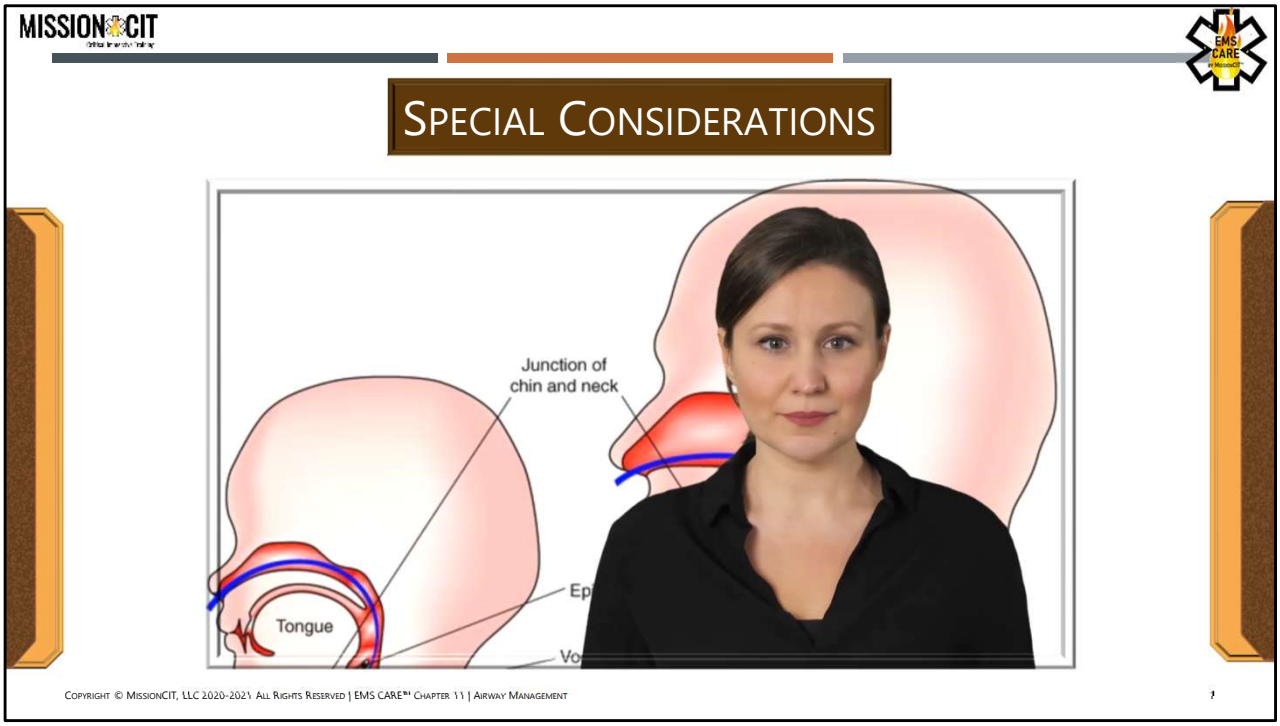


Hello again, this lesson discusses four important special conditions you may face.
We start off with maxillofacial trauma and some of its challenges.
Then, we then talk about solid obstructions, where suction may not be useful.
We discuss dental appliances and how they may affect airway management.
Finally, we spend some time dealing with pediatric patients, and the differences between treating a child and an adult.
Good studying.

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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Airway management of patients with maxillofacial trauma is complex and crucial, because it can dictate a patient's survival.

Securing the airway of patients with maxillofacial trauma is often extremely difficult because the trauma involves the patient's airway, and their breathing is compromised.

In these patients, mask ventilation and endotracheal intubation are anticipated to be difficult.

Additionally, some of these patients may not yet have been cleared of a cervical spine injury. Virtually all such patients are regarded as having a full stomach. Hence, having an increased risk of regurgitation and pulmonary aspiration.

Here are three conditions to consider.

1. Facial trauma frequently results in severe swelling or bleeding that may block or partially block the airway.
2. Bleeding may require frequent suctioning or a more definitive airway.
3. And facial injuries may impair breathing, and alter the procedure for opening the airway.

There are several maxillofacial injuries that require immediate treatment, especially in acute upper airway compromise and/or when profuse hemorrhage occurs. You should consider the following situations as you assess your patient.

- First, fractured or exfoliated teeth, bone fragments, vomitus, blood, and secretions as well as foreign bodies, such as dentures, debris, and shrapnel, may block the airway anywhere along the oropharynx and larynx.
- Next, hemorrhage from distinct vessels in open wounds or severe nasal bleeding from complex blood supply of the nose, may also contribute to airway obstruction.
- Additionally, soft tissue swelling and edema which result from the trauma of the head and neck, may cause delayed airway compromise.
- Finally, trauma of the larynx and trachea may cause swelling and displacement of structures, such as the epiglottis, arytenoid cartilages, and vocal cords, thereby increasing the risk of cervical airway obstruction.

Remember the LEMON mnemonic from the prior lesson as it will be helpful in these situations.

Clearly, advanced life support may be necessary for many facial trauma situations. But securing an airway is your main task as an EMT.

Again, normal procedures often must be altered for maxillofacial injuries. Here are more issues you may face.

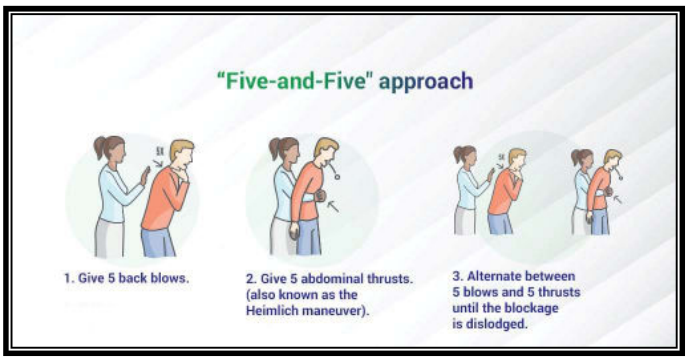
1. Poor visualization of the airway due to deformity and debris.
2. Difficult ventilation, e.g. a poorly fitting mask, or a traumatic airway leak.
3. Requirement for a cervical spine immobilization.
4. Full stomach and resultant aspiration risk.
5. The need for emergent intubation due to airway obstruction or hypoxia.

Now, consider how to adjust your processes for what we just discussed.

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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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Airway obstructions require immediate procedures to clear the airway. However, many suction units are not adequate for removing solid objects. As a result, you may have to remove an object using a manual technique.

Manual methods include Abdominal thrusts, Chest thrusts, and Finger sweeps.

To perform abdominal thrusts:

1. Stand behind the person. Place one foot slightly in front of the other for balance. Wrap your arms around the waist. Tip the person forward slightly. If a child is choking, kneel down behind the child.
2. Make a fist with one hand. Position it slightly above the person's navel.
3. Grasp the fist with the other hand. Press hard into the abdomen with a quick, upward thrust — as if trying to lift the person up.
4. Perform between 6 and 10 abdominal thrusts until the blockage is dislodged.

Many health care providers advise not to perform a blind finger sweep. Rather, use a finger sweep only if you can see the object.

If the person is obese or in late pregnancy, give chest thrusts. To perform a chest thrust,

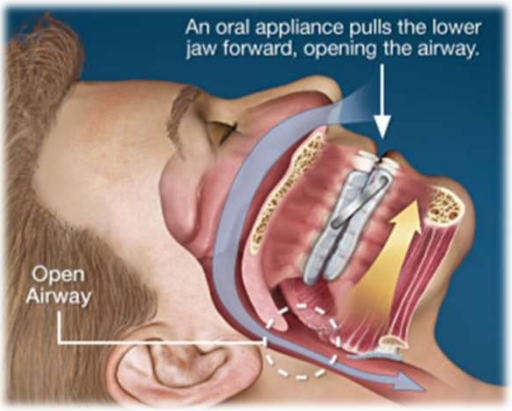
1. Reach around the person's waist.
2. Position one clenched fist above the navel (belly button) and below the rib cage.
3. Grasp your fist with your other hand. Pull the clenched fist sharply and directly

backward and upward under the rib cage 6 to 10 times quickly.

4. Continue uninterrupted until the obstruction is relieved or advanced life support is available.

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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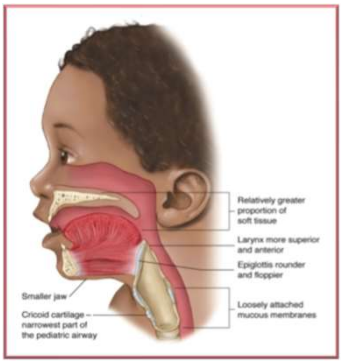
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Dental appliances should be left in place, but they potentially can threaten airway management. If they interfere with the airway, they should be removed. Here are some basic considerations:
First, leave dental appliances in place during airway procedures when possible.
Be aware that partial dentures may become dislodged during an emergency.
Finally, be prepared to remove a dental appliance if the airway is endangered.

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PEDIATRIC NOTE

- Variety of anatomical differences to consider when managing the airway
- Anatomic considerations:
  - ✓ Smaller mouth and nose
  - ✓ Larger tongue
  - ✓ Narrow, flexible trachea



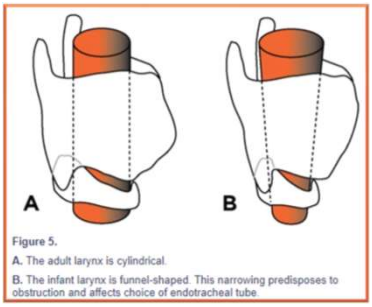


Figure 5.
A. The adult larynx is cylindrical.
B. The infant larynx is funnel-shaped. This narrowing predisposes to obstruction and affects choice of endotracheal tube.

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Pediatric patients are anatomically different from adults; thus, they may require specialized equipment and different airway management techniques.
For example, an infant has a large head relative to its body size. Also, the infant has a rounded occiput, large tongue, and larynx positioned higher in the neck. Together, that anatomy is predisposed to obstruction if the head flexes forward. Or if the child loses consciousness. In addition, the laryngeal and tracheal cartilages are soft and easily compressed.
As a child gets older, tonsils and adenoids often fill the airway, causing obstructive sleep apnea and difficulty with manual ventilation.
Babies and small children get hypoxic very easily as infants and young children have little respiratory reserve, and can develop respiratory failure and hypoxemia quickly, when they are ill. Simply, an infant can't hold his breath as long as an adult.
Some tips for infants and young children.

1. Ensure good ventilation to avoid hypoxia.
2. Preoxygenate all patients if possible.
3. Make sure to obtain a good mask fit.

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PEDIATRIC ANATOMICAL CONSIDERATIONS

- Comparison of child and adult respiratory passages

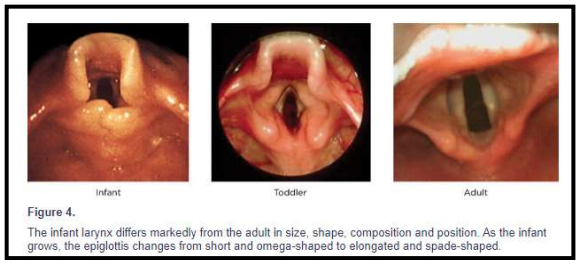
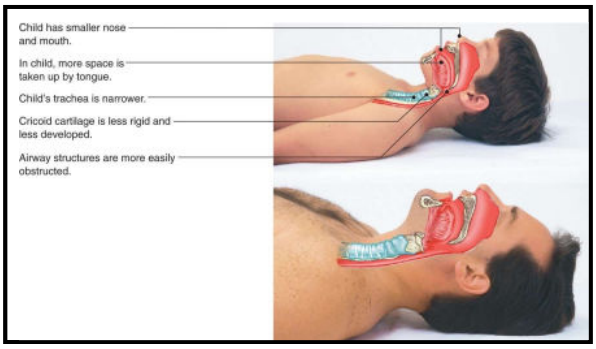


Figure 4.

The infant larynx differs markedly from the adult in size, shape, composition and position. As the infant grows, the epiglottis changes from short and omega-shaped to elongated and spade-shaped.



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Let's discuss some pediatric anatomical considerations, as we contrast child and adult respiratory passages.

As shown in the picture, the infant, child, and adult larynx all have a different shape. Unlike in the adult, the airway in infants and children is wider at the top, above the glottis. It then narrows below the larynx in the subglottic area.

Here is an 11 point summary of anatomy and risks associated with infants and small children

1. The newborn anatomy has narrow nostrils, and is an obligate nose breather. As a result, nasal obstruction in a newborn causes airway obstruction and respiratory distress.
2. In the newborn anatomy, the occiput is large and round, compared with a flatter adult skull. Hence, when a newborn is supine, the occiput flexes head forward, potentially obstructing the airway.
3. A newborn's tongue is large relative to its mouth, filling the oropharynx. As a result, the tongue easily obstructs the larynx if a baby loses consciousness.
4. A newborn's laryngeal and tracheal cartilage is soft and easily compressed. Therefore, excessive flexion or extension of the head, as well as external pressure on the larynx can obstruct the airway.
5. The newborn's larynx is higher in the neck: near the C2 and C3 vertebrae, vs an

adult location at C4 or C5. So, with the larynx higher in the newborn, the tongue and soft tissue can easily obstruct the larynx.

6. A newborn's cricoid ring is narrower than the glottic opening, which is the reverse of an adult's. In the newborn, a narrow cricoid creates a funnel-shaped larynx, and places younger children at risk for obstruction from subglottic edema such as croup.
7. A newborn's laryngeal and tracheal diameter is very narrow. Hence, minimal edema can cause significant obstruction.
8. A newborn's neck is short. As a result, when the infant's chin rests on the chest, reaching the second rib, the hyoid overlaps the thyroid cartilage. Therefore, identification of laryngeal landmarks for emergency percutaneous airway placement can be difficult.
9. A newborn's trachea is short. Hence, accidental extubation and main stem intubation occur easily, with head position changes.
10. A child's adenoids and tonsils fill the posterior pharynx. Consequently, the hypertrophic tonsils and adenoids can cause obstructive sleep apnea and make manual ventilation difficult.
11. As a child grows, baby teeth become loose. As a result, accidental aspiration of loose teeth during airway management can occur.

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Pediatric Note | Management considerations

- Open airway gently
- Do not hyperextend neck
- Consider adjuncts when other measures fail
- Use rigid tip with adjunct, but do not touch back of airway

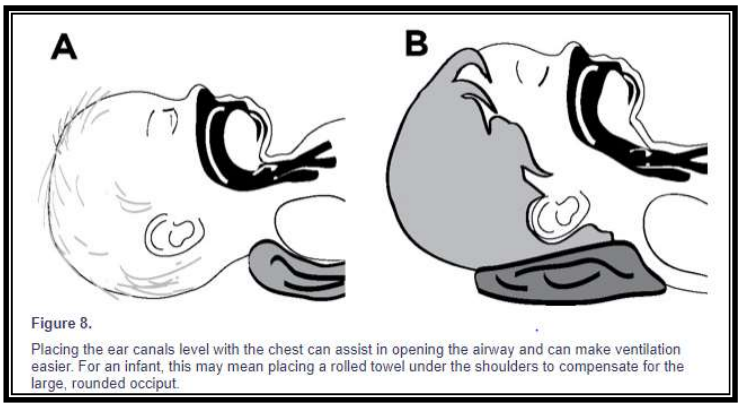


Figure 8.

Placing the ear canals level with the chest can assist in opening the airway and can make ventilation easier. For an infant, this may mean placing a rolled towel under the shoulders to compensate for the large, rounded occiput.

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Here are 4 pediatric management considerations to keep in mind.

1. Open the airway gently.
2. Do not hyperextend the neck.
3. Consider adjuncts when other measures fail.
4. Use a rigid tip with an adjunct, but do not touch the back of the airway.

So again, take anatomy into account when opening the pediatric airway as extreme extension, or flexion of the child's neck can obstruct the airway. A child younger than 2 years, especially an infant, has a relatively large occiput and a short neck.

In the toddler and infant, the larynx is higher in the neck, right behind the tongue. So, don't place a pillow under the head of the small child, as it will bend the head forward over the chest. In addition, it forces the tongue backward, worsening airway obstruction.

A pillow will also make it harder for you to tilt the head back to open the airway. Instead, to open the airway in children younger than 2 years old, you should place a small rolled towel, under the shoulders.

Finally, think about the situation when you are caring for a child who needs an airway adjunct and suctioning. But, you have only adult-sized equipment. Consider the steps that you would take to care for this child's airway. How might you adapt. You may discuss on the forum or with your instructor.

So that’s it for the lesson on special considerations. Justin will review the entire topic of Airway Management with you next.
Good studying.