with Bag-Valve Mask Assembly Operating Instructions for 2 people

- Use only on unconscious patient demonstrating signs of respiratory distress
- Clear mouth and airway of visible foreign bodies
- Have assistant connect the oxygen reservoir system to 100% O2 and adjust flow to 15 liters per minute
- Connect the CO2 detector to the Bag-Valve Mask
- Position head for opening the airway
- Apply the mask firmly to the patient’s face, placing the rounded cushion between the lower lip and chin, and the narrow cushion as high on the ridge of the nose as possible
- Hold the mask firmly against the face with the thumb and index finger, while keeping the chin and head tilted back with the other three fingers
- Have assistant slide his/her hand under the support strap.
- Squeeze the bag with both hands at a rate of 12-15 times per minute for adults
- During insufflations observe the rise of the patient’s chest.
- Release the bag abruptly and observe the lowering of the chest and the change in color of the CO2 detector
- If continued resistance to insufflations is encountered, check for airway obstruction or correct the backward held tilt
- If no resistance, but no chest movement or CO2 detector change, the reposition the mask

Airway Practical
Two Person Sequence
1. Confirm patient is unresponsive and not breathing
2. Activate EMS (911)
3. Request emergency O2, AED, and Emergency Kit
4. PABCD, D = Oxygen
5. If no pulse – AED*

*For the purposes of this exercise we are assuming no breathing, but the patient has a pulse
Supply List

All of the following items should be attached and/or connected to cart system within a supply bag

- Complete set of oropharyngeal airways
- CO₂ Detector (in foil pouch protected from exposure to air)
- Bag-Valve Assembly:
  - Tubing
  - Clear mask
  - Ambubag
  - One-way value
  - Reservoir bag

Equipment List

- Portable Positive Pressure Oxygen Unit:
  - E-Tank of Oxygen Unit
  - Wrench to open Oxygen Valve
  - Regulator
- Pulse Oximeter

Two-Person Emergency Oxygen Rescue Sequence

1) Confirm patient is unresponsive and not breathing
2) Activate EMS by calling 911
3) Begin Basic Life Support (BLS) following the PABCD protocol
   - Positioning
   - Airway
   - Breathing
   - Circulation
   - Definitive Care including defibrillation and emergency drugs (in this case oxygen)
4) If no pulse, then request AED and emergency kit. If there is a pulse, but no breathing, begin rescue breathing according to the following sequence:
GREEN is for “Airway Manager”
BLUE is for “Ventilator”

A. Open the airway.
B. Request Emergency Kit.
C. Determine the proper size Oropharyngeal Airway by measuring from the corner of the mouth to the front of the ear lobe.
D. Place the Oropharyngeal Airway by inserting it upside down, then rotating downwards after it reaches the soft palate.
E. Open CO₂ Detector Pouch and place CO₂ Detector between Mask and Bag Assembly (press pieces together very firmly).
F. Hand bag-valve-mask assembly to Airway Manager.
G. Position mask over nose and mouth to create a seal while raising the chin.
H. Turn on Emergency Oxygen Valve and adjust Oxygen Flow to 15 Liters.
I. Remind “Ventilator” of the proper rate of once every four seconds.
J. Squeeze the Bag completely once every four seconds while observing both the rise and fall of the chest as well as the color change of the CO₂ Detector.
K. Monitor the CO₂ detector to assure ventilation is occurring.
L. If the chest is not rising and falling with each manual ventilation and/or the CO₂ detector is not registering adequate ventilation via appropriate color change, then ask the airway manager to check mask seal, position of oropharyngeal airway, and raise the chin.
M. Reposition the mask to maintain a good seal.
N. Check for consciousness and spontaneous breathing after one-minute and every minute thereafter.
TWO-PERSON POSITIVE PRESSURE OXYGEN DELIVERY FOR RESPIRATORY ARREST PRACTICAL

Seminar Location: __________________________ Date: ________________
Name: _______________________________________

“Airway Manager”

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<tr>
<th>Task</th>
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<tbody>
<tr>
<td>Position the patient and airway</td>
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<tr>
<td>Place oropharyngeal airway</td>
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<tr>
<td>Position mask over nose and mouth and create seal</td>
</tr>
<tr>
<td>Remind “ventilator” of proper rate</td>
</tr>
<tr>
<td>Reposition mask to maintain seal if necessary</td>
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<tr>
<td>Monitor CO₂ detector to assure ventilation</td>
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<tr>
<td>Halt insufflation after each one-minute cycle, monitor vital signs and check for consciousness</td>
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Notes:

“Ventilator”

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<tr>
<th>Task</th>
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<tbody>
<tr>
<td>Select appropriate oropharyngeal airway and hand to “Airway Manager”</td>
</tr>
<tr>
<td>Attach CO₂ detector to bag-valve-mask assembly</td>
</tr>
<tr>
<td>Hand bag/valve/CO₂ mask assembly to airway</td>
</tr>
<tr>
<td>Turn oxygen tank on and check pressure level of oxygen supply</td>
</tr>
<tr>
<td>Adjust flowmeter to 25 liters/min.</td>
</tr>
<tr>
<td>Squeeze bag once every 4 sec. w/ both hands w/ quick complete release</td>
</tr>
<tr>
<td>Monitor rise and fall of chest</td>
</tr>
</tbody>
</table>

Notes:

DOCS FACULTY __________________________ Date ___________________________

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