

**UNITED STATES MARINE CORPS**  
**FIELD MEDICAL TRAINING BATTALION**  
Camp Lejeune, NC 28542-0042

FMST 410

**Manage Abdominal Injuries**

**TERMINAL LEARNING OBJECTIVE**

1. Given a casualty in an operational environment, **treat abdominal injuries** reducing the risk of further injury or death. (8404-MED-2006)

**ENABLING LEARNING OBJECTIVES**

1. Without the aid of reference, given a description or title, **identify anatomy of the major abdominal organs**, within 80% accuracy, per Prehospital Trauma Life Support, current Military Edition. (8404-MED-2006a)

2. Without the aid of reference, given a description or title, **identify the significance of the types of organs in abdominal injuries**, within 80% accuracy, per Prehospital Trauma Life Support, current Military Edition. (8404-MED-2006b)

3. Without the aid of reference, **identify the two major mechanisms of abdominal trauma**, within 80% accuracy, per Prehospital Trauma Life Support, current Military Edition. (8404-MED-2006c)

4. Without the aid of reference, given a description or list, **identify the signs and symptoms of abdominal injuries**, within 80% accuracy, per Prehospital Trauma Life Support, current Military Edition. (8404-MED-2006d)

5. Without the aid of reference, given a description or list, **identify the proper treatment of abdominal injuries**, within 80% accuracy, per Prehospital Trauma Life Support, current Military Edition. (8404-MED-2006e)

6. Without the aid of reference, given a simulated casualty with abdominal injuries and a Corpsman Assault Pack, **manage simulated abdominal injuries**, to prevent further injury or death, per Prehospital Trauma Life Support, current Military Edition. (8404-MED-2006f)

## **OVERVIEW**

Unrecognized abdominal injury is one of the major causes of death in the trauma casualty. Early deaths from severe abdominal trauma typically result from massive blood loss caused by either penetrating or blunt injuries. The abdomen contains the major organs of digestion and excretion. The abdominal cavity is located below the diaphragm; its boundaries include the anterior abdominal wall, the pelvic bones, the vertebral column, and the muscles of the abdomen and flanks. Many organs lie in both the abdomen and the pelvis. The simplest and most common method of describing the portions of the abdomen is by quadrants. In this system, the abdomen is divided into four equal parts by two imaginary lines that intersect at right angles at the umbilicus. The abdomen can further be divided to more specifically identify a region of the abdomen (see Figure 1).

### **1. MAJOR ABDOMINAL ORGANS AND THEIR LOCATIONS**

#### **Right Upper Quadrant (RUQ)**

Colon - the part of the large intestine that extends from the cecum to the rectum.

Right Kidney - one of a pair of organs situated in the body cavity near the spinal column that excrete waste products. The kidneys are bean-shaped organs that consist chiefly of nephrons by which urine is secreted, collected, and discharged through the ureter to the bladder.

Pancreas - a large lobulated gland that secretes digestive enzymes and the hormones insulin and glucagon. Only a small portion of the pancreas is located in the RUQ.

Liver - a large, very vascular, glandular organ that secretes bile and causes important changes in many of the substances contained in the blood.

Gallbladder - a membranous muscular sac in which bile from the liver is stored.

#### **Left Upper Quadrant (LUQ)**

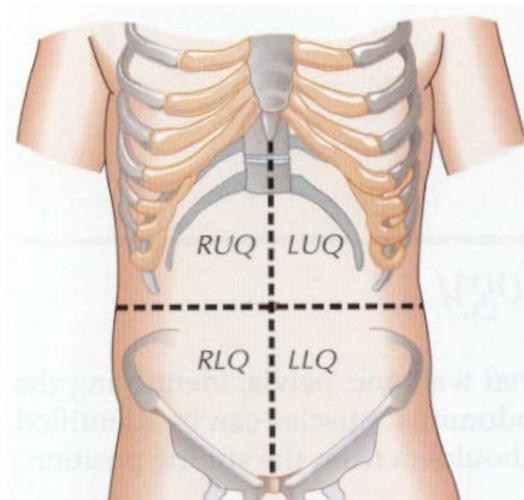
Colon - see above.

Left Kidney - see above.

Pancreas - see above for function. Most of the pancreas is located in the LUQ.

Spleen - a highly vascular, ductless organ that is located in the left abdominal region near the stomach or intestine and is concerned with final destruction of red blood cells, filtration and storage of blood, and production of lymphocytes. Severe bleeding is consistent with injury to this organ.

Stomach - muscular, distensible, saclike portion of the alimentary tube between the esophagus and the colon.



**Figure 1. Areas of the Abdomen**

### Right Lower Quadrant (RLQ)

Ascending Colon - see above. Ascending means to move upwards.

Small Intestine - the part of the intestine that lies between the stomach and colon; it consists of duodenum, jejunum, and ileum. It secretes digestive enzymes, and is the chief site for the absorption of digested nutrients.

Major artery and vein for right leg - iliac artery and vein.

Appendix - a small sac extending from the large intestine.

### Left Lower Quadrant (LLQ)

Descending Colon - see above. Descending means to move downwards.

Small Intestine - see above.

Major artery and vein for left leg - iliac artery and vein.

## 2. **SIGNIFICANCE OF ABDOMINAL ORGANS**

The abdominal organs can be classified as either "hollow" or "solid" organs, depending on their function.

Solid Organs - solid masses of tissue (liver, spleen, pancreas and kidneys)

Significance - highly vascular organs where injury may cause severe bleeding.

Hollow Organs - gastrointestinal/urinary tract through which materials pass. The stomach, intestines, and bladder are hollow organs.

Significance - injury to these organs may cause septicemia and toxicity.

## 3. **MECHANISMS FOR ABDOMINAL INJURY**

Assessing the patient for abdominal injuries begins with knowledge of the MOI. Numerous mechanisms lead to the compression and shearing forces that may damaged abdominal organs. A casualty may experience considerable deceleration forces when involved in motor vehicle crashes, struck or run over by a vehicle, or after falling from a significant height. Any protective gear worn by the casualty should be noted. Abdominal injuries can be caused by blunt or penetrating trauma.

**Blunt Trauma** - Blunt trauma often poses a greater threat to life because potential injuries are more challenging to diagnose than those caused by penetrating trauma. The injuries to abdominal organs result from either compression or shearing forces. In compression incidents, the organs of the abdomen are crushed between solid objects. Shearing forces create rupture of the solid organs or rupture of blood vessels in the cavity because of the tearing forces exerted against their supporting ligaments. The liver and spleen can shear and bleed easily and blood loss can occur at a rapid rate. Increased intra-abdominal pressure produced by compression can rupture the diaphragm, causing the abdominal organs to move upward into the pleural cavity.

**Penetrating Trauma** - A foreign object enters the abdomen and opens the peritoneal cavity to the outside. Penetrating trauma, such as a gunshot or stab wound, is more readily visible than blunt trauma. Multiple organ damage can occur in penetrating trauma, although it is less likely with a stab wound than with a gunshot wound. A mental visualization of the

potential trajectory of a missile, such as a bullet or the path of a knife blade, can help identify possible injured internal organs.

#### 4. **SIGNS AND SYMPTOMS**

History of the injury can be obtained from the patient or from bystanders. If the injury is penetrating, questions should focus on the type of weapon, number of times shot or stabbed, and amount of blood at the scene.

Unless there are associated injuries, casualties with abdominal trauma generally present with a patent airway. When abnormalities are found in the assessment of the abdomen, it should be exposed and examined in greater detail. This involves inspection and palpation of the abdomen looking and feeling for soft tissue injuries and distention.

**The most reliable indicator of intra-abdominal bleeding is the presence of shock from an unexplained source.**

Soft tissue injuries include contusions, abrasions, stab or gunshot wounds, obvious bleeding, and unusual findings such as evisceration or impaled objects. Palpation of the abdomen is undertaken to identify areas of tenderness. Ideally, palpation is begun in an area where the casualty does not complain of pain. Then, each of the abdominal quadrants is palpated. While palpating a tender area, the provider may note that the casualty “tenses up” the abdominal muscles in that area. This reaction, called voluntary guarding, serves to protect the patient from pain.

Involuntary guarding represents rigidity or spasm of the abdominal wall muscles when the casualty is distracted. Deep or aggressive palpation of an obviously injured abdomen should be avoided because palpation may dislodge blood clots and/or promote existing hemorrhage and may increase spillage of contents of the GI tract if perforations are present. Great care during palpation should also be exercised if there is an impaled object. Casualties with altered mental status, such as those with a traumatic brain injury (TBI) may have unreliable examination.

Auscultation of bowel sounds is generally not a helpful field assessment tool. Time should not be wasted trying to determine their presence or absence because this diagnostic sign will not alter the field management of the casualty.

The assessment of abdominal injuries can be difficult, especially with the limited diagnostic capabilities of the field setting. An index of suspicion for abdominal injuries should develop from a variety of sources of information, including mechanism of injury (MOI), findings from the exam, and input from the casualty or bystanders. Some signs that raise the index of suspicion are:

- MOI consistent with rapid deceleration or significant compression forces
- Soft tissue injuries to the abdomen, flank, or back

- Shock without an obvious cause
- Level of shock greater than explained by other injuries
- Significant abdominal tenderness on palpation or with coughing
- Involuntary guarding
- Diminished or absent bowel sounds

**FYI:** Only about 15% of casualties with stab wounds to the abdomen will require surgical intervention, but 85% of casualties with gunshot wounds will need surgery for definitive management of their injuries.

## 5. TREATMENT OF INJURIES

The key aspects of field management of abdominal trauma are to recognize the presence of potential injury and initiate transport to a higher echelon of care.

### Blunt Trauma

Treatment for blunt trauma to the abdomen includes maintaining the ABCs of the patient, collecting vital signs, gathering information for a history, treating for shock, and placing the patient in the supine position with the knees slightly flexed. Remember that with a patient with blunt trauma you need to keep them calm so that you can perform your duties and not to strongly palpate the abdomen because you do not know the extent of the internal injuries. The final step in treating blunt abdominal trauma is to TACEVAC the patient, as the definitive treatment that patient needs is beyond your scope of care.

Impaled objects (see Figure 2) Because removal of an impaled object may cause additional trauma and because the object's distal end may be actively controlling the bleeding, removal of it in the field environment is contraindicated. The impaled object should neither move nor be removed. If bleeding occurs around it, direct pressure should be applied around the object to the wound with a bulky dressing that stabilizes the object and prevents movement.



**Figure 2. Impaled knife in chest**

Evisceration (see Figure 3) A section of intestine or other abdominal organ is displaced through an open wound and protrudes externally outside the abdominal cavity. Efforts should focus on protecting the protruding segment of intestine or other organ from damage. If the intestine or some of the other abdominal organs become dry, cell death will occur. Therefore the eviscerated abdominal contents should be covered with a sterile dressing that has been moistened with saline. These dressings should be periodically remoistened with

saline to prevent them from drying out. Wet dressings may be covered with a large, dry dressing to keep the casualty warm.



**Figure 3. Evisceration of bowel**

**FYI!** Under normal circumstances, treatment of eviscerated bowel requires only a moist sterile dressing. Abdominal contents normally do not need to be reinserted into the abdominal cavity.



## CASUALTY ASSESSMENT AND ABDOMINAL INJURIES

**Care Under Fire Phase:** In the absence of life-threatening hemorrhage from the abdomen, the material in this section is unlikely to be addressed in Care Under Fire.

**Tactical Field Care Phase:** During this phase, you will be required to inspect the abdomen using DCAP-BTLS for any signs of injury. Don BSI. Note and treat all abdominal injuries. Complete a head to toe assessment using DCAP-BTLS noting and treating additional injuries. Determine if vascular access is required (see Tactical Fluid Resuscitation lesson) and give fluids if necessary. If the casualty is able to drink fluids, they should be encouraged to do so. Consider pain medications and give antibiotics if warranted. Reassess all care provided. Document care given, prevent hypothermia, and TACEVAC.

## REFERENCE

Prehospital Trauma Life Support, current Military Edition

## Abdominal Review

1. Which quadrant contains the appendix?
2. Identify the solid organs and explain their significance.
3. Describe the appropriate treatment for an impaled object.
4. Describe the appropriate treatment for an abdominal evisceration.