Chapter 28
Abdominal and Genitourinary Injuries

Unit Summary

After students complete this chapter and the related course work, they will understand how to manage a patient with abdominal and genitourinary trauma. The student will learn how to recognize life threats associated with these injuries and the need for immediate intervention. The curriculum includes detailed anatomy and physiology of the abdominal and genitourinary systems as well as the pathophysiology, complications, assessment, and management of abdominal and genitourinary injuries. The assessment section is very comprehensive and follows the primary and secondary model. Specific injuries discussed include blunt versus penetrating mechanisms, evisceration, impaled object, injuries to external genitalia, vaginal bleeding secondary to trauma, and sexual assault. Emergency care skills include management of blunt abdominal injury, penetrating abdominal injury, and abdominal evisceration.

National EMS Education Standard Competencies

Trauma
Applies fundamental knowledge to provide basic emergency care and transportation based on assessment findings for an acutely injured patient.

Abdominal and Genitourinary Trauma

Recognition and management of:
- Blunt versus penetrating mechanisms (pp 969-972, 979-981)
- Evisceration (pp 971-972, 980-981)
- Impaled object (pp 971-972, 979-980)

Pathophysiology, assessment, and management of:
- Solid and hollow organ injuries (pp 968-969, 972-974)
- Blunt versus penetrating mechanisms (pp 969-972, 979-981)
- Evisceration (pp 971-972, 980-981)
- Injuries to the external genitalia (pp 983-985, 987-988)
- Vaginal bleeding due to trauma (pp 983, 988)
- Sexual assault (p 988)

Knowledge Objectives

1. Describe the anatomy and physiology of the abdomen, including an explanation of abdominal quadrants and boundaries and the difference between hollow and solid organs. (pp 967-969)
2. Describe some special considerations related to the care of pediatric patients and geriatric patients who have experienced abdominal trauma. (pp 968, 969, 974)
3. Define and discuss closed abdominal injuries, providing examples of the mechanisms of injury that are likely to cause this type of trauma in a patient, as well as key signs and symptoms. (pp 969-971)
4. Define and discuss open abdominal injuries, including ways to distinguish low-velocity, medium-velocity, and high-velocity injuries, examples of the mechanisms of injury that would cause each, and signs and symptoms exhibited by a patient who has experienced this type of injury. (pp 971-972)
5. Describe the different ways hollow and solid organs of the abdomen can be injured, and include the signs and symptoms a patient might exhibit depending on the organ(s) involved. (pp 972–974)

6. Discuss assessment of a patient who has experienced an abdominal injury, including key indicators that will help determine the mechanism of injury (MOI) and whether it is significant or nonsignificant. (pp 974–979)

7. Discuss the emergency medical care of a patient who has sustained a closed abdominal injury, including blunt trauma caused by a seatbelt or air bag. (p 979)

8. Discuss the emergency medical care of a patient who has sustained an open abdominal injury, including penetrating injuries and abdominal evisceration, and considerations related to the use of a pneumatic antishock garment (PASG) when caring for these patients. (pp 979–981)

9. Describe the anatomy and physiology of the female and male genitourinary systems, and distinguish between hollow and solid organs. (pp 981–982)

10. Discuss the types of traumatic injuries that may be sustained by the organs of the male and female genitourinary system, including the kidneys, urinary bladder, and internal and external genitalia. (pp 982–985)

11. Discuss assessment of a patient who has experienced a genitourinary injury, including special considerations related to patient privacy and determining the MOI. (pp 985–987)

12. Discuss the emergency medical care of a patient who has sustained a genitourinary injury related to the kidneys, bladder, external male/female genitalia, and rectum. (pp 987–988)

13. Explain special considerations related to a patient who has experienced a genitourinary injury caused by a sexual assault, including patient treatment, criminal implications, and evidence management. (p 988)

Skills Objectives

1. Demonstrate proper emergency medical care of a patient who has experienced a blunt abdominal injury. (p 979)

2. Demonstrate proper emergency medical care of a patient who has a penetrating abdominal injury with an impaled object. (pp 979–980)

3. Demonstrate how to apply a dressing to an abdominal evisceration wound. (pp 980–981)

Lecture

I. Introduction

A. The abdomen is the major body cavity, extending from the diaphragm to the pelvis.

1. It contains the organs that make up the digestive, urinary, and genitourinary systems.
   a. Some organs within the abdomen are better protected from injury.

2. It is important for the EMT to know the anatomy of the abdominal and pelvic cavities and where organs are located.
   a. Understand the functions of the organs so you can assess an injury's seriousness.

B. Eight percent of all significant trauma involves the abdomen.

1. Injuries to the abdomen that go unrecognized and are not repaired in surgery are a leading cause of traumatic death.
   a. 10% to 20% of all trauma patients have some form of genitourinary tract injury.

II. Anatomy and Physiology of the Abdomen

A. Abdominal quadrants
1. The abdomen is divided into four general quadrants.
   a. Right upper quadrant (RUQ)
   b. Left upper quadrant (LUQ)
   c. Right lower quadrant (RLQ)
   d. Left lower quadrant (LLQ)
   e. Note that right and left refer to the patient’s right and left, not yours.

2. The quadrant location of bruising or pain can delineate which organs are possibly involved in a traumatic injury.
   a. Organs commonly found in the RUQ:
      i. Liver
      ii. Gallbladder
      iii. Duodenum of the intestines
      iv. Small portion of the pancreas
   b. Organs found in the LUQ:
      i. Stomach
      ii. Spleen
   c. Organs found in the LLQ:
      i. The descending colon
      ii. The left half of the transverse colon
   d. Organs found in the RLQ:
      i. Large and small intestines
         (a) The ascending colon and the right half of the transverse colon
      ii. The appendix
   e. The RLQ is a common location for swelling and inflammation.
   f. The appendix is a source of infection if it ruptures.

B. Hollow and solid organs:

1. The abdomen contains hollow and solid organs, any of which may be damaged.
2. The hollow organs of the abdomen include the stomach, intestines, ureters, and bladder.
   a. These are structures through which materials pass.
   b. Most of these organs contain food that is in the process of being digested, urine that is being passed to the bladder for release, or bile.
      i. When ruptured or lacerated, the contents spill into the peritoneal cavity.
         (a) Can cause an intense inflammatory reaction and possible infection
         (b) Peritonitis is an inflammation of this type.
            (1) Serious and may become life threatening
            (2) Signs include severe abdominal pain, tenderness, and muscular spasm.
   c. The small intestine is composed of the duodenum, jejunum, and ileum.
   d. Large intestine consists of the cecum, colon, and rectum.
   e. Intestinal blood supply comes from the mesentery.
      i. Connects the small intestine to the posterior of the abdominal wall
      ii. Patients with injuries to the mesentery can bleed significantly into the peritoneal cavity.
      iii. Signs of this include abdominal rigidity and periumbilical bruising (Cullen sign).
3. The solid organs of the abdomen include the liver, spleen, pancreas, and kidneys.
   a. These are solid masses of tissue.
   b. These organs perform the chemical work of the body.
      i. Enzyme production
ii. Blood cleansing
iii. Energy production
c. Because of their rich blood supply, hemorrhage of solid organs can be severe.
d. Many solid organs are found in the retroperitoneal region, including:
i. Great vessels
ii. Abdominal aorta
iii. Inferior vena cava
iv. This area also houses the kidneys, ureters, bladder, colon, and a majority of the pancreas.

III. Injuries to the Abdomen

A. Abdominal injuries are considered either open or closed and can involve hollow and/or solid organs.

B. Closed abdominal injuries
   1. Blunt trauma to abdomen without breaking the skin
   2. Some MOI examples:
      a. Steering wheel
      b. Bicycle handlebars
      c. Motorcycle collisions
      d. Falls
      e. Blast injuries
      f. Pedestrian injuries
      g. Compression
         i. Typically caused by a poorly placed lap belt
         ii. Creates an injury pattern called a clasp-knife injury.
         iii. Can also be caused when a person is run or rolled over by vehicles or objects.
      h. Deceleration
         i. Commonly occurs when a person or the vehicle that he or she is traveling in strikes a large immovable mass such as a larger vehicle, a bridge abutment, or the ground
   3. Signs and symptoms of a closed injury
      a. Pain can be deceiving.
         i. Often diffuse in nature
         ii. May be referred to another body location
            (a) Liver and spleen injuries refer pain to the shoulder.
               (1) Called Kehr sign when it involves injury to the spleen and pain in the tip of the left shoulder
               iii. Tearing pain from the abdomen posteriorly may be dissected aneurysm.
         iv. Pain following the angle from the lateral hip to the midline of the groin can be the result of damage to the kidneys or the ureters.
      v. Pain located in the RLQ can indicate an inflamed or ruptured appendix.
      vi. Pain under the margin of the ribs on the right side or between the shoulder blades can indicate an injury to the gallbladder.
   b. Blood in the peritoneal cavity produces acute pain in the entire abdomen.
      i. Pain spreads as the blood or contaminant seeks out the voids in the peritoneal cavity.
      ii. Often a jarring motion (rebound tenderness or Blumberg sign) will alert the patient to the peritonitis or inflammation of the peritoneum.
   c. Determining the location of the pain or referred pain can be difficult when the patient has voluntary or involuntary guarding.
i. Guarding is conscious or unintentional stiffening of the muscles of the surface of the abdomen to avoid further pain.
ii. May be mistaken for abdominal rigidity.
d. Abdominal distention or swelling between the xiphoid process and the groin is often the result of free fluid, blood, or organ contents spilling into the peritoneal cavity.
e. Additional signs of abdominal injury are bruising and discoloration.
f. Closed abdominal injuries may initially appear as abrasions.
   i. May take minutes to hours for contusion or hematoma to become present on the surface

C. Injuries from seatbelts and air bags
1. Seatbelts have prevented many injuries and saved many lives.
   a. They occasionally cause blunt injuries of the abdominal organs.
      i. When worn properly, a seatbelt lies below the anterior superior iliac spines of the pelvis and against the hip joints.
      ii. If belt lies to high, it can squeeze abdominal organs or great vessels against the spine when the car decelerates or stops.
   b. Can cause bladder injuries to pregnant patients who adjust the lap belt for comfort.
   c. In all current-model vehicles, lap and diagonal belts are combined so they cannot be used independently.
      i. People can still put the shoulder belt behind their backs.
2. Air bags are a great advance in automotive safety.
   a. Can be a lifesaver in head-on collisions.
   b. Must be used in combination with safety belts.
   c. Children or small adults may be at risk of injury if an air bag deploys on them.

D. Open abdominal injuries
1. Injuries in which a foreign object enters the abdomen and opens the peritoneal cavity to the outside
   a. Also called penetrating injuries
   b. Stab wounds and gunshot wounds are examples.
   c. Open wounds can be deceiving; therefore you should maintain a high index of suspicion for unseen injuries, internal damage to organs, and potential life-threatening injuries.
2. Injury depends on velocity of object.
   a. The velocity of the object can help predict the amount of damage to tissue.
   b. Low-velocity injuries
      i. Caused by handheld or hand-powered objects, such as knives and other edged weapons
   c. Medium-velocity injuries
      i. Caused by smaller caliber handguns and shotguns
   d. High-velocity injuries
      i. Caused by larger weapons, such as high-powered rifles and higher-powered handguns
   e. High- and medium-velocity injuries have temporary wound channels in addition to exit and entrance wounds.
      i. Caused by cavitation
         (a) A cavity forms as the pressure wave from the projectile is transferred to the tissues.
         (b) Causes microscopic tears to the blood vessels and nerves
         (c) Can produce a large amount of bleeding
      ii. The higher the velocity of the projectile, the larger the cavity it produces.
   f. Low-velocity penetrations also have the capacity to damage underlying organs.
      i. Internal injury may not be apparent during physical examination.
(a) Bleeding wound may hide the fact that the object went farther and deeper into the peritoneal cavity and injured other organs and tissues.
ii. Anytime a patient has an injury at or below the xiphoid process, it should be assumed that the thoracic and peritoneal cavities have been violated.

3. In evisceration, bowel protrudes from the peritoneum.
   a. This can be extremely painful and is also visually shocking.
   b. Do not push down on the patient’s abdomen.
   c. Only perform a visual assessment when there is any suspicion of this type of injury.
   d. Cut clothing close to the wound.
   e. Never pull on any clothing stuck to or in the wound channel.

4. Signs and symptoms of an open injury
   a. Patients with abdominal injury complain of pain.
   b. A very common sign of significant abdominal injury is tachycardia.
      i. The heart is increasing its pumping action to compensate for blood loss.
   c. Later signs include:
      i. Evidence of shock, such as decreased blood pressure and pale, cool, moist skin
      ii. Changes in patient’s mental status
      iii. Abdomen may become distended from accumulation of blood and fluid.
   d. A patient may have both closed and open injuries.
      i. Blunt injuries should guide your attention to underlying structures.
      ii. Bruises in the RUQ may suggest injury to the liver.
      iii. Bruises in the LUQ may suggest injury to the spleen.
      iv. Bruises to the flank may suggest injury to the kidney.
      v. Bruises around the umbilicus, called the Cullen sign, are predictive of significant internal abdominal bleeding.

E. Hollow organ injuries
1. Often have delayed signs and symptoms
2. Hollow organs commonly spill contents into the abdomen.
   a. Infection develops, which can take hours or days.
   b. Stomach and intestines can leak highly toxic and acidic digestive liquids into the peritoneal cavity.
3. Both blunt and penetrating trauma can cause hollow organ injuries.
   a. Blunt trauma causes the organ to "pop," releasing fluids and air.
   b. Penetrating trauma causes direct injury, such as lacerations and punctures.
4. The gallbladder and the urinary bladder are hollow organs whose contents are potentially irritating and damaging if ruptured.
   a. These fluids move into loose spaces and voids in the peritoneal cavity, eventually leading to infection.
5. Air in the peritoneal cavity produces pain.
   a. It can cause ischemia and infarction.

F. Solid organ injuries
1. Solid organs can bleed significantly and cause rapid blood loss.
   a. Can be hard to identify from a physical exam because the patient is not experiencing significant pain.
   b. Solid organs can also slowly ooze blood into the peritoneal cavity, causing pain to increase slowly over time.
2. The liver is the largest organ in the abdomen.
   a. The liver is very vascular and can contribute to hypoperfusion if injured.
b. It is often injured by a fractured lower right rib or a penetrating trauma.
c. A common finding during assessment of patients with an injured liver is the Kehr sign (left shoulder pain caused by blood in the peritoneal cavity).

3. The spleen and pancreas are also very vascular.
   a. Both are prone to heavy bleeding when fractured, lacerated, or punctured.
   b. The spleen is often injured in:
      i. Motor vehicle collisions, especially in cases of improperly placed seatbelts
      ii. Steering wheel trauma
      iii. Falls from heights or onto sharp objects
      iv. Bicycle and motorcycle accidents where the patient hits the handlebars on impact.

4. If the diaphragm is penetrated or ruptured, loops of bowels are likely to invade the thoracic cavity.
   a. Can cause bowel sounds to present during auscultation of the lungs
   b. Patients may exhibit dyspnea (feel short of breath).

5. The kidneys can also be impacted or penetrated by trauma.
   a. Can cause significant amounts of blood loss
   b. Common finding is blood in the urine (hematuria)
   c. Blood visible on inspection of the urinary meatus indicates significant trauma to the genitourinary system.

IV. Patient Assessment of Abdominal Injuries

A. **Assessment of abdominal injuries is one of the more difficult assessments that you will perform.**
   1. Causes of injury may be apparent, but resulting tissue damage may not be so apparent.
   2. Patient may be overwhelmed with other more painful injuries.
   3. Some abdominal injuries develop and worsen over time, making reassessment critical.

B. **Scene size-up**
   1. Scene safety
      a. Often, information from dispatch will be sketchy or vague.
      b. Standard precautions should be taken at the scene; gloves and eye protection should be a minimum.
      c. Be sure scene is safe for you.
         i. If assault, domestic dispute, or drive-by shooting is indicated, ensure that law enforcement has secured the area.
   2. Mechanism of injury/nature of illness
      a. Observe the scene for early indicators of the MOI.
      b. Consider early spinal precautions.
      c. Consider all of the injuries the MOI could have produced.

C. **Primary assessment**
   1. The goal of the primary assessment is to evaluate the patient’s ABCs and care for any life threats.
      a. First perform a rapid scan.
         i. Will help establish the seriousness of the patient’s condition
      b. Some abdominal injuries will be obvious and graphic, but most will be very subtle and will go unnoticed.
      c. Remember that in some cases of abdominal injuries the injury may have occurred hours or days earlier.
   2. Form a general impression.
      a. Important indicators will alert you to the seriousness of the patient’s condition.
      b. Trauma patients with closed abdominal injuries may have what appear to be minor injuries. You should not be distracted from looking for more serious hidden injuries.
c. Check for responsiveness using the AVPU scale.
   i. Provide high-flow oxygen via nonrebreathing mask to all patients whose level of consciousness is less than alert and oriented.
   ii. An unresponsive patient may indicate a life-threatening condition.

3. Airway and breathing
   a. Ensure that the patient has a clear and patent airway.
   b. If a spinal injury is suspected, prevent the patient from moving.
   c. Clear the airway of vomitus so it is not aspirated into the lungs.
      i. Note the nature of the vomitus.
   d. A distended abdomen may prevent adequate inhalation.
      i. Providing supplemental oxygen will help improve oxygenation.

4. Circulation
   a. Superficial abdominal injuries usually do not produce significant external bleeding.
      i. Internal bleeding can be profound.
      ii. Trauma to the liver, kidneys, and spleen can cause significant internal bleeding.
   b. Evaluate pulse, skin color, temperature, and condition to determine the stage of shock.
   c. Treat aggressively if the patient is in shock.

5. Transport decision
   a. Abdominal injuries generally indicate a quick transport to the hospital.
      i. A delay in medical evaluation may result in an unnecessary and dangerous progression of shock.
   b. Patients with abdominal injuries should be evaluated at the highest level of trauma center available.

D. History taking
   1. Investigate chief complaint.
      a. Determine and investigate the chief complaint and further investigate the MOI.
      b. Also identify associated signs and symptoms and pertinent negatives.
         i. Note the position in which the patient is lying.
      c. Movement of the body or the abdominal organs irritates the inflamed peritoneum, causing additional pain.
         i. To minimize this pain, patients will lie still, usually with their knees drawn up.
         ii. Breathing will be rapid and shallow.
   2. SAMPLE history
      a. Use OPQRST to help explain an abdominal injury.
      b. If the patient is not responsive, attempt to obtain the SAMPLE history from friends or family members.
      c. Make sure to ask if the patient has experienced any nausea, vomiting, or diarrhea.
         i. If so, ask how many times and over what period.
      d. Ask about the appearance of any bowel movements and urinary output.
         i. Determine if there was any blood in the urine or black tarry stools (melena).
         ii. This will help determine if the patient has gastrointestinal bleeding and if there is bleeding in the lower gastrointestinal tract.

E. Secondary assessment
   1. May not have time to perform this detailed, comprehensive exam in critically injured patients
   2. Physical examinations
      a. Remove or loosen clothes to expose injured regions of the body.
         i. Inspect the patient for bleeding before removing the clothing to prevent damaging exposed tissues.
         ii. Provide privacy or perform in back of the ambulance.
      b. Patient should be able to stay in position of comfort unless spinal injury is suspected.
i. Will relieve some of the tension

ii. Place padding under a patient’s knees with a suspected spine injury.
   (a) Can worsen pain if you are too aggressive

iii. Fetal position may be the position of most comfort for a patient without spinal injury.

c. Examine the entire abdomen including all posterior, anterior, and lateral surfaces.
   i. Critical step for patients with an entrance wound

d. Evaluate the bowel sounds.
   i. Can be difficult to hear
   ii. Use the term hypoactive if you cannot hear the bowel sounds.
   iii. Use the term hyperactive if you hear a lot of gurgling and the sounds of gas moving about frequently.
   iv. Considered to be of limited value to you in the assessment

e. Use DCAP-BTLS to help identify specific signs and symptoms of injury.
   i. Inspect and palpate the abdomen for the presence of deformities.
   ii. Look for the presence of contusions and abrasions.
   iii. Puncture wounds and other penetrating injuries cannot be overlooked.
      Intra-abdominal extent of these injuries may be life threatening.
   iv. Note the signs of burns.
   v. Palpate for tenderness and attempt to localize to a specific quadrant of the abdomen.
   vi. Treat lacerations with appropriate dressings.
   vii. Swelling may involve the abdomen globally and indicate significant intra-abdominal injury.

f. Palpate the abdomen when examining the region.
   i. Palpate the quadrant farthest away from the quadrant that is exhibiting signs and symptoms of injury and pain.
   ii. This technique allows you to investigate the possibility of radiation and extension of the pain into other quadrants.

g. Perform a full-body scan to identify injuries other than abdominal injuries.
   i. Begin with the head and finish with the lower extremities, moving in a systematic manner.
      (a) Goal is to identify the presence of other injuries, not the extent of those injuries
   ii. If you find a life-threatening issue, stop and treat it immediately.

h. If the MOI suggests an isolated injury to the abdomen, focus your physical examination on the injured area only.
   i. Inspect the skin of the abdomen for wounds through which bullets, knives, or other missile-type foreign bodies may have passed.
      (a) If you find an entry wound, you must always check for a corresponding exit wound.
   ii. Do not attempt to remove a knife or other impaled object.
      (a) Instead, stabilize the object with supportive bandaging.
   i. Inspect and palpate the kidney area for tenderness, bruising, swelling, or other signs of trauma.
   ii. Hollow organs will spill their contents into the peritoneal cavity.
   ii. These injuries will typically present as diffuse pain with guarding and reaction to sudden jarring movements.

3. Vital signs
   a. Many abdominal emergencies can cause a rapid pulse and low blood pressure.
   b. Your record of vital signs will help you identify changes in the patient’s condition.
   c. Use appropriate monitoring devices when available.
      i. Pulse oximetry
      ii. Noninvasive blood pressure devices
iii. It is always recommended that you always assess the patient’s first blood pressure manually with a sphygmomanometer and stethoscope.

F. Reassessment

1. Repeat the primary assessment and vital signs.
   a. Reassess the interventions and treatment you have provided.

2. Interventions
   a. Manage airway and breathing problems based on signs and symptoms found during the primary assessment.
   b. Provide complete spinal stabilization to the patient with suspected spinal injuries.
   c. If the patient has signs of hypoperfusion, provide aggressive treatment for shock and rapid transport.
   d. If an evisceration is found, place a saline-moistened dressing over the wound and transport.
      i. Never attempt to push eviscerated tissue or organs back into the abdominal cavity.
   e. A patient with a ruptured diaphragm may have an abdomen with a sunken anterior wall.
      i. These patients should receive positive-pressure ventilations with a bag-mask device.

3. Communication and documentation
   a. Communicate all relevant information to staff at the receiving hospital.
   b. Appropriate medical and anatomic terminology is important.
      i. When in doubt, just describe what you see.
   c. Document the results of the physical examination and any pertinent negatives.
      i. Also document if you passed over any steps in the physical examination.
   d. It is imperative that you be able to describe the scene in enough detail to give the trauma team a clear idea of the circumstances.
   e. Your written report is a legal record of your care.
   f. Be cautious and diligent when dealing with patients who refuse transport after sustaining an injury to the abdomen or genitourinary system.
      i. These patients are at high risk for complications.

V. Emergency Medical Care of Abdominal Injuries

A. Closed abdominal injuries

1. The EMT’s biggest concern is not knowing the true extent of the closed abdominal injury.
   a. The patient requires expedient transport.
      i. Primarily to a trauma center with a surgeon
   b. Position the patient for comfort.
   c. Apply high-flow oxygen.
   d. Treat for shock.

2. A patient with blunt abdominal wounds may have:
   a. Severe bruising of abdominal wall
   b. Liver and spleen laceration
   c. Rupture of intestine
   d. Tears in mesentery
   e. Rupture of kidneys or avulsion of kidneys from their arteries and veins
   f. Rupture of bladder
   g. Severe intra-abdominal hemorrhage
   h. Peritoneal irritation and inflammation

3. A patient with a blunt abdominal injury should be log rolled to a supine position on a backboard.
a. Protect the spine.
b. Monitor the patient’s vital signs for any indication of shock and treat appropriately.

B. Open abdominal injuries

1. Patients with penetrating injuries
   a. Generally obvious wounds and external bleeding
   b. Maintain a high index of suspicion for serious unseen blood loss.
      i. Only a surgeon can accurately assess the damage.
         (a) You should assume the object has penetrated the peritoneum and possibly injured organs.
   c. Follow the general procedures described previously for care of a blunt abdominal injury as well as:
      i. Inspect the patient’s back and sides for an exit wound.
      ii. Apply a dry, sterile dressing to all open wounds.
      iii. If the penetrating object is still in place, apply a stabilizing bandage around it to control external bleeding and to minimize movement of the object.
   d. Severe lacerations of the abdominal wall may result in evisceration.
      i. Internal organs or fat protrude through the wound.
      ii. Never try to replace a protruding organ.
         (a) Keep the organs moist and warm.
         (b) Cover the wound with moistened, sterile gauze or occlusive dressing.
         (c) Secure the dressing with a bandage.
         (d) Secure the bandage with tape.

VI. Anatomy of the Genitourinary System

A. The genitourinary system controls reproductive functions and waste discharge.

1. Generally considered together
2. The urinary system controls discharge of waste.
   a. Kidneys are solid organs.
   b. Ureters, bladder, and urethra are hollow organs.
3. The genital system controls reproductive processes.
   a. The male genitalia lie outside the pelvic cavity, except for the prostate gland and seminal vesicles.
   b. The female genitalia are contained entirely within the pelvis, except the vulva, clitoris, and labia.
4. The reproductive organs allow for the production of sperm and egg cells and appropriate hormones, the act of intercourse, and reproduction.

VII. Injuries of the Genitourinary System

A. Kidney injuries

1. Not unusual and rarely occur in isolation
   a. Kidneys lie in a well-protected area of the body.
      i. A forceful blow or penetrating injury is often involved.
   b. Less significant injuries can result from a direct blow or even a football tackle.
2. Suspect kidney damage if the patient has a history or physical evidence of any of the following:
   a. An abrasion, laceration, or contusion in the flank
   b. A penetrating wound in the region of the lower rib cage (flank) or the upper abdomen
   c. Fractures on either side of the lower rib cage or of the lower thoracic or upper lumbar vertebrae
   d. A hematoma in the flank region

B. Urinary bladder injuries
1. May result in rupture
   a. Urine spills into surrounding tissues.
   b. Blunt injuries to lower abdomen or pelvis can cause rupture to urinary bladder, particularly when the bladder is full and distended.
2. In males, sudden deceleration from a motor vehicle or motorcycle crash can shear the bladder from the urethra.
3. In later trimesters of pregnancy, bladder injuries increase by displacement of the uterus.

C. External male genitalia injuries
   1. Soft-tissue wounds
   2. Painful and of great concern for the patient
      a. Rarely life threatening
      b. Should not be given priority over more severe wounds

D. Female genitalia injuries
   1. Internal female genitalia
      a. The uterus, ovaries, and fallopian tubes are rarely damaged.
         i. Small, deep in the pelvis, and well protected
      b. Exception is the pregnant uterus
         i. Uterus enlarges substantially and rises out of the pelvis.
         ii. Injuries can be serious because the uterus has a rich blood supply during pregnancy.
         iii. Also keep the fetus in mind.
         iv. In last trimester of pregnancy, the uterus is large and may obstruct the vena cava.
            (a) Blood pressure may decrease.
            (b) Patient should be placed on her left side so the uterus will not lie on the vena cava.
   2. External female genitalia
      a. Includes the vulva, clitoris, and the major and minor labia at the entrance of the vagina
      b. Very rich nerve supply
         i. Injuries are very painful.
      c. Consider sexual assault and pregnancy.
         i. Ask patient about last known menstrual period.
         ii. Ask about sexual history.
         iii. The assumption is that all women of childbearing age are pregnant.
            (a) This information is relevant because some medications and tests are harmful for a fetus.
      d. In cases of external bleeding and trauma, a sterile absorbent sanitary napkin or pad may be applied to the labia.
      e. Do not insert instruments, gloved fingers, or a tampon into the vagina.
         i. Can cause further damage.

VIII. Patient Assessment of the Genitourinary System

A. Potential for patient embarrassment
   1. Maintain a professional presence.
   2. Provide privacy during assessment.
   3. When possible, have an EMT of the same gender perform the assessment.
   4. Look for blood on the patient’s undergarments, and only inspect the external genitalia when there are complaints of pain or external signs of injury.

B. Scene size-up
   1. Scene safety
a. Assess the scene for hazards and threats to crew safety.
   b. Assess the impact of hazards on patient care.
   c. Assess for the potential for violence and environmental hazards.
   d. At minimum, gloves and eye protection are required.
      i. Minimize your direct contact with bodily fluids.
      ii. Blood can be hidden under thick layers of clothing.

2. Mechanism of injury/nature of illness
   a. Look for indicators of the MOI.
      i. Consider how the MOI produced the injuries expected.
      ii. Patient may avoid the discussion to avoid undergoing a physical examination.
      iii. Patient may also provide an MOI that seems less embarrassing than the actual MOI.

C. Primary assessment
   1. Quickly scan the patient to identify and treat life threats.
      a. Genitourinary system is very vascular.
         i. Injuries can produce a significant volume of blood.
      b. Do not avoid this area in the rapid scan.
         i. If bleeding is present, maintain privacy for patient and inspect exterior genitals for visible injury.
   2. Form a general impression.
      a. Important indicators will alert you to the seriousness of the patient’s condition.
         i. Is the patient awake and interacting, or lying still?
         ii. Does the patient have any life threats?
         iii. What color is the patient’s skin?
         iv. Is he or she responding appropriately or inappropriately?
   3. Airway and breathing
      a. Ensure that the patient has a clear and patent airway.
         i. Protect the patient from further spinal injury if trauma was involved.
      b. If patient is unresponsive or has a significant altered level of consciousness, consider inserting an oropharyngeal airway or nasopharyngeal airway.
   4. Circulation
      a. Genitourinary system can be a significant source of bleeding.
         i. Assess pulse rate and quality.
         ii. Determine skin condition, color, and temperature.
         iii. Check capillary refill time.
      b. Closed injuries do not have visible signs of bleeding.
         i. Shock may be present.
         ii. Assessment of pulse and skin will indicate how aggressively to treat for shock.
      c. Control bleeding if visible bleeding is seen.
         i. Significant bleeding is a life threat and must be controlled quickly.
   5. Transport decision
      a. Any injury to the genitourinary system can be life altering.
         i. Often requires medical specialist for specialized care

D. History taking
   1. Investigate chief complaint.
      a. Determine why 9-1-1 was called.
b. Avoid putting words into the patient’s mouth.

c. Common associated complaints with genitourinary injuries are:
   i. Nausea and vomiting
   ii. Diarrhea
   iii. Blood in urine (hematuria)
   iv. Vomiting blood (hematemesis)
   v. Abnormal bowel and bladder habits

2. SAMPLE history
   a. Use OPQRST to learn about the patient’s pain.
   b. Ask patient about output from the genitourinary system.
      i. Especially urine in the blood
   c. Ask about allergies to medications or environmental triggers.
   d. The importance of past medical history cannot be overstated.
      i. Repeated or previous injuries or illness can help determine the extent of the current injury or illness.
   e. Last intake of food and fluids is important because it can predict the genitourinary system’s contents.
   f. Address the events leading up to the injury.

E. Secondary assessment

1. Physical examinations
   a. Genitourinary system injuries can be awkward to assess and treat.
      i. Privacy is a genuine concern.
   b. When patient has an isolated injury, focus on that and the body region affected.
   c. Look for DCAP-BTLS.
   d. Identify wounds and control bleeding.
   e. For significant trauma, start with a full-body scan to see if there is trauma affecting multiple systems.
      i. Presence of penetrating injury indicates possible internal injury that should be managed accordingly.
      ii. Presence of burns must be noted and managed immediately.
      iii. Palpate for tenderness to localize the injury and presence of fractures.
      iv. Look for lacerations and local swelling.

2. Vital signs
   a. Obtain the patient’s vital signs.
      i. It is important to reassess vital signs to identify how quickly the patient’s condition is changing.
      ii. Signs such as tachycardia; tachypnea; low blood pressure; weak pulse; and cool, moist, and pale skin indicate hypoperfusion.
         (a) Evaluate the need for rapid transport.
   b. Use pulse oximetry and noninvasive blood pressure devices when available.

F. Reassessment

1. Repeat the primary assessment and vital signs.
   a. Reassess the interventions and treatment you have provided.

2. Interventions
   a. Provide oxygen and maintain a patent airway.
   b. Attempt to control bleeding and treat for shock.
   c. Place patient in position of comfort and transport.

3. Communication and documentation
   a. Communicate your concerns to the hospital staff.
   b. Describe all injuries and treatment given.
c. Documentation should be complete and thorough.

IX. Emergency Medical Care of Genitourinary Injuries

A. Kidneys

1. Damage may not be obvious upon inspection.
   a. However, you will see:
      i. Signs of shock
      ii. Blood in the urine (hematuria)

2. Treat for shock, transport promptly, and monitor vital signs en route to the hospital.

B. Urinary bladder

1. Suspect a urinary bladder injury if you see:
   a. Blood at urethral opening
   b. Signs of trauma to the lower abdomen, pelvis, or perineum

2. In the presence of shock or associated injuries:
   a. Transport promptly.
   b. Monitor vital signs en route.

C. External male genitalia

1. A few general rules for the treatment of injuries to the external male genitalia:
   a. Injuries are painful; make the patient comfortable.
   b. Use sterile, moist compresses to cover areas stripped of skin.
   c. Apply direct pressure with dry, sterile gauze dressings to control bleeding.
   d. Never move or manipulate foreign objects in the urethra.
   e. Identify and take avulsed parts in bag to hospital with patient.
      i. If patient has an avulsion of skin on the penis:
         (a) Wrap the penis in a soft, sterile dressing moistened with sterile saline.
         (b) Transport promptly.
         (c) Use direct pressure to control any bleeding.
         (d) Try to save and preserve the avulsed skin.

2. Amputation of penile shaft
   a. Managing blood loss is the top priority.
      i. Use local pressure with a sterile dressing on the remaining stump.
   b. Never apply a constricting device.
   c. Surgical reconstruction is possible if you can locate the amputated part.
      i. Wrap it in a moist, sterile dressing.
      ii. Place it in a bag.
      iii. Transport it in a cooled container without directly touching it to ice.

3. If the connective tissue surrounding the erectile tissue is severely damaged, the shaft can be fractured or severely angled.
   a. Sometimes requires surgical repair
   b. Injury may occur during particularly active sexual intercourse.
   c. Associated with intense pain, bleeding into the tissues, and fear.

4. Accidental laceration of the head of the penis is associated with heavy bleeding.
   a. Local pressure with a sterile dressing usually stops the hemorrhage.

5. Skin of shaft or foreskin can get caught in the zipper of pants.
   a. Not uncommon event
b. If a small segment of the zipper is involved, you can try to unzip the pants.

c. If a longer segment is involved, use heavy scissors to cut the zipper out of the pants to make the patient more comfortable.
   i. Explain what you are going to be cutting.
   ii. Be careful not to injure the scrotum while cutting.

6. Urethral injuries in the male are not uncommon.
   a. Lacerations of the urethra can result from:
      i. Straddle injuries
      ii. Pelvic fractures
      iii. Penetrating wounds of the perineum
   b. It is important to know if the patient can urinate and if there is blood in the urine.
      i. Save any urination for later examination at the hospital.
   c. Any foreign bodies protruding from the urethra will have to be surgically removed.

7. Avulsion of the skin of the scrotum may damage the scrotal contents.
   a. Preserve the avulsed skin in a moist sterile dressing for possible use in reconstruction.
   b. Wrap the scrotal contents or the perineal area with a sterile moist compress, and use a local pressure dressing to control bleeding.

8. Direct blows to the scrotum can result in the rupture of a testicle or significant accumulation of blood around the testes.
   a. Apply an ice pack to the scrotal area during transport.

D. Female genitalia

1. Treat lacerations, abrasions, and avulsions with moist, sterile compresses.
   a. Use local pressure to control bleeding.
   b. Hold dressings in place with diaper-type bandage.
2. Do not pack dressings into vagina.
3. Leave any foreign bodies in place after stabilizing with bandages.
4. Injuries are painful but generally not life threatening.
   a. In-hospital evaluation required.
   b. Transport urgency is determined by associated injuries, the amount of hemorrhage, and the presence of shock.

E. Rectal bleeding

1. Common complaint
   a. Bleeding from the rectum may present as blood in or soaking through undergarments, or may be passed into the toilet with a bowel movement.
2. Possible causes include sexual assault, hemorrhoids, colitis, and ulcers in the digestive tract.
3. Significant rectal bleeding can occur after hemorrhoid surgery.
4. Acute rectal bleeding should never be passed off as something minor.
   a. Pack the crease between the buttocks with compresses.
   b. Consult medical control to determine the need for transport.

X. Sexual Assault

A. Sexual assault and rape are all too common.

B. Victims are generally women.

1. Sometimes men and children are victims.
2. Often there is little that you can do beyond providing compassion and transport.
3. The patient may have sustained multisystem trauma.
   a. Will need treatment for shock

C. Do not examine the genitalia unless obvious bleeding requires application of a dressing.

D. Follow appropriate procedures and protocol.
   1. Shield the patient from curious onlookers.
   2. Document the patient’s history, assessment, treatment, and response to treatment, for possible court appearances.
      a. Do not speculate.
      b. Record only the facts.
   3. Follow any crime scene policy of your EMS system.
      a. Advise the patient not to wash, douche, urinate, or defecate until after a physical examination.
      b. If oral penetration occurred, advise the patient not to eat, drink, brush the teeth, or use mouthwash until after a physical examination.
      c. Handle the patient’s clothes as little as possible
         i. Place articles of clothing or other evidence in paper bags.
         ii. Do not use plastic bags because mold can grow and destroy evidence.
   4. Make sure that the EMT caring for the patient is of the same gender as the patient whenever possible.
   5. Treat medical injuries and provide privacy, support, and reassurance.

XI. Summary

A. Abdominal injuries are categorized as either open (penetrating trauma) or closed (blunt force trauma).
B. Either type of injury can result in injury to the hollow or solid organs of the abdomen and cause significant life-threatening bleeding.
C. Blunt force trauma that causes closed injuries results from an object striking the body without breaking the skin, such as being hit with a baseball bat or when the patient’s body strikes the steering wheel during a motor vehicle crash.
D. Penetrating trauma is often a result of a gunshot wound or stab wound. Other MOIs such as a fall on an object can also cause penetrating trauma to the abdomen.
E. Injury to the solid internal organs often causes significant unseen bleeding that can be life threatening.
F. Injury to the hollow organs of the abdomen may cause irritation and inflammation to the peritoneum as caustic digestive juices leak into the peritoneum. A serious infection may also occur over several hours.
G. Always maintain a high index of suspicion for serious intra-abdominal injury in the trauma patient, particularly in the patient who exhibits signs of shock.
H. Assess the abdomen for signs of bruising, rigidity, penetrating injuries, and pain.
I. Never remove an impaled object from the abdominal region. Secure it in place with a large bulky dressing and provide prompt transport.
J. Be prepared to treat the patient for shock. Place the patient in the modified shock position, keep the patient warm, and provide high-flow oxygen.
K. Never replace an organ that protrudes from an open injury to the abdomen (evisceration). Instead, keep the organ moist and warm. Cover the injury site with a large sterile, moist, bulky dressing.
L. Injuries to the kidneys may be difficult to detect because of the well-protected region of the body where they are located. Be alert to bruising or a hematoma in the flank region.
M. Injury to the external genitalia of male and female patients is very painful but not usually life threatening.
N. In the case of sexual assault or rape, treat for shock if necessary, and record all the facts in detail. Follow any crime scene policy established by your system to protect the scene and any potential evidence. Advise the patient not to wash, douche, or void until after a physician has examined him or her.
Post-Lecture

Unit Assessment

1. List four signs of peritonitis.

2. What complications can occur if a seatbelt is worn too high?

3. In a penetrating injury to the abdomen, there are low-velocity, medium-velocity, and high-velocity mechanisms. Which of these would cause cavitation?

4. List three signs and symptoms associated with abdominal injuries.

5. How should the patient with blunt abdominal injuries be managed?

6. What is the displacement of abdominal organs outside of the body called?

7. What findings would suggest damage to the kidneys?

8. In what position should a hypotensive patient in the late stages of pregnancy be transported?

9. In assessing a patient with an injury to the genitourinary system, what monitoring devices are recommended, if they are available?

10. How should bleeding from amputation of the penis be managed?
Knowledge Objectives