

Liver & pancreatic injury

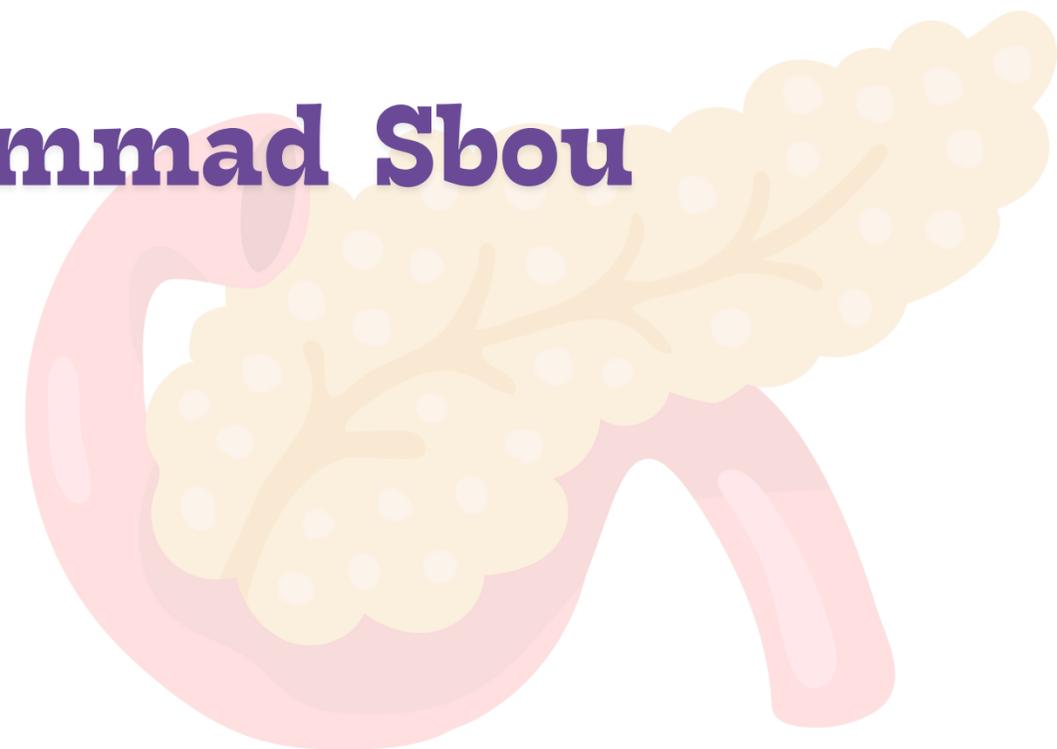
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The liver is the most commonly injured solid abdominal organ in blunt trauma.

High vascularity → risk of severe hemorrhage.

Causes:

Blunt trauma: Motor vehicle accidents, falls, sports injuries.

Penetrating trauma: Stab wounds, gunshots

Blunt trauma:

Deceleration injuries → shearing of hepatic veins.

Direct compression → parenchymal laceration.

Penetrating trauma:

Stab → often localized injury.

Gunshot → high-velocity, more extensive tissue destruction.

Clinical Presentation

Signs:

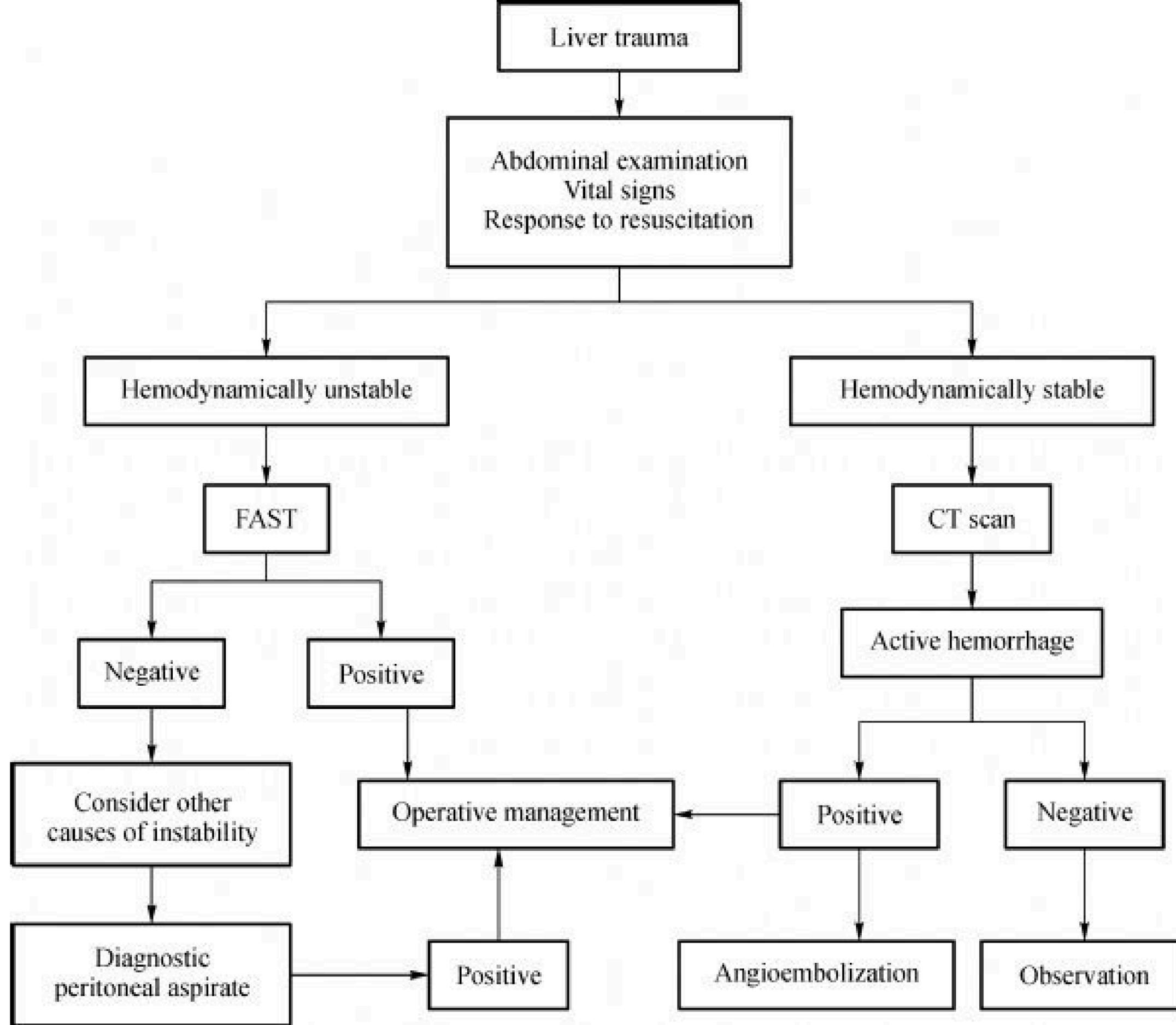
Right upper quadrant tenderness
Signs of peritonitis (if associated hollow viscus injury)

Systemic:

Hypotension, tachycardia (hemorrhagic shock)

Other findings:

Right shoulder pain (referred from diaphragmatic irritation)
Bruising (seatbelt sign, flank ecchymosis)



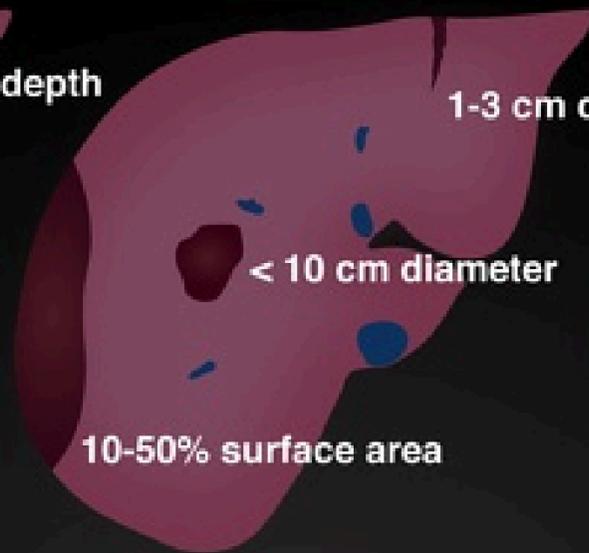


< 1 cm depth

< 10% surface area

Grade I

- laceration
- subcapsular haematoma



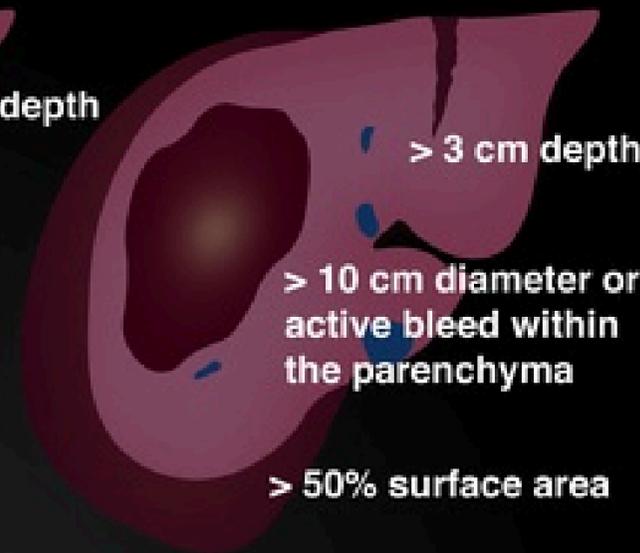
1-3 cm depth

< 10 cm diameter

10-50% surface area

Grade II

- laceration
- intraparenchymal haematoma
- subcapsular haematoma



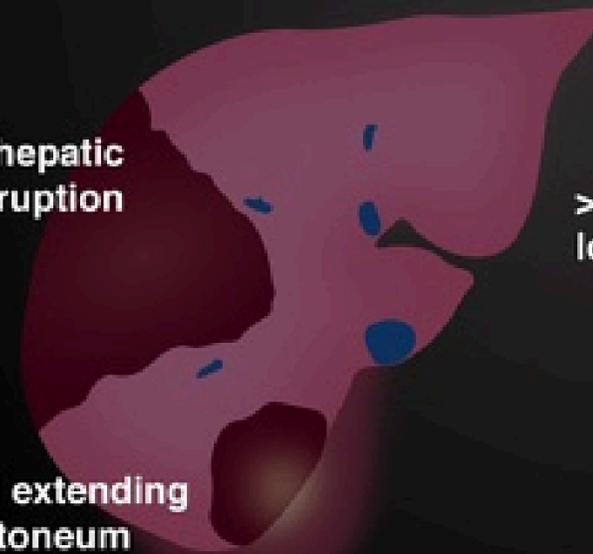
> 3 cm depth

> 10 cm diameter or active bleed within the parenchyma

> 50% surface area

Grade III

- laceration
- intraparenchymal haematoma
- contained active bleed
- subcapsular haematoma
- vascular injury
e.g. pseudoaneurysm or AV fistula

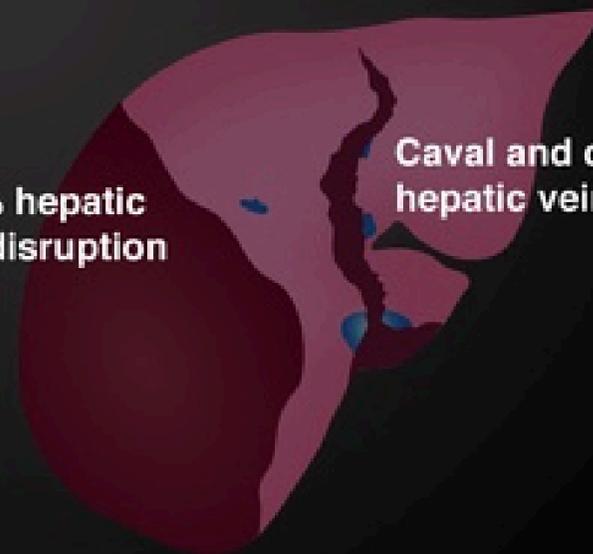


25-75% hepatic lobe disruption

Active bleed extending into the peritoneum

Grade IV

- parenchymal disruption
- active bleeding



> 75% hepatic lobe disruption

Caval and central major hepatic vein injury

Grade V

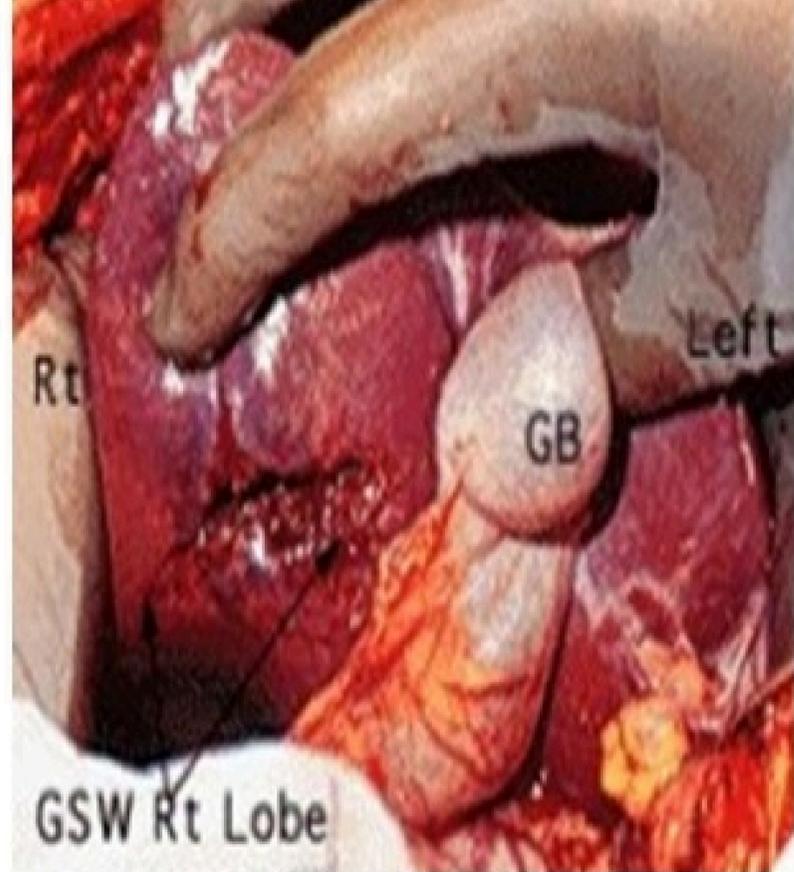
- parenchymal disruption
- juxtahepatic venous injury

SHapu

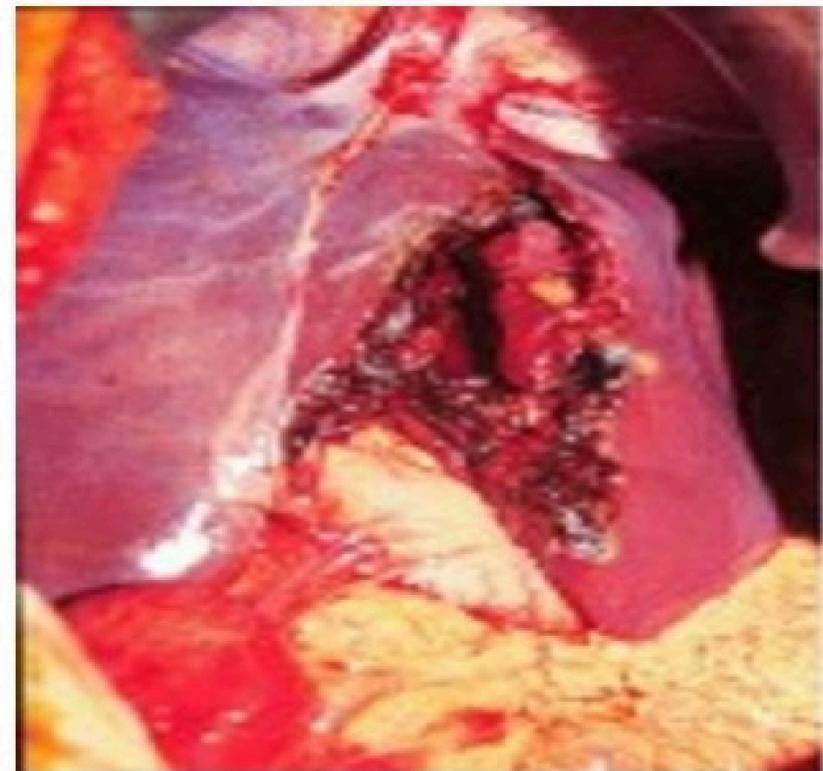
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*Advance one grade for each additional injury upto grade III.



Grade II



Grade IV

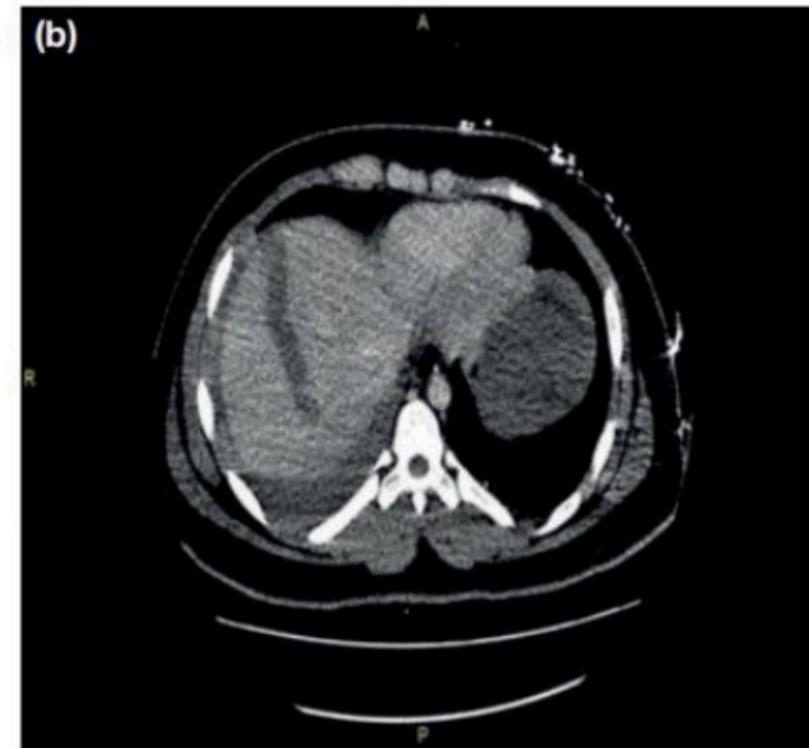
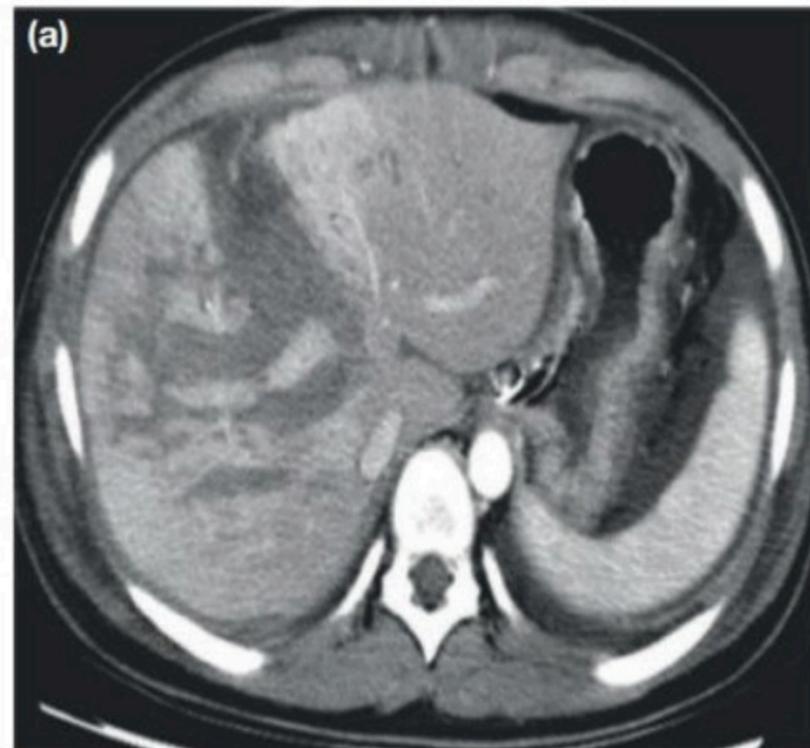


Figure 69.8 Computed tomography scans demonstrating the significant differences between blunt (a) and penetrating (b) trauma (assault with a kitchen knife).

Non-Operative Management

Criteria:

Hemodynamically stable

No peritonitis

Isolated liver injury

Monitoring:

ICU admission

Serial hemoglobin / hematocrit

Repeat CT if worsening

Advantages: Reduced morbidity, preserved liver tissue.

Operative Management

Indications:

Ongoing bleeding

Peritonitis

Associated hollow viscus injury

Surgical options:

Direct pressure / packing

**Hepatorrhaphy /
parenchymal suturing**

**Perihepatic packing (damage
control)**

**Vascular control (Pringle
maneuver: clamp
hepatoduodenal ligament)**

Resection in severe cases

Complications

Early:

Hemorrhage, shock, bile leak

Late:

Abscess, biloma, biliary fistula, stricture

Case:

A 28-year-old male is brought to the ED after a high-speed motor vehicle collision. He is alert but pale, diaphoretic, and tachycardic (HR 130), with BP 80/50 mmHg. Physical ecchymosis across the abdomen. FAST exam reveals free fluid in the hepatorenal recess

:Question

?Which of the following is the most appropriate next step in management

- A) Immediate CT abdomen with contrast**
- B) Non-operative management with ICU monitoring**
- C) Exploratory laparotomy with liver packing**
- D) Peritoneal lavage only**
- E) Observation with serial vitals**

Pancreatic injury

Introduction of pancreatic injury :

- Pancreatic trauma is rare but potentially catastrophic injury that can be very difficult to diagnose.
- Pancreatic injuries are rare, because pancreas lies in a relatively protected position high in the retroperitoneum.
- Pancreatic injuries are commonly associated injury to duodenum or portal or superior mesenteric veins.
- Mostly occurs due to the penetrating trauma.

Anatomy of pancreas :

- The **pancreas** is a large central retroperitoneal gland overlying the vertebral column in the supracolic compartment of the abdomen.

- **Arterial supply:**

Splenic artery

Superior pancreaticoduodenal artery

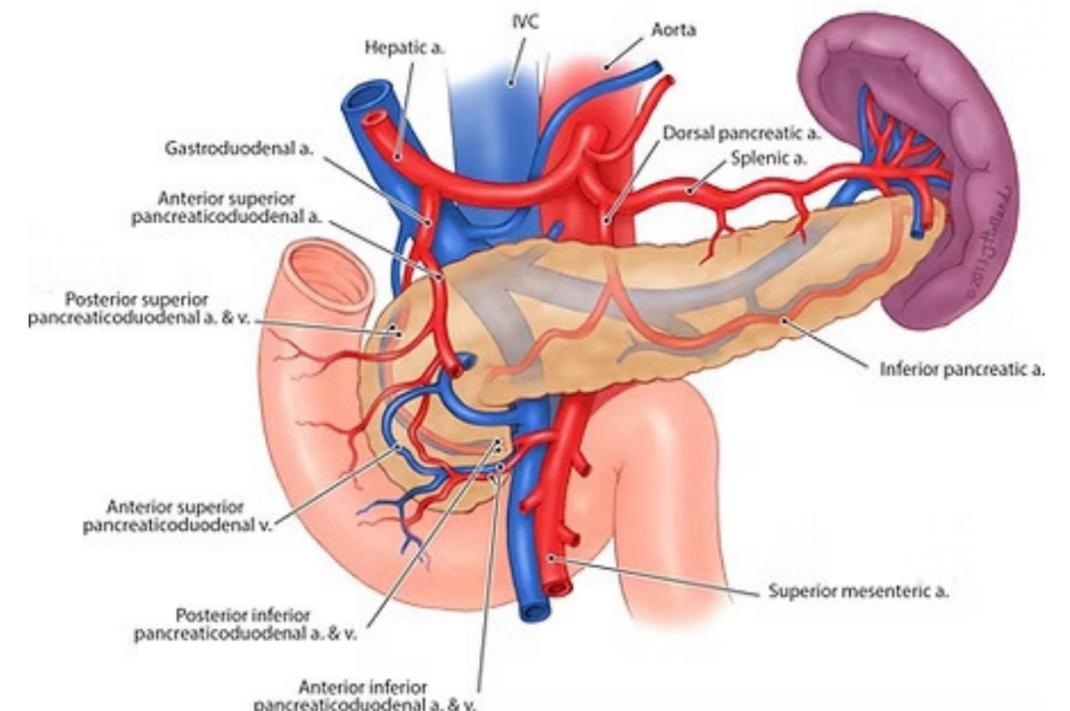
Inferior pancreaticoduodenal artery

- **Venous drainage:**

Portal vein

Superior mesenteric vein

Splenic vein



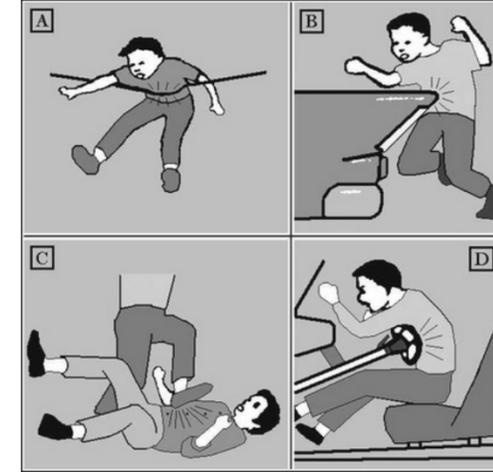
Pancreatic injuries may range from a contusion or laceration of the parenchyma without duct disruption to major parenchymal destruction with duct disruption (sometimes complete transection) and, rarely, massive destruction of the pancreatic head.

The most important factor that determines treatment is whether the **pancreatic duct** has been disrupted.

Etiology

Blunt trauma

- Fracture over the spinal column is usually observed in smaller children.
- Caused by direct abdominal blows from malposition seat belt



Penetrating trauma

caused by firearms result in the highest frequency of pancreatic injury.

Iatrogenic pancreatic injury:

ERCP, multiple pancreatic biopsies, splenectomy, inexperienced exploration of CBD and trans duodenal sphincteroplasty.

Isolated pancreatic injury:

Result from penetrating trauma to the mid back.

Penetrating trauma to the upper abdomen or the back carries a higher chance of pancreatic injury.

Clinical Presentation

- Symptom free early in the postinjury time frame and even silent in many cases.
- Epigastric pain (Most frequent presentation of blunt pancreatic trauma) - Mild initially then becomes severe due to leakage of pancreatic fluids into the surrounding tissues.
- Symptoms of injury to other structures commonly mask or supersede that of pancreatic injury.

In blunt trauma

- Retroperitoneal hematoma
- Retroperitoneal fluid
- Free abdominal fluid
- Pancreatic edema

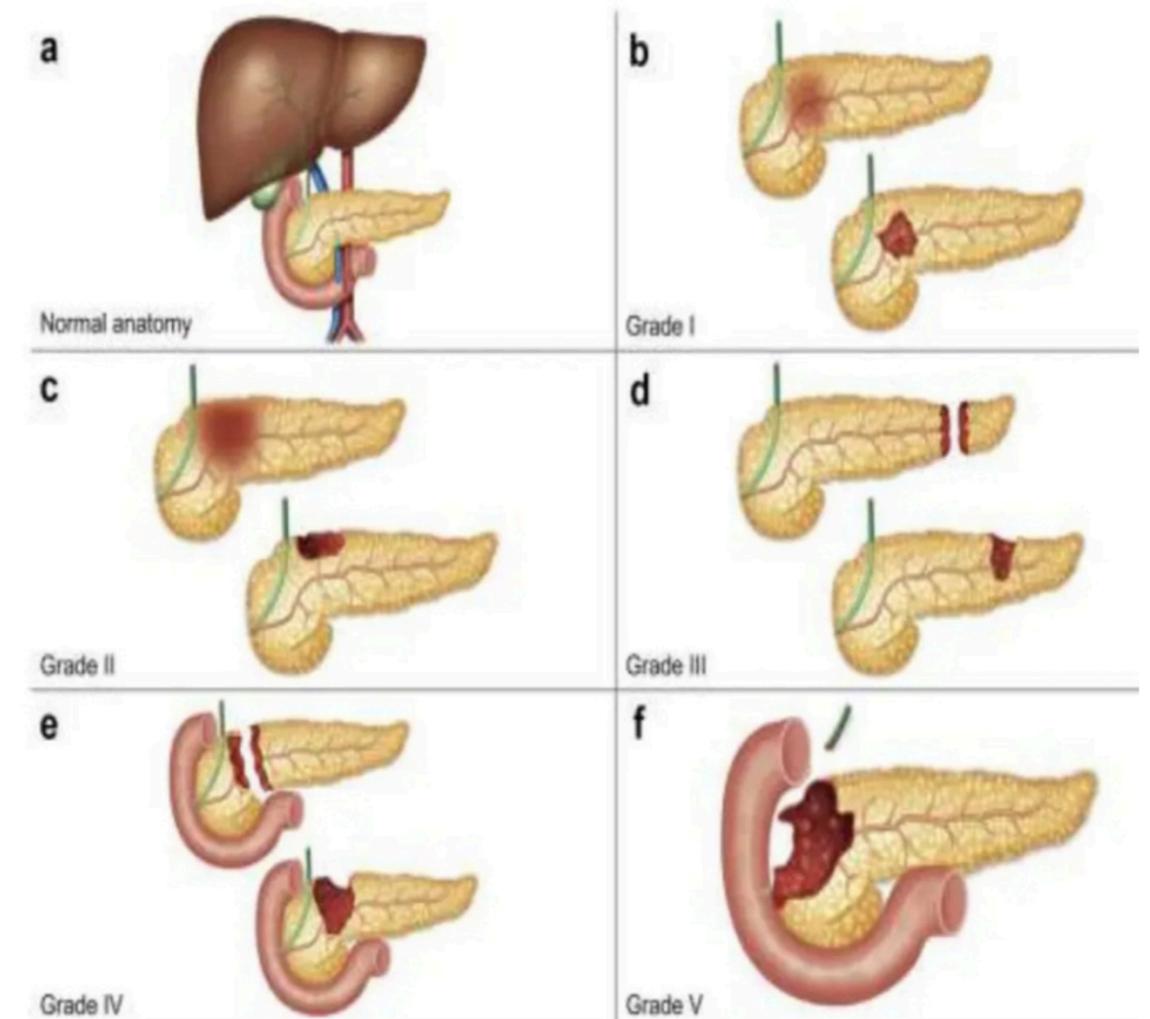
In penetrating trauma

- Visualization of perforation
- Hemorrhage or fluid leak (e.g., bile, pancreatic fluid)
- Retroperitoneal hematoma around the pancreas



Grading

- Grade I - Minor contusion/ laceration without duct injury.
- Grade II - Major contusion/ laceration without duct injury.
- Grade III - Distal transection or injury with duct involvement.
- Grade IV - Proximal transection or injury with involving ampulla.
- Grade V - Massive disruption of pancreatic head.



Investigations

- Laboratory studies

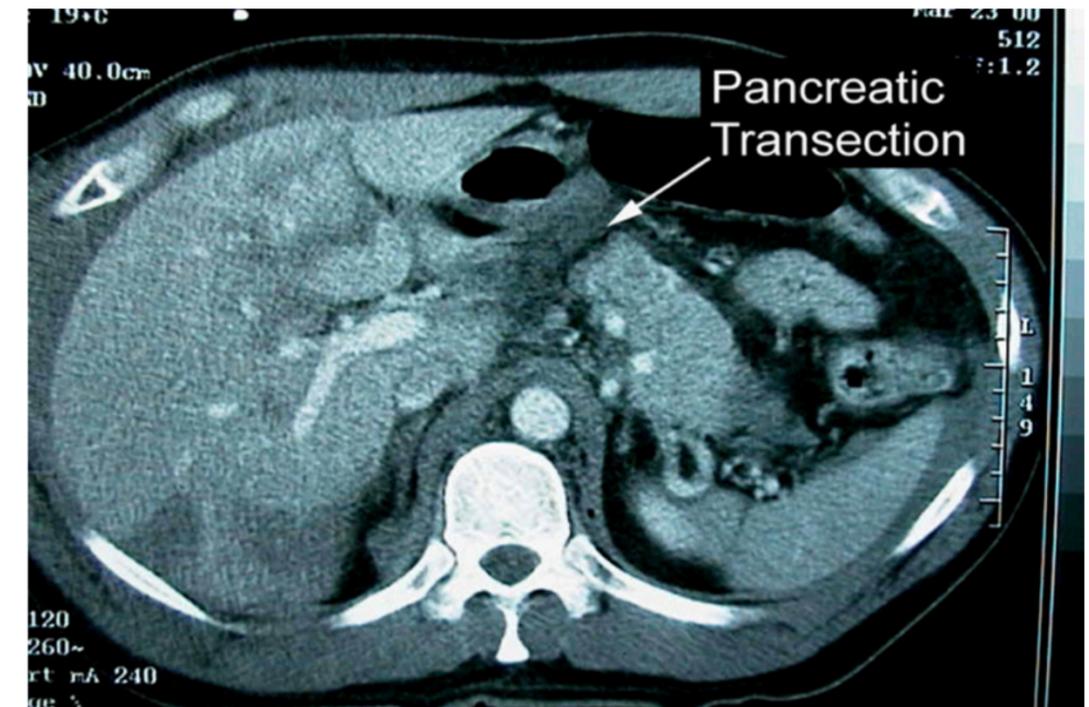
Rise in pancreatic amylase (Not diagnostic).

- Imaging studies

X-ray abdomen: May detect foreign bodies such as bullet fragments and projectile-induced bone injury.

A CT-Scan of abdomen provides simplest and least invasive method to diagnose pancreatic injury.

- (MRCP) - is being used to assess injury to the ductal components but not frequently used.
- (ERCP) is gold standard for detection of pancreatic ductal injuries.



Non-operative management

- If there is no evidence of a ductal injury on CT, non-operative management is acceptable, although it may be wise to perform ERCP to establish normal ductal anatomy definitively.

operative management

- Indications:
- Peritonitis on physical examination Hypotension
- Evidence of disruption of the pancreatic duct

Prognosis

- The most common cause of death in the immediate period is bleeding, usually from associated injuries.
- Fistula formation is the most frequently reported complication,
- Treatment : wide local drainage and good nutrition and supportive care, usually resolve spontaneously within 2 weeks of injury

Deudenal injury

In humans , the duodenum is a C-shaped hollow jointed tube . It is devided anatomically into four sections duodenal injury is frequently associated with injuries to the adjoining pancreas. Like the pancreas, the duodenum lies **retroperitoneally (except the first part)** and so injuries are hidden, discovered late or at laparotomy performed for other reasons.

Clinical presentation :

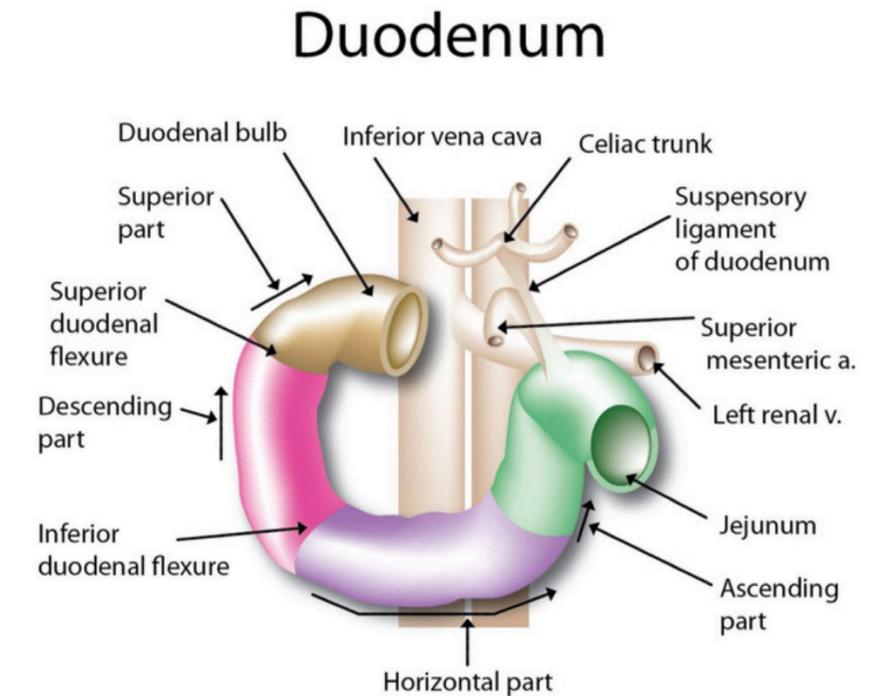
The diagnostic accuracy of duodenum injury is low because it has no specific clinical symptoms and signs. the injury may not present with any peritoneal irritation sign. May be present with abdominal pain , retching or vomiting with blood in the vomitus. Abdominal distension especially in the upper quadrant .

Diagnosis :

Water-soluble radiopaque contrast medium can be injected through a nasogastric tube just before the abdominal film is taken. If leakage happens, rupture of duodenum can be confirmed.

CT is the diagnostic modality of choice

The only sign may be gas or a fluid collection in the periduodenal tissue , and leakage of oral contrast , administration of which may improve accuracy of diagnosis



Management :

Duodenal Hematoma Management: Non operative: NGT , TPN

Surgical: Evacuation after 2 weeks

Duodenal perforation management:

Primary repair (most perforations of the duodenum can be treated by primary repair)

Management of Duodenal injury depends on which portion is affected:

1st portion debridement & end-to-end anastomosis (because of the mobility and rich blood supply of the gastric pylorus)

2nd portion For lesions between the accessory papilla and the papilla of Vater, avascularized jejunal graft, either a patch or tubular interposition graft, may be required.

3rd & 4th portion resect the third and fourth portions and perform a duodenojejunostomy on the left side of the superior mesenteric vessels

High-risk or complex duodenal repairs Whipple procedure (Pancreaticoduodenectomy)

Case !?!

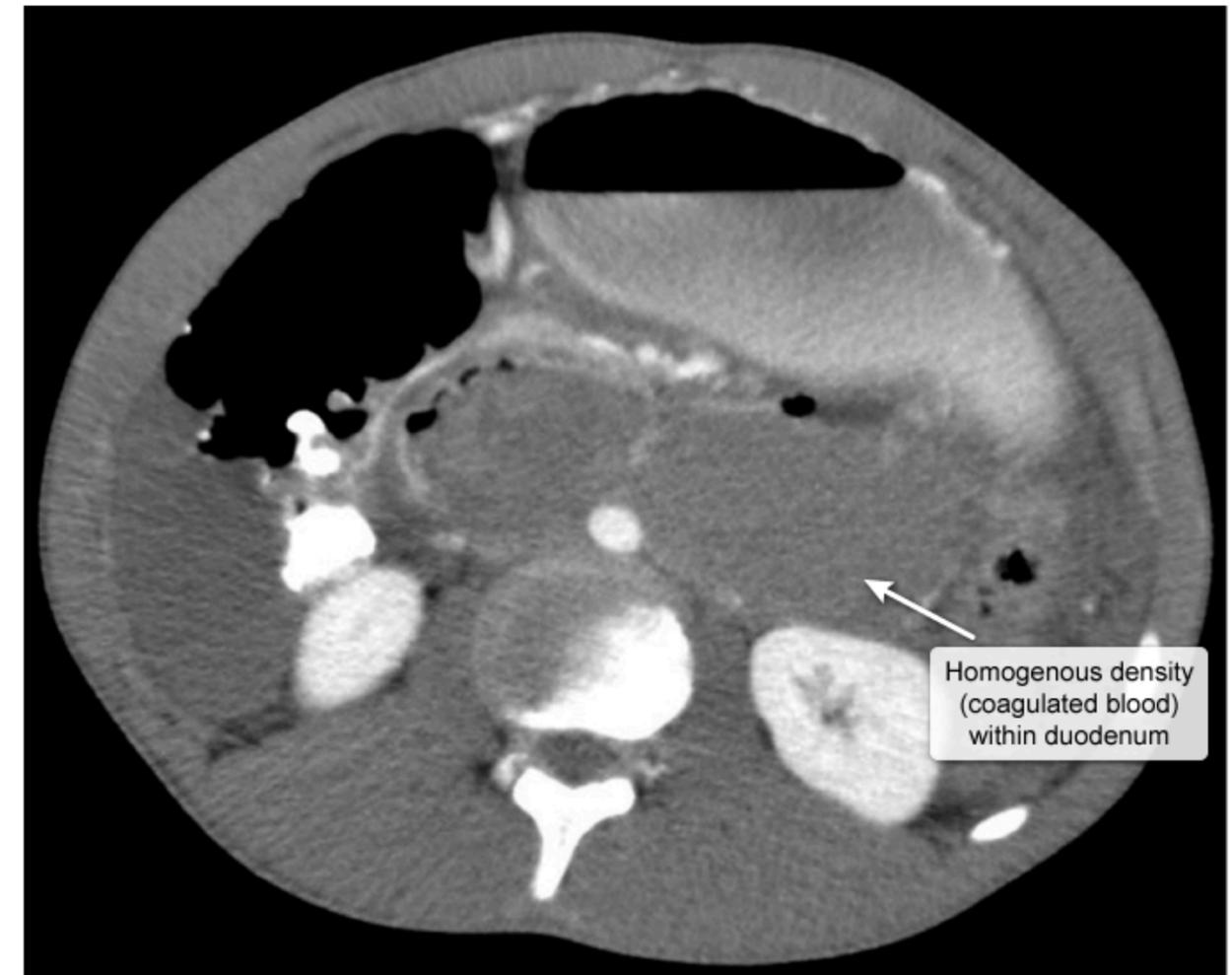
A 11-year-old girl is brought to the emergency department due to persistent vomiting. The first episode of emesis occurred 12 hours ago, and for the past 4 hours, the patient has been unable to keep any liquids down. She also has nausea and epigastric discomfort but no fever, abdominal distension, or diarrhea. The patient is a competitive gymnast. Yesterday, she fell and struck her abdomen hard on the balance beam during practice. Temperature is 36.7 C (98.1 F), blood pressure is 106/72 mm Hg, pulse is 110/min, and respirations are 18/min. On examination, mucous membranes are dry. Lung and heart sounds are normal. The abdomen is scaphoid with linear bruising across the epigastrium. On palpation, there is epigastric tenderness without guarding, rigidity, or rebound tenderness. Upright chest and abdominal x-rays are normal, with no free air under the diaphragm. Focused assessment with sonography for trauma reveals no intraperitoneal free fluid or air. Which of the following is the best next step in management of this patient?

1. Antiemetics and observation only
2. CT scan of the abdomen
3. Diagnostic peritoneal lavage
4. Exploratory laparotomy
5. Gallbladder ultrasonography

ans : CT scan of the abdomen

CT scan of the abdomen can confirm the diagnosis and visualize the extent of the hematoma, which typically appears as a homogenous density (ie, coagulated blood) within the C-shaped duodenum. Once confirmed, DHs typically are managed with bowel rest, nasogastric decompression, and parenteral nutrition and are followed with serial CT scans or duodenal ultrasonography. Most DHs resolve within a few weeks with nonoperative management.

Duodenal hematoma



Homogenous density
(coagulated blood)
within duodenum

Thank You

