General Medical Procedure

**Emergency Airway Techniques (General Airway Protocol)**

Appropriate airway management is often the most important intervention a prehospital care provider makes, as ensuring adequate oxygenation and ventilation is crucial to the survival of every patient. The approach to airway control should proceed in a stepwise fashion, from basic to advanced, since basic maneuvers can sustain life until an advanced airway can be established. All of the following procedures may be performed prior to radio contact.

**Indications For Airway Intervention**

1. Airway obstruction

2. Need for positive pressure ventilation
   a. Apnea or inadequate respiratory effort
   b. Impending respiratory failure
   c. Patients who, as a result of an acute event, have a Glasgow Coma Score of less than 8.

3. Airway protection, such as an unconscious patient without a gag reflex.

**Procedure:**

A. (MFR/BLS/LALS/ALS) Open the airway using the basic maneuvers (chin lift or jaw thrust). Patients with a potential cervical spine injury should not have their neck hyper extended.

B. (MFR/BLS/LALS/ALS) Attempt to ventilate using BVM or other approved device.

C. (MFR/BLS/LALS/ALS) In cases of airway obstruction, abdominal thrusts or other interventions as indicated.

D. (LALS/ALS) Endotracheal intubation may be performed via the orotracheal or nasotracheal route. Orotracheal intubation is the preferred method for unconscious patients without a gag reflex. Patients who still have spontaneous respiratory efforts may be nasotracheally intubated.

E. (BLS) Double lumen airway insertion may be performed in unconscious and apneic patients.

F. (LALS/ALS) Double lumen airway insertion may be performed to secure the airway in unconscious and apneic patients in whom oral and nasal intubation are unsuccessful and patient can be ventilated with basic maneuvers.

G. (ALS RSI CLEARED) Trauma patients with a GCS of 8 or less in which oral intubation is not possible or unsuccessful may have a definitive airway established using the Trauma Rapid Sequence Intubation Procedure (see below).

H. (ALS) In cases where intubation is unsuccessful, where facial trauma precludes the possibility of successful intubation, or in cases of complete airway obstruction unresponsive to dislodging efforts, a cricothyrotomy should be performed. Patients less than age 8 should have a needle cricothyrotomy performed; age 8 or greater should ideally undergo a surgical cricothyrotomy.

I. Any intubated patient that has a pulse (i.e. not in cardiac arrest) must have correct tube position verified by use of an end tidal CO\textsubscript{2} detector. This should not supplant standard methods of verifying correct tube placement (breath sounds, chest rise, etc.). Paramedics must be familiar with the use and limitations of this device.
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OROTRACHEAL INTUBATION (LALS/ALS)

Technique for Endotracheal Intubation:

A. Hyperventilate the patient with 100% oxygen.

B. Gather equipment:
   - appropriate size ETT
   - stylet
   - syringe
   - laryngoscope
   - suction
   - BVM or substitute
   - device for securing tube after placement
   - end tidal CO2 detector
   - pulse oximeter

C. Place the laryngoscope blade along the right side of the tongue, moving the tongue to the left as the blade is advanced. Lift the blade anteriorly, using caution to avoid using the teeth as a fulcrum. If using a straight blade, lift the epiglottis with the tip of the blade. If using a curved blade, place the tip anterior to the epiglottis into the vallecula. Proper neck position and external cricoid pressure will facilitate visualization.

D. For infants and children, a straight blade is usually used.

E. The tube should be advanced past the cords until the proximal portion of the balloon (if present) is passed 2 to 3 cm. beyond the vocal cords.

F. If using a cuffed tube, inflate the balloon with 10 cc's of air.

G. Confirm adequate tube placement by auscultation of bilateral breath sounds and absence of gurgling over the stomach. Ensure you are hearing ventilation through the tube and not spontaneous sounds around the tube. As a general rule, the tube should be at 21 cm. at the gum line for adult females and 23 cm. for adult males.

NASOTRACHEAL INTUBATION (LALS/ALS)

Contraindications:

Patients without spontaneous respiratory effort
Known bleeding disorder

Technique for Nasotracheal Intubation:

A. Hyperventilate patient with 100% oxygen.

B. Gather equipment:
   - nasal pharyngeal airway
   - appropriate size ETT
   - syringe
   - laryngoscope
   - suction
   - BVM or substitute
   - device for securing tube after placement
   - end tidal CO2 detector
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C. Liberally lubricate nares and the distal portion of the tube. If available, lidocaine jelly on a nasal pharyngeal airway should be used.

D. Insert ET tube into nares against septum. Secure BVM-tube adapter to the tube with firm pressure prior to beginning procedure.

E. Advance tube posteriorly, using gentle pressure.

F. If resistance is met, cephalad traction or rotation of the tube may facilitate passage, or alternatively, a smaller tube may be required.

G. Slight flexion of the head or lifting of the jaw (if C-spine is not a concern) may facilitate passage.

H. Listen for air movement through the tube. When sound is loudest, briskly advance the tube at the beginning of an inspiration.

I. Inflate the balloon.

J. Confirm adequate tube placement by auscultation of bilateral breath sounds and absence of gurgling over the stomach. Ensure you are hearing ventilation through the tube and not spontaneous sounds around the tube. Confirm tube placement with an end tidal CO\textsubscript{2} detector. Document all the above confirmation techniques for each nasal intubation. As a general rule, the nasotracheal tube should protrude from the nose only 1-2 cm when in correct position.

**DOUBLE LUMEN AIRWAY (BLS/LALS/ALS)**

**Equipment Requirements**

A. Must be a double lumen airway which provides for blind placement and allows for adequate patient ventilation with either esophageal or tracheal placement.

B. Type and design to be utilized must be approved by the MCB.

**Double Lumen Airway Procedure (BLS/LALS/ALS)**

**Indications for double lumen airway use:**

1. Patient is unconscious and apneic.
2. (LALS/ALS) Oral intubation attempts were unsuccessful

**Contraindications to double lumen airway use:**

1. Patient with an intact gag reflex
2. Patient under 5 feet tall, 4 feet for small adult tube
3. Patients with known esophageal disease (e.g. esophageal varices)
4. Patients with suspected caustic substance ingestion
5. Presence of a tracheostomy

**Technique for Double Lumen Airway insertion:**

1. Cardio-respiratory Arrest

   A. (BLS) The first priority is to defibrillate the patient in cases of ventricular fibrillation. The AED should be applied first, using conventional airway management, following the AED procedure.

   B. (BLS) The double lumen airway should be placed during the one minute of CPR between sets of AED analyses. (This may somewhat delay subsequent AED analysis.)
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C. (BLS/LALS/ALS) Hyperventilate the patient prior to double lumen insertion for 10-15 seconds using either a BVM or Mouth-to-Mask device with supplemental oxygen.

D. Insertion
   i. Gather equipment:
      - Double Lumen Airway
      - suction
      - BVM or substitute
      - device for securing the tube after placement
   ii. Except in cases of suspected cervical spine injury, hyper-extend the head and neck.
   iii. In cases of suspected cervical spine injury, C-spine precautions will be taken at all times.
   iv. Patent airway and ventilation should already have been established by other Basic methods.
   v. Insert the thumb of a gloved hand into the patient's mouth, grasping the tongue and lower jaw between the thumb and index finger, and lift upward.
   vi. With the other hand, hold the double lumen with the curve in the same direction as the curve of the pharynx. Insert the tip into the mouth and advance carefully behind the teeth to the appropriate depth for the device in use. **CAUTION:** Do not force the airway device. If it does not advance easily, re-direct it or withdraw it and re-insert.
   vii. If the double lumen airway device is not successfully placed within 30 seconds, remove the device and hyperventilate the patient for 30 seconds using basic methods, as described in C above, before re-attempting insertion.

E. Inflating the cuffs of the airway device according to the manufacturer's recommendations.

F. Ventilation
   i. Begin ventilation through the longer (distal) tube. Watch for chest rise. If auscultation of breath sounds is positive and auscultation of gastric air sounds is negative, continue ventilation.
   ii. If no chest rise, negative lung sounds, and/or positive gastric air sounds with ventilation through the distal tube, begin ventilation through the shorter (proximal) tube. Confirm ventilation with chest rise, presence of auscultated lung sounds, and absence of gastric air sounds.
   iii. If there is no chest rise or positive lung sounds through either tube, remove the device, hyperventilate the patient for 20-30 seconds as described in C above, and repeat the insertion/inflation/ventilation procedures.
   iv. Continue to ventilate the patient through the tube which resulted in lung sounds using a BVM.

G. If two consecutive attempts at double lumen airway placement fail to result in a proper placement and ventilation, do not attempt placement again. Ventilate the patient using basic methods and equipment.

2. Respiratory Arrest (Pulse Present)

A. (BLS/LALS/ALS) Hyperventilate the patient prior to intermediate airway insertion for 10-15 seconds using either a BVM or Mouth-to-Mask device with supplemental oxygen.

B. (BLS/LALS/ALS) Follow the procedure described in 1 (D-G) above.
CRICOTHYROTOMY (ALS)

The cricothyroid membrane is located subcutaneously between the thyroid cartilage ("Adam's apple") and cricoid cartilage. There are two methods for performing a cricothyrotomy - the standard surgical approach and needle cricothyrotomy. The surgical technique uses a scalpel blade to create an opening in the cricothyroid membrane through which an endotracheal tube is inserted. The needle technique uses an angiocath inserted percutaneously. Needle cricothyrotomy is used for children less than age 8.

Indications for cricothyrotomy:

1. Total airway obstruction not relieved by other methods.
2. Airway compromise from injuries that make oral or nasal intubation impractical.
3. Inability to ventilate and inability to intubate.

**Technique for Surgical Cricothyrotomy:**

A. Gather necessary equipment in addition to that needed for oral intubation
   - antiseptic solution
   - scalpel

B. Identify cricothyroid membrane

C. Prep the site with antiseptic solution

D. While stabilizing the larynx with one hand, use the opposite hand to make a 3-4 cm. *vertical incision* through the skin in the midline over the cricoid membrane.

E. After identification of the cricoid membrane, use the scalpel to make approximately a 1cm. *horizontal incision* through the lower portion of the membrane.

F. Enlarge the hole, place the ET tube into the airway, and inflate the balloon.

G. Verify correct placement using usual techniques, including an end tidal CO\textsubscript{2} monitoring device.

**Technique for Needle Cricothyrotomy:**

A. Gather necessary equipment:
   - antiseptic solution
   - BVM or jet insufflation valve-type device
   - Needle (13 or 14 gauge)

B. Identify cricothyroid membrane.

C. Prep the site with antiseptic solution.

D. Connect the angiocath to a syringe.

E. Stabilize the larynx and identify the cricothyroid membrane.

F. Direct the angiocath caudally at an angle of less than 45 degrees to the skin.

G. Insert the angiocath through the skin, maintaining negative pressure on the syringe. Entry of air and loss of resistance signifies entry into the larynx.

H. Advance the cannula into the larynx and remove the angiocath.

I. Caution must be used to ensure the catheter does not bend.

J. The patient may be ventilated using a commercially available pressure device, or via a BVM connected to the adapter top of a number 3 endotracheal tube.

2-01d
K. Deliver 100% O2 at 20 bursts/minute with Inspiratory/Expiratory (I:E) of 1:2.

NOTES:

BVM use through an angiocath may deliver insufficient quantities of oxygen. Air may be forced out through the nose and mouth in addition to the lungs and may also blow secretions out of the patients nose and mouth.

TRAUMA RAPID SEQUENCE INTUBATION (ALS - RSI CLEARED)

Indications for Trauma Intubation:
1. Trauma patients with a GCS of 8 or less.

Contraindications for RSI:
1. Known allergy to any of the RSI medications
2. Severe facial or neck injury that would prevent bag-valve mask ventilation or cricothyrotomy
3. Patient not supine (e.g., still in car) preventing alternative airways

Technique for Trauma Intubation:
A. Assess patient and determine GCS
B. Hyperventilate the patient with 100% oxygen
C. Gather equipment
   - pulse oximetry
   - appropriate size ETT
   - stylet
   - syringe
   - laryngoscope
   - suction
   - BVM with oral and nasopharyngeal airways ready
   - device for securing tube after placement
   - end tidal CO2 detector
   - cricothyroidotomy supplies
D. Assemble RSI medications (RSI Drug Box)
   - Lidocaine
   - Atropine
   - Etomidate
   - Succinylcholine
E. Attempt orotracheal intubation without RSI medications. If unable to secure airway per orotracheal intubation protocol proceed with following RSI protocol. If contraindications to RSI exist, use alternative ventilation techniques as indicated (Nasal ET, BVM, etc.).

Technique for Trauma Rapid Sequence Intubation:
A. Verify that a functioning intravenous line is established. Hang NS or LR.
B. Place the patient on a cardiac monitor and pulse oximeter. Assign an individual to monitor these devices.
C. Pre-oxygenate patient with 100% oxygen.
D. Prepare RSI medications for administration.
E. Premedicate the patient:
   - Lidocaine 1-1.5 mg/kg IV to prevent elevated ICP
   - Atropine 0.02 mg/kg IV for children (min 0.1 mg, max 1.0 mg)
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6. Assign an individual to apply cricoid pressure to occlude the esophagus until intubation is completed and ET tube is secured.

G. Administer Sedation and Paralytic drugs:
   Etomidate 0.2 - 0.3 mg/kg IV for induction
   Succinylcholine 1.0 - 1.5 mg/kg IV (1.0 - 2.0 mg/kg IV for children).

H. Observe for fasciculations. Demonstrate adequate relaxation by opening the mouth.

I. Perform endotracheal intubation with inline neck stabilization. If unable to intubate within 30 seconds, stop and ventilate the patient with a bag-valve mask for 30-60 seconds. If relaxation is inadequate, give a second dose of succinylcholine 1 to 1.5 mg/kg. Observe for fasciculations and re-attempt intubation.

J. If unsuccessful after three attempts, ventilate the patient with a bag-valve mask.

K. Insert double lumen airway per double lumen airway protocol.

L. If unable to ventilate with BVM or Combitube, perform cricothyrotomy per cricothyrotomy protocol.

M. Confirm definitive airway placement (ET, Combitube, Cricothyrotomy) with conventional listening techniques and with end tidal CO2 monitor. Clearly document these confirmation techniques.

N. Secure endotracheal tube.

O. Administer additional medications for sedation and paralysis as needed:
   Vecuronium 0.1 to 0.15 mg/kg IV for maintenance paralysis.
   Versed 0.05 to 0.15 mg/kg IV for sedation.

P. If adverse effects occur see appropriate protocol.

REFERENCES: