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Chapter

Abdominal Trauma

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Abstract

Abdominal trauma accounts for 7–10% of hospital admissions due to trauma. Depending on the mechanism of occurrence, abdominal traumas are classified as either blunt or penetrating. The most important risk after trauma is hypovolemic shock. Deaths caused by blunt trauma are frequently the result of diagnostic difficulties and treatment delays. Abdominal surgery after traumatic injury is performed for two reasons; bleeding due to injury to vascular structures or a solid organ (e.g., spleen, liver, kidney) or injury due to perforation of a hollow organ (stomach, small intestine, colon, gallbladder). Patients may remain asymptomatic until they have lost 50–60% of their blood volume. Through inspection, auscultation, and palpation, the damaged organs and the presence of hemorrhage should be examined during the physical examination. The findings of peritoneal irritation are incredibly critical. Even though some studies indicate a mortality rate as high as 25.8% for abdominal injuries, the overall mortality rate is 10%. Other studies reveal mortality rates ranging from 15% to 17.1%. It should not be forgotten that the patient with abdominal trauma may have multi-trauma. The patient's vital signs, abdominal examination, and hematocrit should be checked at frequent intervals. Early surgical evaluation is important. It is important to remember that the main source of bleeding and shock may be the abdomen.

Keywords: abdominal trauma, hemorrhage, hypovolemic shock, blunt trauma, diagnostic laparoscopy

1. Introduction

Abdominal trauma accounts for 7–10% of hospital admissions due to trauma. In people under the age of 45, 10% of trauma-related deaths are caused by abdominal trauma [1].

Motor vehicle accidents, abdominal blows, and falls account for the majority of abdominal injuries. Less common causes of abdominal trauma include penetrating injuries, home accidents, and iatrogenic conditions [2].

Depending on the mechanism of occurrence, abdominal traumas are classified as either blunt or penetrating. Blunt abdominal injuries are seen in approximately three quarters of the patients [3]. In some studies, it has been reported that the most common abdominal injury is penetrating injury [4]. Most blunt abdominal traumas occur

after motor vehicle accidents. It is usually accompanied by multitrauma. The most important risk after trauma is hypovolemic shock. Deaths caused by blunt trauma are frequently the result of diagnostic difficulties and treatment delays.

Typically, a penetrating injury is caused by violence, such as a stab wound or gunshot wound. Gunshot wounds result from the explosion effect (a combination of blunt and penetrating trauma associated with blasts). The causes of penetrating abdominal injuries include accidental, homicidal, iatrogenic, and gunshot wounds [2].

Abdominal surgery after traumatic injury is performed for two reasons; bleeding due to injury to vascular structures or a solid organ (e.g., spleen, liver, kidney) or injury due to perforation of a hollow organ (stomach, small intestine, colon, gallbladder).

The first intervention of trauma patients prior to arrival at the hospital is crucial for clinical outcomes [5]. It has been demonstrated that a delay in trauma patients' arrival at the hospital significantly increases their risk of morbidity and mortality [6].

Almost all deaths are mostly caused by bleeding that occurs immediately after injury. In the late stage, it is related to septic complications [7].

Although many trauma patients do not require immediate laparotomy, emergency surgery should be considered in patients with suspected intra-abdominal injury and who are hemodynamically unstable.

Patients who are hemodynamically stable should usually undergo further diagnostic investigations such as abdominal computed tomography (CT) scanning. Sometimes, these patients are treated in interventional radiology units with diagnostic angiography followed by therapeutic embolization when CT shows the possibility of arterial extravasation.

Nonsurgical Conservative treatment experience is mostly based on blunt abdominal trauma experience. Some publications also state that nonoperative treatment of gunshot and stab wounds can be performed in selected patients [8, 9].

In the past decade, the concept of "damage control" has revolutionized surgical practice by restricting early therapeutic procedures to those required to achieve hemostasis and deferring reconstructive surgeries such as intestinal anastomoses until enough resuscitation is achieved [10].

Surgery can be delayed if the patient is hemodynamically stable and requires an examination to identify other system injuries (nervous system, bone, thoracic, and vascular) [10].

2. Classification: types of trauma

Traumas can be blunt, penetrating, or blunt-penetrating (mixed) based on their mechanism; thus, the affected organs can vary. Depending on the location of the trauma, one or more internal organs may be damaged.

1. *Blunt traumas*: It is mostly caused by motor vehicle accidents, beating, or falling from a height. In this type of trauma, the mechanisms of injury are direct blow (pressure), crushing (compression), or deceleration (rupture). The organs most commonly affected are the spleen, small intestine, and liver [11].

2. *Penetrating traumas*: Penetrating traumas consist of stab wounds and gunshot wounds.

Stab wounds: Penetrating tools cause low-energy penetrating injuries. The mechanism of injury is tear-cut, and the liver, small intestine, diaphragm, and colon are most commonly affected. In peritoneal penetration, a physical examination, diagnostic peritoneal lavage (DPL), and local exploration are required. A laparotomy may be needed if the diagnosis cannot be confirmed.

Gunshot wounds: High-energy injuries occur in penetrating traumas due to gunshot wounds (GSW). The mechanism of injury can be cavitation, disruption, and fragmentation. Small intestine, colon, liver, and vascular structures are most commonly affected in GSW-related injuries. Peritoneal penetration is important and requires laparotomy. CT with contrast is recommended for back and flank injuries. In cases with single entry, abdominal X-ray graphics can be helpful in identifying traces. It is difficult to determine the trace in multiple entries [12, 13].

3. *Mixed traumas*: There are both penetrating and blunt traumas(**Figures 1** and **2**).



Figure 1.
Falling from height, multiple small and large intestine, rectum, anal sphincter, bladder, prostate injury. Trauma-related bladder and prostate were completely absent. There were hematomas and perforation in the small intestine and large bowel. Small bowel resection and anastomosis were performed. Performed left-end colostomy for anal region and rectum injury. Permanent urostomy performed for bladder injury (absence).

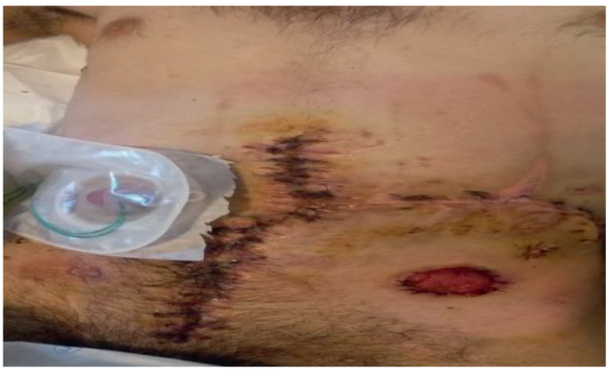


Figure 2.
Right permanent urostomy, left colostomy.

3. Clinical presentation

There is an insidious clinical picture. Patients may remain asymptomatic until they have lost 50–60% of their blood volume. It is frequently overlooked under conditions that alter the neurologic picture, such as head trauma and alcohol consumption.

Until there is significant intra-abdominal blood loss, abdominal pain and distension may not occur. More than 35% of patients initially exhibit normal vital signs and examinations despite the presence of severe intra-abdominal hemorrhage.

4. Priorities

Initial evaluation should focus on intra-abdominal hemorrhage and shock. When abnormal vital signs are seen, shock and hemorrhage should be investigated. The possibility of occult intra-abdominal injury is an indication of laparotomy.

5. Physical examination

The abdomen should be checked comprehensively for any signs of injury. Head trauma, spinal cord injury, multi-trauma, altered consciousness, mental retardation, pregnancy, and old age all contribute to an unreliable physical examination. Especially in such conflicting conditions, repeated and thorough examinations are essential. It must be performed every 30 minutes for the first four hours, then every two to four hours thereafter.

Through inspection, auscultation, and palpation, the damaged organs and the presence of hemorrhage should be examined during the physical examination. The findings of peritoneal irritation are incredibly critical.

In the inspection process, finds are explored for using the *CLAP* algorithm: contusion, laseration, abrasion, and penetration.

Intestinal sounds should be listened to for a least one minute during auscultation. If rigidity and perioneal irritation are present, bowel sounds are either absent or weak.

On palpation, the presence of distension is first evaluated. It is assessed based on defense, rebound, and rigidity. The most painful portion is left for last, and the abdomen is palpated. On palpation, the legs must be drawn toward the abdomen.

The examination of pelvic instability, genital examination, rectal examination, and back and vertebral examination should be done.

The fundamental principle in abdominal trauma is to stabilize the patient and prioritize interventions to accomplish this.

Findings leading to the diagnosis should be carefully examined. The presence of gross hematuria, hypotension, lower rib fractures, hemothorax or pneumothorax, abdominal abrasions, or hematomas gives an idea about the organs likely to be injured [14].

Despite physical examination and imaging, retroperitoneal injuries, pancreatic injuries, mesenteric injuries, hollow organ injuries, and urinary injuries can be overlooked.

5.1 Laboratory tests

The patient's blood group and cross-match, hemoglobin and hematocrit, PT, aPTT, and INR levels should be measured to reduce the risk of hemorrhage.

6. Diagnostic techniques

Direct radiography, ultrasonography (USG), computed Tomography (CT), diagnostic peritoneal lavage (DPL), diagnostic laparoscopy, angiography, and diagnostic peritoneal lavage.

6.1 Direct graphy

Standing direct abdominal and PA chest radiographs have limited utility in cases of abdominal trauma. They may be useful in the presence of concomitant thoracic trauma. They can be particularly useful in locating foreign names or lead fragments. Pelvic X-ray can be seen in a suspected pelvic fracture.

6.2 Ultrasonography (USG): Focused assessment with sonography for trauma (FAST)

It is non-invasive, highly sensitive, inexpensive, and mobile. The fact that it can be applied even in unstable patients and can diagnose at the bedside makes it an advantageous method. It is the best technique for the diagnosis of intra-abdominal bleeding in trauma patients. Identify solid organ injuries. It should be done twice with an interval of at least 6 hours. Repeated FAST increases sensitivity in diagnosis.

In the initial evaluation of trauma patients, FAST should be performed on all patients, if possible. In the FAST technique, free fluid in the abdomen is investigated in the areas listed below.

- Subxiphoid view (Pericardial fluid)
- Right upper quadrant (Morisson pouch)
- Left upper quadrant (Splenorenal space)
- Pelvic view (Douglas/Rectovesical pouch)

However, USG is not an appropriate method in the evaluation of bowel perforation. It is also insufficient in terms of evaluating the retroperitoneal area.

6.3 Computed tomography (CT)

It is a suitable imaging method for stable trauma patients. Today, CT has become the gold standard in the evaluation of abdominal trauma. Intravenous contrast-enhanced imaging allows evaluation of both the peritoneal cavity and the retroperitoneum. It also allows the assessment of the duodenum and pancreas, extravasation from the ureter, and the amount of blood in the abdomen. It may also show additional injuries, but it is insufficient to detect hollow organ injuries [15].

The sensitivity for intra-abdominal injury was 95%, and the specificity was 97%. It is very useful and successful in retroperitoneal organ injuries. The sensitivity and specificity in cases of bowel and mesenteric trauma were, respectively, 94% and 96% [16].

It is not successful in the initial stage of pancreatic injuries. It can identify the patients who will result an operational decision in liver and spleen injuries. Intestinal, diaphragm, and pancreatic injuries may not be recognized. In addition, it is useful for detecting retroperitoneal hemorrhage.

6.4 Diagnostic peritoneal lavage (DPL)

Because of CT and USG, it is no longer the first choice method in the evaluation of hemoperitoneum. It is 100% sensitive and 83% specific for hemoperitoneum. The major complication rate is 1% [17, 18]. If the clinical condition of the patient does not allow for examinations such as CT or USG, DPL may be preferred.

6.5 Angiography

It is not a routinely used option. Angiography can show intraparenchymal vascular injuries and active bleeding in the abdominal organs. It can be useful in pelvic traumas. Bleeding in the spleen, liver, and retroperitoneum can be treated with embolization and angiography without the need for surgery.

6.6 Emergency laparotomy

Emergency laparotomy should be performed when the patient's hemodynamic status does not improve with initial resuscitation, peritoneal irritation findings are present, peritoneal penetration of abdominal injury with gunshot, bile and intestinal contents are present in the DPL, and the patient has evisceration.

Laparotomy is indicated in the presence of abnormal vital signs such as tachycardia and hypotension after blunt abdominal trauma, signs of shock without blood loss, signs of peritonitis, and the presence of additional injuries (such as lower rib fracture).

Emergency surgery should be performed in cases of external bleeding accompanied by hypotension and shock after penetrating injuries, positive peritoneal lavage, subsequent deterioration of consciousness, and sudden abdominal distension.

Emergency laparotomy should be performed if extraluminal air is detected on direct X-ray, diaphragmatic rupture is detected, amylase elevation accompanying positive physical examination findings in the abdomen, intraperitoneal bladder rupture, blood in the nasogastric drainage or rectal examination is detected.

Emergency laparotomy should be performed in the presence of fluid during FAST, positive DPL, contrast extravasation or extraluminal air on gastrointestinal radiological images, severe pelvis fracture, bladder rupture on a contrast cystogram, or gross hematuria.

Laparoscopy can be used for the diagnosis and treatment of blunt and penetrating traumas [19]. Diagnostic and therapeutic laparoscopy is recommended in blunt abdominal trauma for diaphragmatic injury, mesenteric injury, hollow organ injury, and in cases where the patient's clinical condition is unstable [20].

7. Trauma-related organ injuries

The abdomen is divided into three regions: the peritoneal cavity, the pelvis, and the retroperitoneal space. The upper peritoneal cavity contains the diaphragm, liver, spleen, stomach, and colon, whereas the lower peritoneal cavity contains the small intestine and colon.

The retroperitoneal space contains the aorta, vena cava, pancreas, duodenum, and ureters. There are structures such as the rectum, bladder, uterus, and iliac vessels in the pelvis.

7.1 Solid organ injuries

Liver, spleen, pancreas, kidney, diaphragm, and abdominal wall injuries.

Trauma to solid organs causes symptoms related to bleeding. Vital signs and hypotension may develop rapidly. As a result of progressive blood loss, tachycardia, skin changes, and changes in consciousness can be seen. With severe intra-abdominal damage, abdominal tenderness, distention, and tympanism may occur later. The risk of mortality and morbidity due to blood loss is high.

7.2 Hollow organ injuries

Stomach, duodenum, small intestine, colon, rectum, gallbladder, bile ducts, and genitourinary system injuries.

Due to the bacterial content in the small intestine and colon, inflammation develops within hours. This can cause septic conditions due to bleeding and peritoneal contamination (**Figure 3**).

7.3 Retroperitoneal injuries

Retroperitoneal injuries are often initially asymptomatic. Diagnosis can be difficult due to their location and limitation of symptoms. Nausea, vomiting, abdominal



Figure 3.
Small bowel and colon perforation due to blunt abdominal trauma in an elderly patient. Small bowel resection, double barrel ostomy (colostomy), and Bogota bag technique. Since the intra-abdominal pressure will increase when the abdomen is closed, the Bogota bag technique, which is a temporary closure method, maybe a good alternative [21].

pain, and fever may develop in duodenal injuries. Diagnosis is difficult in pancreatic injury, increased amylase supports the diagnosis. It may initially appear normal on CT imaging. Retroperitoneal injuries occur more frequently after being hit by high-speed vehicles or falling from a height.

7.4 Esophageal injury

Blunt or penetrating trauma of the esophagus is rare. There are symptoms such as severe chest pain and fever, bloody vomiting, dysphagia, and respiratory distress after hours.

Diagnosis is made by finding air in the mediastinum, pleural effusion or hydropneumothorax on endoscopy or radiological imaging.

Treatment options include wound debridement, suture repair, drainage, and esophageal diversion in delayed cases.

7.5 Stomach injury

The stomach is resistant to blunt injuries. Most are due to penetrating trauma to the epigastric region. Vascular support is quite high. Bleeding from the nasogastric tube suggests a gastric injury.

The gastrocolic omentum should be opened widely. Debridement is done as needed. The outcomes of primary repair are excellent.

7.6 Duodenum injury

Since it is located retroperitoneally, it is usually diagnosed after laparotomy. Signs and symptoms may develop late. Duodenum injury indicates severe trauma. Mortality increases up to 4 times in delayed cases.

Serum amylase may be elevated. Radiograph shows retroperitoneal air. Diagnosis is made with oral and intravenous contrast-enhanced CT. Laparotomy is mandatory.

7.7 Small intestine injury

The incidence of small bowel injury in penetrating abdominal trauma reaches up to 50%. This rate is 5–15% in blunt traumas. In most cases, signs of peritoneal irritation due to injury are seen. Relatively less mobile segments, such as the jejunum near the ligament of Treitz and the distal ileum near the ileocecal valve, are more susceptible to injury. Mesenteric injuries range from simple contusions to mesenteric avulsions. In cases where only vascular structures are injured, symptoms may be delayed until bowel ischemia develops.

Free air can be visualized by direct graphy. USG can show even a very small amount of free fluid.

In most cases, debridement and primary repair are sufficient. Simple incisions are repaired with “Lembert” sutures. Resection and anastomosis should be preferred if the damage to the intestinal wall is extensive or if there are multiple perforation foci that are close to each other. Due to the adequate vascular supply, the surgical outcomes are satisfactory.

7.8 Colon injury

Delaying surgery increases the risk of increased contamination. Classical treatment involved the creation of a proximal diverting colostomy with bowel repair or conversion of the injured area to a colostomy. Today, the routine creation of a colostomy is contradictory. Primary repair can be performed in right colon injuries with minimal contamination. Colostomies can be created in right colon injuries with severe contamination or in severe left colon injuries. Surgical site infection due to bowel injury is the most common postoperative complication. IntestinalDue to the bacterial content, suppurative peritonitis symptoms may occur from 6 to 8 hours after injury. Contents leak into the peritoneal cavity, contaminating the peritoneal cavity (and thus the surgical wound) with intestinal bacteria [22]. Due to the bacterial content, symptoms indicating suppurative peritonitis may appear 6–8 hours after injury.

7.9 Rectum injury

Since it is a retroperitoneal organ, the diagnosis may be difficult, but the symptoms are indistinct. Rectal injury should be suspected in pelvic fractures. Early diagnosis and treatment provide reduced mortality and morbidity. If the injury is full thickness and above the dentate line, primary repair is not performed without a colostomy. In most cases, an end sigmoid colostomy is created proximal to the injury, the distal rectum is irrigated with saline solution, and drains are implanted. For injuries below the dentate line, debridement and primary repair and drainage are sufficient without colonic diversion.

8. Injury of the gallbladder and biliary tracts

Among abdominal traumas, gallbladder injuries are relatively rare. It is usually associated with penetrating trauma and liver injuries [23].

USG is the first examination in the imaging of the biliary tract. Intra-abdominal collection can be detected. Bile leakage and fistulas can be detected by MRCP examination using liver-specific contrast material. Leakage and fistula can be easily demonstrated on images taken in the biliary phase [2]. The treatment is cholecystectomy. In blunt trauma, common bile duct injury may also occur with papilla rupture. These types of injuries are difficult to diagnose before surgery. If necessary, an intraoperative cholangiogram should be taken, and careful exploration should be performed.

8.1 Liver injury

Isolated injuries are rare and are associated with other organ injuries in 70–90% of cases [2]. The liver is the most frequently injured organ in blunt and penetrating abdominal trauma [24].

Ultrasonography (USG) is the first imaging method in cases with stable general conditions. USG shows intra-abdominal fluid collections and parenchymal lesions. A positive USG finding is an indication of CT. Bleeding cannot be detected when more than 50% of liver injuries are explored. Bleeding can be stopped with primary sutures, cautery, or hemostatic agents. Mortality is over 50% in massive traumas

associated with vena cava or hepatic vein injury. Thanks to CT examination, lesions that can be treated without surgery can be recognized. In many studies, the failure rate in non-surgical follow-up is less than 10% (**Figure 4**) [24].

8.2 Spleen injury

The spleen is the most frequently injured intra-abdominal organ in blunt trauma. Due to its cancellous structure, it is sensitive to trauma and is responsible for significant bleeding. It is often associated with other organ injuries. The main symptoms are tachycardia, hypotension, and syncope due to blood loss. Left shoulder pain (Kehr's sign) is the classic finding of spleen injuries. There is tenderness and pain in the left upper quadrant. Fractures in the lower ribs should suggest injury to the spleen. After clamping the splenic artery, blood pressure usually stabilizes. CT has a sensitivity and specificity of up to 95% for spleen injuries [2].

The classical treatment method is splenectomy. With the high incidence of sepsis after splenectomy, more selective approaches are now preferred, and splenic repair and nonoperative follow-up are among the treatment options [26]. From 60% to 90% of patients with spleen injuries are conservatively treated [27]. Polyvalent pneumococcal vaccine is administered after splenectomy.

8.3 Pancreatic injury

Although pancreatic injuries are rare, mortality and morbidity rates are high. Isolated pancreatic injury is rare and does not usually lead to massive bleeding. It is most commonly seen with duodenal injuries in penetrating traumas. Imaging findings may be negative in the first 12 hours after trauma. Mortality and morbidity are very high due to autodigestion caused by exocrine secretions in delayed diagnosis and treatment [2, 23]. Damage to the pancreatic duct is crucial and requires operative treatment, including control of bleeding, resection, and drainage of necrotic or damaged pancreatic tissue. CT is very useful in diagnosis. Endoscopic retrograde

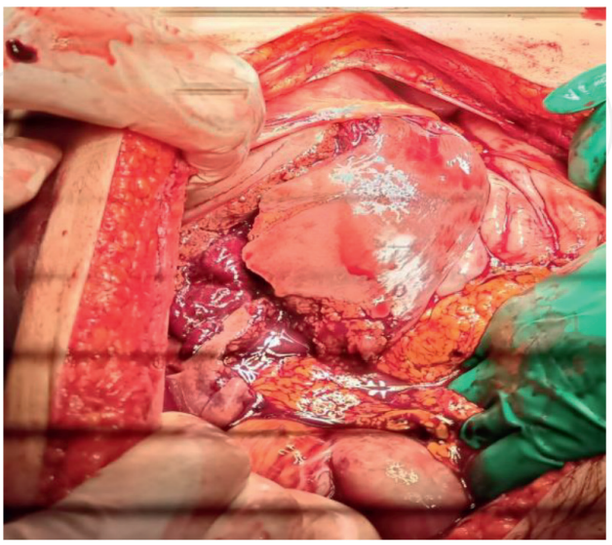


Figure 4.
Blunt abdominal trauma involving segment 5,6,7,8 and large branches of the middle hepatic vein injuries. Large branches of the middle hepatic vein suturing and perihepatic packing. Removing of liver packs 36 hours after insertion reduced the risk of rebleeding [25].

cholangiopancreatography (ERCP) is the gold standard for both diagnosis and treatment. Pseudocyst can be seen as a late complication.

8.4 Kidney injury

Approximately 10% of blunt abdominal traumas result in kidney injury. Lower rib fractures, thoracolumbar injury, macroscopic hematuria, and hypotension with microscopic hematuria should be evaluated for renal trauma in blunt trauma. The kidney is the most frequently injured part of the urinary tract [2].

Hematuria is present in 90–95% of cases. Macroscopic hematuria often accompanies severe trauma. If there is a ureteral tear, vascular pedicle injury, or ureteropelvic junction avulsion, hematuria may not be present. Complications such as urinary extravasation, urinoma, hemorrhage, perirenal abscess, pseudoaneurysm, hypertension, and arteriovenous fistula can be seen. Renovascular hypertension may develop as a result of prolonged compression of the renal parenchyma by subcapsular hematoma or urinoma [2].

Renal bleeding itself is rarely the cause of hemodynamic instability. It is usually followed up with non-surgical treatment. Continued bleeding, Gerota's fascia injury, or renal function loss require surgery. Diagnosis can be made with contrast-enhanced CT, and cystography.

9. Genitourinary system injury

The ureter is the least injured part of the urinary tract and is usually penetrating injuries of iatrogenic origin. There is no hematuria in 1/3 of the cases. Ureteral injuries can easily be overlooked and cases may present with late complications such as urinoma, periureteral abscess, fistula, and stenosis [2].

Blunt, penetrating, or iatrogenic injuries of the bladder may occur. Bladder rupture is a common form of injury. Hematuria is observed in bladder injury. Pelvic fracture is present in almost all cases of bladder injury [2, 23]. Because the urine is sterile, peritoneal symptoms may only be observed in bladder perforation cases. Minor injuries may spontaneously heal within one to two weeks. Major injuries require surgical intervention. Urine output is reduced or absent in perforations. As a result of the resorption of urine from the peritoneum, urea increases in the blood [2].

10. Diaphragmatic injuries

Diaphragmatic injuries are usually diagnosed late as they do not cause obvious symptoms. Abdominal organs seen in the thorax on direct thorax should be suspected in case of pleural effusion. Diagnosis can be made with CT, MRI, thoracoscopy, and laparoscopy. Herniation can occur months or years after injury. Treatment is surgery.

11. Abdominal wall injuries

There is a risk of evisceration in penetrating injuries of the abdominal wall. Rectus hematoma is the most common form of injury. Since there is a possibility of multiple injuries in many abdominal organs in these patients, surgery is performed without

the need for DPL. First, the comorbid injuries and then the abdominal wall injury is addressed.

12. Injury to vascular structures

Both artery and vein injuries in the abdomen are life-threatening. Controlling both proximal and distal parts should be the main principle.

Solid organ damage can result in massive bleeding and hypovolemia. The primary complication of injury to hollow organs is abdominal or systemic sepsis. Failure to find anything in the laparotomy does not mean that the laparotomy was performed incorrectly.

13. General approach to abdominal trauma

1. Investigate any intra-abdominal bleeding.

2. Fix unstable vital signs due to shock and bleeding.

3. Determine if the source of bleeding is in the abdomen.

4. Decide if an urgent laparotomy is needed.

5. Thorough examination, laboratory, and radiological tests to determine if there is an occult intra-abdominal injury.

6. Monitor the patient with frequent physical examinations.

The causes of abdominal injuries vary by country. Most abdominal injuries in Europe are blunt trauma from traffic accidents. Gunshot wounds to the abdomen are the most common cause in Africa [28]. Although motor vehicle accidents are an important social problem in our country, stab injuries constitute the majority of abdominal injuries in our clinics. Most thoracic abdominal injuries are associated with other parts of the body such as the chest and limbs. Hemodynamic instability, chest and extremity injuries, and abdominal trauma should be questioned in patients with low Glasgow scores.

14. Conclusion

Although some studies put the mortality rate of abdominal injuries as high as 25.8%, the overall mortality rate is 10% [29]. However, some other studies reveal that mortality rates vary between 15% and 17.1% [3, 22].

It should not be forgotten that the patient with abdominal trauma may have multi-trauma. The patient's vital signs, abdominal examination, and hematocrit should be checked at frequent intervals. Early surgical evaluation is important. It is important to remember that the main source of bleeding and shock may be the abdomen.

Nonoperative treatment can be applied in hemodynamically stable blunt abdominal trauma patients with normal physical examination findings [29]. Similarly,

hemodynamically stable patients with penetrating injuries can be treated non-operatively in the absence of symptoms of peritonitis. These patients should be followed up with close clinical observation and imaging methods (CT, ultrasound).

When symptoms of hemodynamic instability and/or peritonitis are recognized, emergency surgery should be performed under the right conditions.

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