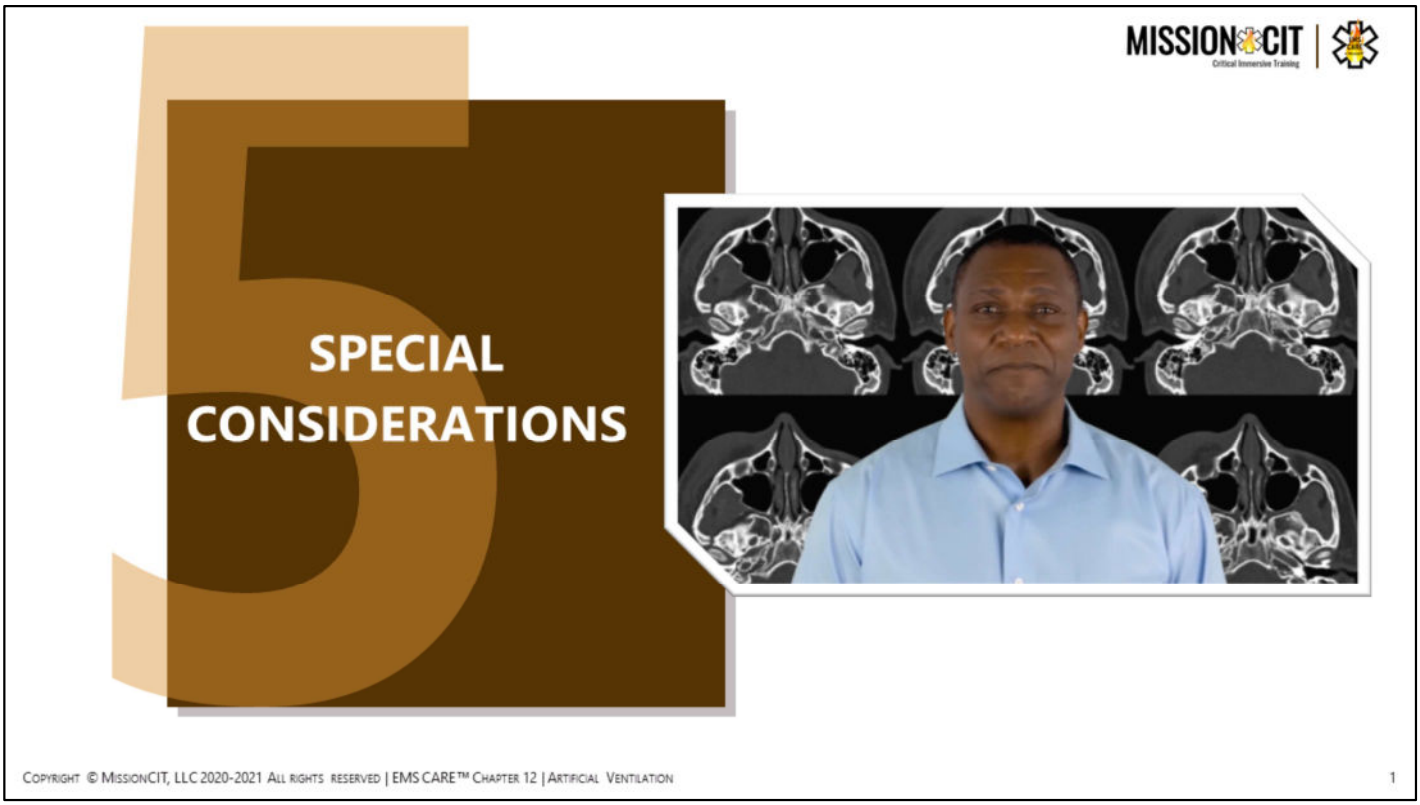
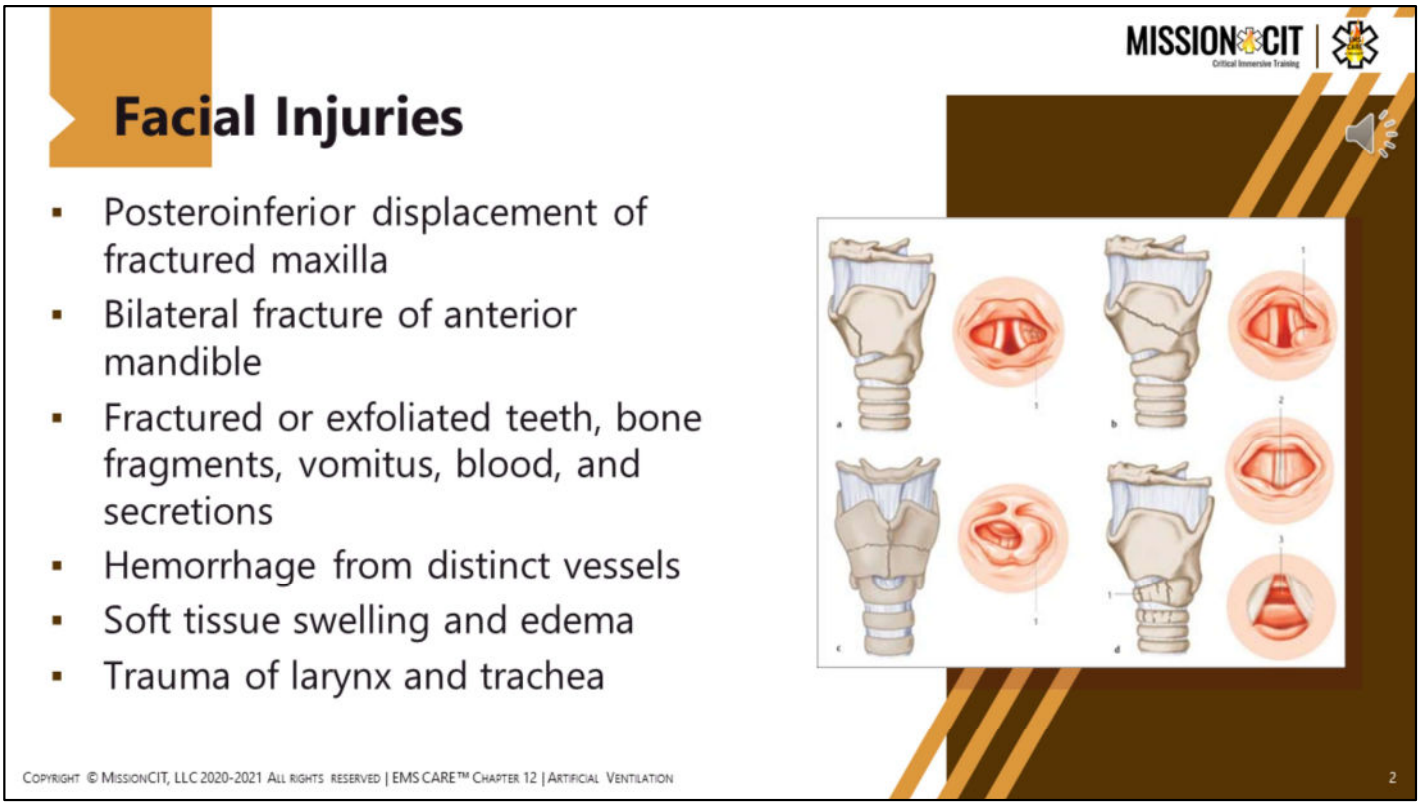


Hello again, this lesson discusses important special conditions you may face.

We start off with facial injuries, obstructions and dental applicances. Then, we then talk about airway blast injuries and how they may affect airway management. Finally, we spend some time dealing with pediatric and geriatric patients.

Good studying.



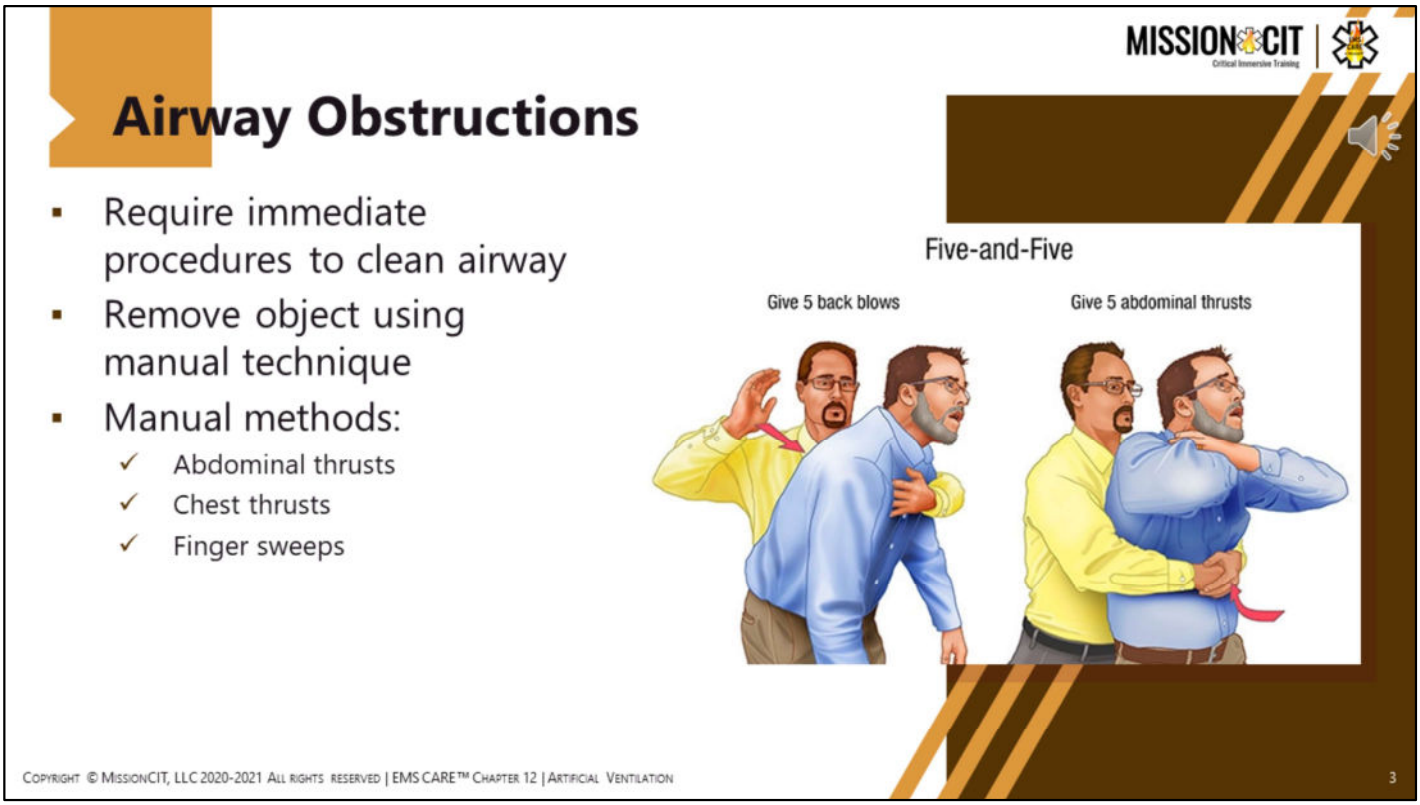
Facial injuries:

Securing the airway is the first task of a primary caregiver while managing a patient with life-threatening injuries. Safe and optimal airway management of the patient with maxillofacial trauma requires appreciation of the nature of the trauma. There are several maxillofacial injuries that require immediate treatment, especially in acute upper airway compromise and/or when profuse hemorrhage occurs. There are six specific situations associated with maxillofacial trauma, which can adversely affect the airway.

- Posteroinferior displacement of a fractured maxilla parallel to the inclined plane of the base of the skull may block the nasopharyngeal airway.
- A bilateral fracture of the anterior mandible may cause the fractured symphysis and the tongue to slide posteriorly and block the oropharynx in the supine patient.
- 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.
- Hemorrhage from distinct vessels in open wounds or severe nasal bleeding from complex blood supply of the nose may also contribute to airway obstruction. Bleeding may require frequent suctioning. An airway adjunct or endotracheal tube may be needed.
- Soft tissue swelling and edema which result from trauma of the head and neck may cause

delayed airway compromise.

- 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.



Obstructions:

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.

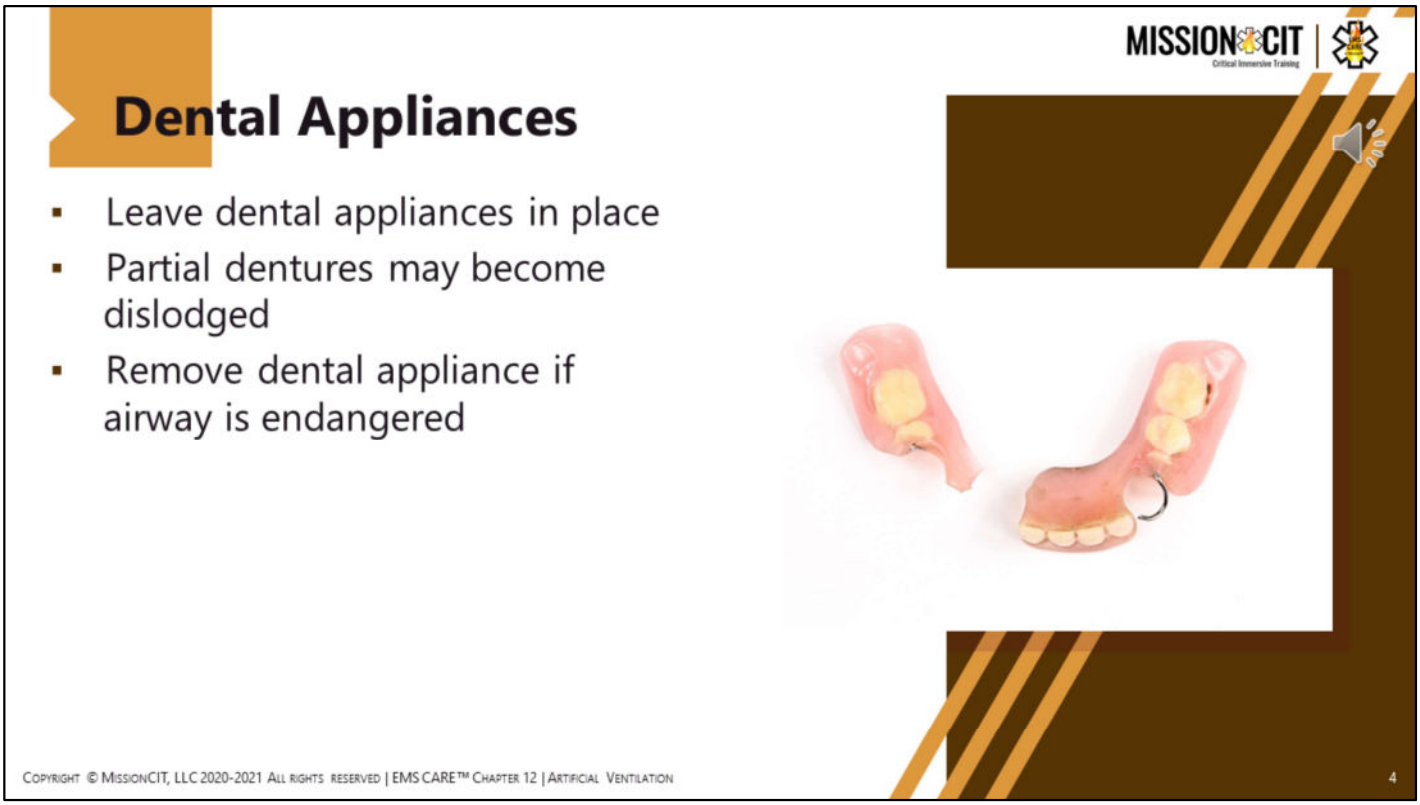
To perform abdominal thrusts:

- 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.
- Make a fist with one hand. Position it slightly above the person's navel.
- 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.
- 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,

- Reach around the person's waist.
- Position one clenched fist above the navel (belly button) and below the rib cage.
- 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.
- Continue uninterrupted until the obstruction is relieved or advanced life support is available.



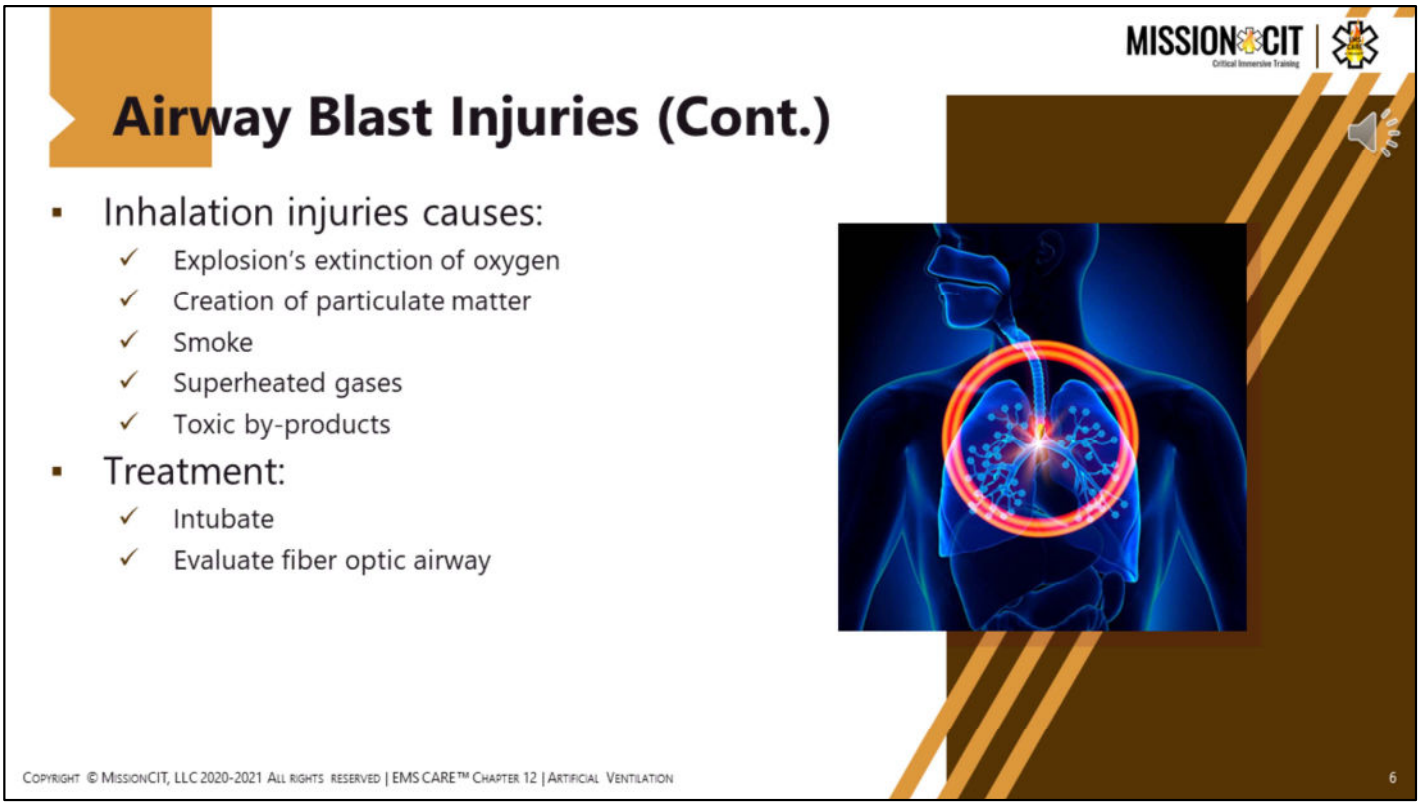
Dental appliances can threaten airway management. Here are some basic considerations:

- 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.



Explosions can produce unique patterns of injury. When they do occur, they have the potential to inflict multi-system life-threatening injuries on many persons simultaneously. The injury patterns following such events are a product of the composition and amount of the materials involved, the surrounding environment, delivery method (if a bomb), the distance between the victim and the blast, and any intervening protective barriers or environmental hazards. The trauma induced by the explosive wave can be categorized into different categories: primary, secondary, tertiary, and quaternary injuries. Explosive-related injuries to the respiratory system may be any of the following:

- Blast lung
- Hemothorax
- Pneumothorax
- Pulmonary contusion and hemorrhage
- A-V fistulas (source of air embolism)
- Airway epithelial damage
- Aspiration pneumonitis
- Sepsis



Inhalation injury can result from the explosion's extinction of available oxygen and creation of particulate matter, smoke, superheated gases, and toxic by-products.

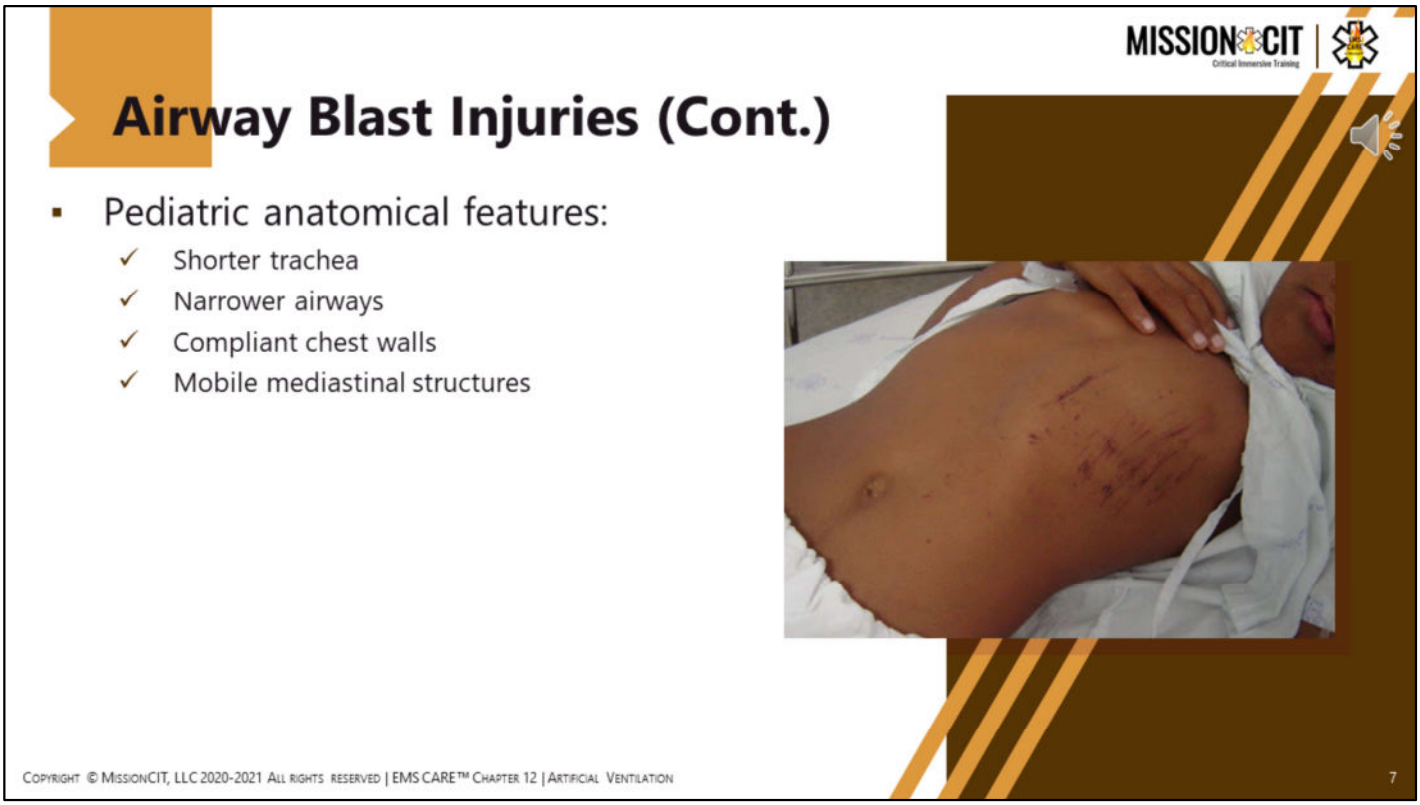
Suspect an inhalation injury with a:

- Closed space explosion;
- Singed nasal vibrissae or carbonaceous sputum; or
- Elevated Carbon monoxide or Cyanide levels.

If airway injury exists, intubate early. Inhalation injury can be fatal if a patient's airway is blocked due to mucosal swelling and progressive edema that obliterates normal airway structures.

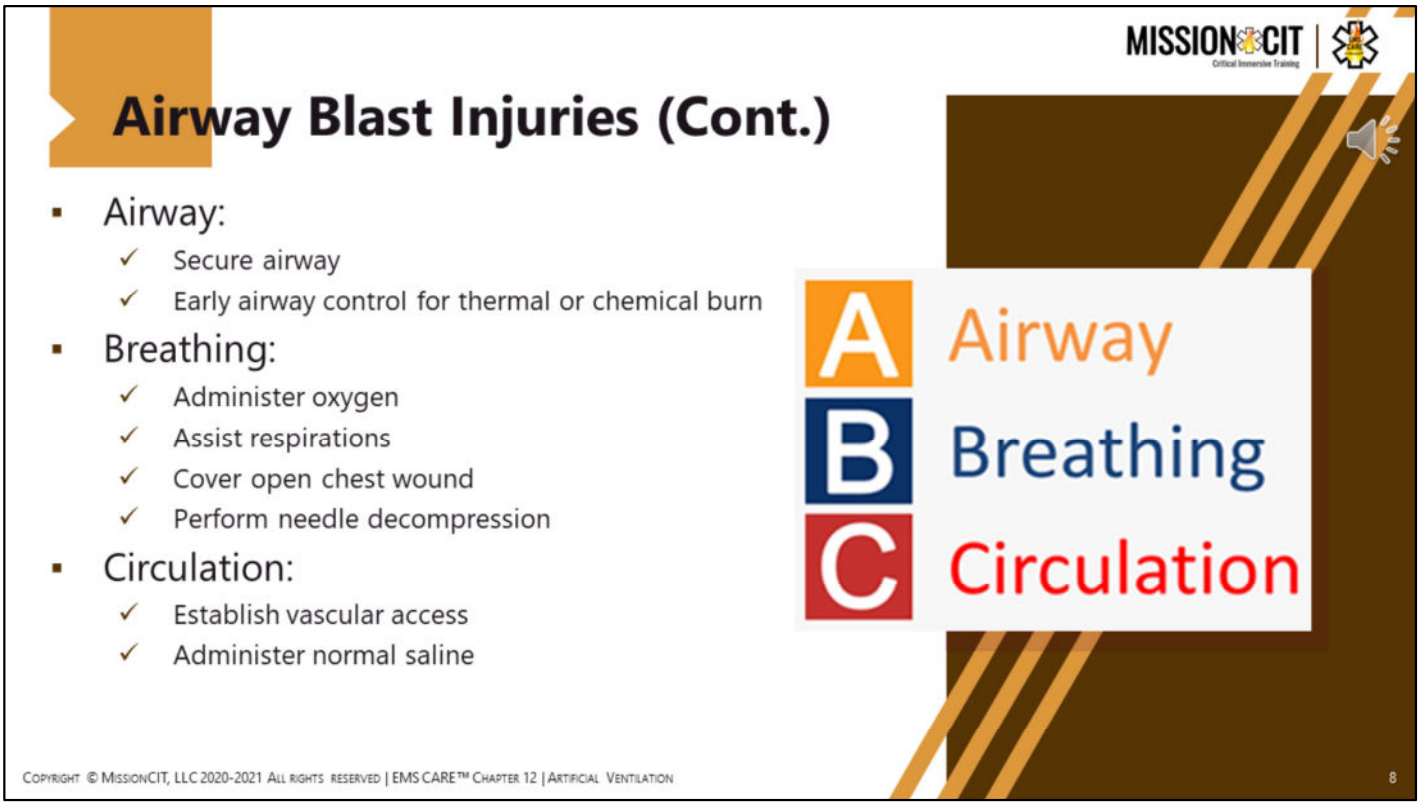
At admission, consider evaluating the fiber optic airway to determine if subsequent airway intervention or aggressive pulmonary toilet is needed.

Among patients with primary blast injury to the lung, mechanical ventilation and positive pressure may increase the risk of alveolar rupture and air embolism. Patients with inhalational injury may be at a higher risk of barotrauma.



Chest injuries, usually caused by blunt-force impact, are a common cause of death in children subjected to an explosive blast. Several anatomical features unique to children affect their injury patterns. For example:

- Children have a shorter trachea and so endotracheal intubation is more difficult, and unintentional extubation occurs more commonly.
- Children have narrower airways and as a result, are more prone to bronchospasm and obstruction.
- Children have much more compliant chest walls; rib fractures are much less common and severe thoracic injuries can occur without significant external evidence of injury.
- Children have more mobile mediastinal structures. Accordingly, a tension pneumothorax can shift the mediastinum causing respiratory and cardiovascular compromise. Always consider tension pneumothorax in the hypotensive, hypoxic child.



Treatment and interventions include:

Airway:

- Secure airway as needed
- If thermal or chemical burn to the airway is suspected, consider early airway control (which may be accomplished with SGA if difficult intubation is expected)

Breathing:

- Administer oxygen as appropriate with a target of achieving 94-98% saturation
- Assist respirations as needed
- Cover any open chest wounds with semi-occlusive dressing (chest seal)
- If the patient has evidence of tension pneumothorax, perform needle decompression

Circulation:

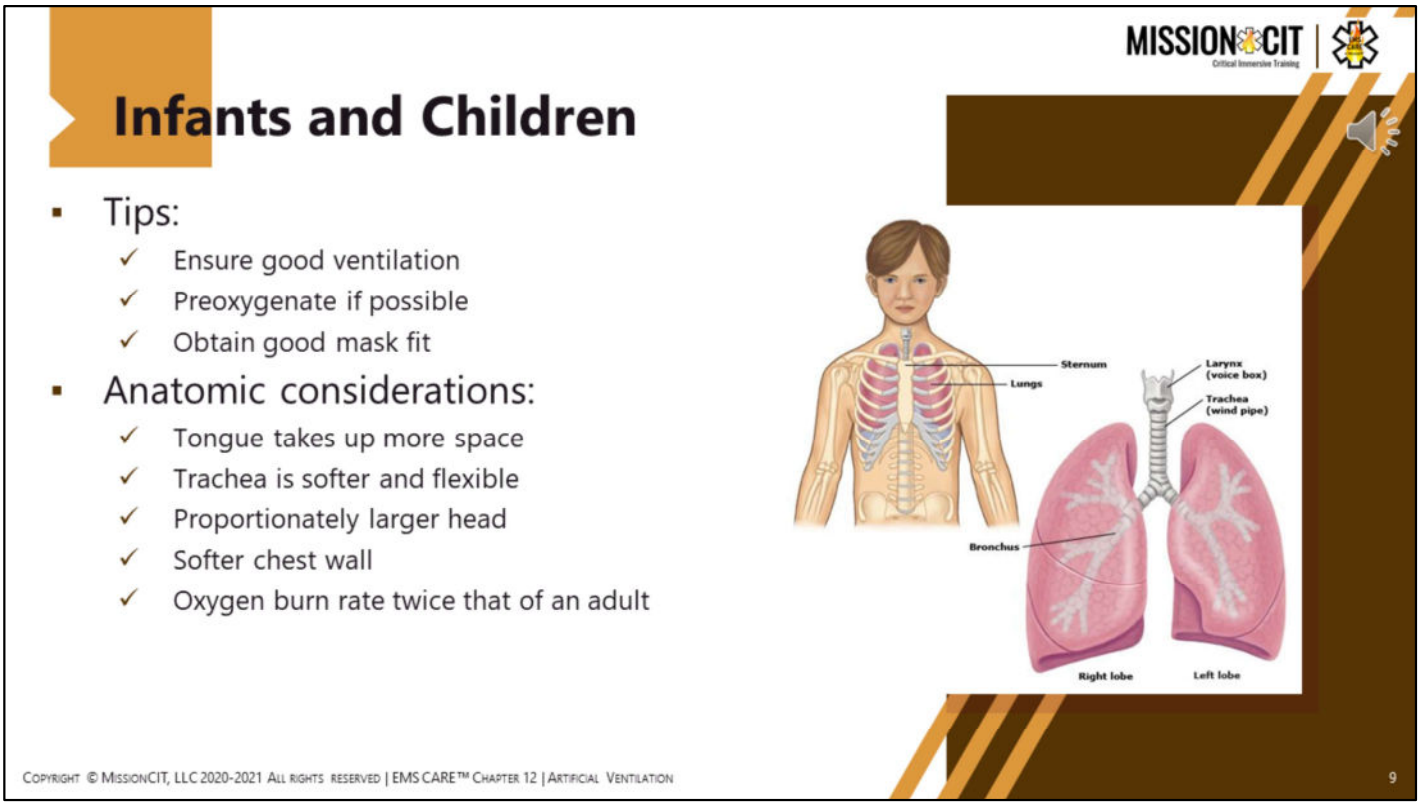
- Establish vascular access as necessary
- Administer normal saline as needed

Key considerations:

Consideration of airway injury, particularly airway burns, should prompt early airway management when clinically necessary (requires clinical judgement)

Patient Safety Considerations:

- Ensuring scene safety is especially important at the scene of an explosion
- Consider the possibility of subsequent explosions, structural safety, possible toxic chemical contamination, the presence of noxious gasses, and other hazards
- In a possible terrorist event, consider the possibility of secondary explosive devices
- Remove patient from the scene as soon as is practical and safe
- If the patient has sustained burns (thermal, chemical, or airway), transport to a burn center



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.

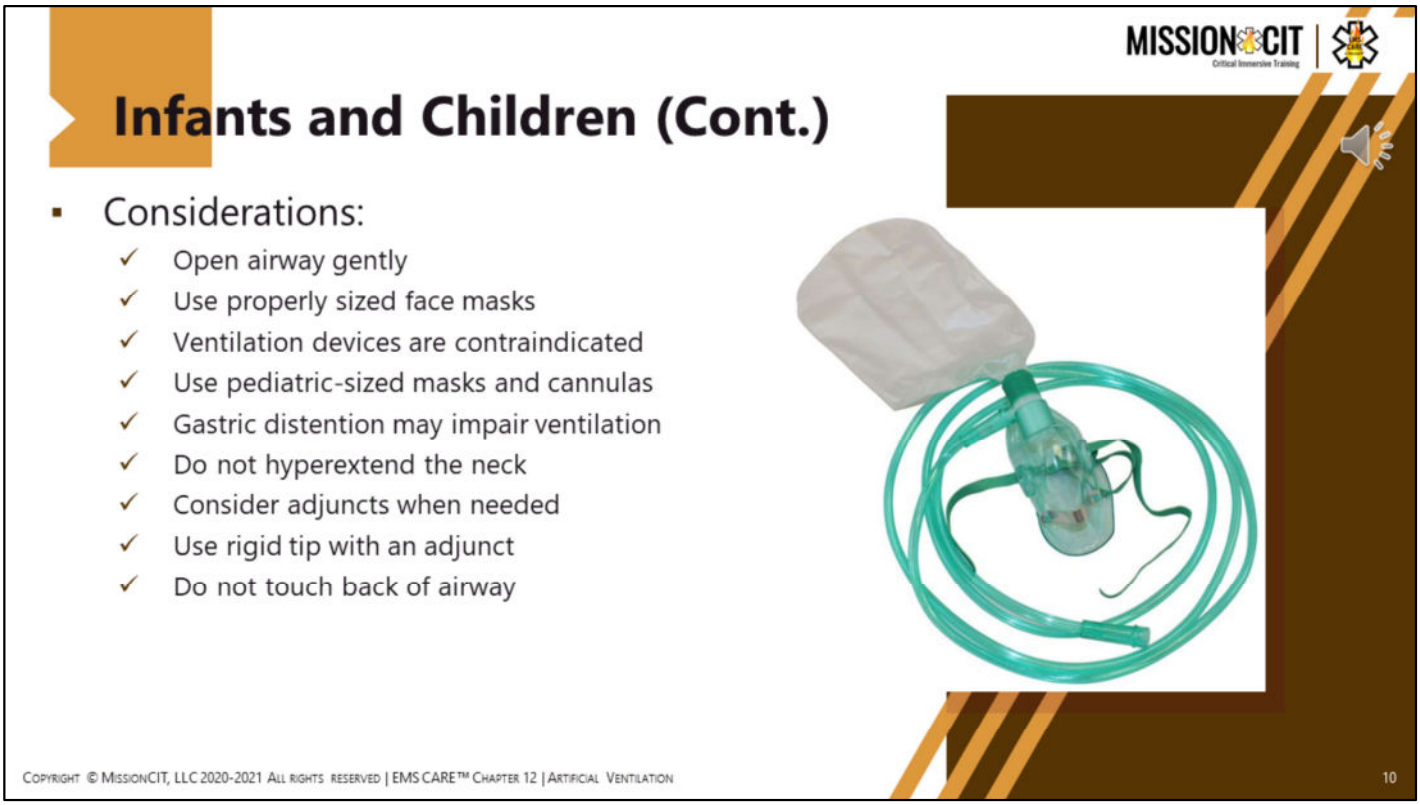
Babies and small children get hypoxic very easily as infants and young children have little respiratory reserve, and can develop respiratory failure and hypoxemia quickly, when they are ill. Simply, an infant can't hold his breath as long as an adult.

Some tips for infants and young children:

- Ensure good ventilation to avoid hypoxia
- Preoxygenate all patients if possible
- Make sure to obtain a good mask fit

Anatomic considerations:

- The tongue takes up more space
- The trachea is softer and more flexible and the head is proportionately larger
- Chest wall is softer and diaphragm breathing is more important
- Oxygen burn rate is twice the adult rate



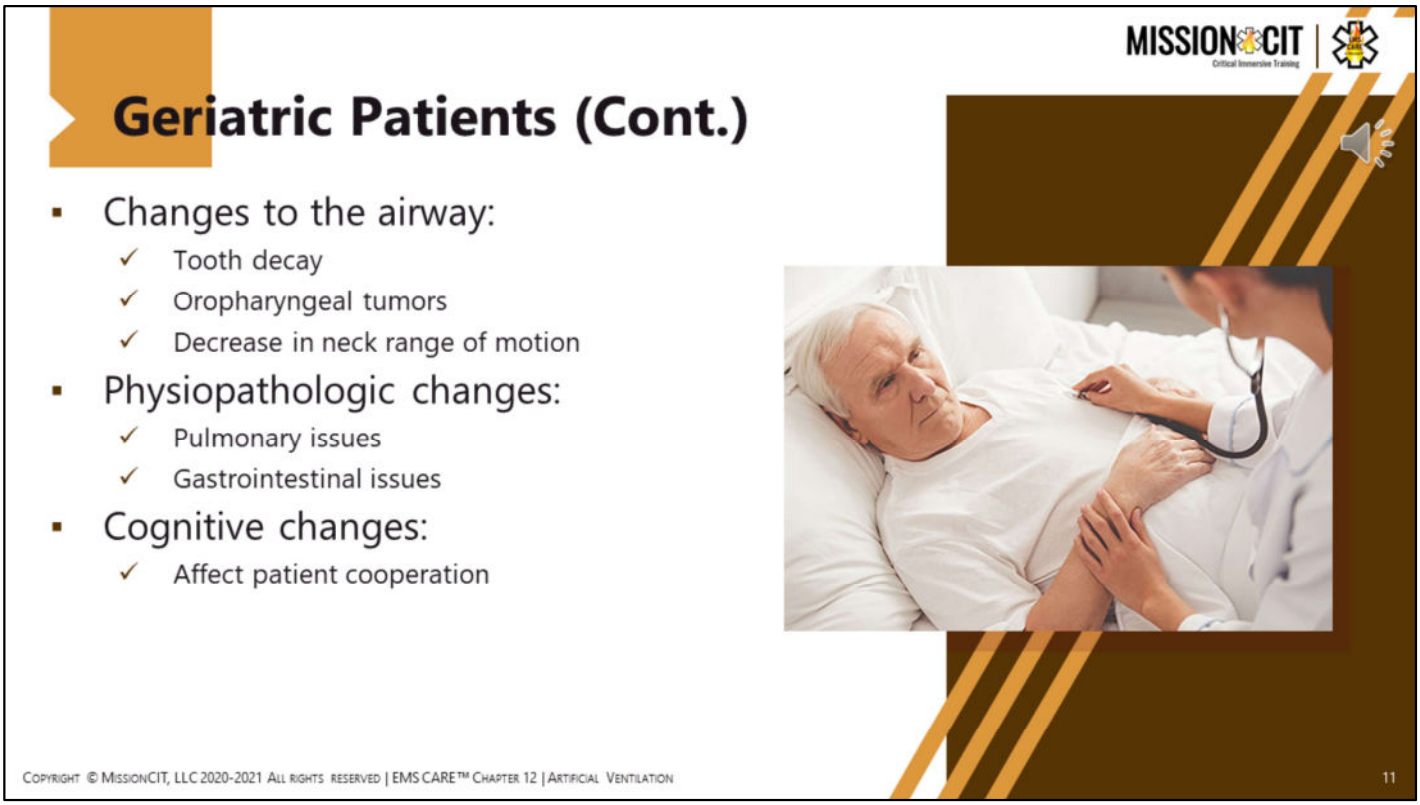
Here are some pediatric management considerations to keep in mind:

- Open the airway gently
- Use properly sized face masks
- Flow-restricted, oxygen-powered ventilation devices are contraindicated
- Use pediatric-sized nonrebreather masks and nasal cannulas
- Gastric distention may impair adequate ventilation
- Do not hyperextend the neck
- Consider adjuncts when other measures fail
- 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.



There are many anatomical, physiopathological, and cognitive changes that occur in the elderly that affect different components of airway management: intubation, ventilation, oxygenation, and risk of aspiration.

Anatomical changes occur in different areas of the airway from the oral cavity to the larynx. Common changes to the airway include tooth decay, oropharyngeal tumors, and significant decreases in neck range of motion. These changes may make intubation challenging by making it difficult to visualize the vocal cords and/or place the endotracheal tube. Also, some of these changes, including but not limited to, atrophy of the muscles around the lips and an edentulous mouth, affect bag mask ventilation due to a difficult face-mask seal.

Physiopathologic changes may impact airway management as well. Common pulmonary issues in the elderly increase the risk of an oxygen desaturation event, while gastrointestinal issues increase the risk of aspiration.

Finally, cognitive changes not often seen as related to airway management may affect patient cooperation, especially if an awake intubation is required. Overall, degradation of the airway along with other physiopathologic and cognitive changes makes the elderly population more prone to complications related to airway management.

This brings us to the end of this lesson and in the next one, Missah will take you through the chapter review.