

## Assessment and Emergency Care of Chest Injuries

### Scene Size-up

#### Scene Safety

Ensure scene safety and safe access to the patient. Be aware of potential violence or the possibility of a crime scene, and call for law enforcement if needed; disturb potential evidence as little as possible. Follow standard precautions, putting on a minimum of gloves and eye protection. Scenes with multiple patients may require the EMT to carry additional pairs of gloves. Determine the number of patients. Assess the need for additional resources such as utility services, fire department, or advanced life support (ALS). The mechanism of injury and presence of bleeding may suggest the injury extent and type. Dark clothing may mask signs of bleeding.

#### Mechanism of Injury (MOI)/ Nature of Illness (NOI)

Determine the MOI. Observe the scene, and look for indicators that will assist you with this. The nature of the problem may not be readily apparent until more information is gathered. Falls, assaults, and motor vehicle crashes are common mechanisms in chest trauma. Consider spinal immobilization in any trauma patient with a significant MOI.

### Primary Assessment

#### Form a General Impression

Identify immediate threats to life. Determine the priority of care based on the MOI. If the patient has a poor general impression, call for ALS assistance. A rapid scan of the patient will help you identify and manage life threats. Keep alert for signs of shock. Assess the patient's level of consciousness using the AVPU scale. If the patient is able to communicate, obtain the chief complaint. Difficulty speaking, cyanosis, and hemoptysis may be signs of a chest injury.

#### Airway and Breathing

Ensure the airway is open, clear, and self-maintained. Unresponsive patients will need the airway opened and maintained using a modified jaw-thrust maneuver if spinal injury is suspected. A patient with an altered level of consciousness may need emergency airway management; consider inserting a properly sized oropharyngeal or nasopharyngeal airway. Evaluate the patient's ventilatory status for rate and depth of breathing, respiratory effort, and tidal volume. Patients breathing at a rate of less than 12 breaths/min or more than 20 breaths/min may have inadequate breathing and require assistance. Jugular vein distention may be a sign of a tension pneumothorax or cardiac tamponade. Inspect for DCAP-BTLS, observe chest for equal rise, and auscultate lung sounds. Treat life threats such as sucking chest wounds and flail chest immediately. Injuries to the chest may alter the mechanics of respiration; breathing problems should be observed early and managed aggressively. Paradoxical chest wall motion is a sign of a flail chest and must be managed immediately. Continuously monitor oxygen saturation and for additional signs of hypoxia. Administer high-flow oxygen at 15 L/min, providing ventilatory support as needed.

#### Circulation

Observe skin color, temperature, and condition. Assess capillary refill time; if greater than 2 seconds, treat aggressively for shock. Look for life-threatening bleeding, and treat accordingly. Consider that the patient may have significant internal bleeding with chest trauma. Evaluate distal pulse rate, quality (strength), and rhythm. Tachycardia may be an early indicator of shock.

#### Transport Decision

If the patient has an airway or breathing problem, signs and symptoms of bleeding, or other life threats, manage them immediately and consider rapid transport, performing the secondary assessment en route to the hospital. Serious chest injuries may be present without obvious signs; do not delay transport to perform a lengthy assessment.

**NOTE:** The order of the steps in this section differs depending on whether the patient is conscious or unconscious. The following order is for a conscious patient. For an unconscious patient, perform a primary assessment, perform a full-body scan, obtain vital signs, and obtain the past medical history from a family member, bystander, or an emergency medical identification device. Transport immediately.

## Assessment and Emergency Care of Chest Injuries, continued

### History Taking

#### Investigate Chief Complaint

Investigate the chief complaint and gather a history once you have identified and treated life threats. Identify associated symptoms and pertinent negatives. Ask SAMPLE questions, focusing on the events surrounding the incident and the mechanism of injury. SAMPLE can also be obtained from family, bystanders, and medical alert tags if the patient is not able to provide the information.

### Secondary Assessment

#### Physical Examinations

If the patient is unconscious, perform a systematic full-body scan beginning with the head, looking for DCAP-BTLS. Assessment should be rapid if the patient has a poor general impression. Focus the assessment on an isolated injury once all the systems have been examined. Significant trauma requires a full-body scan. If a thoracic injury is noted, examine the anterior and posterior aspects of the thoracic cavity. Look for deformities, asymmetry, and contusions while palpating for tenderness.

Note: The rib cage of children is very flexible. This flexibility can allow for compression and internal injury without fracture to the ribs. MOI, work of breathing, and changes to the vital signs may be the only indicators of chest trauma in children.

Note: Elderly patients with trauma to the chest may have significant underlying injuries as a result of reduced bone density.

#### Vital Signs

Obtain baseline vital signs. Vital signs should include blood pressure by auscultation, pulse rate and quality, respiration rate and quality, pupils, and skin assessment for perfusion. Note the patient's level of consciousness. Use pulse oximetry, if available, to assess the patient's perfusion status. Tachycardia or hypotension may indicate hypoperfusion. Bradypnea may indicate cerebral hypoxia and impending cardiopulmonary arrest. A narrowing pulse pressure is an indicator of possible cardiac tamponade. Reassess the patient's vital signs every 5 minutes to observe trends.

### Reassessment

#### Interventions

If spinal injury is suspected, stabilize and immobilize the spine as needed. Ensure an open airway, using an oropharyngeal or nasopharyngeal airway if necessary. Provide oxygen via a nonbreathing mask or bag-mask device as required, and manage any chest wall injuries. Control external bleeding, and treat for shock. Reassess the chief complaint, primary assessment, vital signs, and any interventions already performed. If an occlusive dressing was placed, is the wound still sealed? Is the oxygen delivery sufficient and is the patient breathing adequately? Are pulse oximetry values improving? Vital signs should be repeated every 5 minutes and compared with those taken earlier. Place the patient in a position of comfort unless shock is suspected, then place the patient supine and treat accordingly. Continuously observe and reassess the patient during transport so worsening conditions can be managed.

#### Communication and Documentation

Contact medical control/receiving hospital with a radio report including notification of chest trauma so appropriate staff and equipment will be ready when you arrive. Include a thorough description of the MOI and the position the patient was found in. Include treatments performed and patient response. Be sure to document the chief complaint, physical findings, history, and any changes in patient status and the time. Document the scene observations on your arrival. Follow local treatment protocols.

**NOTE:** Although the following steps are widely accepted, be sure to consult and follow your local protocols. Take appropriate standard precautions when treating all patients.

## Assessment and Emergency Care of Chest Injuries, continued

### Chest Injuries

#### General Management of Chest Injuries

Managing life threats to the patient's ABCs is the primary concern with any traumatic emergency. The MOI that caused the chest injury may also have caused a spinal injury or other fracture, and these must be managed at the appropriate time following local protocols. Breathing difficulties are often present with chest injuries, as are injuries involving bleeding. With all chest injuries, once crew safety has been established, management of airway, breathing, and circulatory problems is a priority. For all of the following specific chest injuries, begin with the following steps:

1. Ensure scene safety.
2. Determine the MOI.
3. Consider spinal immobilization.
4. Open, clear, and maintain the patient's airway.
5. Inspect, palpate, and auscultate the chest.
6. Administer high concentration oxygen via a nonbreathing mask or bag-mask device as appropriate.
7. Control bleeding, and treat for shock.
8. Transport to the appropriate treatment facility.

#### Pneumothorax

A pneumothorax occurs when air accumulates in the pleural space during breathing. The different types of pneumothorax consist of spontaneous, simple, open, and tension. Treatment of a spontaneous or simple pneumothorax consists of supporting the patient's ABCs and transporting to an appropriate hospital. An open pneumothorax, often associated with a sucking chest wound, requires sealing the opening in the chest wall with an occlusive dressing, managing the ABCs, and transporting to a trauma center. An occlusive dressing should cover the wound sufficiently to avoid the danger of being pulled into the wound. The dressing can be taped on all four sides or on three sides to create a flutter valve allowing the release of air. Follow local protocol when deciding which method to use. A pneumothorax may worsen, causing the lung on the affected side to collapse because of an increased amount of trapped air in the pleural space. As air continues to enter the pleural space, the mediastinum and opposite lung are compromised. This is termed a tension pneumothorax. Treatment for a tension pneumothorax includes high-flow oxygen via nonbreathing mask and the insertion of a needle between the second and third rib to release the trapped air. This is an ALS intervention.

#### Hemothorax

A hemothorax is similar to a pneumothorax except that blood, not air, is collecting in the pleural space. If blood and air are present, it is called a hemopneumothorax. The MOI, dyspnea, decreased breath sounds on the affected side, and signs of shock are indicators of a possible hemothorax. Definitive treatment for a hemothorax requires surgical intervention. Prehospital treatment consists of supporting the ABCs and rapid transport to a trauma center.

## Assessment and Emergency Care of Chest Injuries, continued

### Chest Injuries

#### Cardiac Tamponade/Pericardial Tamponade

Blunt or penetrating trauma to the chest can compromise the protective membrane surrounding the heart, allowing blood or fluid to collect. Blood or fluid collecting in the pericardial sac decreases cardiac output and must be managed quickly. Jugular vein distention, muffled heart sounds, and a narrowing pulse pressure, along with a mechanism suggestive of chest trauma, are signs of possible cardiac tamponade. Rapid surgical intervention is required. Provide high-flow oxygen and support the patient's breathing while transporting rapidly to the appropriate trauma center. Notify the hospital while en route that you suspect a cardiac tamponade.

#### Rib Fractures/Flail Chest

Patients with suspected rib fractures will often report pain with breathing. Patients tend to avoid taking deep breaths and will guard or attempt to self-splint the affected area with their arm. Although common, rib fractures can be serious because the broken ends may lacerate the lung surface, causing air to escape. Patients with rib fractures should receive high-flow oxygen via a nonbreathing mask.

When three or more ribs are fractured in two or more places, a free-floating segment, called a flail chest, is created. Flail chest is a serious life threat requiring rapid intervention. The detached portion of the ribs moves in the opposite direction of the rest of the chest (paradoxical motion), resulting in painful and ineffective breathing. Provide support of the airway and breathing, and administer supplemental oxygen via a nonbreathing mask or bag-mask device if breathing becomes inadequate. If local protocol allows, stabilize the flail section with a bulky dressing or pillow and transport to a trauma center. Be alert for signs of increasing respiratory distress because a pulmonary contusion often accompanies flail chest.

#### Pulmonary Contusion

Injury to lung tissue causes fluid accumulation in the injured area of the lung and blood filling the alveoli; this causes the patient to become hypoxic. Support the ABCs by providing high-concentration oxygen and respiratory assistance as needed. Lung contusions are often associated with a significant MOI. Transport to a trauma center for further evaluation.

#### Sternal Fractures/Traumatic Asphyxia

Significant force is required to fracture a patient's sternum. Airway maintenance, supplemental oxygen, and ventilatory support are required treatments. The severe compression forces that cause sternal fractures may produce a sudden increase in intrathoracic pressure, termed traumatic asphyxia. Ensure an open airway, assist with ventilations as required, administer supplemental oxygen, and provide rapid transport to a trauma center.

## Assessment and Emergency Care of Chest Injuries, continued

### Chest Injuries

#### Myocardial Contusion

In addition to lung contusions, cardiac contusions are often present when there has been blunt trauma to the chest. The patient's signs and symptoms often mimic those of a heart attack. Treatment is mostly supportive; administer oxygen, and provide rapid transport immediately on recognizing this condition.

#### Commotio Cordis

Suspect commotio cordis if your patient is unconscious and unresponsive immediately after a sudden impact to the chest. Ensure the airway is open, the patient is breathing, and a pulse is present. Begin cardiopulmonary resuscitation, and provide early defibrillation if the patient is pulseless. Transport to the nearest emergency department.

#### Laceration of the Great Vessels

Signs of shock in patients with chest trauma without signs of obvious bleeding may indicate an injury to one or more of the great vessels. This unseen bleeding may be rapid and fatal. Support the ABCs, provide cardiopulmonary resuscitation if necessary, and be alert for rapidly changing conditions. Surgical intervention is required. Monitor vital signs every 2 to 3 minutes en route to the hospital. Do not delay transport if an internal chest injury is suspected.