

# **Abdominal Genitourinary Injuries and Emergencies**

**EMS Continuing Education  
Technician through Technician-Advanced Paramedic**

**Consistent with the  
National Occupational Competency Profiles  
as developed by  
Paramedic Association of Canada  
and  
“An Alternate Route to Maintenance of Licensure”  
as developed by Manitoba Health**

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Educational Subcommittee – Paramedic Association  
of Manitoba**

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## Disclaimer

These documents were developed for improved accessibility to standardized continuing education for all paramedics in Manitoba.

This training package is consistent with the National Occupational Competency Profiles and the core competency requirements (both mandatory and optional) as identified in “An Alternative Route to Maintenance of Licensure” (ARML). It is not the intent that this package be used as a stand-alone teaching tool. It is understood that the user has prior learning in this subject area, and that this document is strictly for supplemental continuing medical education. To this end, the Paramedic Association of Manitoba assumes no responsibility for the completeness of information contained within this package.

It is neither the intent of this package to supersede local or provincial protocols, nor to assume responsibility for patient care issues pertaining to the information found herein. Always follow local or provincial guidelines in the care and treatment of any patient.

This package can be used in conjunction with accepted models for education delivery and assessment as outlined in “An Alternative Route to Maintenance of Licensure”. Any individual paramedics wishing to use these continuing education packages to augment their ARML program should contact their local EMS Director.

This document was designed to encompass all licensed training levels in the province (Technician, Technician – Paramedic, Technician – Advanced Paramedic.). Paramedics are encouraged to read beyond their training levels. However, it is suggested that the accompanying written test only be administered at the paramedic’s current level of practice.

This package has been reviewed by the Paramedic Association of Manitoba’s Educational Subcommittee and is subject to review by physician(s) or expert(s) in the field for content.

As the industry of EMS is as dynamic as individual patient care, the profession is constantly evolving to deliver enhanced patient care through education and standards. The Paramedic Association of Manitoba would like to thank those practitioners instrumental in the creation, distribution, and maintenance of these packages. Through your efforts, our patient care improves.

This document will be amended in as timely a manner as possible to reflect changes to the National Occupational Competency Profiles, provincial protocols/Emergency Treatment Guidelines, or the Cognitive Elements outlined in the Alternate Route document.

Any comments, suggestions, errors, omissions, or questions regarding this document may be referred to [info@paramedicsofmanitoba.ca](mailto:info@paramedicsofmanitoba.ca) , attention Director of Education and Standards.

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## **Introduction:**

The sections covered in this document include both “Abdominal and Genitourinary Emergencies” and “Abdominal and Genitourinary Injuries”. Topics covered include:

- Anatomy and physiology of the gastrointestinal and genitourinary systems.
- Abdominal and genitourinary illness.
- Abdominal and genitourinary injuries.
- Abdominal and Genitourinary Devices.

## **Conventions Used in this Manual**

Black lettering without a border is used to denote information appropriate to the Technician Level and above.

Text with the single striped border on the left is information appropriate to Technician Paramedic and above.

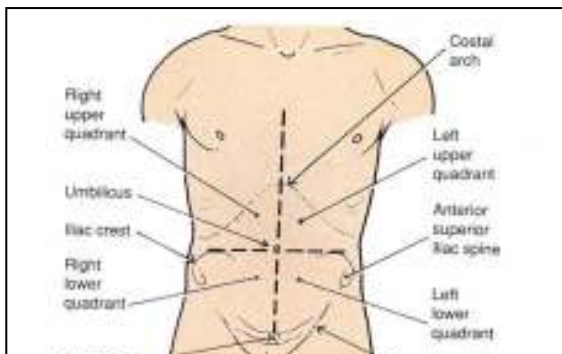
Text with double striped border on the left is information appropriate to Technician Advanced Paramedic and above.

# Anatomy and Physiology of the Gastrointestinal and Genitourinary Systems

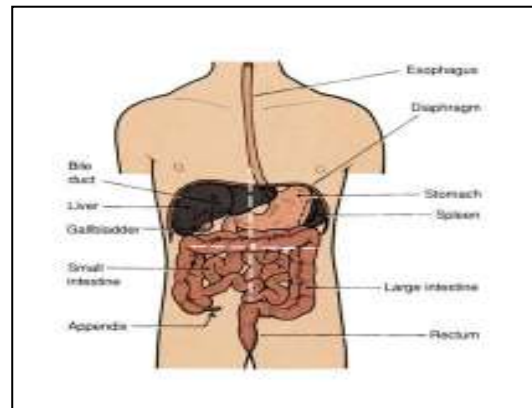
## The Abdominal Cavity

The abdomen is the largest body cavity. It is separated from the chest by the diaphragm and from the pelvis by an artificial plane extending through the pelvic inlet. It is bordered posteriorly by the spine and back and anteriorly by the abdominal wall. The abdominal cavity contains the organs of the gastrointestinal system and a portion of the organs of the genitourinary system. The pelvic cavity is below the abdominal cavity and contains most of the reproductive organs as well as portions of the genitourinary system. The anterior surface of the abdomen is divided topographically into four divisions, or quadrants. They are delineated by drawing a vertical line from the symphysis pubis to the xiphoid process and a horizontal line through the umbilicus. Each quadrant contains the following organs.

- *Left Upper Quadrant (LUQ)*: spleen, tail of the pancreas, stomach, left kidney, and splenic flexure of the colon.
- *Right Upper Quadrant (RUQ)*: liver, gall bladder, head of the pancreas, part of the duodenum, right kidney, and hepatic flexure of the colon.
- *Right Lower Quadrant (RLQ)*: appendix, ascending colon, small intestine, and the right ovary and fallopian tube.
- *Left Lower Quadrant (LLQ)*: small intestine, descending colon, the left ovary, and fallopian tube.



*Fig.1 The abdominal cavity is divided into four quadrants, for identifying and reporting problems.*



*Fig. 2 the solid organs are solid masses of tissue that do much of the chemical work in the body.*

The lateral portion of the abdomen, often referred to as the flank, is associated with the kidneys. Immediately inferior to the xiphoid process is the epigastrium. A common location of abdominal pain, the epigastrium is frequently associated with peptic ulcer disease, gastritis, and esophagitis.

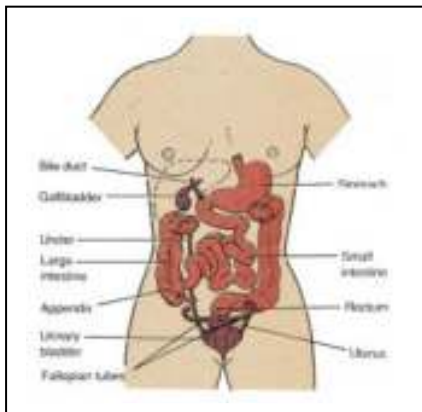
The abdomen is lined with a membrane called the peritoneum. The parietal layer of the peritoneum lines the abdominal wall and the visceral peritoneum lines the surface of the organs. Between these two layers is the peritoneal space. Most organs are located within

the peritoneal cavity. Some, however, are located behind it and are referred to as being retroperitoneal. These include the kidneys, portions of the duodenum, and portions of the pancreas. In certain disease states, the peritoneum can become inflamed - a condition known as peritonitis. This medical condition is characterized by generalized abdominal pain and rebound tenderness. {Rebound tenderness is tenderness on release of the examiner's hands, allowing the patient's abdominal wall to return to its normal position. Rebound tenderness is associated with peritoneal irritation.}

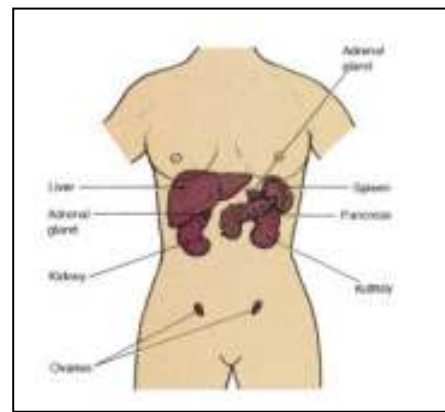
Anatomically, the organs of the abdominal cavity can be divided into two categories- solid and hollow.

**Solid Organs:** liver, spleen, pancreas, kidneys, adrenals, and ovaries (in the female).

**Hollow Organs:** stomach, intestines, gall bladder, urinary bladder, and uterus (in the female).



*Figure 3 the hollow organs in the abdominal cavity are actually tubes through which material passes.*



*Figure 4 the solid organs are solid masses of tissue that do much of the chemical work in the body.*

## **The Gastrointestinal System**

Most of the organs in the abdomen belong to the gastrointestinal system. The gastrointestinal system is responsible for converting raw food into an energy form that the body can use. The gastrointestinal system includes the following organs.

**Mouth:** The mouth, oral cavity, consists of the lips, cheeks, gums, teeth, and tongue. It plays an essential role in digestion, breaking down food into smaller particles. Also, through salivary gland secretions, primarily amylase, digestion begins in the mouth.

**Esophagus:** A hollow, muscular tube, the esophagus transports food between the mouth and the stomach.

**Stomach:** The stomach is a hollow organ in the left upper quadrant of the abdomen. After receiving food from the esophagus, it continues the process of digestion. Covered by a mucous membrane to protect itself from the low pH, the stomach secretes hydrochloric acid.

**Intestines:** The intestines are the major sites of digestion and absorption. Food moves through the intestines through a process called peristalsis. {Peristalsis: wavelike muscular motion of the esophagus and bowels that moves food through them}. The **small intestines** are divided into three regions:

- i) duodenum
- ii) jejunum
- iii) ileum

Partially digested food empties into the duodenum from the stomach at the pyloric sphincter. Most digestion and absorption occurs in the small intestine. Its structure is specifically adapted for this function. Once digested food reaches the ileum, it enters the large intestine via the ileocecal valve. The **large intestines** are divided into four principle regions:

- i) cecum
- ii) colon
- iii) rectum
- iv) anal canal

The colon can be further divided into the ascending, transverse, descending and sigmoid colon. The functions of the large intestines are to complete the absorption process, produce certain vitamins, form and expel feces.

Besides these major organs, a number of accessory organs play a part in digestion. These include:

**Salivary Glands:** Located in the head, the salivary glands produce saliva to lubricate food passage and amylase to initiate digestion.

**Teeth:** The teeth play a major role in processing food into a form usable by the digestive system.

**Liver:** Located in the right upper quadrant, the liver is the largest organ in the body. It secretes bile necessary for the digestion of fats. The liver is also responsible for carbohydrate metabolism, protein metabolism, detoxification of toxins such as alcohol, excretion of bilirubin, and storage of glycogen.

**Gall Bladder:** The gall bladder is a hollow organ immediately behind the liver that stores bile for later use. Following ingestion of a fatty meal, the gall bladder contracts and excretes bile, through the cystic duct, into the duodenum.

**Pancreas:** The pancreas lies in both the right and left upper abdominal quadrants behind the stomach. It secretes several digestive enzymes called pancreatic juice. The pancreas

also has endocrine function. In the Islets of Langerhans, hormones such as glucagon, insulin, and somatostatin are secreted.

### **The Circulatory System**

Major blood vessels travel through the abdomen. The descending aorta is the largest artery in the abdomen and supplies blood to all of the abdominal viscera. The superior mesenteric and inferior mesenteric arteries supply blood to most of the intestines. The aorta divides into the iliac arteries to supply the lower extremities. The inferior vena cava, the largest vein in the abdomen drains the lower extremities and certain abdominal viscera. The portal system is a specialized circulatory system within the abdomen. This system drains blood from parts of the intestines and transports it to the liver, where it is filtered and processed.

### **The Genitourinary System**

Much of the genitourinary system is also located in the retroperitoneal space. The system is composed of the following organs.

**Kidneys:** The kidneys are paired organs located in the right and left flank area. The kidneys contain **nephrons**, which are the functional units of the kidneys. They are responsible for:

- i) filtering blood
- ii) returning useful substances
- iii) removing non useful substances
- iv) producing urine

The kidneys also have an endocrine responsibility in which they excrete the hormones:

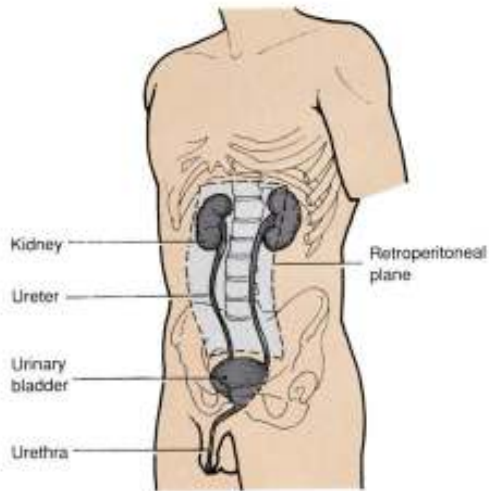
- i) Angiotensin II
- ii) Aldosterone
- iii) Antidiuretic Hormone
- iv) Atrial Natriuretic Peptide

These hormones play a large part in the regulation of blood pressure and in maintaining and regulating fluid and electrolyte balances.

**Ureters:** The ureters are tubes connecting the kidneys with the urinary bladder. A kidney stone can sometimes enter a ureter, causing intense pain. These stones often lodge at the pelvic brim where the ureter enters the pelvis.

**Urinary Bladder:** Located in the pelvis, the bladder receives and stores urine from the kidneys.

**Urethra:** The urethra is the tube connecting the bladder to the outside. It is considerably shorter in the female than in the male.

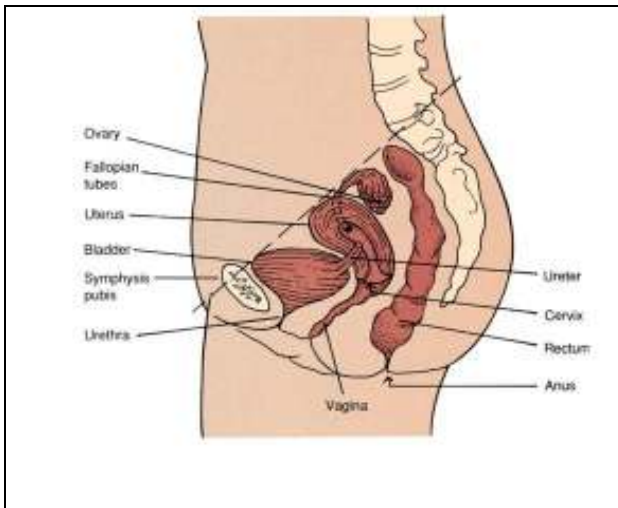


*Fig. 5 The urinary system lies in the retroperitoneal space behind the digestive tract. The kidneys are solid organs; the ureters, bladder, and urethra are hollow organs.*

## **The Reproductive System**

### **Female**

The female reproductive system is located in the pelvic cavity and includes the following organs.



*Fig. 6 the female reproductive system includes the ovaries, fallopian tubes, uterus, cervix and vagina.*

**Ovaries:** The ovaries, or female gonads, are small, walnut-sized organs adjacent to the uterus. They are responsible for producing a portion of the female hormones and for production of the female component of reproduction, the ovum.

**Fallopian Tubes:** The fallopian tubes are hollow tubes connecting the ovary to the uterus. They transport the ovum to the uterus. Fertilization usually occurs in the fallopian tube, which is open at the end adjacent to the ovary. This provides direct access to the abdominal cavity and to the uterus. The fallopian tube is a source of infection (salpingitis), especially in pelvic inflammatory disease (PID).

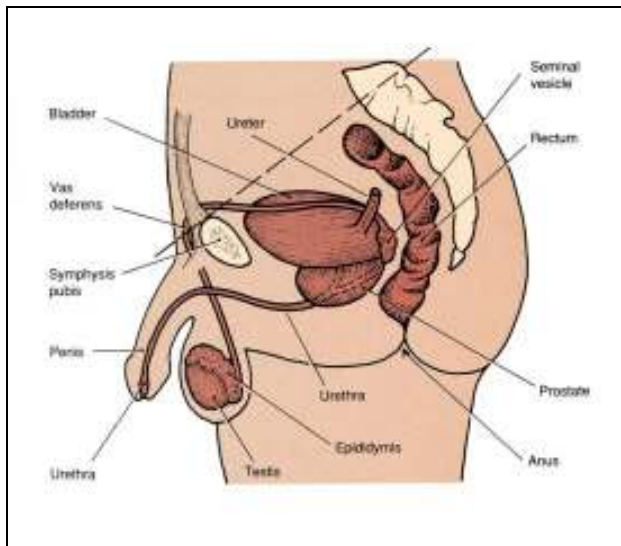
**Uterus:** The uterus is a hollow, muscular organ, situated low in the pelvis. A portion of it, the cervix, extends into the vagina. The superior part of the uterus is called the fundus. The uterus is the site of implantation and development of the fetus.

**Vagina:** The vagina extends from the uterus to the vulva. It is the female organ of copulation and the birth canal. The external opening of the vagina is called the introitus.

**Vulva:** The vulva is the external female genitalia. It consists of the labia majora, labia minora, and accessory glands.

## Male

The male reproductive organs are located in the lower portion of the pelvic cavity, and outside the pelvic cavity in the scrotum. These organs include the following structures.



*Fig. 7 The male reproductive system includes the testicles, vas deferens, seminal vesicles, prostate gland, urethra, and penis.*

**Testes:** The testes, or male gonads, lay in the scrotum. They are responsible for production of the male hormones and sperm. To facilitate sperm production, the scrotum maintains the testes at a temperature slightly lower than that of the body.

**Epididymis:** The epididymis are small appendages on the testes that act as a reservoir for sperm.

**Prostate:** A small gland at the base of the bladder, the prostate is responsible for production of fluid to transport sperm. In older men, it can become enlarged (benign prostatic hypertrophy) and, at certain times, obstruct urine flow.

**Vas Deferens:** The vas deferens is a small muscular tube that transports sperm from the testes to the urethra for discharge during ejaculation. To achieve sterility in the male, they are sometimes cut in a procedure called vasectomy.

**Urethra:** The urethra is a canal that drains urine from the bladder to the outside. In the male, it also discharges sperm during ejaculation.

**Penis:** The male organ of copulation, the penis is covered by loose skin, thus allowing for erection. The skin overlying the end of the penis (glans) is sometimes surgically removed in a procedure called circumcision.

## **Abdominal Illnesses**

### **Abdominal Pathophysiology**

The “acute abdomen” refers to the relatively sudden onset of abdominal pain, and it is often associated with other signs and symptoms such as nausea, vomiting, guarding, and rebound tenderness. Many conditions producing the acute abdomen are potentially fatal unless treated promptly by surgery. Therefore, it is essential to assess the severity of the patient’s complaints. Every patient with abdominal pain should be transported to the emergency department for evaluation by a physician.

Abdominal Illnesses can be divided into gastrointestinal system emergencies, genitourinary system emergencies, or reproductive system emergencies. Because it is difficult to determine the source of an abdominal problem in the field, your approach to the patient with acute abdominal pain should be the same regardless of the system involved.

Problems can arise from virtually any organ of the gastrointestinal system. The following is a discussion of common gastrointestinal system problems, beginning proximally at the esophagus.

**Esophageal Varices:** Esophageal varices are swollen veins in the lower third of the esophagus. They result from increased pressure in the portal circulation (portal hypertension) or by ingestion of toxic substances. The portal circulation drains from the intestines to the liver. Diseases of the liver, such as alcoholic cirrhosis, can slow portal circulation, causing engorgement of the veins in the lower esophagus and the rectum (hemorrhoids). The most common presentation is painless gastrointestinal bleeding. Massive quantities of blood can be vomited. Treatment consists of fluid replacement and transfusion. If bleeding does not stop, the veins can be injected - via a scope passed into the esophagus - with an agent to constrict them. A specialized tube (Sengstaken-Blakemore) may occasionally be placed to tamponade the bleeding vessels. Patients with significant bleeding esophageal varices tend to have a high mortality.

**Esophageal Disruption:** The esophagus can also bleed due to other etiologies. A **Mallory Weiss Tear** is a disruption (tear) to the vasculature of the esophagus due to excessive retching and is commonly found in chronic alcoholics. Bleeding tends to be minor with blood streaks found in emesis.

The esophagus may also perforate. 50% of esophageal perforations are caused by iatrogenic procedures such as nasogastric tube insertion, and endoscopy. Other causes include trauma, tumors and caustic ingestions.

**Esophagitis:** Esophagitis is inflammation of the esophagus. It is most often caused by back flow of acid and stomach contents due to inappropriate relaxation of the lower esophageal sphincter (LES). Substances such as excessive alcohol, caffeine and cigarette smoking can contribute to LES relaxation. Esophagitis can also be associated with hiatus hernia and can be caused by infection. Treatment is with antacids, H<sub>2</sub> blockers (e.g. Cimetidine), and proton pump inhibitors (e.g. omeprazole). Some patients may undergo endoscopy or barium swallow for investigation.

**Esophageal Obstruction:** Esophageal Obstruction frequently causes dysphagia. Obstructive disease is usually progressive. History of CVA, muscle disease or Parkinson's is often present. A neoplasm or stricture may also be found. Obstruction caused by foreign body can occur at any point along the esophagus. Foreign body obstructions may cause anxiety, retrosternal chest pain, vomiting coughing or choking. Nitrates and anticholinergics are often used to relax the esophagus allowing the foreign body to pass.

**Gastritis:** Gastritis is an inflammation of the lining of the stomach. It results from increased gastric acid secretion and is associated with alcohol ingestion, drugs, stress, and other factors. The patient will often complain of epigastric pain, belching, and indigestion. The pain often improves after eating. If allowed to progress untreated, the protective lining of the stomach will eventually be destroyed and a gastric ulcer (erosion) may develop. Treatment involves administration of antacids and H<sub>2</sub> blocking drugs such as Cimetidine (Tagamet).

**Peptic Ulcer Disease:** Peptic ulcer disease is due to a progression of gastritis. Erosion of the lining of the esophagus, stomach, or duodenum occurs. It often results from excess secretion of hydrochloric acid from the stomach, alcohol, non steroidal anti-inflammatories such as ASA or infection with helicobacter pylori virus. Abdominal pain associated with peptic ulcer disease is usually located in the epigastrium or the left upper quadrant. Severe ulceration can cause significant gastrointestinal bleeding in the form of melena or hematemesis. The ulcer can sometimes erode through the wall of the organ, resulting in an acute abdomen. Pain is often relieved following meals or usage of antacids. Treatment with H<sub>2</sub> receptor antagonists or proton pump inhibitors may also be indicated.

**Gastroesophageal Reflux Disease (GERD):** Gastroesophageal Reflux Disease is similar to gastritis. Pyrosis (heartburn) is the most common symptom and sometimes the sole manifestation of GERD. It is caused by lower esophageal mucosal inflammation. Pain occurs frequently following meals and can radiate to the back, neck and arms. It may be brought on by exertion and relieved by rest. H<sub>2</sub> blockers and proton pump inhibitors assist in the reduction of the symptoms of GERD.

**Gastroenteritis:** Gastroenteritis results from ingestion of food contaminated with bacteria capable of causing disease itself (e.g. salmonella) or toxins caused by the bacteria. Patients complain of symptoms 1 – 8 hours post ingestion. Complaints of fever, cramps, diarrhea, nausea and vomiting are common. Fluid and electrolyte replacement along with gastrointestinal rest is usually all that is required. Antiemetics are largely unnecessary.

**Diverticulitis:** Diverticula are pouches that develop, usually with age, on the large intestine, particularly on the descending colon (left side). These diverticula can become inflamed in much the same manner as the appendix. In fact, most cases of diverticulitis present like a left-sided appendicitis. The patient has abdominal pain, fever, vomiting, anorexia, and tenderness. Treatment includes antibiotics, dietary modifications, and, in certain cases, surgery.

**Bleeding Diverticulosis:** Lower gastrointestinal bleeding can include bleeding from diverticula on the large intestines. It usually presents as painless rectal bleeding. The bleeding most often presents as brighter than that of melena and is referred to as **hematochezia**. Left-sided abdominal pain, however, can be present. The primary concern is prevention of shock.

**Carcinoma of the Colon:** Carcinoma of the colon is a malignant growth occurring anywhere in the colon. The presentation may be diverse. It can begin as painless rectal bleeding, weight loss, or abdominal pain. Prevention of shock is the primary concern if the bleeding is severe.

**Irritable Bowel Disease (IBD):** Irritable Bowel Disease includes **Crohn’s Disease** and **Ulcerative Colitis**

Crohn’s	Ulcerative Colitis
Occurs anywhere in the GI tract	Occurs in colon only
Associated with malabsorption	No malabsorption
Less increased risk of cancer	Marked cancer risk
Abscesses are common	Bleeding common
Diarrhea	Diarrhea
Abdominal pain	Colicky pain
Melena in 50% of patients	Good response to surgery
Poor response to surgery	

**Appendicitis:** Appendicitis is the inflammation of the vermiform appendix. A piece of hard stool (fecalith) or a similar substance will occasionally obstruct the lumen of the appendix. This can result in inflammation of the appendix itself. Often, however, no identifiable cause can be found. The patient suffering appendicitis will usually complain of right lower quadrant abdominal pain. The onset of the pain is usually acute, often beginning in the area around the umbilicus. As the process develops, the pain migrates to the right lower quadrant. Nausea, vomiting, fever, and anorexia are common. The

peritoneum will generally become inflamed and rebound tenderness will be present. If the appendix ruptures, the pus will leak into the abdominal cavity. The result is severe peritonitis characterized by guarding, rebound tenderness, and, occasionally, a rigid abdomen. Prehospital treatment should include fluid replacement and prevention of shock. Definitive treatment is surgical removal of the appendix.

**Perforated Abdominal Viscus:** Perforation of a hollow abdominal organ, most commonly the stomach, duodenum, or colon, can cause loss of the stomach or intestinal contents into the abdominal cavity. This can result in inflammation and infection of the peritoneum and other abdominal organs. Common causes of perforation include perforated ulcers or a perforated diverticulum. The patient will present with sudden onset of abdominal pain and generalized tenderness. Rebound is often present. In many cases, the abdomen is rigid from sympathetic contraction of the muscles of the abdominal wall. Treatment includes IV fluids, antibiotics, and emergency surgery to repair the perforation.

**Bowel Obstruction:** A bowel obstruction is the blockage of a portion of the intestines. The most common site of obstruction is the small intestine. Causes include tumors, hernias created by prior abdominal surgery, volvulus (twisting of bowel), adhesions and intussusception (telescoping of bowel into itself). Large intestine obstructions are less common. Causes of large intestine obstruction include tumors and fecal impactions. The patient will often indicate a history of progressive anorexia, abdominal bloating, diffuse abdominal pain, nausea, and vomiting. If the obstruction has been present for a prolonged period of time, the patient may have fever, chills, and peritonitis. Prolonged bowel obstruction can cause death of the affected portion of the intestine. Prehospital treatment includes fluid replacement and prevention of shock. Definitive treatment often involves surgery.

**Gastrointestinal Bleeding:** Bleeding from the gastrointestinal system can be massive and exhibit very few outward signs. A gastrointestinal bleed is usually classified as either an upper GI Bleeding or a lower GI Bleeding.

**Upper GI Bleeding:** Bleeding that arises from the esophagus, stomach or duodenum is referred to as an upper GI hemorrhage. Causes of upper GI hemorrhage include peptic ulcer disease (stomach or duodenum), gastritis, esophagitis, tumors, and esophageal varicities. Signs and symptoms of an upper GI hemorrhage include hematemesis (vomiting of blood), dark stools resembling coffee grounds, or both. The stools appear dark because the blood is partially digested as it passes through the gastrointestinal tract. The presence of dark stool tends to indicate an upper GI hemorrhage as opposed to a lower GI hemorrhage. Blood in the intestinal tract acts as a cathartic {cathartic-an agent or substance that causes evacuation of the bowels}. Thus, most patients with a GI hemorrhage will complain of increasingly frequent stools or frank melanotic {melena-black, tar-like feces due to gastrointestinal bleeding} diarrhea. Pain, if present, usually manifests as epigastric or left upper quadrant pain.

**Lower GI Bleeding:** Bleeding that arises from the distal small intestine, colon, or rectum is referred to as a lower GI hemorrhage. Causes include tumors, bleeding from diverticula on the colon (diverticulosis), hemorrhoids, or rectal fissures. Signs and symptoms include rectal bleeding (either bright red or wine-colored, depending on the source of the bleeding) and increased stool frequency. Pain may or may not be present. If present, it usually manifests as epigastric or left upper quadrant pain.

### **Assessment of GI Bleeding**

Often patients with GI hemorrhage will have few symptoms. Weakness is a common complaint. GI bleeding can be severe, causing shock. Vital signs indicative of significant GI bleeding include increased heart rate, decreased blood pressure, orthostatic changes and normal to increased respirations. Prehospital treatment includes supplemental oxygen administration and fluid replacement.

**Pancreatitis:** Pancreatitis, an inflammation of the pancreas is frequently associated with chronic alcohol abuse, although there are eighty other known causes. It can also occur in persons with marked elevations of blood lipids (cholesterol and triglycerides). In some cases, the cause is unclear. Patients with pancreatitis will often complain of abdominal pain that begins abruptly. Located in the mid-abdomen, the pain tends to radiate through to the back and shoulders. Nausea and vomiting are common. Treatment of the condition includes IV fluids, pain medication, and placement of a nasogastric tube to rest the patient's digestive system and to control vomiting.

**Cholecystitis:** Inflammation of the gall bladder is called cholecystitis. It usually occurs when gallstones lodge in the cystic duct that drains the gall bladder. A stone may also lodge in the common bile duct, causing congestion of the liver, inflammation of the gall bladder, and, in severe cases, pancreatitis. The usually colicky pain of cholecystitis is located in the upper right quadrant. Pain may also be referred to the right shoulder. Pain onset is generally within 3 hours following meals, especially meals containing high amounts of fats (fried foods, cheeses, etc.). Antacids usually do not lessen the pain. Treatment often includes surgical removal of the gall bladder.

**Hepatitis:** Hepatitis is an inflammation or infection of the liver. It results from viral infections (Hepatitis A, B, C etc.), or by toxins such as alcohol or other substance abuse. The patient will often complain of dull right upper quadrant abdominal tenderness, usually unrelated to digestion of food. Many cases involve associated malaise, decreased appetite, clay-colored stools, and jaundice (yellow tint to sclera and skin). In toxic hepatitis, treatment involves cessation of toxin consumption. In viral-induced hepatitis, the patient is observed and treated symptomatically.

**Cirrhosis:** Cirrhosis is irreversible end-stage liver disease caused by alcohol abuse. The liver becomes fibrotic and decreases in size. This reduces liver function leading to complications such as encephalopathy, hypoglycemia, renal failure, cerebral edema, gastrointestinal bleeding and hyperkalemia. These patients have a general deterioration in health and loss of muscle mass. Death usually occurs within 5 years of diagnosis.

**Aortic Aneurysm:** Weakness in the wall of the descending aorta can occur with age and result in a ballooning of the wall of the vessel. This ballooning may increase in size and eventually rupture. The patient with an abdominal aortic aneurysm (AAA) is usually an older person who complains of diffuse abdominal pain and severe back pain. Such patients will occasionally report a tearing sensation if the artery is dissecting (loosening of the layers of the artery wall, allowing blood to flow in between). A pulsatile abdominal mass may be noted. Prehospital treatment of a dissecting or ruptured AAA consists of supplemental oxygen and initiation of two large bore IVs with normal saline to maintain a blood pressure around 100mmHg systolic. Rapid transport is indicated. Definitive treatment consists of surgical repair or replacement of the diseased blood vessel.

**Peritonitis:** As stated earlier, the abdomen is lined with a membrane called the peritoneum. In certain disease states, the peritoneum can become inflamed – a condition known as peritonitis. This medical condition is characterized by generalized abdominal pain and rebound tenderness.

## **Genitourinary Illnesses**

There are four general causes of genitourinary disorders: inflammation, infection, obstruction, and hemorrhage. These conditions usually present in the following forms.

**Renal Colic (Kidney Stone):** A kidney stone is the result of crystal aggregation in the collecting system of the kidney. Urinary stone formation is more common in men than in women. The usual age range is 20-50 years, although it can occur at any age. Kidney stones may form anytime during the year, but they seem to form more often in the spring and the fall.

Many factors predispose a patient to kidney stone formation. These include urinary tract infections, immobilization, certain metabolic disorders (increased calcium), gout (increased uric acid), and tumors. Sometimes these stones will break loose and enter the ureter. Since their diameter is usually greater than that of the ureter, the passage is quite painful. Some kidney stones will not pass completely through the ureter and will obstruct urine flow from the kidney on the involved side.

The pain typically starts acutely as the stone enters the ureter. Initially colicky (intermittent), the pain appears either in the back or in the flank. As the stone moves down the ureter, the pain also appears to move down. When the stone approaches the bladder, the pain may actually seem as though it is in the testicle (in male patients). Patients with a kidney stone are often restless and cannot get comfortable due to significant pain. Many patients will have difficulty urinating. When urinating, the urine is often bloody (hematuria). Nausea and vomiting are also common.

Initial therapies for kidney stones include intravenous fluids, which often facilitate stone movement into the bladder, and analgesics. Kidney stones unable to pass remain lodged

in the ureter and require surgical removal. Sometimes they can be broken up by sound waves generated through extracorporeal shock wave lithotripsy (ultrasound energy). Complications from urinary stone formation include inflammation, infection, and partial or total urinary obstruction.

**Urinary Tract Infections:** Urinary tract infections (UTI) occur frequently. The most common UTI is bladder infection (**cystitis**), seldom a medical emergency, UTI occurs more often in females because of the relatively short urethra compared to that in males. The most common infectious agent in UTI is E-coli. The UTI can sometimes infect the kidney, causing pyelonephritis. Symptoms of urinary tract infection include dysuria (painful or burning urination), hesitancy (difficulty starting urine stream), discolored urine, and lower abdominal pain (especially during urination).

**Pyelonephritis:** Pyelonephritis is infection of the kidney. It is often a result of infection ascending from the bladder, and appears more commonly in women than in men. The patient will typically be febrile and complain of flank or low back pain. Chills are also common. There may be tenderness at the area below where the 12th rib attaches to the 12th thoracic vertebra (costovertebral angle). Urinary burning and frequency may or may not be present. Treatment usually requires intravenous antibiotics.

**Renal Failure:** The kidneys normally maintain body fluid volume, blood pH, and the composition of body fluids within a very narrow range. They also continuously eliminate metabolic waste products. However, the kidneys can sometimes stop working or work less efficiently. This condition is often referred to as renal failure or renal insufficiency. Depending on its duration and potential reversibility, renal failure can be classified as acute or chronic (long duration).

**Acute Renal Failure:** Acute renal failure is characterized by rapid and potentially reversible deterioration of kidney function. Acute renal failure can be caused by several conditions. These include:

*Prerenal:* reduced renal blood flow (shock, dehydration, and use of vasopressor agents).

*Renal:* injury to the substance of the kidney itself (trauma, nephrotoxic drugs or infection).

*Postrenal :* obstruction of the flow of urine (enlarged prostate or tumor obstructing the ureters or bladder).

As renal failure progresses, metabolic waste products accumulate. These can have a toxic effect on virtually every body organ. Urea is an end-product of protein metabolism and is usually cleared by the kidneys. In renal failure, the level of urea in the blood increases, producing a condition known as uremia.

**Chronic Renal Failure:** Chronic renal failure refers to long-standing renal failure associated with loss of nephron (kidney cell) mass and is usually irreversible. Many disease processes can destroy the kidneys or the renal arteries.

**Presentation:** Renal failure can produce fluid overload, dangerously elevated potassium levels, uremic pericarditis, pericardial tamponade, and uremic encephalopathy. In patients with severe renal failure and low urine output the ability to excrete electrolytes and water is markedly diminished, predisposing them to fluid overload and episodes of non cardiac pulmonary edema. These patients present with severe dyspnea, neck vein distention, ascites {accumulation of fluid within the peritoneal cavity}, and rales at the lung bases. These patients are prone to hyperkalemic states.

Patients with chronic renal failure will often appear wasted. Their skin will be pasty yellow and their extremities thin. The latter is due to the protein loss accompanying chronic renal failure and poor nutrition. In the later stages urea crystals may form on the skin, producing a frostlike appearance (uremic frost). Edema (due to decreased protein, jaundice, and low urine output) is frequently present.

**Management:** Many medications are eliminated through the kidneys. Because patients with renal failure do not clear medications as rapidly as normal patients do, they are susceptible to toxic drug concentrations despite relatively low medication doses. Once filtration becomes severely impaired, patients are treated by dialysis (hemodialysis or peritoneal dialysis) Treatment for hyperkalemic or suspected hyperkalemic patients may include calcium, glucose, insulin and sodium bicarbonate administration.

## **Reproductive System Emergencies**

Occasionally, the reproductive organs may be the source of acute abdominal pain. The next sections present common reproductive system emergencies that can cause acute abdominal pain.

### **Female Reproductive Emergencies**

**Pelvic Inflammatory Disease (PID):** PID is an infection of the female reproductive organs that is usually sexually transmitted. As an ascending infection, PID spreads from the vagina or cervix to the uterus, the fallopian tubes, and the broad ligament. The patient usually presents with fever, chills, lower abdominal pain, and vaginal bleeding or discharge. In addition, the patient may complain of pain on walking or pain with intercourse. Pain is also common following menses.

**Ovarian Cyst:** An ovarian cyst is a fluid-filled sac that forms intermittently on the ovaries. If the cyst ruptures, blood will be spilled into the abdominal cavity causing pain and tenderness. The patient will often present with abdominal pain, occurring with either a rapid or a gradual onset. Often, intercourse will cause the cyst to rupture and the pain will begin acutely. On rare occasions, the patient may experience syncope and develop shock.

**Mittelschmerz:** Mittelschmerz is abdominal pain that may accompany ovulation. It occurs half-way through the menstrual cycle and is associated with release of the ovum from the ovary. In rare cases, pain can be severe.

**Ectopic Pregnancy:** An ectopic pregnancy is the implantation of a developing fetus outside of the uterus. It must be considered as a cause in any female of childbearing age with lower abdominal pain. The most common location is in the fallopian tube (hence the name “tubal pregnancy”). The fetus continues to grow until it exerts pressure on the wall of the fallopian tube. If the pregnancy is allowed to progress, the fallopian tube can rupture, causing significant bleeding into the abdomen and pelvis.

Upon questioning, a patient often will report a missed menstrual period or irregular periods. She may also have already had a positive pregnancy test. If rupture is present the patient will usually present with tenderness on the affected side. She will often show pallor, a weak pulse, and signs of shock or hemorrhage. Pain may be referred to the shoulder, and the umbilicus may appear bluish in color. Prehospital treatment includes the administration of supplemental oxygen and initiation of 1-2 IVs of normal saline.

### Male Reproductive Emergencies

**Testicular Torsion:** The most serious male reproductive emergency is testicular torsion. Torsion of testes occurs when the testicle rotates in the scrotum. This rotation twists the spermatic cord and can stop blood flow to the testicle. Testicular torsion usually occurs in children and teenagers. However, it can occur in older patients as well. Patients who have a history of testicular torsion have a tendency to have the problem recur on the opposite side. The patient will present with severe testicular pain and may feel as though he has received an injury to his testicles. There may be associated lower abdominal pain as well. Often the affected testicle is swollen, tender, and appears higher in the scrotum than the other. Occasionally, a knot can be palpated in the spermatic cord immediately above the affected testicle. Prehospital treatment includes reassurance and possible administration of analgesics.

**Epididymitis:** Epididymitis is the inflammation of the epididymis. It may occur secondary to gonorrhea, syphilis, tuberculosis, mumps, prostatitis, urethritis, or following prolonged use of an indwelling catheter. The patient with epididymitis will present with fever and chills, pain in his inguinal region, and a swollen epididymis.

**Prostatitis:** Infection of the prostate is called prostatitis. Male patients tend to develop prostate infections instead of bladder infections. Signs and symptoms of prostatitis include urinary frequency, burning, pain with ejaculation, and occasionally pain with defecation. Sometimes a patient with prostatitis will present with fever, chills, nausea, and vomiting. Prehospital treatment is primarily supportive.

## ***Assessment of the Acute Abdomen***

### **Initial (Primary) Assessment**

As with any other emergency, you should begin with the initial (primary) assessment. You should deal immediately with any threats to life. Unstable vital signs, or shock, warrant emergent transport with care provided en route.

### **Detailed (Secondary) Assessment**

If the patient is stable, proceed with the secondary assessment including vital signs. Pay particular attention to the abdomen. Firstly **inspect** the abdomen, noting any obvious asymmetry or distention. Also, observe the position of the patient. Patients presenting with acute abdominal pain will frequently have the knees drawn up toward the chest to lessen tension on the peritoneum and to decrease intra-abdominal pressure.

**Auscultation** for the presence of bowel sounds (normal = 5 – 34 in 2 minutes) Auscultation should be performed prior to palpation in the assessment of the abdomen.

The abdomen should be gently **palpated**. First, ask the patient to point to the location of the pain. Begin palpation away from the site of the pain. Each quadrant must be lightly palpated and any tenderness noted. Also, test the patient for the presence of rebound tenderness. This can be done by slowly depressing on an area, and then quickly withdrawing your hand, allowing the abdominal wall to return to its normal position. If this causes pain, the patient has rebound tenderness, usually suggestive of peritoneal irritation. **DO NOT** repeat the examination for rebound tenderness, as this is painful for the patient. Presence of a pulsatile mass in association with signs and symptoms of shock is indication for rapid transport. Prolonged or vigorous palpation of an abdominal aortic aneurysm is inappropriate and should not be done.

### **History**

Pain is the most common presentation of the acute abdomen. Elicit information about the quality of the pain. Is it continuous, intermittent, or constant? Does it increase, then decrease, and subsequently increase again?

The patient should be asked where in the abdomen the pain began and whether it radiates to another area of the body. If the pain moves, determine whether it penetrates through to the back or goes around the abdomen to the back. Also, ask if the pain is associated with or aggravated by food intake, physical activity, or any increase in intra-abdominal pressure (breathing, coughing, or straining). This occurrence of related symptoms such as nausea, vomiting, or diarrhea can be of assistance in localizing the source of the symptoms to a specific site or organ. Many prehospital providers find the following OPQRST method useful for evaluating pain.

- O** Onset: What were you doing when the pain began?
- P** Provocation: What initiates the pain? What makes it better or worse?
- Q** Quality: How would you describe the pain?
- R** Radiation: Where is the pain located? Does the pain travel to other body areas?
- S** Severity: How intense is the pain? On a scale of 0 to 10?
- T** Timing: How long ago did the pain begin? When does it occur? Is it intermittent or constant?

It is crucial to obtain a history of menstrual activity in female patients who present with abdominal pain. Record the date of the last menstrual period (LMP). Also, ask the patient whether her periods have been regular. Question her about the use of oral contraceptives (birth control pills). If she uses them, inquire about any pills that may have been missed. If the LMP was abnormal, note the duration, time of onset, estimated amount of blood loss, or unusual pain associated with menstruation. If the patient's menses are late, question her about possible pregnancy.

Appropriate past medical history is also significant in assessing the patient presenting with abdominal pain. Obtain information concerning any previous illnesses, particularly any abdominal conditions or prior surgery, during the patient assessment.

## **Abdominal Injuries**

Life-threatening injury to the abdomen presents with less obvious signs and symptoms than other trauma. Assessment of this area is more difficult because the abdominal container is soft and pliable. Also, the effects of hemorrhage or abdominal organ dysfunction are often delayed. Thus, it is very difficult to predict the nature and the extent of injury.

**Penetrating Trauma:** Penetrating trauma to the abdomen may cause severe injury. With high-speed projectiles, such as bullets, the injury is dependent upon the energy expended by the projectile and the particular organ involved. The liver, kidneys, and spleen are very susceptible to injury from the cavitation wave, while the small and large bowels are not. {cavitation- formation of a partial vacuum and subsequent cavity, within a liquid). This describes the action of a high-velocity projectile on the human body, which is 60 percent water}. It is also important to note that you cannot determine the depth of a wound, its pathway, or the organs and tissues affected from an entrance wound alone.

**Evisceration:** Evisceration is a rupture or laceration of the abdominal wall that allows abdominal contents to escape through the opening. The small bowel is the most common protruding viscera. As the bowel protrudes, it may obstruct the wound. At the same time, however, pressure from the protrusion may occlude the bowel's blood supply. The atmosphere may also expose the bowel to drying. Finally, as the bowel exits and reenters

the wound, the pathogens in the atmosphere and on bodily surfaces may contaminate it. Any of these conditions pose significant threats to bowel survival.



*Fig. 6 An abdominal evisceration is an open wound in the abdominal cavity in which internal organs or fat protrude from the wound.*



*Fig. 7 Management of evisceration includes: A: The open abdomen radiates body heat rapidly and must be covered. B: Cover the wound with sterile, saline soaked dressings, and then cover with bulky dry dressings. **Not shown, next apply padding in a “circumferential” (corralling) manner around the evisceration to protect the protruding organs** C: Cover the dressing with aluminum foil, or plastic wrap. D: bandage the area securely enough to provide support, but not to cause discomfort. At all times avoid touching protruding organs. Never attempt to replace organs within the abdomen.*

**Blunt Trauma:** Blunt trauma is responsible for several types of injuries within the abdomen. Solid organs may contuse, lacerate, or fracture. Hollow organs may rupture, and abdominal vasculature may tear. Hemorrhage, organ dysfunction, irritation, or destruction of the abdominal lining and organs may also occur with these injuries.

**Solid-Organ Injury:** During deceleration or acceleration, the posterior abdominal wall and the anterior abdominal surface may trap and compress the solid abdominal organs. Tissues are compressed, resulting in swelling, hemorrhage, and, possibly, organ failure. If the forces of injury are severe enough, they may cause the solid organs to fracture. Frequently, the organs peritoneal envelope contains the hemorrhage, and may rupture with time. Although the result may be delayed, rapid exsanguination can follow.

**Hollow-Organ Injury:** Deceleration may also compress hollow organs. If kinetic forces are great enough, the organ may rupture and spill its contents into the abdominal cavity. The large bowel contains bacteria and other pathogens that, if spilled, cause severe infection. The gall bladder, stomach, and small bowel contain caustic fluids that will chemically damage the abdominal contents if released into the peritoneal space.

**Other Trauma-Related Injuries:** Traumatic jarring or deceleration of abdominal organs may also cause them to tear at their sites of attachment. Blood vessels often tear where they branch from the abdominal aorta or vena cava or at the organ they supply. Injuries involving the blood supply to any abdominal organ can result in rapid and extensive blood loss and organ dysfunction. Ligamentous detachment can also lead to

abdominal organ trauma. When the various organs within the cavity decelerate, ligaments and other connective tissue may restrain them.

The ligamentum teres suspends the liver. In deceleration, the ligaments may slice the liver as cheese is sliced by a wire cutter. The laceration is severe, often resulting in rapid hemorrhage.

The design of the pelvic cavity protects its internal structures. Even so, some injuries may still occur. In rapid deceleration, the full bladder may rupture when the seat belt slows the body and expresses great force along the top of the pelvic ring. A similar injury may occur to a full sigmoid colon or rectum. The spilling of abdominal contents or blood into the peritoneal space will generally present in one of two ways.

Spillage of blood, urine, small bowel contents, and gastric or other digestive fluids (bile or pancreatic juices) are very irritating. These substances will inflame the peritoneum within 12 hours.

Spillage of the highly infectious contents of the large-bowel will inflame more slowly (about 12-24 hours).

The first indication of either of the above evolving injuries may be rebound tenderness.

### ***Abdominal Trauma Care***

Direct care of the patient with suspected abdominal trauma with anticipation of internal hemorrhage and the need for rapid surgery. Immediately transport the patient with any significant signs, symptoms, or mechanism of injury that suggests internal bleeding. The patient may have a history of blunt trauma, severe abdominal or back pain, Hematemesis, history of dizziness or syncope, shoulder tip pain in association with abdominal pain, blood in the urine or stool, rigid abdomen, bruising around the umbilicus or bruising on the flanks. While en route to the emergency department, start IV fluids if trained. Evaluate vital signs frequently, along with other signs possibly indicating the early development of shock. These signs include slow capillary refill, dropping blood pressure, pale or ashen skin color, patient anxiety or restlessness, and pulse rate and strength.

In the presence of any significant sign or symptom of shock, it is imperative to provide aggressive fluid replacement. Rapid blood loss can result from various sources and leave the patient with irreversible shock if not treated early.

***Penetrating Abdominal Injury Care:*** Cover penetrating wounds of the abdominal cavity, as you would with any open wound. If it appears that the bowel is protruding, cover the wound with a sterile, saline soaked dressing, then, cover with bulky dry dressings and then an occlusive dressing. The occlusive dressing ensures that the tissues will remain moist. It will also provide a barrier against evaporation and contamination. If an object remains impaled in the abdomen, carefully immobilize it in

place. Consider restraining the hands of a patient with either an evisceration or an impaled object to prevent them from manipulating the wound.

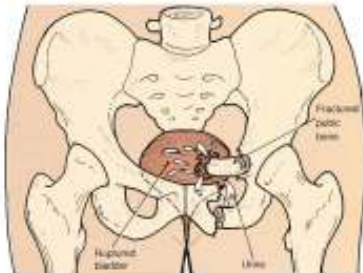
In penetrating trauma, particularly gun shot wounds, examine the patient for exit wounds and apply dressings. Realize that one cannot anticipate the complete pathway of damage and immobilization should be considered.

**Blunt Abdominal Injury Care:** Care for the blunt abdominal injury is supportive. Signs and symptoms of shock may also be present. Unless otherwise required, place the patient in the most comfortable position, usually on the side, and flex the legs. Then transport the patient rapidly and as smoothly as possible. Jarring may increase both the patient's discomfort and the rate of hemorrhage.

## Genitourinary Injuries

### Injury of the Urinary Bladder

Injury of the urinary bladder, either blunt or penetrating may result in its rupture. When this happens, urine spills into surrounding tissues, and any urine that passes through the urethra is likely to be bloody. Blunt injuries of the lower abdomen or pelvis often cause rupture of the urinary bladder, particularly when the bladder is full and distended. Sharp, bony fragments from a fracture of the pelvis often perforate the urinary bladder.



*Fig. 8 Fracture of the pelvis can result in a laceration of the bladder by the bony fragments. Urine then leaks into the pelvis.*

Penetrating wounds of the lower mid-abdomen or the perineum (the pelvic floor and associated structures that occupy the pelvic outlet) can directly involve the bladder. In the male, sudden deceleration from a motor vehicle or motorcycle crash can literally shear the bladder from the urethra.

Suspect a possible injury of the urinary bladder if you see blood at the urethral opening or physical signs of trauma on the lower abdomen, pelvis, or perineum. There may be blood at the tip of the penis or a stain on the patient's underwear. If possible, save any urine passed by a patient with suspected bladder injury for detailed analysis in the emergency department, even if the urine does not look bloody. Under a microscope, even a tiny number of red blood cells will show up.

The presence of associated injuries or of shock will dictate the urgency of transport. In most instances, provide prompt transport, and monitor patient's vital signs en route.

## **Genitalia Injury**

Injury to the female genitalia most commonly results from direct trauma to the area. Child molestation and rape are common causes. The mechanism of injury normally involves forceful placement of objects into the vaginal canal. Tearing of the internal genitalia presents with moderate to severe internal and/or external bleeding.

The external male genitalia suffer injury more frequently. The penis and testicles are well supplied with nerves and a blood vessel. Injury can be very painful. Laceration can cause significant blood loss, while blunt trauma may lead to a sizable hematoma.

## **Injuries to Male Genitalia**

### **Amputation or near amputation/avulsion of skin of penis and/or scrotum**

- control bleeding-direct pressure
- apply dressings
- recover avulsed or amputated parts and transport with patient as per the amputation guideline
- reassure patient

### **Blunt trauma**-usually resulting from a direct blow

- carefully apply ice pack or cold pack
- transport with knees bent
- reassure patient

### **Superficial lacerations**

- control bleeding-direct pressure
- apply dressings

### **Impaled object**

- stabilize the object but DO NOT remove it
- treat as impaled object
- transport

### **Injuries to the External Female Genitalia:** most likely laceration types

- apply pressure dressing to injured area
- DO NOT pack the vaginal opening with dressing.
- treat soft tissue injury.
- DO NOT remove impaled objects, stabilize
- transport

## **Injuries to the Internal Female Genitalia**

The uterus, ovaries and fallopian tubes are subject to the same kinds of injuries as any other internal organs. However, they are rarely damaged because they are small, deep in

the pelvis, and well protected by the pelvic bones. Unlike the bladder, which lies adjacent to the bony pelvis, they are usually not injured in a pelvic fracture.

An exception is the pregnant uterus. As pregnancy progresses, the uterus enlarges substantially and rises out of the pelvis, becoming vulnerable to both penetrating and blunt injuries. These injuries can be particularly severe because the uterus has a rich blood supply during pregnancy. One must also keep the fetus in mind as it may be at risk. One can expect signs and symptoms of shock in these patients; be prepared to provide all necessary support and prompt transport. Note that contractions can begin as well. Obtain relevant history enroute.

In the last trimester of pregnancy, the uterus is large and may obstruct the vena cava, decreasing the amount of blood returning to the heart if the patient is placed in a supine position. As a result, blood pressure may decrease. **The patient should be carefully placed on her left side so that the uterus will not lie on the vena cava.**

## **Abdominal and Genitourinary Devices**

### **Ostomies**

An ostomy is an artificial opening into the urinary tract, GI tract, or trachea. An ostomy may be temporary or permanent. (An ileostomy is an opening into the small intestine. A colostomy is an opening into the large intestine.) The bowel usually discharges liquid or solid feces into the bag (pouch) once or twice a day; the bag is then changed. Potential complications associated with ostomies include:

- Infection
- Hemorrhage
- Obstruction
- Stomal problems (e.g. necrosis, retraction, stenosis, prolapse)

Colostomy irrigation, ostomy care, and pouch changes are usually performed by the patients themselves, family members, or home health practitioners. These procedures require special training and usually are not considered an acute intervention for paramedic practice.

Bowel perforation and/or significant fluid/electrolyte imbalances may accidentally occur.

### **Indwelling Urinary Catheters**

Urinary catheterization of the bladder involves placing a tube, rubber or plastic into the urinary bladder to drain collecting urine. This procedure is used for a number of medical and surgical reasons.

**For example:**

- A patient incontinent of urine.
- Unable to void due to position (i.e. secured to a spine board).
- To monitor certain organ functions (a measure of end organ perfusion).

Urinary catheterization is a procedure done under strict aseptic conditions because the urinary structures are normally sterile except at the end of the urethra. If an infection is introduced into the urinary bladder, it can ascend up the ureters and eventually involve the kidneys.

**Care and Transport of Indwelling Urinary Catheters**

1. The collection bag should always be kept below the level of the patient's bladder so that urine can flow out with gravity. If this is not possible when moving the patient from bed to bed, make sure the bag is drained first, or kink the tubing. The bag must be placed lower than the bladder during transport. Urine should be prevented from flowing back into the bladder thus minimizing the risk of infection.
2. It is important that the tube or catheter is not accidentally pulled. A full collection bag not supported and pulling on the catheter can cause discomfort as well as risking damage to the tissue and nerves in the bladder.
3. The transport personnel must always be aware of tubing which might be trapped in stretcher securement locks or caught under wheels of stretchers, etc. Always walk around the bed or stretcher prior to moving the patient and look for bags, lines, etc. which are attached.
4. Ensure the collection bag is emptied prior to a long transport.
5. Make sure that during transport that the pt is not lying on the tubing and occluding the flow.

**Nasogastric Tube**

Nasogastric intubation is used for both diagnostic and therapeutic reasons. It is most often used for decompression of the stomach and evacuation of gastric contents. It involves passing an uncuffed tube into the nostril or mouth and passing it through the nasopharynx or oropharynx into the esophagus and into the stomach.

Indications for use:

- decompression of the stomach and small intestine;
- evacuation of blood or secretions;
- evacuation of ingested drugs or toxins;
- instillation of medications and feedings;
- obtaining gastric contents for analysis;
- bowel or gastric obstruction
- administration of warm fluid to correct hypothermia.

## Care and Transport of the Patient with a Nasogastric Tube

The collection bag should always be kept below the level of the patient's stomach. This may not always be possible during loading and unloading, but the bag must be placed lower than the stomach during transport.

1. It is important that the tube is not accidentally pulled.
2. The transport personnel must always be aware of tubing which might be trapped in stretcher securement locks or caught under wheels of stretchers, etc. Always walk around the bed or stretcher prior to moving the patient and look for bags, lines, etc. which are attached.
3. Ensure the collection bag is emptied prior to a long transport.
4. Make sure that during transport that the pt is not lying on the tubing and occluding the flow.

## **Pharmacology**

Administration of dimenhydrinate may be appropriate in some situations. The paramedic must be certified in the appropriate Emergency Treatment Protocol.

### **DIMENHYDRINATE (gravol)**

**Pregnancy Category: B**

#### **Class**

- Antihistamine, antiemetic

#### **Mechanism of Action**

- Contains both diphenhydramine and chlorotheophylline. Antiemetic mechanism not known, but it does depress labyrinthine and vestibular function. May mask ototoxicity due to aminoglycosides. Possesses anticholinergic activity.

#### **Duration**

- 3-6 hr. Uses: Motion sickness, especially to relieve nausea, vomiting, or dizziness. Treat vertigo. Special Concerns: Use of the injectable form is not recommended in neonates. Geriatric clients may be more sensitive to the usual adult dose.

#### **How Supplied**

- Chew Tablet: 50 mg; Injection: 50 mg/mL; Liquid: 12.5 mg/4 mL, 12.5 mg/5 mL; Tablet: 25 mg, 50 mg

#### **Dosage**

•Elixir, Syrup, Tablets, Chewable Tablets Motion sickness.

Adults: 50-100 mg q 4 hr, not to exceed 400 mg/day. Pediatric, 6-12 years: 25-50 mg q 6-8 hr, not to exceed 150 mg/day; 2-6 years: 12.5-25 mg q 6-8 hr, not to exceed 75 mg/day. •IM, IV

Adults: 50 mg as required. Pediatric, over 2 years: 1.25 mg/kg (37.5 mg/m<sup>2</sup>) q.i.d., not to exceed 300 mg/day.

•IV

Adults: 50 mg in 10 mL sodium chloride injection given over 2 min; may be repeated q 4 hr as needed. Pediatric: 1.25 mg/kg (37.5 mg/m<sup>2</sup>) in 10 mL of 0.9% sodium chloride injection given slowly over 2 min; may be repeated q 6 hr, not to exceed 300 mg/day.

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