

Chapter 13: INJURIES TO THE THORAX AND ABDOMEN

Anatomy Review. The thorax and abdomen contain the majority of organs in the body. The area is enclosed by the spinal column, rib cage, and the clavicle, which provide bony protection. There are 12 thoracic vertebrae and 5 lumbar vertebrae located posterior to the abdomen. _____ (Slide 2); the first 7 (sometimes 8) pairs connect directly to the spinal column and sternum and are called true ribs. Pairs 8 through 10 connect via a common costal cartilage; pairs 11 and 12 do not connect directly to the sternum anteriorly, thus they are called _____ (Slide 2). All joints between the ribs and the spinal column are reinforced with ligaments. The area is further strengthened by the anterior longitudinal ligament.

A. The major joints of the thorax include the _____ (Slide 2). The **sternoclavicular joint** is the only bony articulation between the thorax and the arm.

B. The muscles of the area include _____ (Slide 3). Refer to Time Out 13.1 on p. 200 for a list of the main muscles of the thorax and abdomen and their actions and innervations.

C. Internal Organs. The two main organs in the thorax are heart and lungs. The heart is situated in an area called the mediastinum. The diaphragm separates the thoracic and abdominal cavities (refer to Figure 13.1 on page 201.)

1. The abdomen can be divided into four quadrants. (Slides 5 & 6)

- a.
- b.
- c.
- d.

I. Common Sports Injuries. Sports injuries to the thorax and abdomen are relatively uncommon in children and adolescents, but when they occur, injuries to this area can be very serious.

A. External Injuries.

1. Fractures. _____ (Slide 7).

_____ (Slide 7). In a sternal fracture, an airway obstruction is possible if the manubrium is dislocated and moves posteriorly. If the sternum and ribs separate completely, a flail chest can occur, along with pneumothorax or hemothorax.

a. Rib fractures are common in sports. These fractures typically result when two or more players collide and the rib cage is compressed violently. Rib fractures can vary in severity.

1). Signs and symptoms include _____ (Slide 8)

2) _____ (Slide 8).

3) _____ (Slide 8).

4) _____ (Slide 8)

5) First aid care includes _____ (Slide 8)

6) Arrange for transport to medical facility.

b. The athlete may also experience subluxations and dislocations of thoracic skeletal joints. Costochondral separations involve disunion of the sternum and ribs.

1) Signs and symptoms include _____ (Slide 9).

2) _____ (Slide 9)

3) _____ (Slide 9)

4) _____ (Slide 9)

5) First aid care involves _____

_____ (Slide 9)

6) Arrange for transport to medical facility.

B. Breast Injuries. _____ (Slide 10). Sports bras typically do not provide protection from direct contact, but they can provide breast support for women who choose to wear them. _____

_____ (Slide 10).

1. Regardless of gender, _____

_____ (Slide 10).

C. Internal Injuries. It is not always easy to determine if an internal injury has occurred.

1. Heart Injuries. Sudden death among athletes is more often the result of an impact to the heart than any other factor. Although it is not a common occurrence, heart contusions can occur any time the heart is compressed between the sternum and spinal column by a violent external force such as being hit by a baseball or hockey puck. If the impact occurs when the contracting heart is in the repolarization phase, the athlete can experience ventricular fibrillation leading to death (commotio cordis).

a. _____

_____ (Slide 11). This device is shown in Figure 13.3 on page 204.

b. _____

_____ (Slide 12). Aortic injury is often fatal and must be given immediate attention.

1) _____

_____ (Slide 12)

c. Protective equipment is required in certain sports to prevent injury to the heart, lungs, and chest. Chest protectors are made of materials that are much better at attenuating the shock from a high velocity ball.

d. For sports that do not require chest protection, the athletes should be trained in techniques that protect the chest during specific situations.

e. Certified athletic trainers with CPR/AED training should be prepared to provide immediate care for an athlete with a significant chest injury. The athletic trainer should have an AED or an Emergency Action Plan available for this situation.

2. Lung Injuries. _____

_____ (Slide 13)

a. A fractured rib can puncture the pleural sac, allowing air to enter the pleural cavity, which can cause a lung collapse (pneumothorax).

1) _____ (Slide 13);

this condition has been reported among runners and weight lifters.

b. Signs and symptoms of cardiac or pulmonary contusion and/or a pneumothorax include:

1) _____ (Slide 14)

2) _____ (Slide 14)—either shortness of breath

or painful breathing accompanied by short shallow breaths. The chest wall lacks movement during breathing.

3) _____ (Slide 14).

c. First aid care include: _____

_____ (Slide 15)

3. Liver. The liver is susceptible to blunt trauma, especially if the athlete has hepatitis or the organ is enlarged. However, the liver is fairly safe from sports injuries.

4. Kidneys. The kidneys are located on either side of the posterior abdomen and are susceptible to blunt trauma or extreme heat. An athlete who has experienced a hit in the lower back or exercised in the heat should be watched for blood in urine (**hematuria**) and referred to a physician. The athlete's exercise regimen must often be modified until the urine is clear of blood.

5. Spleen. The spleen is susceptible to blunt trauma and internal disorders. An athlete who sustains a hard hit to the abdomen over the spleen can experience a lacerated spleen. Nevertheless, the organ can splint or patch itself after an injury, but if the patch is disrupted by even a small amount of trauma, the bleeding can resume and may result in death.

a. An athlete who is hit hard in the upper left quadrant and later complains of pain in abdomen and/or left shoulder and upper third of the left arm (sometimes right shoulder) is exhibiting **Kehr's sign**. The athlete must be referred to a physician immediately.

b. Mononucleosis often causes spleen enlargement that makes the organ susceptible to injury during sports participation. An athlete who suffers from this infection needs to restrict his or her activity until a physician permits the athlete to resume participation.

6. Bladder. _____ (Slide 19). If the athlete receives a direct blow to the bladder resulting in an injury, the signs are pain in the area and possibly blood in the urine. _____ (Slide 19)

7. Abdominal Pain. Abdominal pain can occur before, during, and after competition. If an athlete experiences chronic pain in the same location, he or she should see a physician immediately.

a. Abdominal pain is often referred pain. For example, an athlete who complains of chronic low back pain, may actually have a duodenal ulcer.

b. Exercise-related transient abdominal pain (ETAP) is often called a "side ache." Although the cause is unknown, the pain may be the result of ischemia in the diaphragm or an acute increase of venous return from the lower extremities to the liver. This increase in blood flow stretches the vein near the liver and causes a pain response to the brain.

1) Warming up before exercise can reduce the incidence of side ache.

c. Appendicitis is another reason for abdominal pain. Any athlete who has generalized abdominal pain or very severe pain in the lower right quadrant, nausea, vomiting, and fever should be referred to a physician immediately.

d. It is important to review each athlete's medical history very closely to determine if a cardiac or respiratory problem may be exacerbated by athletic participation.

e. Preexisting conditions may disqualify an athlete from participation in certain activities that stress the affected system.

f. Conditions that may disqualify an athlete from competition include: hypertrophic cardiomyopathy (HCM), heart murmurs, cystic fibrosis, or chronic obstructive pulmonary disorder (COPD).

II. Prevention of Internal Injuries: Some sports require protective equipment that may prevent injuries to the heart, lungs, and chest. _____ (Slide 20). CPR and AED-trained personnel should be available to provide immediate care.

III. Preexisting Conditions: It is important to review each athlete's medical history very closely to determine if a cardiac or respiratory condition may be present. _____

(Slide 21).

These conditions may include: HCM, heart murmurs, cystic fibrosis, or COPD.