



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

▶ King saud university



SPECIFIC ABDOMINAL TRAUMA

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References

- Current Surgical Diagnosis and Treatment
- Surgical Practice by Peter Lawrence
- Essentials of Surgery
- Principles and Practice of Surgery by James Gardener

Abdominal Trauma

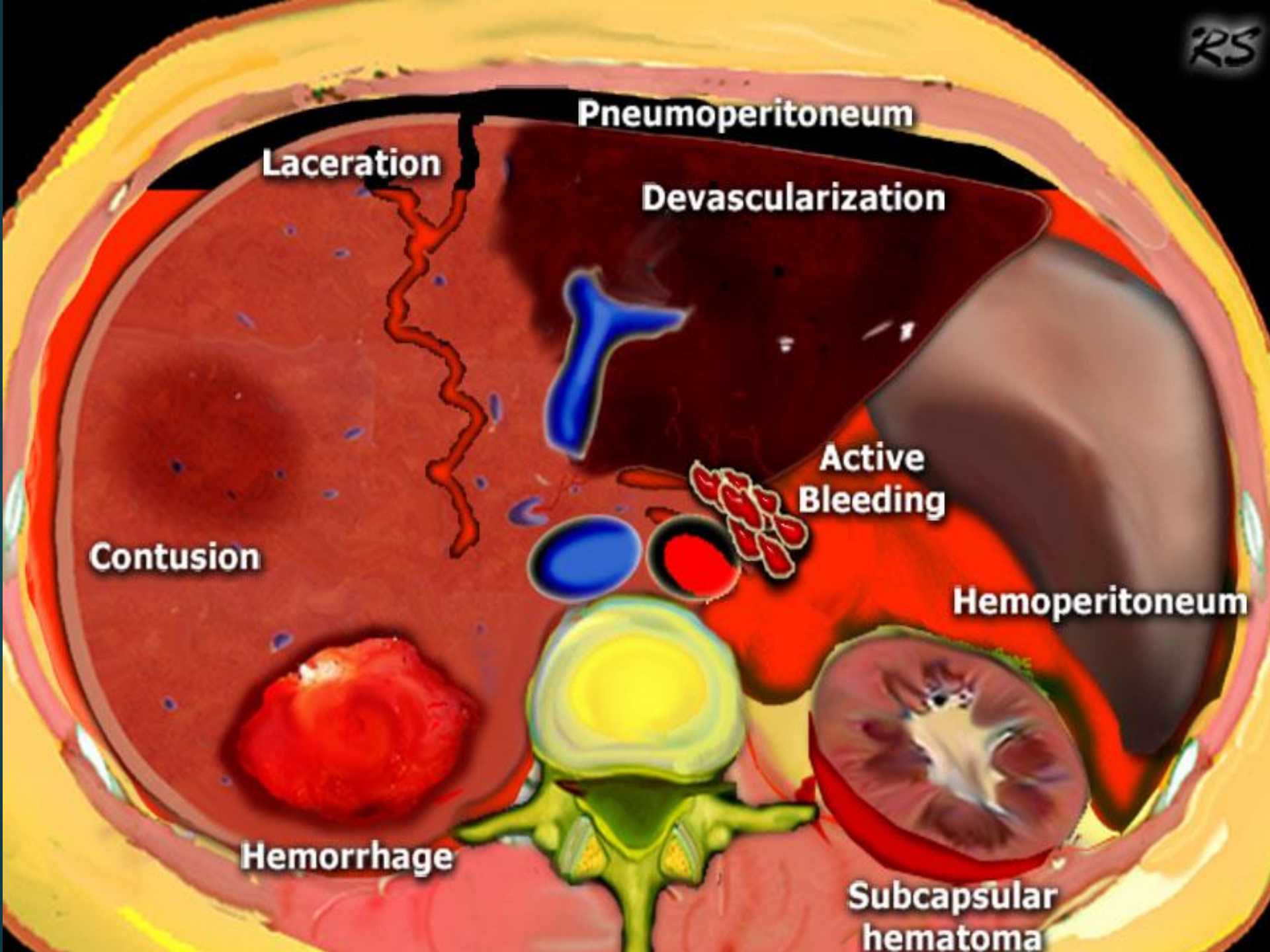
- ▶ what is the objective of the lecture?
- ▶ what are the types of the abdominal trauma?
- ▶ how would you evaluate the patient with blunt trauma?
- ▶ what are the commonly solid organs involved the blunt and penetrating trauma?

Objectives

- 1. Describe the anatomical regions of the abdomen.***
- 2. Discuss the difference in injury pattern between blunt and penetrating trauma.***
- 3. Identify the signs suggesting retroperitoneal, intraperitoneal or pelvic injuries.***
- 4. Outline the diagnostic & therapeutic procedures specific to abdominal trauma***

Overview of Multiple Trauma

- ▶ Good example of trauma is RTA. Trauma remains major cause of death after IHD and malignancy
- ▶ Trauma is the leading cause of death in people aged 1-35 years
- ▶ Trauma given a larger group of people per minute disability
- ▶ Trauma care account up to 7% of all hospital care



Pneumoperitoneum

Laceration

Devascularization

Active Bleeding

Contusion

Hemoperitoneum

Hemorrhage

Subcapsular hematoma



How do we initiate to reduce RTA?



Classification of Trauma according to Mechanism

- Blunt
- Penetrating
- Burns
- Blast

- ▶ The majority of abdominal injuries are due to blunt abdominal trauma secondary to high speed automobile accidents.



- 
- ▶ *The failure to manage the abdominal injuries accounts for majority of preventable death following multiple injuries.*

Types of the abdominal trauma

- ▶ Blunt abdominal trauma.
- ▶ Penetrating abdominal trauma.



- ▶ The recognition of the mechanism of the injury whether is penetrating or non-penetrating trauma is a greatest importance for treatment and diagnosis and workup therapy.

Anatomical regions of the abdomen:



▶ (a) Peritoneum

⇒ Intrathoracic abdomen

▶ (liver ,spleen , and stomach, pancreas).

▶ ⇒ True abdomen

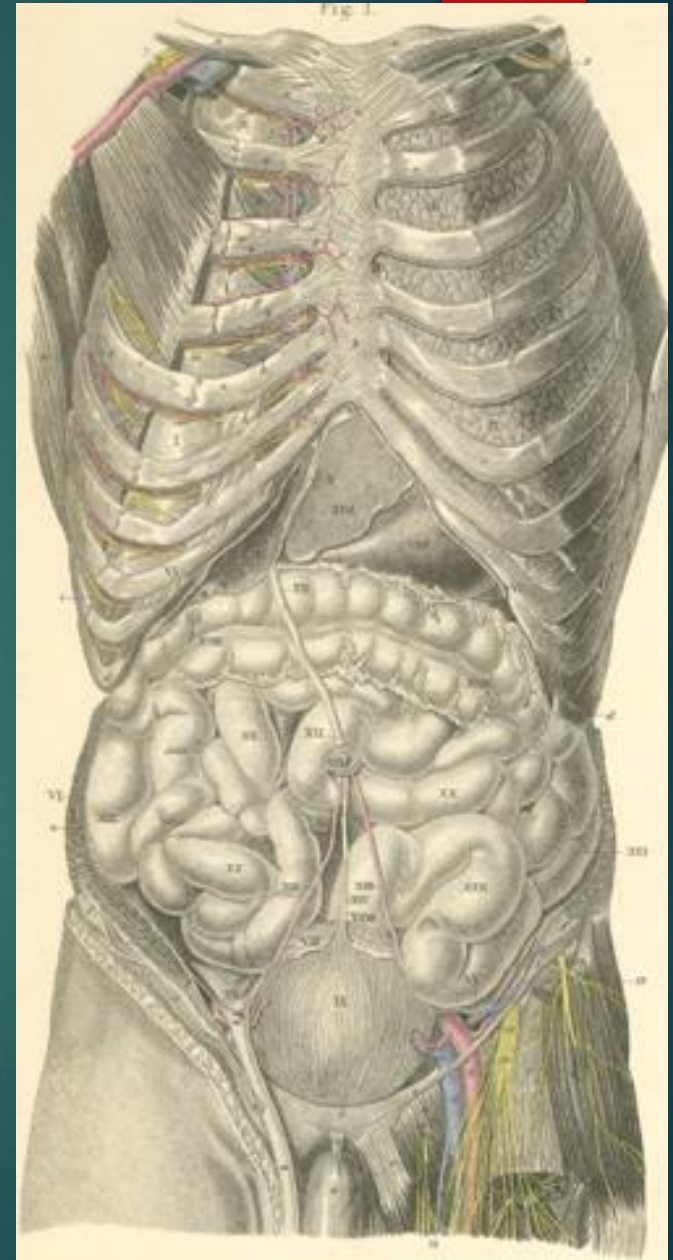
▶ # The accessible part during PEx.

▶ (b) Retroperitoneum abd. :

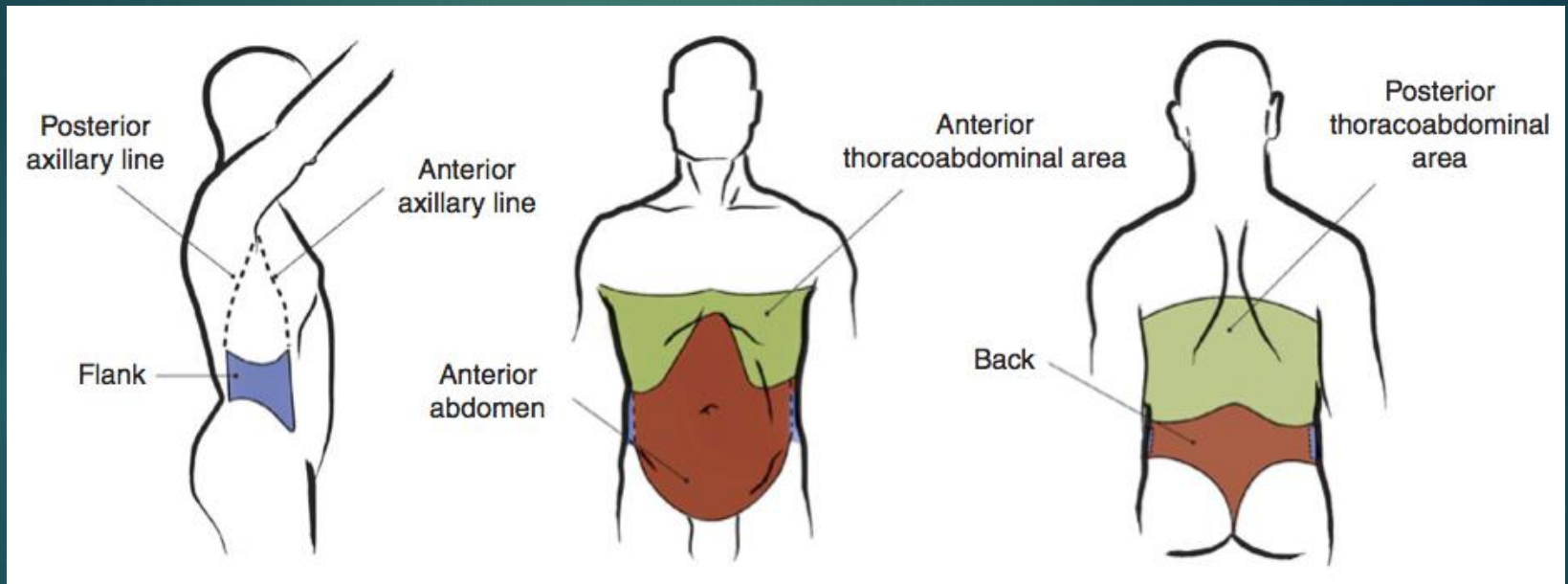
▶ (kidney, pancreas, part of colon)

▶ (c) Pelvic abdomen

▶ (bladder, genital system of female).



Anatomical regions of the abdomen



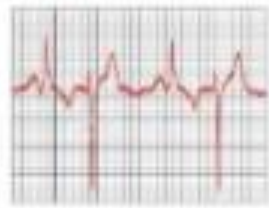
Hospital Care and Diagnosis

- ▶ **Primary survey:**
- ▶ The resuscitation & Management priorities of patient with major abdominal trauma are:
- ▶ The (ABCDE) of EMERGENCY resuscitations airway, breathing and circulation with hemorrhage control should be initiated.

ATLS – Primary Survey

- Airway (& C-spine Immobilization)
- Breathing
- Circulation
- Disability Neurological
- Exposure/Environmental Control
- Full Vital Signs

Adjuncts to Primary Survey



ECG



Vital signs



ABGs

After a pulse is found, a blood sample is taken from the artery.

Urinary output



Pulse oximeter and CO₂

Urinary / gastric catheters unless contraindicated



Secondary Survey

- ▶ **HISTORY:**
 - ▶ Blunt abdominal trauma
 - ▶ Penetrating abdominal trauma
- ▶ **PHYSICAL EXAMINATION:**
 - ▶ General physical Examination
 - ▶ Examination of the abdomen.

Abdominal Examination

- 1. Inspection**
- 2. Palpation**
- 3. Percussion**
- 4. Auscultation**
 - ▶ **And .. Rectal Examination**
 - ▶ **Vaginal Examination**

DIAGNOSTIC PROCEDURES

- ▶ (A) Blood Tests
- ▶ (B) Radiological Studies (Plain abdominal X-ray , CXR)
- ▶ (C) Peritoneal lavage (DPL)
- ▶ (D) USG abdomen
- ▶ (E) CT abdomen
- ▶ (F) Peritoneoscopy (Diagnostic laparoscopy)

ESTABLISHING PRIORITIES AND INDICATIONS FOR SURGERY:

- ▶ Q : when should we do laparotomy ?
- ▶ A : if there are :
 - ▶ (A) Signs of peritoneal injury
 - ▶ (B) Unexplained shock
 - ▶ (C) Evisceration of viscous
 - ▶ (D) Positive diagnostic (DPL)
 - ▶ (E) Determination of finding during routine follow up

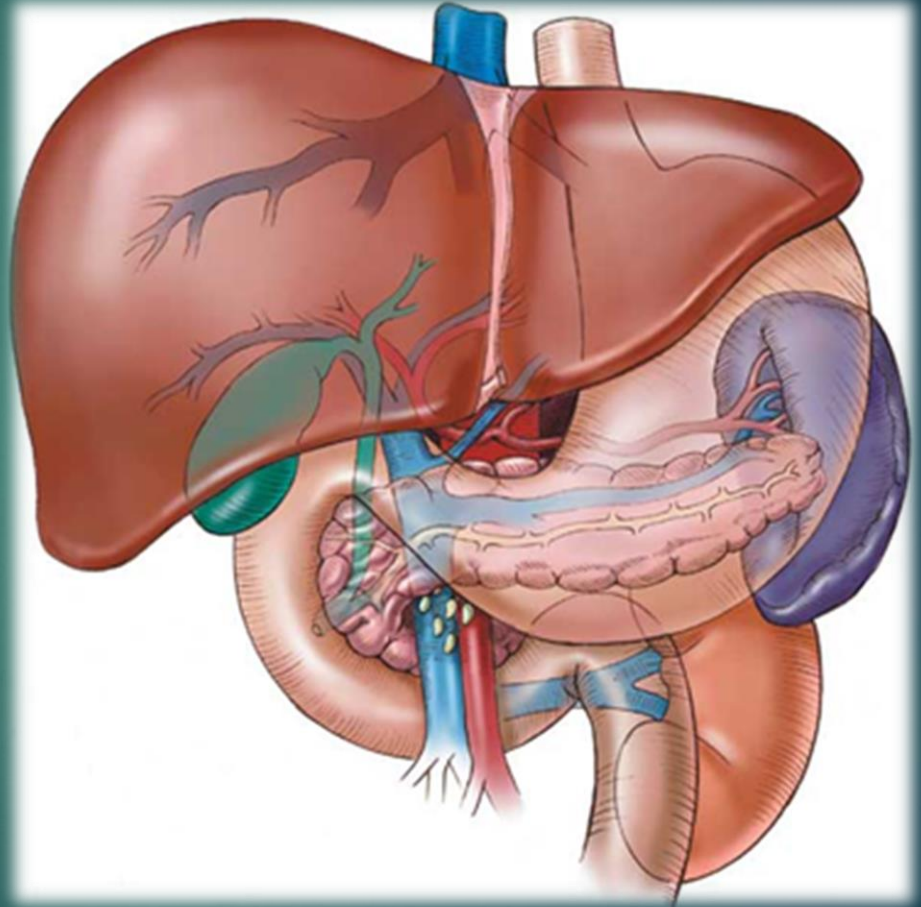




Exploratory Laparotomy

Specific Organs Trauma

- ▶ Liver
- ▶ Spleen
- ▶ Kidneys
- ▶ Bowel



Retroperitoneal

- Pancreas & Duodenum
- Bowel
- Vascular(IVC , aorta)
- Kidneys, ureter

Genito-urinary system

- ▶ Urinary bladder, urethra
- ▶ Female reproductive system

Liver Trauma

- ▶ The liver is the largest organ in the abdominal cavity
- ▶ Continues to be the most commonly injured organs in all patients with abdominal Trauma
- ▶ The commonest organ injured in case of penetrating trauma



Mechanism of injury

- ▶ Hepatic injuries result from direct blows, compression between the lower ribs on right side and the spine or shearing at fixed points secondary to deceleration.
- ▶ Any penetrating gunshot, stab or shotgun wound below the right nipple on right upper quadrant of the abdomen is also likely to cause a hepatic injury.

Penetrating Trauma




Diagnosis of liver trauma

- ▶ **CLINICAL MANIFESTATIONS**
- ▶ Diagnosis of hepatic injury is often made at laparotomy in patients presenting with penetrating injuries requiring immediate Surgery
- ▶ Or those sustaining blunt Trauma who remain in shock or present with abdominal rigidity.

Diagnosis of liver trauma

- ▶ **Investigation :**

- ▶ Adjuvant diagnostic tests are necessary in the decision making process to determine whether or not laparotomy is necessary:

- 
- ▶ **Diagnostic peritoneal lavage (DPL)** has been extremely reliable 98% in determining the presence of blood in the peritoneal cavity once (positive) patient should be taken to the Operating Room without delay.
 - ▶ N.B : DPL used in In patient with shock or abdominal distention

DPL



Diagnosis of liver trauma

- ▶ **Investigation :**
- ▶ CT Scan abdomen used for diagnosing intra peritoneal injuries in stable patients after blunt trauma.
- ▶ N.B : CT used in stable patient .

LIVER TRAUMA





TREATMENT

- ▶ When patient arrived to ER the initial management of the patient should be uniform regardless of organs system injuries. Resuscitation is performed (ABCDE) in the standard fashion.



Non operative approach:

The hepatic injury diagnosed by CT in stable patient is now non operative approach practiced in many centers.

CT Criteria for non operative management

- ▶ Simple hepatic laceration Or intra hepatic hematoma
- ▶ No evidence of active bleeding
- ▶ Intra peritoneal blood loss less than 250 ml
- ▶ Absence of other Intra peritoneal injuries required surgery

OPERATIVE APPROACH

- ▶ Persistent hypotension, despite adequate volume replacement, suggests ongoing blood loss and mandates immediate operative intervention.

Injury Classification

- ▶ **Grade I:** Simple injuries – non bleeding
- ▶ **Grade II:** Simple injuries managed by superficial suture alone if you open the patient.
- ▶ **Grade III:** Major intraparenchymal injury with active bleeding but not requiring inflow occlusion (Pringle maneuver) to control haemorrhage
- ▶ **Grade IV:** Extensive intraparenchymal injury with major active bleeding requiring inflow occlusion for hemostatic control
- ▶ **Grade V:** Juxtahepatic venous injury (injuries to retrohepatic cava or main hepatic veins) portal vein injury.

OPERATIVE MANAGEMENT

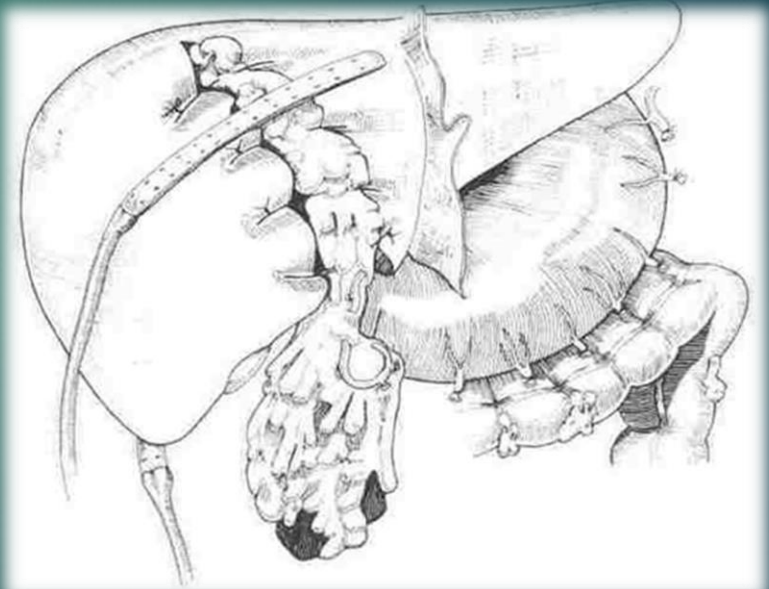
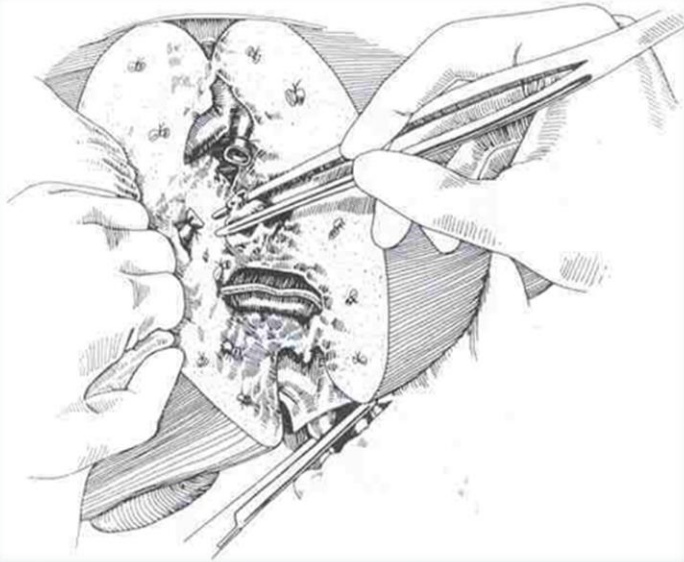


- ▶ All patients undergoing laparotomy for trauma should be explored through midline incision because you do not know where is the lesion.

MANAGEMENT OF SPECIFIC LIVER INJURIES


- ▶ **Grade-I&II:** Simple injuries can be management by any one of variety of methods (simple suture, electrocautery or Tropical Hemostatic Agents) This type of injury like Liver Bx. does not require drainage.
- ▶ **Grade III:** Major intraparenchymal injuries with active bleeding can best be managed by Finger Fracturing the hepatic parenchyma and ligating or repairing lacerated blood vessels & bile ducts under direct vision.

- ▶ **Grade IV:** Extensive intra parenchymal injuries with major rapid blood loss require occlusion of portal triad to control hemorrhage.



SUMMARY

- ▶ Simple techniques includes drainage only of non-bleeding injuries, application of fibrin glue, and sutures hepatorrhaphy and , Application of Surgical (I & II).
- ▶ Advanced Techniques of Repair (III & IV) all performed with Pringle Maneuver in place.

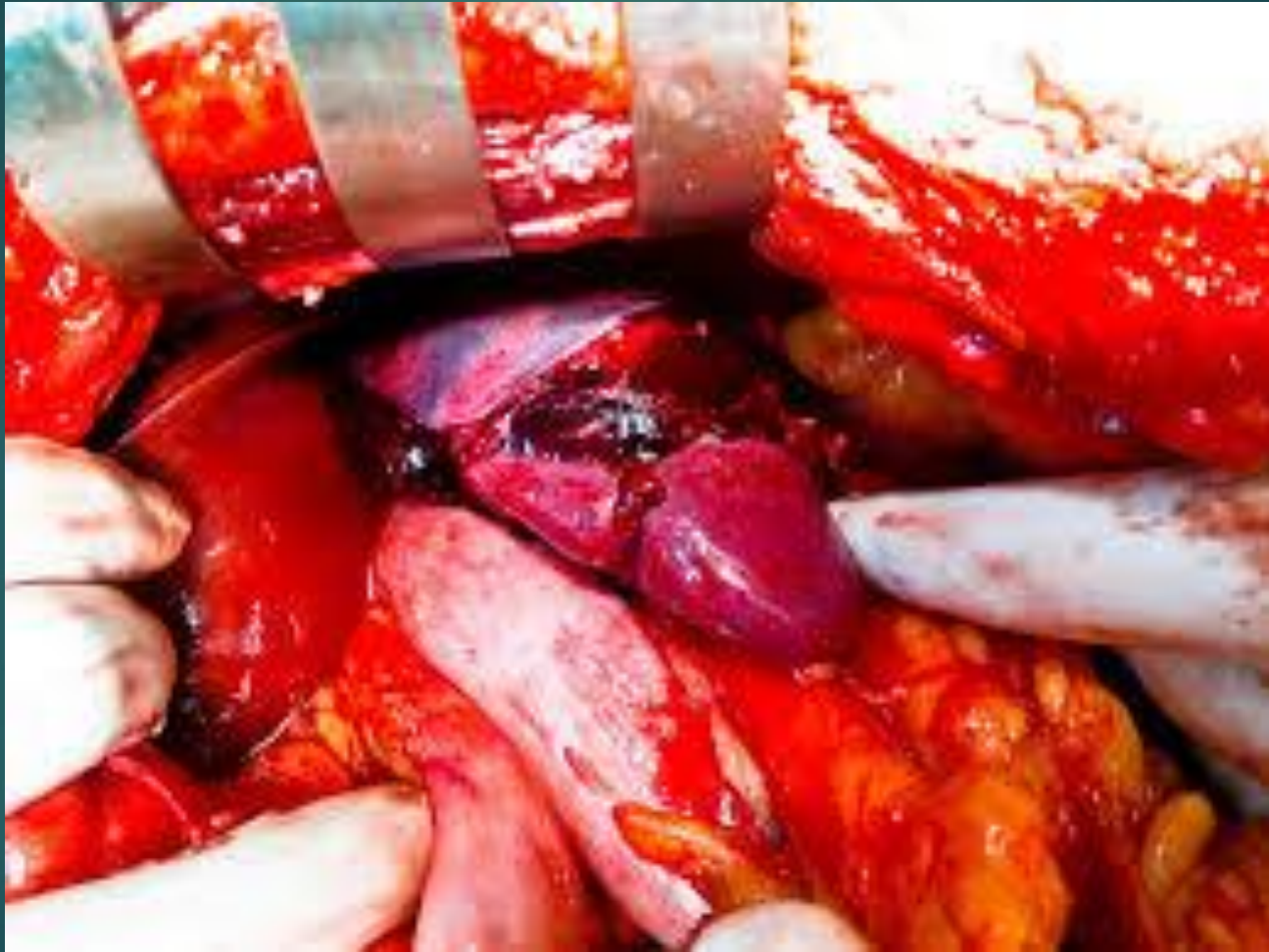
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- ▶ Extensive hepatorrhaphy
 - ▶ Hepatotomy with selective vascular ligation
 - ▶ Omertal Pack
 - ▶ Resectional debridement with selective vascular ligation
 - ▶ Resection
 - ▶ Selective Hepatic Artery Ligation
 - ▶ Perihepatic packing



COMPLICATIONS & MORTALITY


- ▶ Recurrent bleeding
- ▶ Hematobilia
- ▶ Perihepatic abscess
- ▶ Biliary Fistula
- ▶ Intrahepatic Haematoma
- ▶ Pulmonary Complications
- ▶ Coagulopathy
- ▶ Hypoglycemia

Splenic Trauma



INCIDENCE

- ▶ The spleen remains the most commonly injured organ in patients who have suffered blunt abdominal trauma and is involved frequently in penetrating wounds of the left lower chest and upper abdomen. Management of the injured spleen has changed radically over the past decade.

- 
- ▶ Now recognized as an important immunologic factory as well as reticuloendothelial filter. Although the risk of overwhelming postsplenectomy sepsis (OPSS) is greatest in child less than 2 yrs recognition of OPSS has stimulated efforts to (Conserve spleen) by splenorrhaphy.

MECHANISM OF INJURY

- ▶ The spleen is commonly injured in patients with blunt abdominal trauma because of its mobility.
- ▶ Most civilian stab wounds and gunshot wounds cause simple lacerations or through and through injuries.
- ▶ It is of interest 2% of patient who are undergoing surgery LUQ of the abdomen can injured the spleen

PATHOPHYSIOLOGY & CLASSIFICATION

- ▶ The Magnitude of splenic disruption depend on patient age, injury mechanism and presence of underlying disease spleenic injury have been classified according to their pathologic anatomy as such:

Grading

- ▶ Grade I: Subcapsular hematoma
- Grade II: Sub segmental parenchymal injury
- Grade III: Segmental devitalization
- Grade IV: Polar disruption
- Grade V: Shattered or devascularized organ

DIAGNOSIS (EVALUATION)

- ▶ Patient History
- Physical Examination
- ▶ Symptoms and signs :
 - ▶ 1- LUQ bruising or abrasion
 - ▶ 2- Left lower ribs fracture
 - ▶ 3- Kehr's sign : shoulder tip pain
 - ▶ 4- Balance's sign : LUQ mass

DIAGNOSIS (EVALUATION)

- ▶ Radiological Evaluation
- ▶ CXR
- ▶ Plain abdominal X-Ray
- ▶ CT Scan
- ▶ Angiography





TREATMENT

- ▶ *Initial Management (Resuscitation) ABCDE*
- ▶ *Non operative approach:*
- ▶ Widely practiced in pediatric trauma the criteria for nonoperative approach
- ▶ Haemodynamically stable children / adult
- ▶ Those patient without peritoneal finding at anytime
- ▶ Those who did not require greater than two unit of blood

Contra indication for splenic salvage:

- ▶ The patient has protracted hypotension
- ▶ Undue delay is anticipated in attempting repair the spleen
- ▶ The patient has other severe injury

Operative approach

- ▶ Decision to perform splenectomy or splenorrhaphy is usually made after assessment & grading the splenic injury



Post splenectomy and splenorrhaphy complications

Early Complications

- ▶ Bleeding
- ▶ Acute gastric distention
- ▶ Gastric necrosis
- ▶ Recurrent splenic bed bleeding
- ▶ Pancreatitis
- ▶ Subphrenic abscess

Late Complications

- ▶ Thrombocytosis
- ▶ OPSS (1 – 6 Week)
- ▶ DVT

Renal Trauma

- ▶ The commonest organ prone to injury in urinary system
- ▶
- ▶ If contusion occur , can be treated by conservative therapy
- ▶
- ▶ If hematuria presence , means poor indicator of severe renal injury



Mechanism of Blunt Renal Injury



Renal Trauma

Diagnosis

- ▶ **Symptoms and signs (3 Fs) :**
- ▶ 1- Flank abrasion
- ▶ 2- Fracture of the ribs
- ▶ 3- Fracture vertebral transverse process
- ▶
- ▶ **Investigation :**
- ▶ Intravenous urography (IVU) + CT scan



Management

- ▶ Minor injuries >> US scan , percutaneous drainage , antibiotic usage
- ▶ Severe injuries >> partial nephrectomy or total nephrectomy



Shattered Kidney

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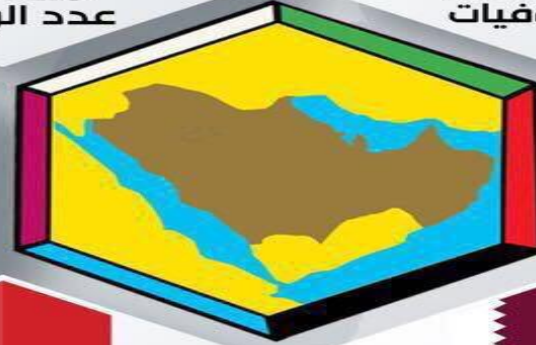
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4796 حادثاً
725 حالة
عدد الوفيات



السعودية
550 ألف حادث
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الكويت
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عمان
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البحرين
1524 حادثاً
47 حالة
عدد الوفيات



قطر
1759 حادثاً
178 حالة
عدد الوفيات



Thank
You