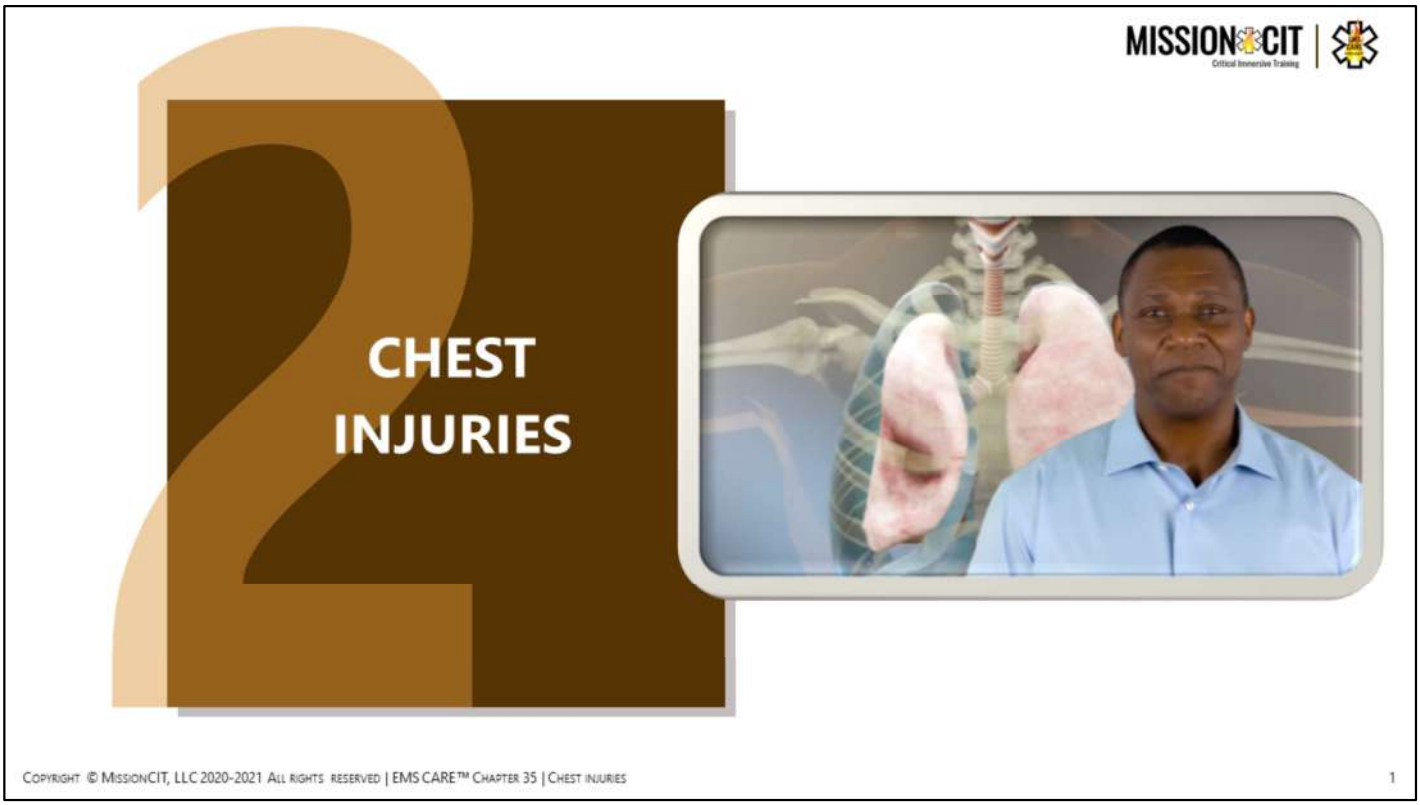
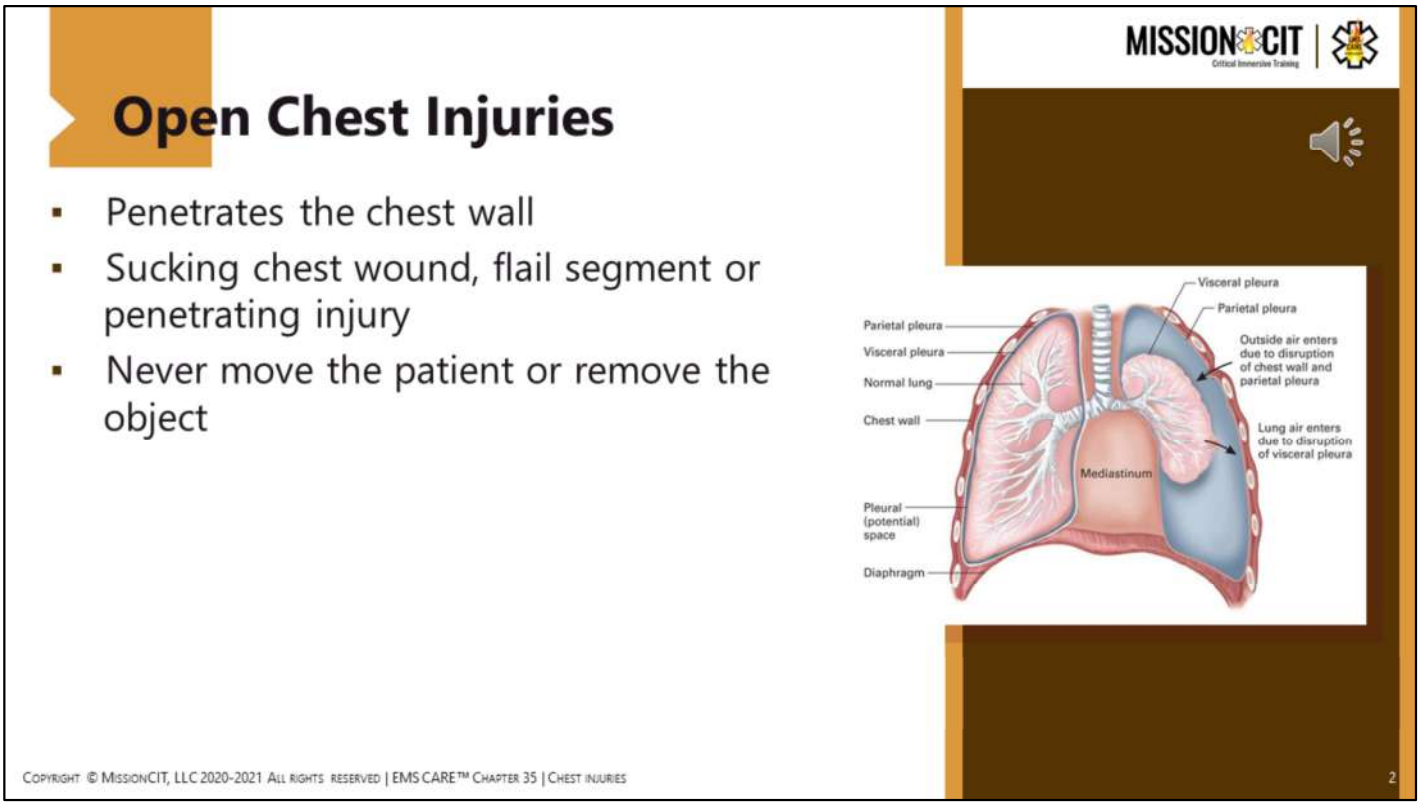


Thank you Missah!

Welcome to this lesson where we will talk about different chest injuries and how you can identify them.

Are you ready to jump in?



Chest injuries can be divided into two categories, namely, open and closed chest injuries.

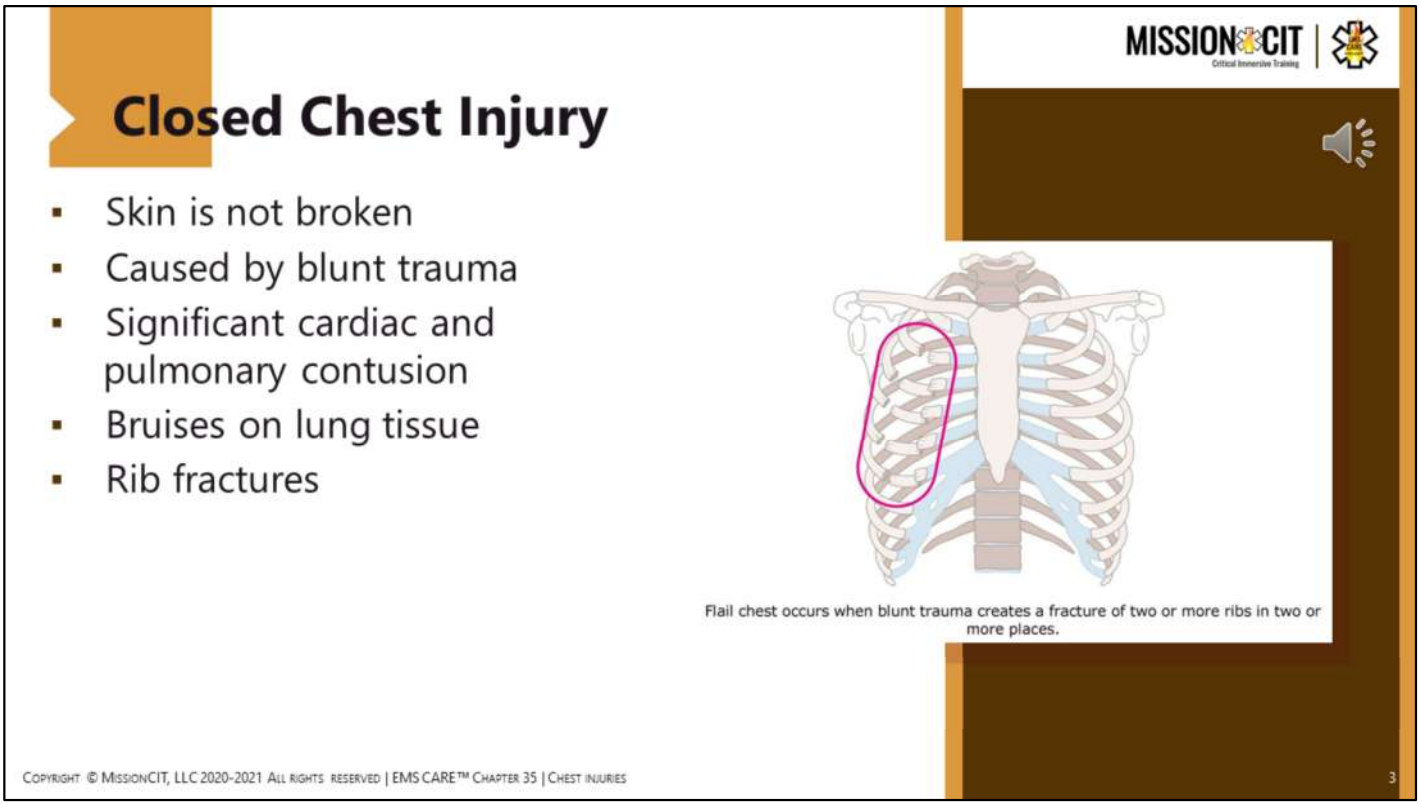
In an open chest injury, an object penetrates the chest wall itself, and these objects can be a knife, bullet, piece of metal, or even the broken end of a fractured rib.

Many times, it's difficult to tell what caused an injury just by looking at the wound. Because open chest injuries affect the pressure gradient, which affects ventilation, all open chest injuries are an immediate life threat and must be treated as soon as you identify them in the primary assessment.

These open chest injuries can include,

- A sucking chest wound – Treatment will include an occlusive dressing taped on three to four sides
- A flail segment – Treatment will be a bulky dressing
- An impaled object or Penetrating injury – Treatment will be a bulky dressing around the object

If you see a patient with an open chest injury, treat immediately. Do not attempt to remove an impaled object. If for some reason an impaled object needs to be removed because it prevents adequate respiration, call for ALS.



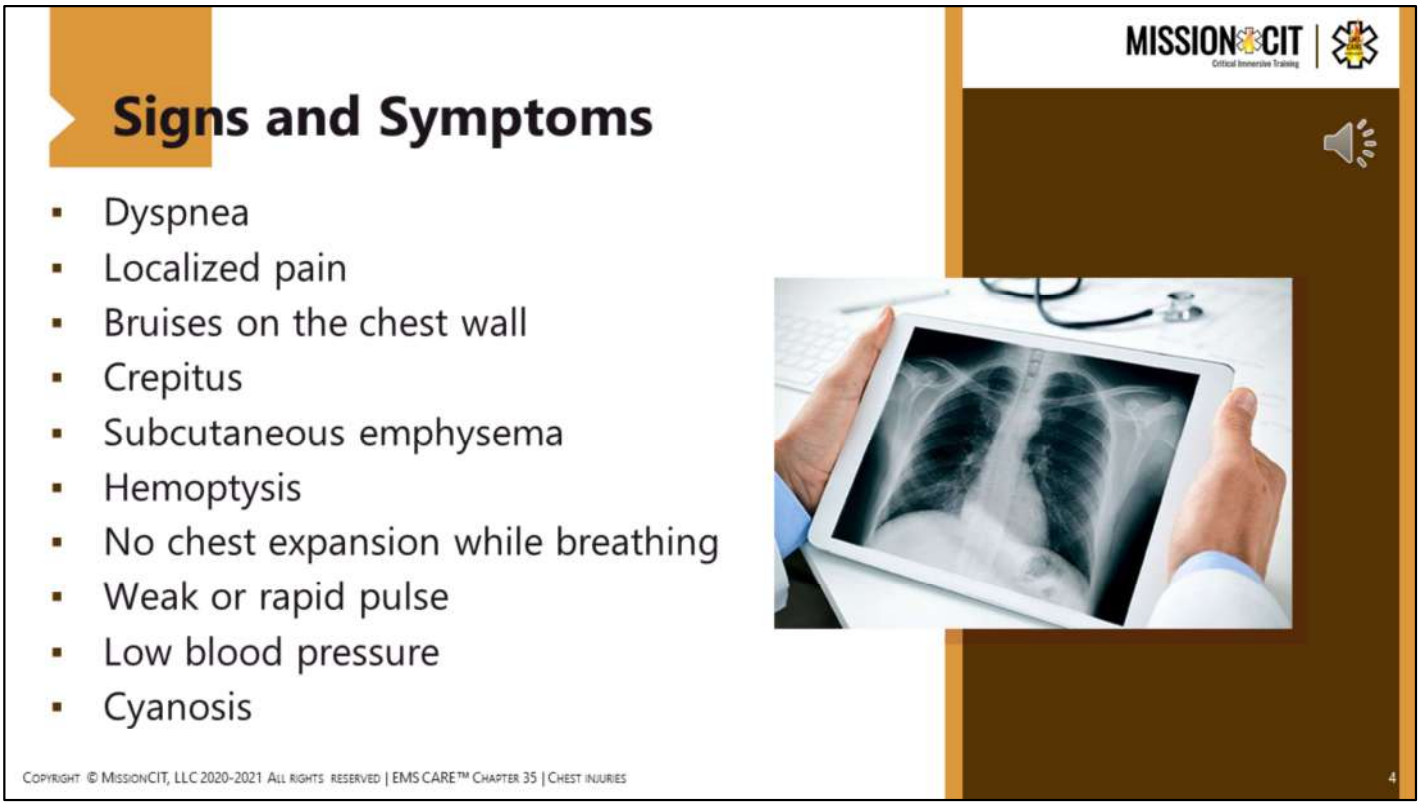
In a closed chest injury, the skin is not broken, and the injury is often caused by blunt trauma.

This is a serious injury because there are few visible signs and yet, the damage can be enormous. In particular, it can cause significant cardiac and pulmonary contusion.

For example, if the heart is damaged, it may not be able to refill with blood, or not enough blood will be pumped out of the heart. Both these conditions can be life-threatening.

Similarly, bruises on the lung tissue can result in exponential loss of surface area for ventilation.

Further, these injuries can get exacerbated by rib fractures.

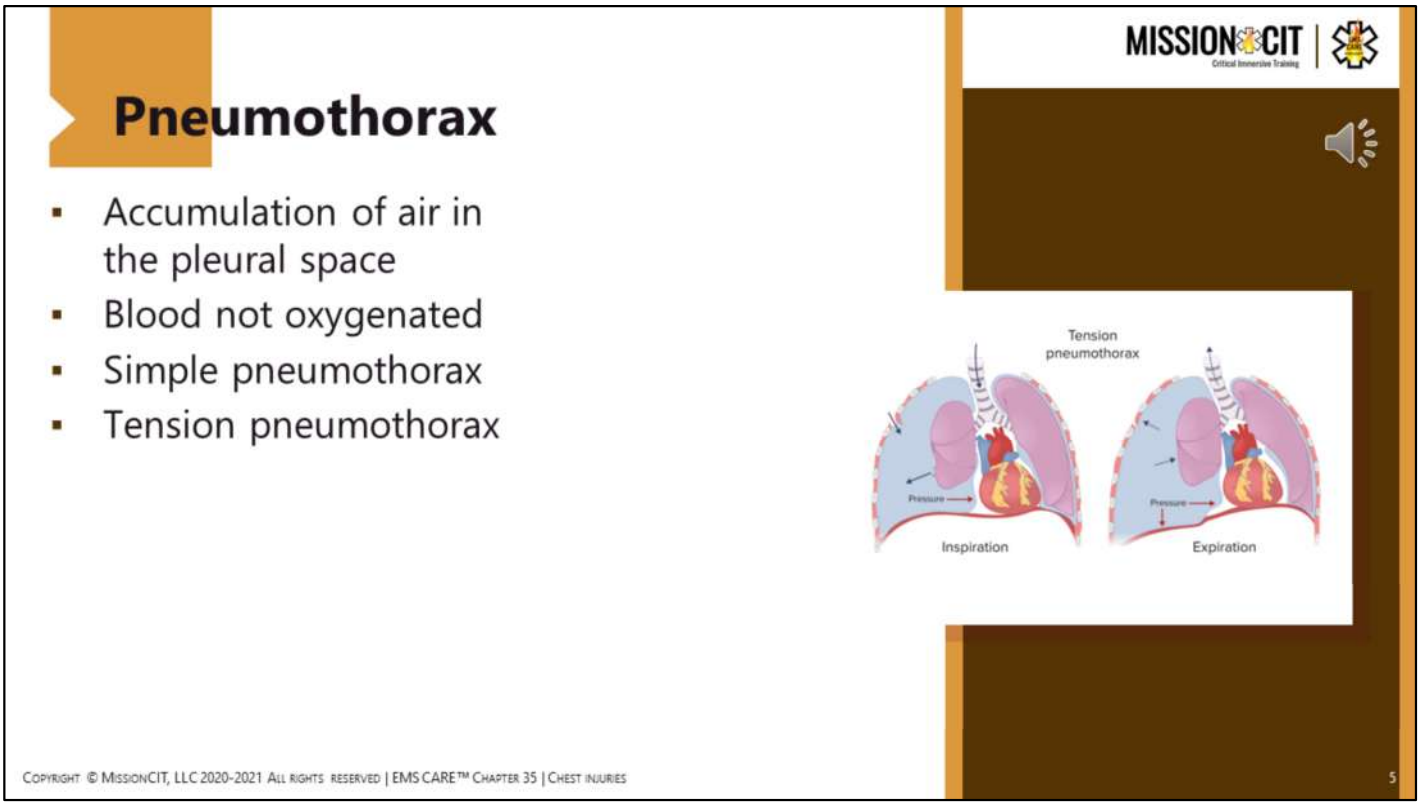


Some of the signs and symptoms to watch out for are:

- Dyspnea
- Localized pain at the site of injury
- Pain with each breath
- Bruises on the chest wall
- Crepitus
- Subcutaneous emphysema
- Hemoptysis or coughing blood
- Failure of one or both sides of the chest to expand while breathing
- Weak or rapid pulse
- Low blood pressure or different pressures bilaterally
- Cyanosis

Out of these, the most prominent sign is breathing difficulty, where the patient may have to work to breathe. The patient may not be moving sufficient air with each breath. You should

always auscultate or listen to lung sounds.



Remember the pleural fluid and pleural space we spoke about earlier? Pneumothorax or a collapsed lung is a condition where there is an accumulation of air in the pleural space. Adequate respiration will not be obtained despite ventilations. You may hear abnormal or diminished breath sounds.

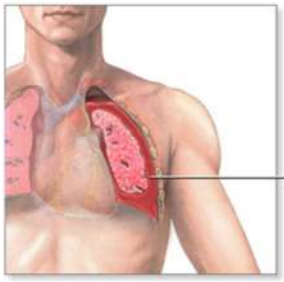
Depending on the nature and severity of the injury, pneumothorax can be categorized into simple and tension.

A simple pneumothorax, referred to as pneumothorax, does not result in major changes in the patient's cardiac physiology. The lung has collapsed similarly to a deflated balloon.

Conversely, a tension pneumothorax is caused by a blunt injury where a fractured rib lacerates a lung or bronchus this may be an open or closed injury. This tension pneumothorax is a pneumothorax where the pleural space continues to fill with air or blood and will push towards the only space that is available in the closed chest. The pleural space will continue to fill and continue to push towards the opposite side of the chest. In a secondary assessment when you check for JVD and tracheal deviation, you are looking for the late sign of a tension pneumothorax. If this tension pneumothorax is not resolved it may cause a cardiac tamponade which we will talk about in a bit.

Hemothorax

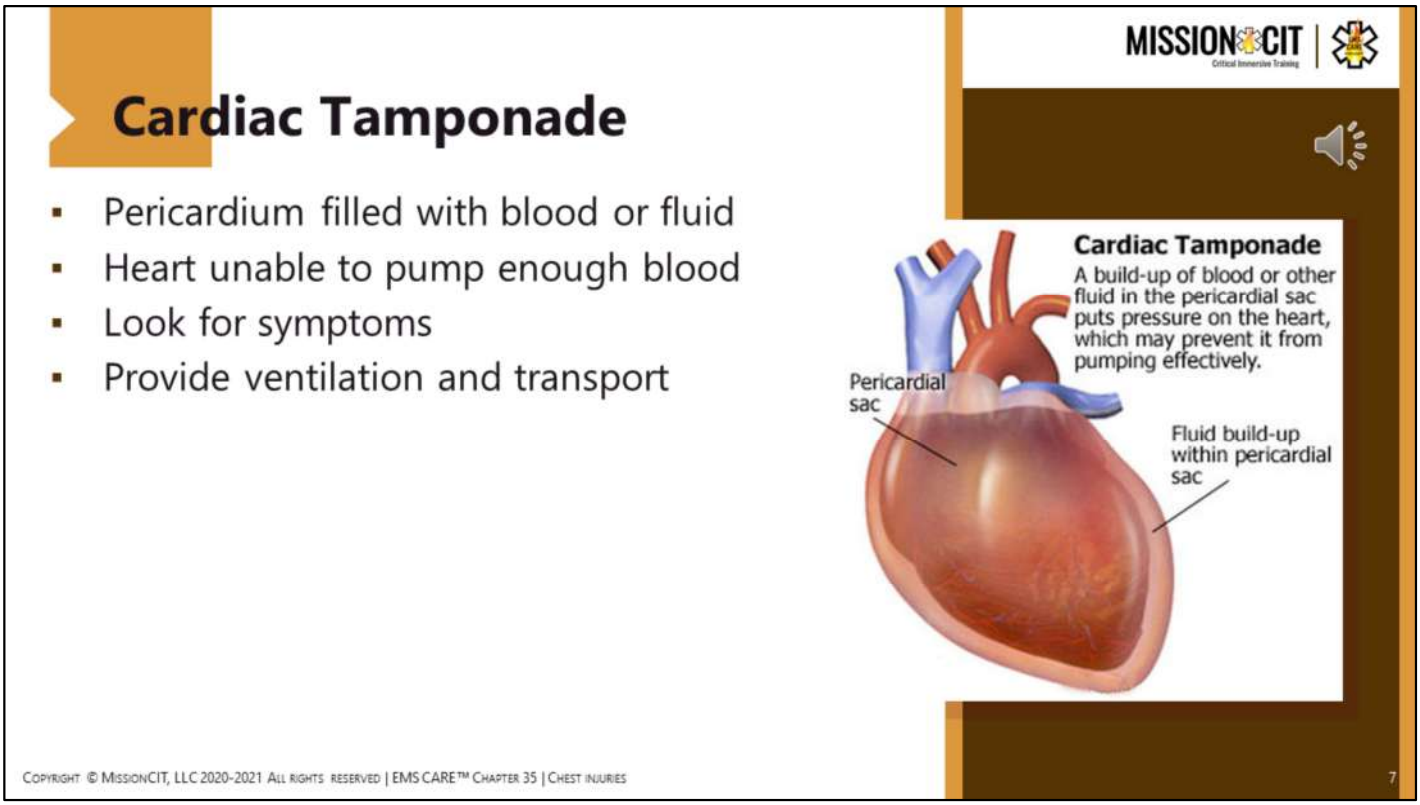
- Accumulation of blood:
  - ✓ Rib cage
  - ✓ Lung
  - ✓ Blood vessel
- Hemopneumothorax – Both blood and air



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Hemothorax is similar to pneumothorax, except that blood accumulates in the pleural space due to bleeding in the rib cage, lung, or blood vessel.

If there's both blood and air in the pleural space, it's called hemopneumothorax.

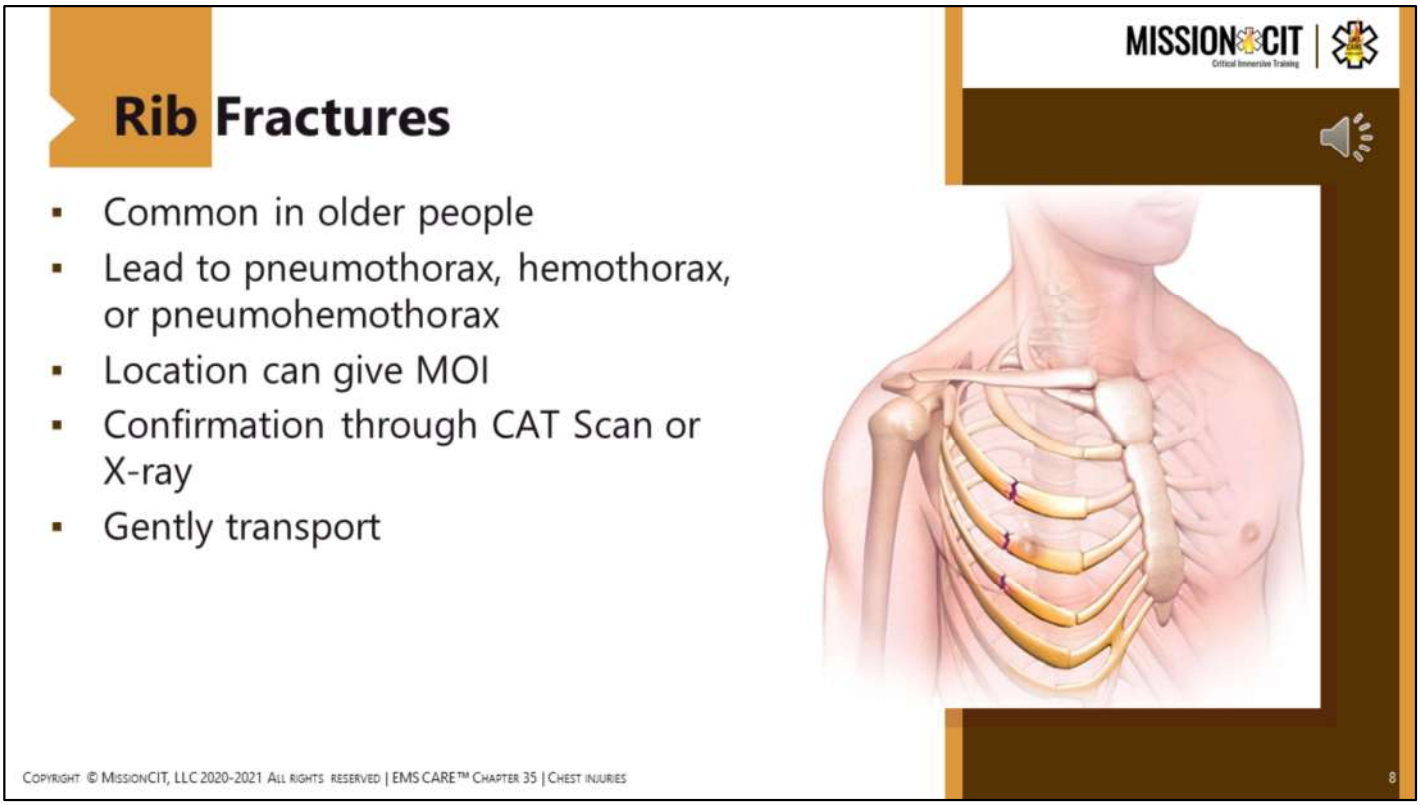


In this condition, the protective membrane called the pericardium that surrounds the heart gets filled with blood or fluid. As a result, the heart can't pump enough blood.

The symptoms of cardiac tamponade are:

- Chest pain or a feeling of discomfort
- Shortness of breath
- Fainting
- Enlargement of veins on the neck
- Increased heart rate
- Swelling in arms and legs
- Pain in the upper right abdomen

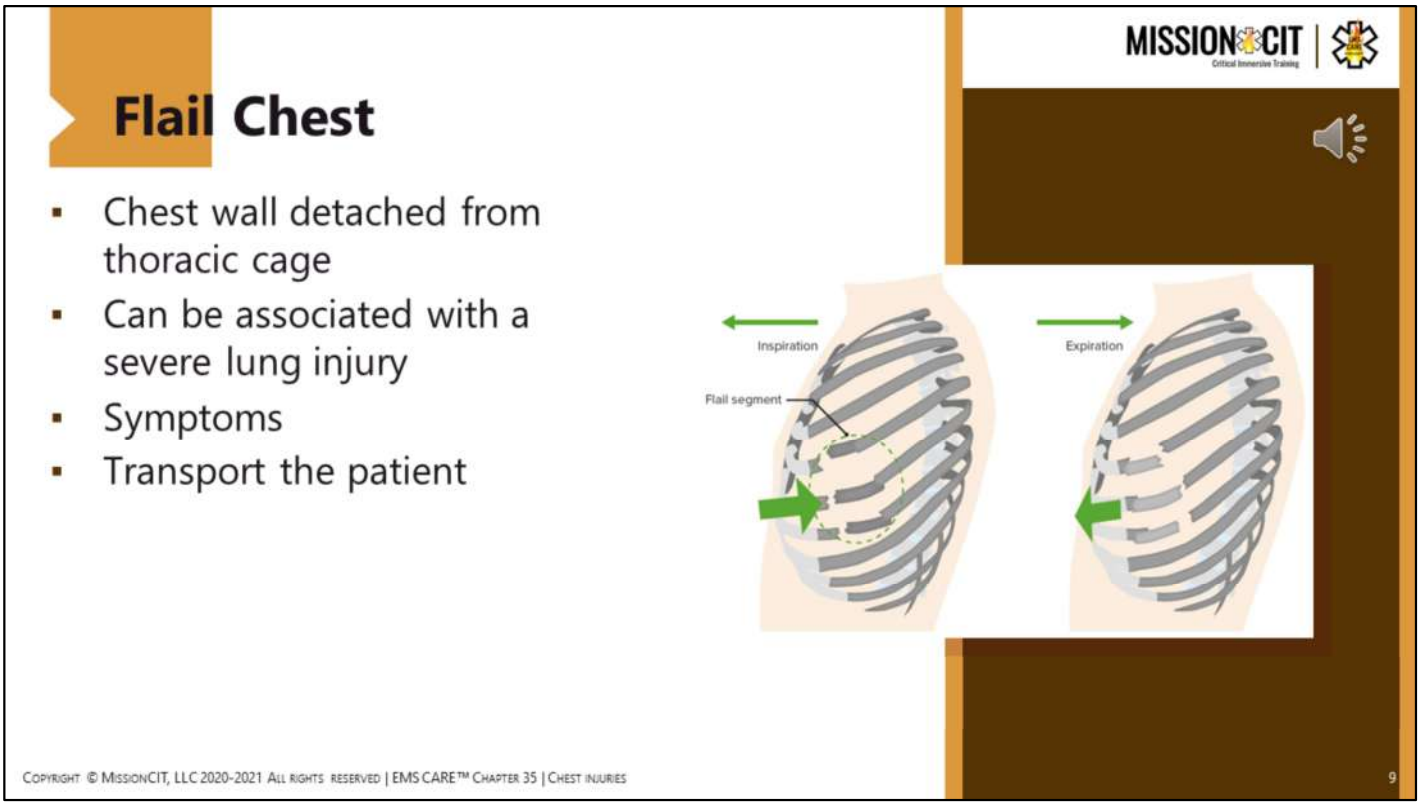
There's nothing much you can do, so provide ventilation, and rapidly transport the patient.



Rib fractures are more common in older people as their bones tend to be brittle with age. These fractures can quickly lead to pneumothorax, hemothorax, or pneumohemothorax.

The location of the fracture can tell you a lot. For example, if the first four ribs are broken, it may indicate a severe mechanism of injury. Confirmation of rib fracture and location of fracture should be through imaging such as a CAT Scan or x-ray. Pain on palpation may be an indication of a broken rib.

In such cases, give supplemental oxygen and gently transport the patient.

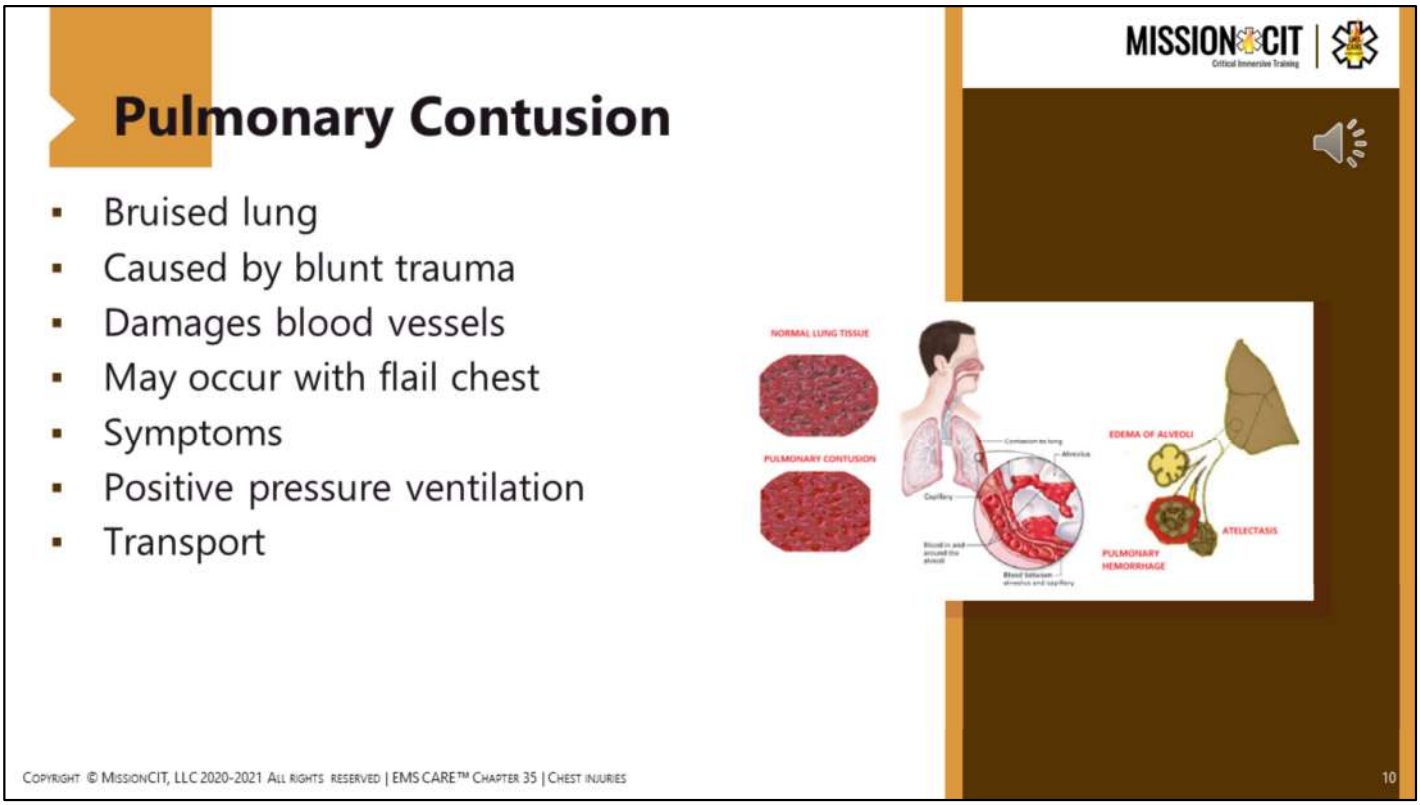


A flail chest is a condition where a segment of the chest wall is detached from the rest of the thoracic cage. The detached portion moves opposite of its normal movement called paradoxical movement. This injury is often caused due to blunt trauma to the chest, with the common causes being, CPR chest compressions, and kicks by animals.

This is a serious injury as it could be associated with a severe lung injury. Some of the symptoms that can indicate a flail chest are:

- Significant difficulty in breathing
- Bruising and inflammation
- Uneven rise or fall of the chest while breathing
- Tenderness in the chest area
- Extreme pain

In this situation too, transport the patient.



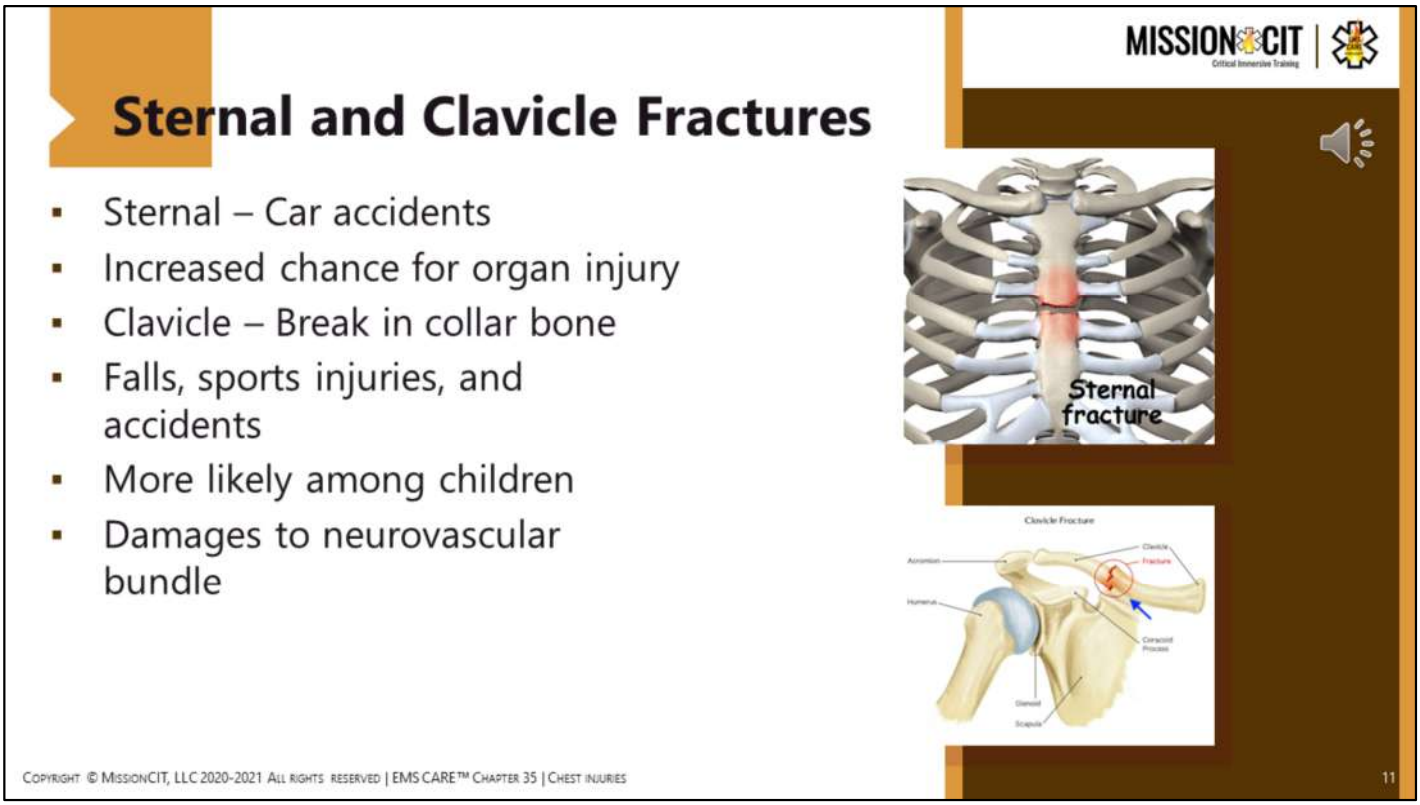
Pulmonary contusion, also known as bruised lung, is caused due to blunt trauma. It can damage the blood vessels, thereby causing blood and fluid to build up in the lungs. In particular, the pulmonary alveoli become filled with blood and can lead to hypoxia.

It is common in patients with a flail chest and those who have suffered a direct blow to their chest. The symptoms of pulmonary contusion include,

- Shortness of breath
- Chest pain
- Coughing
- Low energy levels
- Increased heart rate
- Wheezing
- Crackling sound in the chest
- Low blood pressure
- Coughing up blood

Provide oxygen and positive pressure ventilation and transport the patient to the nearest

healthcare facility.



Sternal fractures often occur in motor vehicle collisions, especially when the chest hits the steering wheel. It is more likely in older cars that don't have an airbag deployment. The area around the sternum will swell and this is your major indicator. The pain gets worse while breathing or coughing.

In this fracture, there's an increased index of suspicion for organ injury.

Clavicle fractures, on the other hand, are a break in the collar bone located near the shoulders. It occurs during falls, sports injuries, and traffic accidents, and is more common among children than adults.

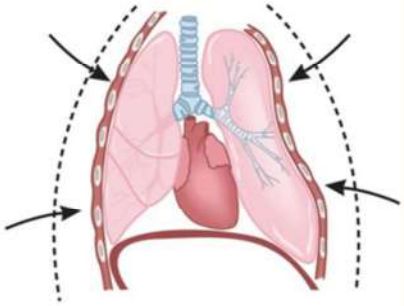
This is a serious injury as it can cause possible damage to the neurovascular bundle. Also, suspect upper rib fractures in medial clavicle fractures, and watch out for the development of conditions like pneumothorax.

Traumatic Asphyxia

- Distended neck veins
- Cyanosis in the face and neck
- Severe chest compression
- Provide ventilatory support
- Monitor vital signs
- Transport

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TRAUMATIC ASPHYXIA



Severe chest compression puts pressure on heart and forces blood back into vein of the neck. It may cause severe lung damage.

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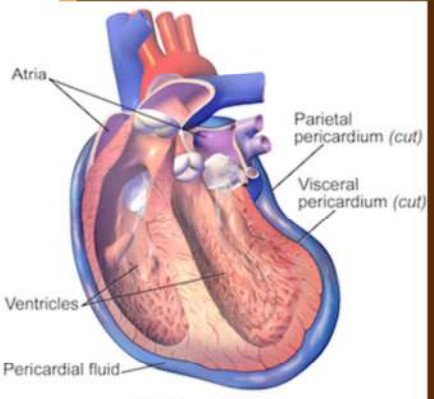
Traumatic asphyxia is characterized by distended neck veins, cyanosis in the face and neck, and hemorrhage in the sclera part of the patient's eyes.

This is a sudden and severe compression of the chest caused by pulmonary contusion and possibly an underlying injury to the heart.

In such situations, provide ventilatory support with oxygen, transport the patient, and monitor the vital signs.

Blunt Myocardial Injury

- Bruising of the heart muscle
- Reduces the heart's ability to pump blood
- Monitor pulse and blood pressure
- Provide oxygen if needed
- Transport



Pericardial Sac

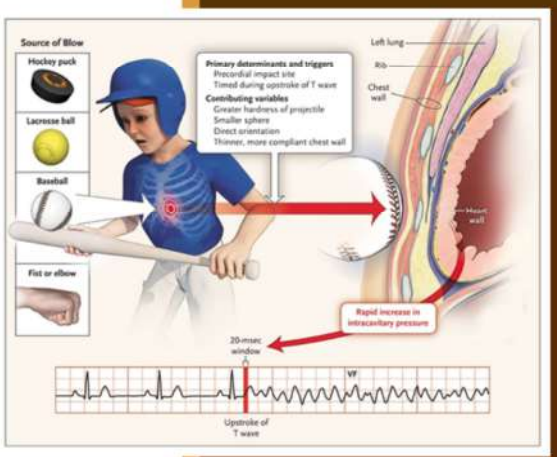
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Blunt myocardial injury is the bruising of the heart muscle that may cause reduce the heart's ability to pump blood. You must suspect this condition in all chest injuries. Shortness of breath, palpitations and chest pain are some symptoms to watch out for.

Monitor the pulse and blood pressure of the patient, provide oxygen if needed, and transport immediately.

Commotio Cordis

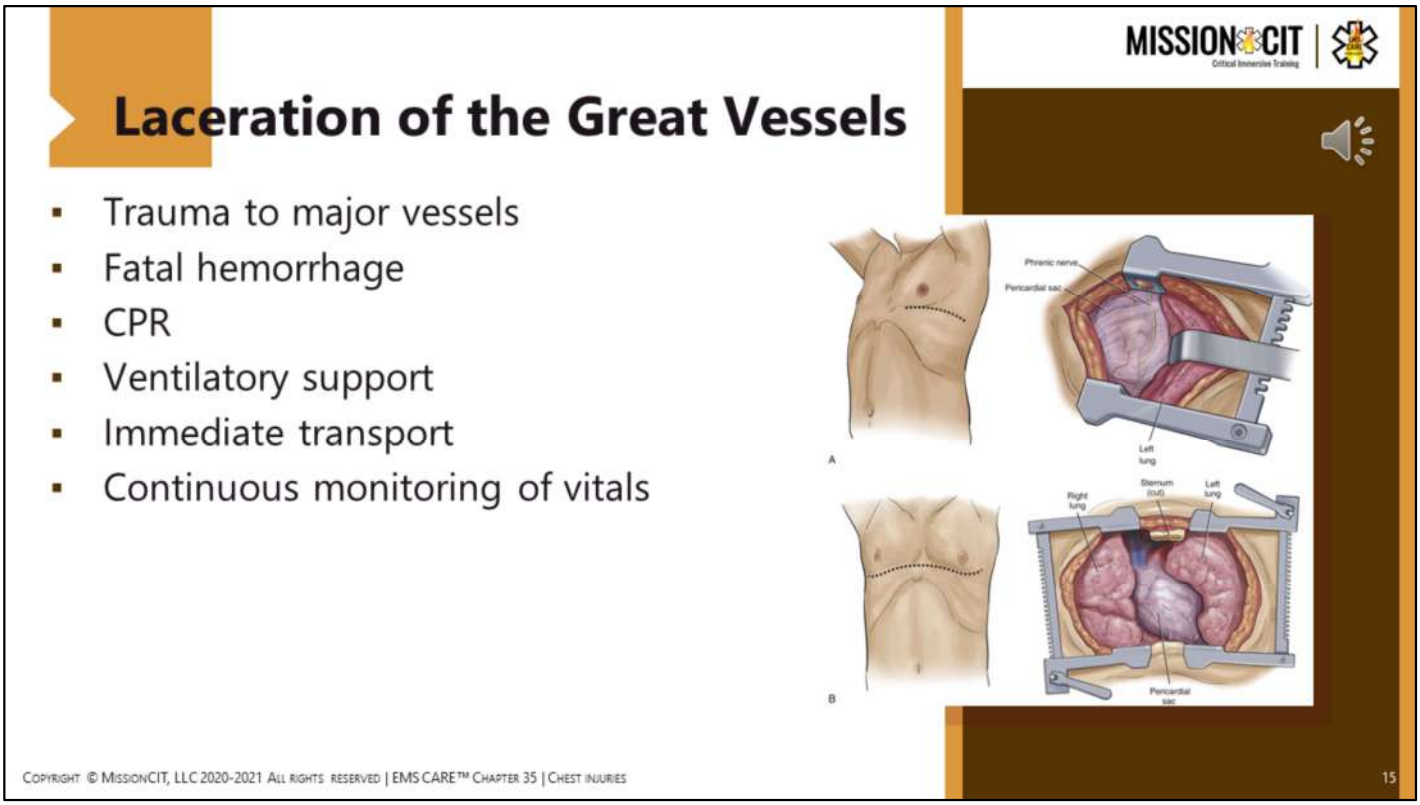
- Sudden blow to the chest
- Defibrillate
- More likely – 15 year boys



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This injury is caused by a sudden direct blow to the chest during a critical part of the heartbeat. Since this can result in a cardiac arrest, make sure you defibrillate the patient within the first two minutes of injury.

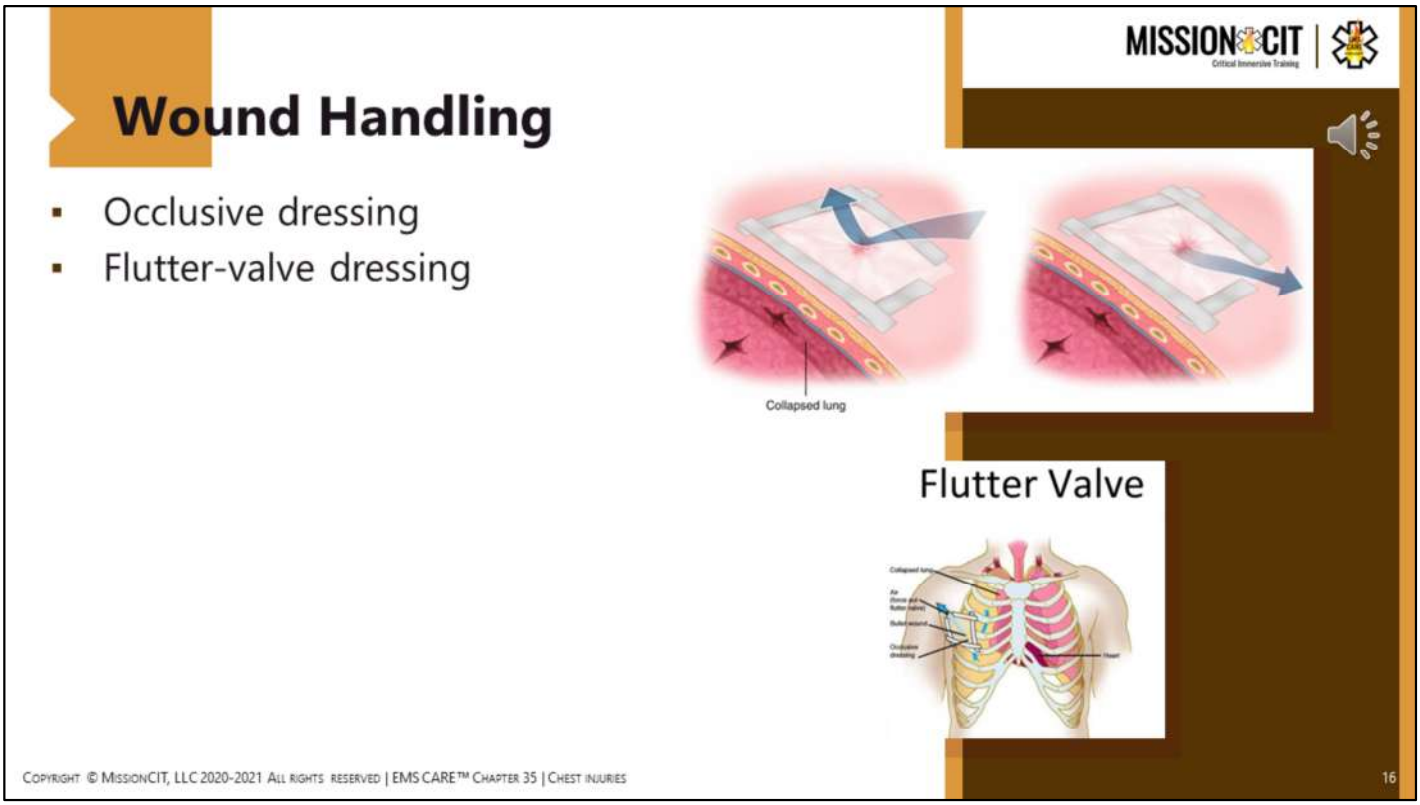
This condition is more prevalent among young boys, around 15 years, especially when they play sports like baseball. This is because the thorax of an adolescent is less well-developed than adults, hence there's a greater risk of injury.



Great vessel injuries include trauma to the vena cava, pulmonary artery, pulmonary veins, and the aorta, and all of these can result in rapidly fatal hemorrhage.

The prehospital treatment for this condition includes,

- CPR resuscitation
- Ventilatory support and oxygen
- Immediate transport
- Continuous monitoring for shock and changes to the vital signs



If you notice any open injuries, seal the wound and apply an occlusive dressing, according to your local protocols.

You can do occlusive or flutter-valve dressing, depending on the situation on hand.

Occlusive dressings stop the movement of air while flutter-valve dressings involve taping dressing in place and leaving a side or corner of dressing unsealed. As the patient inhales, the dressing will seal the wound and as the patient exhales, the free corner or edge acts as a flutter valve to release the air trapped in the chest cavity.



This video from the Committee on Tactical Combat Casualty Care demonstrates the proper steps for the application of the vented chest seal and occlusive dressing and how to burp the occlusive dressing. This video covers the following topics:

- How to inspect the thorax and occlude wound with hand
- How to remove and apply occlusive dressing and/or vented chest seal
- How to burp the occlusive dressing
- How to clear any clots from the injured area
- How to reassess the casualty after application

With this, we come to the end of this lesson and in the next one, Missah will review what we have learned so far.