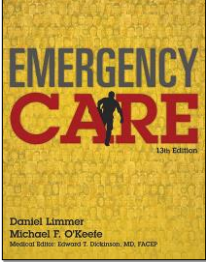


Emergency Care

THIRTEENTH EDITION



CHAPTER 9

Airway Management

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Topics

- ✓ [Airway Physiology](#)
- ✓ [Airway Pathophysiology](#)
- ✓ [Opening the Airway](#)
- ✓ [Airway Adjuncts](#)
- ✓ [Suctioning](#)
- ✓ [Keeping an Airway Open: Definitive Care](#)
- ✓ [Special Considerations](#)

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Case Study

You are dispatched by state radio to a residence for a patient who “is very sick” with an unknown problem.

When you arrive you observe a male in his 40’s who is lying on the floor with a makeshift tourniquet on his arm and a syringe with needle nearby.

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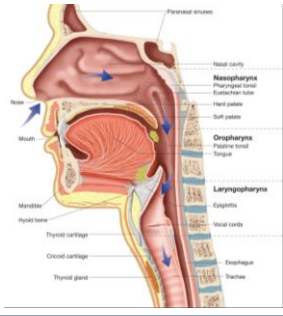
Case Study

The patient is pale, has cyanotic lips, and breathing that is very shallow and slow. You also observe vomit nearby on the floor.

- What life threats are evident so far?
- What immediate interventions are needed?
- What equipment will be required on scene?

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Airway Physiology

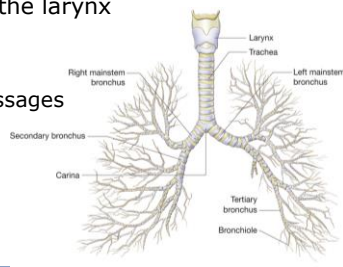


- Upper airway
 - Where
 - What happens

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Airway Physiology

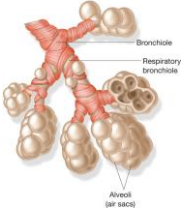
- Lower airway
 - Begins below the larynx
 - Composed of:
 - Trachea
 - Bronchial passages
 - Alveoli



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Airway Physiology

- Alveoli
 - Tiny sacs in grapelike bunches at the end of the airway
 - Surrounded by pulmonary capillaries
 - Oxygen and carbon dioxide diffuse through pulmonary capillary membranes.



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Airway Pathophysiology

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Four Key Components

- Pulmonary Ventilation
 - Air moving in/out of the lungs
- External Respiration
 - Gas exchange between alveoli and pulmonary capillaries
- Internal Respiration
 - Delivery of O₂ to the cells, removal of CO₂
- Cellular Respiration & Metabolism
 - Breakdown of glucose to produce ATP

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Airway Pathophysiology

- Acute obstructions
 - Foreign bodies
 - Vomit
 - Blood
- Chronic obstructions
 - Edema from burns, trauma, or infection
 - Decreasing mental status
- Providers must initially evaluate airway and monitor patency over time.



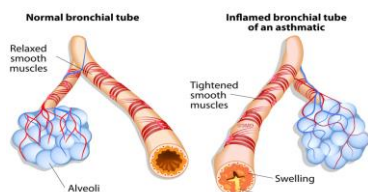
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Airway Pathophysiology

- Other Airway Obstructions

Asthma

Bronchoconstriction results in dyspnea, wheezing, and coughing



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Patient Assessment

- Addressed in primary assessment
- Two questions must be answered.
 - Is airway open?
 - Will airway stay open?

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Is the Airway Open?

- In most patients, can be determined by simply saying hello
- "Sniffing position" seen when swelling obstructs airflow through upper airway



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Is the Airway Open?

- Findings indicating breathing problems
 - Inability to speak
 - Unusual raspy quality to voice
 - Stridor
 - Snoring
 - Gurgling

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Will the Airway Stay Open?

- Airway assessment is not just a moment in time.
- Must give constant consideration

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Signs of an Inadequate Airway

- No signs of breathing or air movement
- Evidence of foreign bodies in airway
- No air felt or heard
- Inability or difficulty speaking
- Unusual hoarse or raspy voice
- Absent, minimal, or uneven chest movement

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Signs of an Inadequate Airway

- Abdominal breathing
- Diminished or absent breath sounds
- Abnormal noises such as wheezing, crowing, stridor, snoring, gurgling, or gasping during breathing
- In children and infants, nasal flaring
- In children, retractions above the clavicles

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Opening the Airway

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Patient Care

- The airway
 - When primary assessment indicates inadequate airway, a life-threatening condition exists.
 - Take prompt action to open and the maintain airway

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Opening the Airway

- If airway is not open, use position to open it.
- Indications of head, neck, spinal injury
 - Mechanism of injury known to cause such injuries
 - Any injury at or above the level of the shoulders
 - Family or bystanders give information leading you to suspect it.

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Head-Tilt, Chin-Lift Maneuver



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Jaw-Thrust Maneuver



Jaw-thrust maneuver, side view. Inset shows EMT's finger position at angle of the jaw just below the ears.

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Jaw-Thrust Maneuver



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Jaw-Thrust Maneuver

1. Keep patient's head, neck, and spine aligned, moving patient as a unit into the supine position.
2. Kneel at the top of patient's head.
3. Place one hand on each side of patient's lower jaw, at angles of jaw below ears.
4. Stabilize patient's head with your forearms.

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Performing Jaw-Thrust Maneuver

5. Using index fingers, push angles of patient's lower jaw forward.
6. You may need to retract patient's lower lip with your thumb to keep the mouth open.
7. Do not tilt or rotate patient's head.

Airway Management

- After airway has been opened, position must be maintained to keep airway open.
- Airway must be cleared of secretions and other obstructions.

Recovery Position



Airway Adjuncts

- Airway position and maneuvers are short-term solutions.
- Airway adjunct provides longer term air channel.
- Adjuncts do not prevent aspiration!
- Two most common airway adjuncts
 - Oropharyngeal airway (OPA)
 - Nasopharyngeal airway (NPA)

How Well Do I Know My Airways?



Oropharyngeal airway

Nasopharyngeal airway

- Used on patient's with no gag reflex
- Patient must be free of facial/head trauma
- Patient must be unconscious
- Patient typically conscious/semi-conscious

Rules for Using Airway Adjuncts

- Open patient's airway manually before using adjunct device.
- When inserting airway, take care not to push patient's tongue into pharynx.
- Have suction ready prior to inserting any airway.
- Do not continue inserting airway if patient gags.

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Rules for Using Airway Adjuncts

- Maintain head position after adjunct insertion and monitor airway.
- If patient regains consciousness or develops a gag reflex, remove the airway immediately.
- Use infection control practices while maintaining airway.

Oropharyngeal Airway



Device used to move tongue forward as it curves back to pharynx

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Sizing Oropharyngeal Airways



Measure from the corner of the patient's mouth to the tip of the earlobe (or corner of the jaw).



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Inserting OPA



Use the crossed-fingers technique to open the patient's mouth.

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Inserting OPA



Insert the airway with the tip pointing to the roof of the patient's mouth.

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Oropharyngeal Airway

- Inserting OPA
 1. Place patient on his back, and use appropriate method to open the airway
 2. Open mouth with crossed-finger technique
 3. Position airway with tip pointing toward roof of mouth

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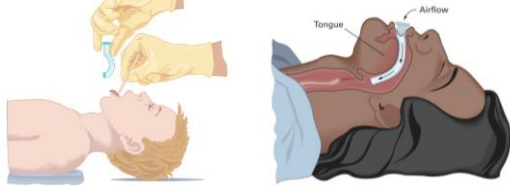
Oropharyngeal Airway

- Inserting OPA
 4. Insert device along roof of mouth
 5. Gently rotate airway 180 degrees so tip is pointing down into patient's pharynx
 6. Position patient
 7. Check that flange of airway is against patient's lips
 8. Monitor patient closely

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Oropharyngeal Airway

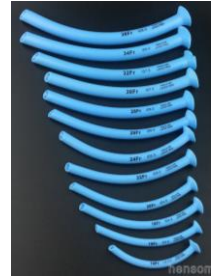
- Alternate placement of OPA
 - Use tongue depressor or rigid suction tip and insert OPA directly



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Nasopharyngeal Airway

- Come in various sizes
- Must be measured
- Must be lubricated
- Typical adult sizes
 - 26-36 French
- Pediatric sizes
 - 14-24 French



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Nasopharyngeal Airway

- Soft, flexible tube inserted through nostril and into hypopharynx
- Moves tongue and soft tissue forward to provide a channel for air
- Can be used in patients with intact gag reflex or clenched jaw
- Contraindicated if clear (cerebrospinal) fluid coming from nose or ears

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Inserting NPA - Measure



Measure the nasopharyngeal airway from the patient's nostril to the tip of the earlobe or to the angle of the jaw.

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Inserting NPA - Lubricate



Apply a water-based lubricant before insertion.

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Inserting NPA - Insertion



Gently push the tip of the nose upward, and insert the airway with the beveled side toward the base of the nostril or toward the septum (wall that separates the nostrils).

Insert the airway, advancing it until the flange rests against the nostril.

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Suctioning

- Obvious liquids (blood, secretions, vomitus) must be removed from airway to prevent aspiration into lungs.
- Use vacuum device to remove liquids from airway.
- What PPE must be used?

- Eyewear
- Mask
- Gloves
- Gown



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Suction Devices

- **Mounted** suction systems
 - Installed near head of stretcher
 - Furnish air intake of at least 30 liters/min
 - Generate vacuum of no less than 300 mmHg when collecting tube clamped



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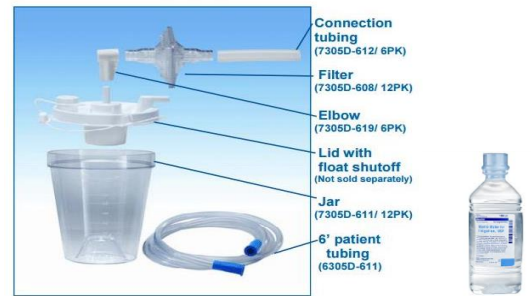
Suction Devices

- **Portable** suction units
 - Same requirements as mounted
 - Oxygen- or air-powered or powered by batteries/electricity
 - Manual



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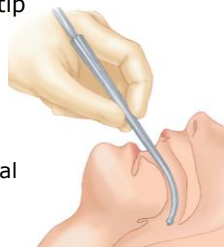
Suction Equipment



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Suction Devices - Yaunker

- Tubing, tips, and catheters
 - **Rigid** pharyngeal suction tip
 - Suction only as far as you can see.
 - Do not lose sight of distal end.
 - Careful insertion helps prevent gag reflex or vagal stimulation.



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Suction Devices - Soft

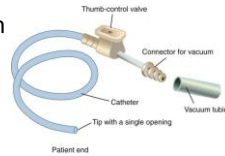
- Flexible suction catheters
 - Designed to be used when a rigid tip cannot be used
 - Can be passed through a tube such as the nasopharyngeal or endotracheal tube
 - Can be used for suctioning the nasopharynx
 - Come in various sizes identified by a number "French"
 - Larger the number, larger the catheter



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Suction Devices - Soft

- Flexible suction catheters
 - Not typically large enough to suction vomitus or thick secretions
 - May kink
 - In event of copious, thick secretions consider removing tip or catheter and using large bore, rigid suction tubing.



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Suction Devices

- Tubing, tips, and catheters
 - Flexible suction catheters
 - Measured in similar way as OPA
 - Length of catheter that should be inserted into patient's mouth equals distance between corner of patient's mouth and earlobe.



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Suctioning Techniques



Position yourself at the patient's head and turn the patient's head or entire body to the side.

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Techniques of Suctioning

- Place tip or catheter where you want to begin suctioning and suction on the **way out**.
- Suction no longer than **10** seconds at a time. Alternate suctioning and ventilating.
 - Prolonged suctioning can cause hypoxia and bradycardia.
 - If patient vomits for longer than ten seconds, continue suction.
 - What if there is just too much?

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Keeping an Airway Open: Definitive Care

- Keeping the airway open may exceed capabilities of a basic EMT.
- Medications and/or surgical procedures may be necessary to resolve airway obstruction.

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Keeping an Airway Open: Definitive Care

- Rapidly evaluate and treat airway problems.
- Quickly recognize when more definitive care is necessary.
 - May be Advanced Life Support intercept
 - May be closest hospital

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Special Considerations

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Special Considerations

- Facial injuries
 - Frequently result in severe swelling or bleeding that may block or partially block airway
 - Bleeding may require frequent suctioning or more definitive airway.



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Special Considerations

- Obstructions
 - Many suction units are not adequate for removing solid objects.
 - Objects may have to be removed with manual techniques
 - Abdominal thrusts
 - Chest thrusts
 - Finger sweeps

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Special Considerations

- Dental appliances
 - Leave in place during airway procedures when possible.
 - Partial dentures may become dislodged during an emergency.
 - Be prepared to remove if airway endangered.



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Pediatric Anatomical Considerations

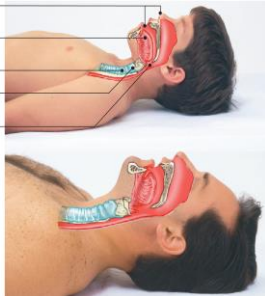
Child has smaller nose and mouth.

In child, more space is taken up by tongue.

Child's trachea is narrower.

Cricoid cartilage is less rigid and less developed.

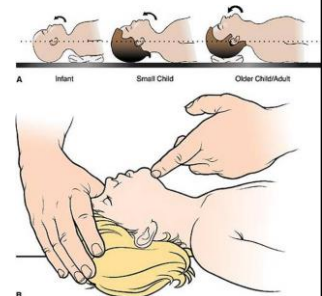
Airway structures are more easily obstructed.



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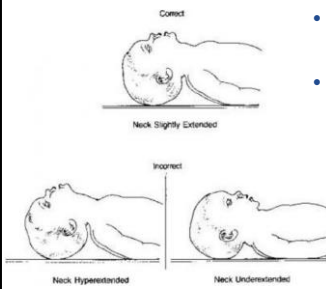
Pediatric Notes

- Correct Airway Positioning
- Consider adjuncts when other measures fail



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Pediatric Notes



- Do not hyperextend neck
- Use rigid tip with adjunct, but do not touch back of airway

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Remember

- Always use proper personal protective equipment when managing an airway.
- Airway assessment must be an ongoing process. Airway status can change over time.
- Airway management should start simply and become more complicated only if necessary.

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Critical Thinking

- On arrival at the emergency scene, you find an adult female patient with gurgling sounds in the throat and inadequate breathing slowing to almost nothing. How do you proceed to protect the airway?

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Critical Thinking

- When evaluating a small child you hear stridor. What does this sound tell you? What are your immediate concerns regarding this sound?
- When assessing an unconscious patient, you note snoring respirations. Should you be concerned with this and if so, what steps can you take to correct this situation?

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Questions?

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