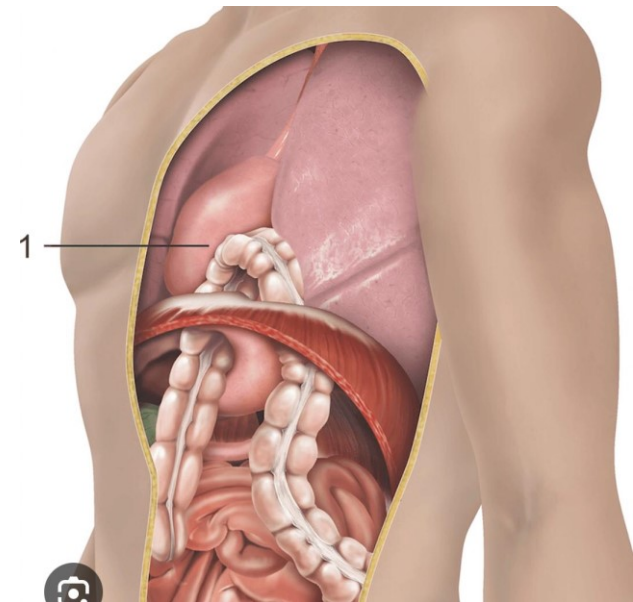
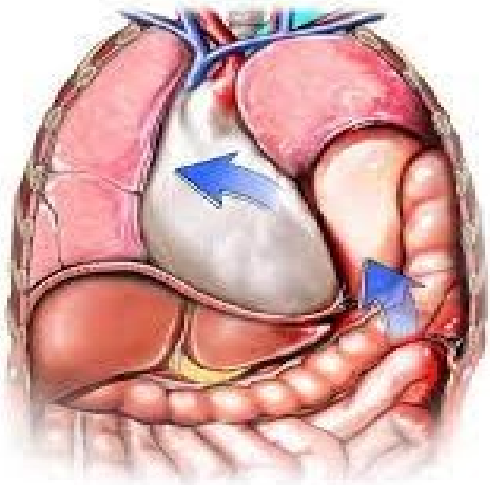


Traumatic Diaphragmatic Rupture (TDR)

DR.SAAD HAMWIAH



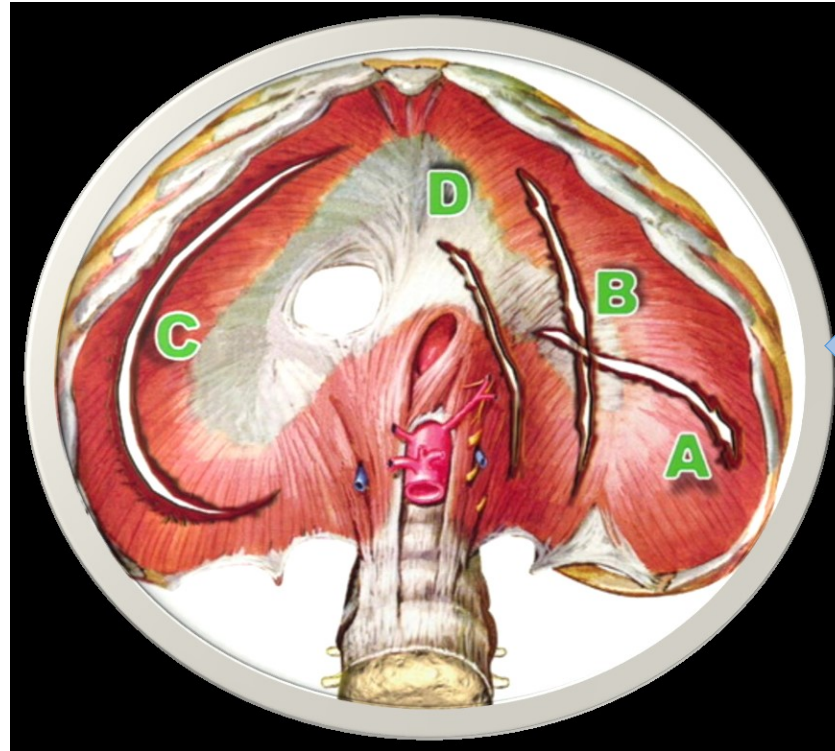
Mechanism

- Diaphragmatic injury is a recognized consequence of high velocity blunt and penetrating trauma to the abdomen and chest .
- TDR occur in about **8 %** of patients who sustain blunt trauma
- Up to **90%** of TDRs occur after motor vehicle accidents



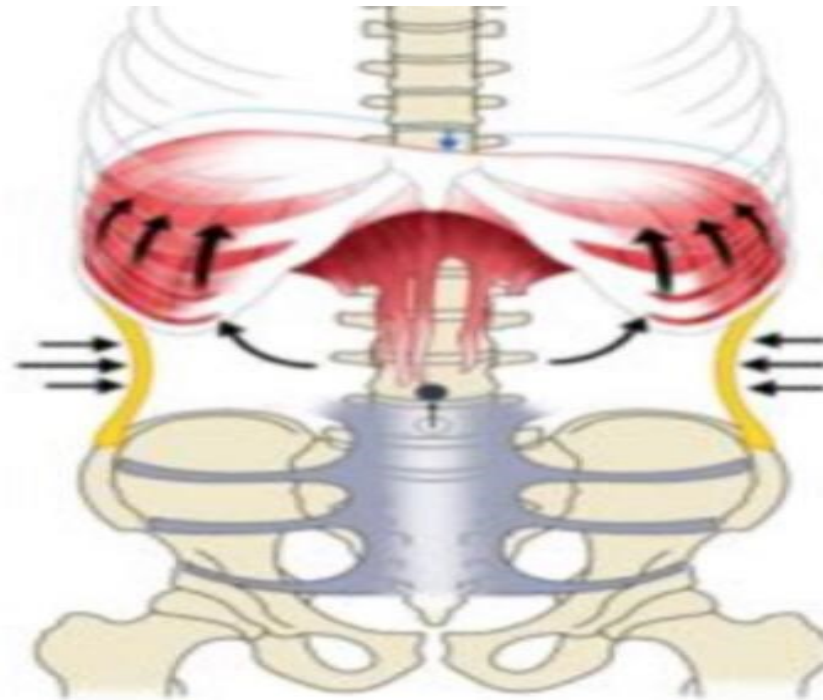
Mechanism

- Both bilateral tears and extension of tears into central tendon are uncommon: 2% to 6% of TDRs

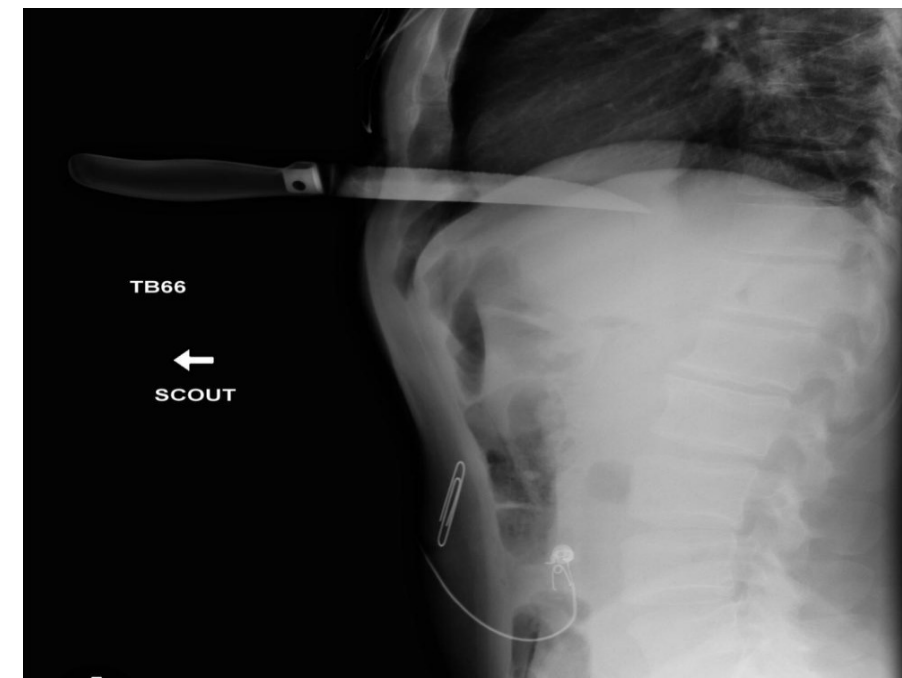
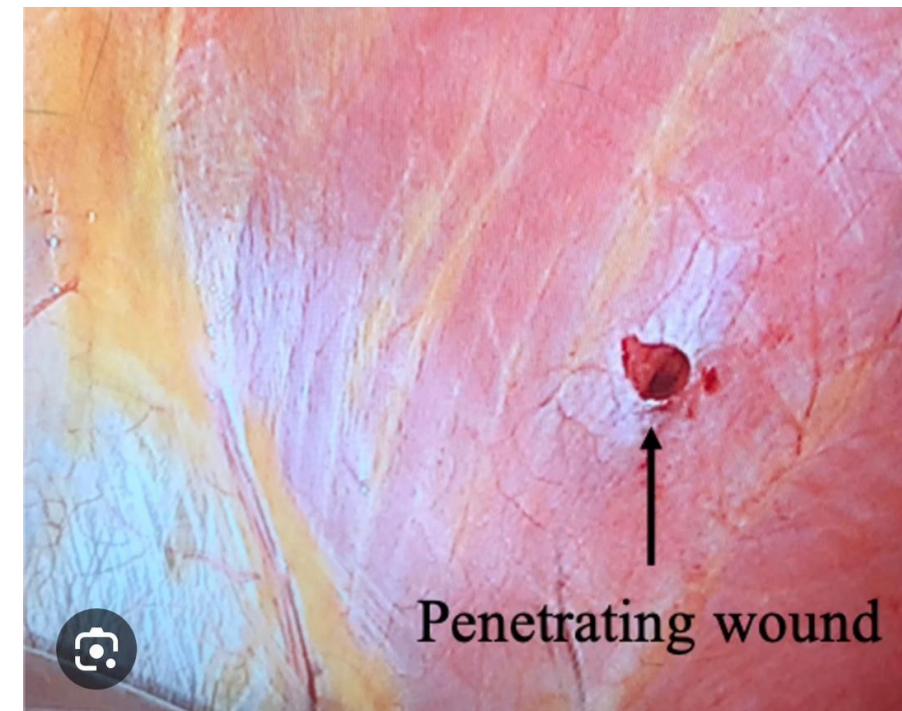


- Injuries to the left hemidiaphragm occur 3X more frequently than to the right side due to a buffering effect of the liver

Mechanisms of injuries include lateral impact which distorts the chest wall and shears the diaphragm and direct frontal impact which leads to increased intraabdominal pressure



Penetrating injuries such as gunshot wounds or stab injuries are more random (2:1 ratio of penetrating vs blunt trauma) and produce small diaphragmatic holes (usually 1 cm) which are often overlooked.



Sites of rupture

Left sided diaphragmatic tear : accounts 50% to 80%

Right sided diaphragmatic tear : is associated with liver injury in 50% of cases injuries on the right side are associated with higher rate of death(more serious)

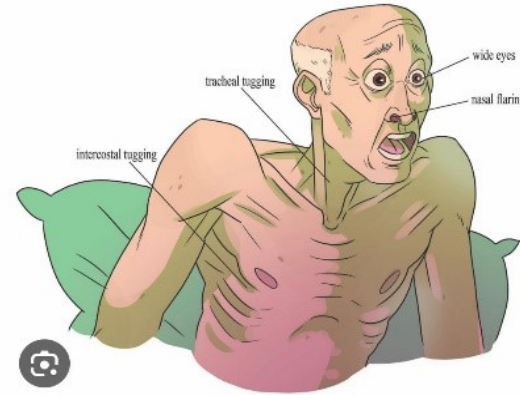
Bilateral diaphragmatic rupture : 1% to 2% of TDR (more mortality)

Presentation

- Initially diagnosis can be difficult especially when severe injuries are present thus the condition is **commonly diagnosed late**

Early presentation(acute onset) :

- 1-marked respiratory distress
- 2- Decreased breath sounds on the affected side
- 3- Palpation of abdominal contents upon chest tube insertion



- 4- auscultation of bowel sounds in the chest



- 5- paradoxical movement of the abdomen with breathing



- 6- diffuse abdominal pain



Delayed presentation (Gradual onset) :

- **Dyspnea and dry cough**

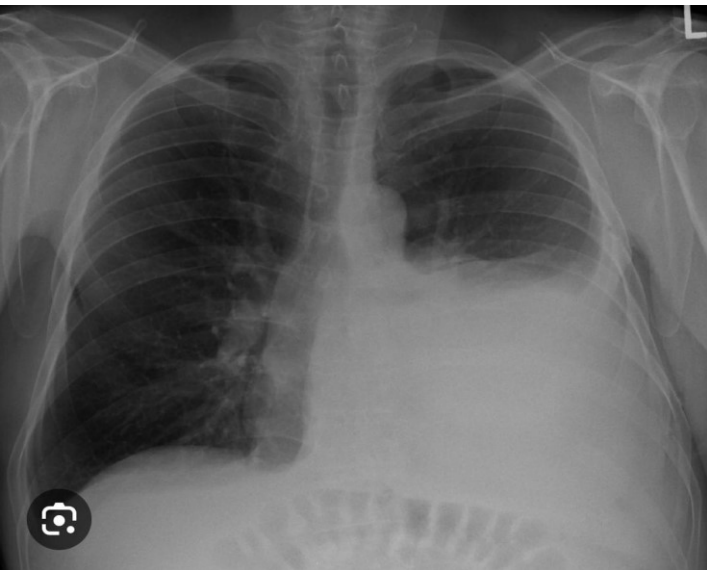


Chest radiography

- Chest radiographs are the principal screening method for thoracic injury after blunt trauma
- This study is often technically compromised by use of portable radiography units ; supine projections ; and limited patient cooperation .
- Chest X ray can pick up less than 50% of left sided TDR ; and less than 20% on the right side on the initial examination .

Chest radiography

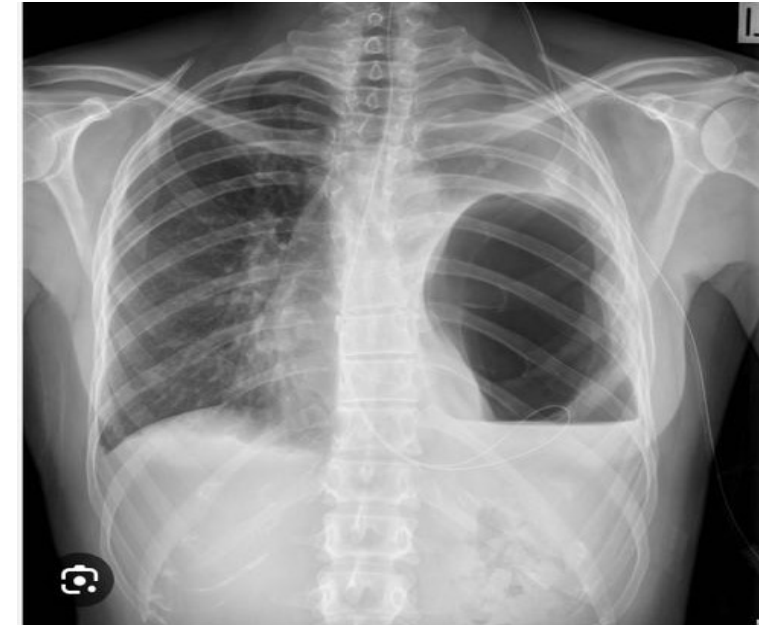
- Chest X ray signs include :



as well as a diaphragm that is very elevated



The tip of the nasogastric tube above the diaphragm



The definite presence of filled viscera in chest

CT scan

- **CT is the imaging modality of choice** in the evaluation of blunt abdominal trauma :
- **sensitivity** of 61 % -71% .
- **specificity** of 87%-100% as an aid in the diagnosis of acute TDR

CT signs of diaphragmatic injury

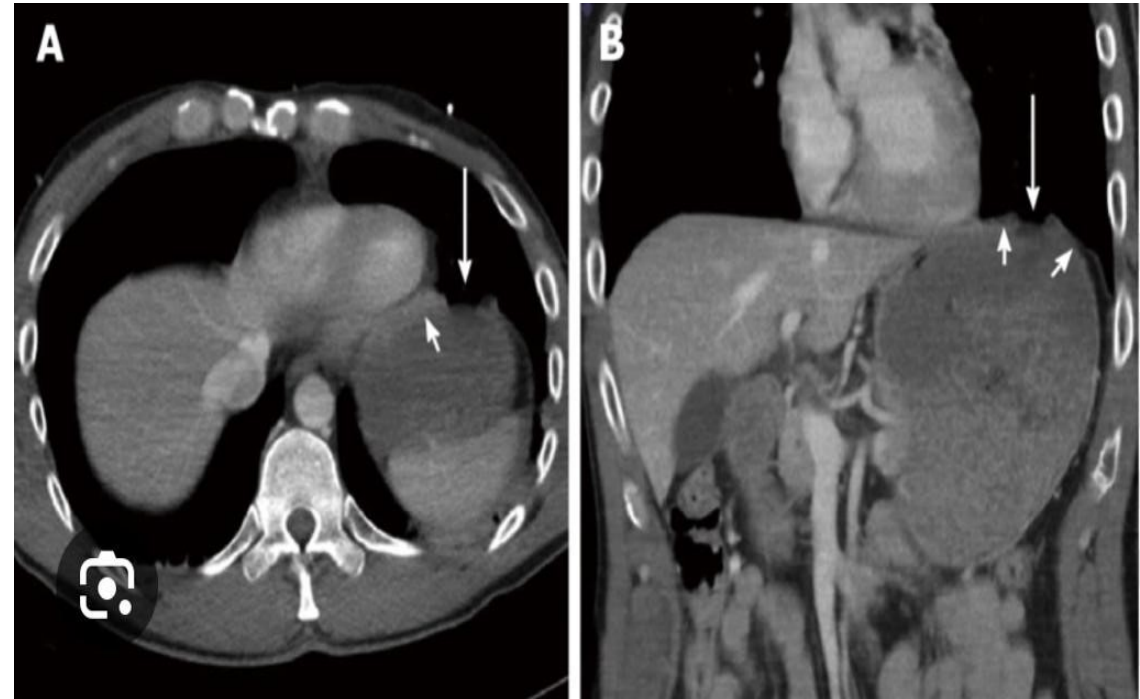
- 1- diaphragmatic discontinuity
- 2- "Dangling diaphragm" sign
- 3- "Depending viscera" sign
- 4- Intrathoracic herniation of abdominal contents
- 5- "Collar" sign
- 6- Thickened diaphragm
- 7- "The hump and band" sign

Direct CT scan signs of TDR

1-The segmental diaphragmatic defect sign

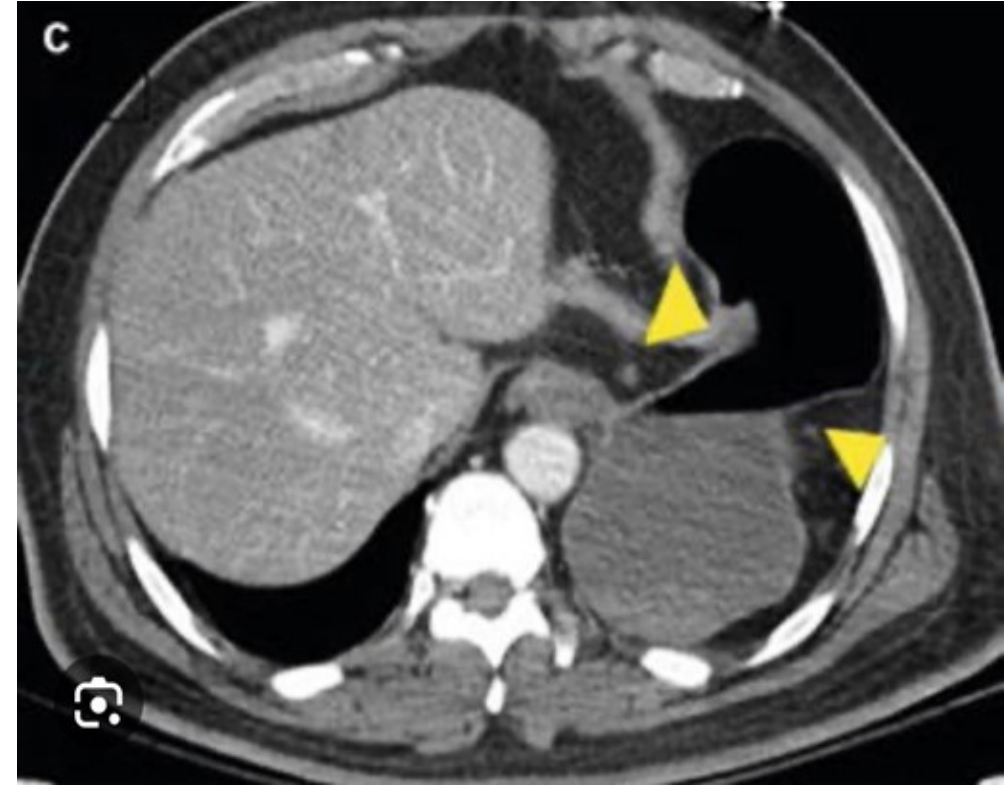
:

A focal and abrupt loss of continuity in the diaphragm ; The free edge of the disrupted diaphragm demarcates the defect and may appear thickened because of muscle retraction or hemorrhage .



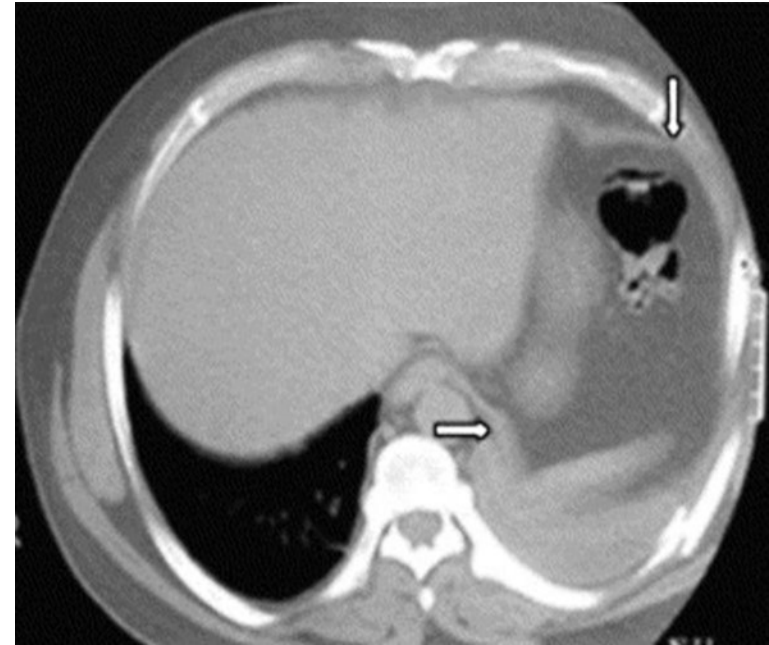
2-The dangling diaphragmatic sign :

Produced by the free edge of torn diaphragm which curls inward from its normal course toward the center of the body.



3-The absent diaphragmatic sign :

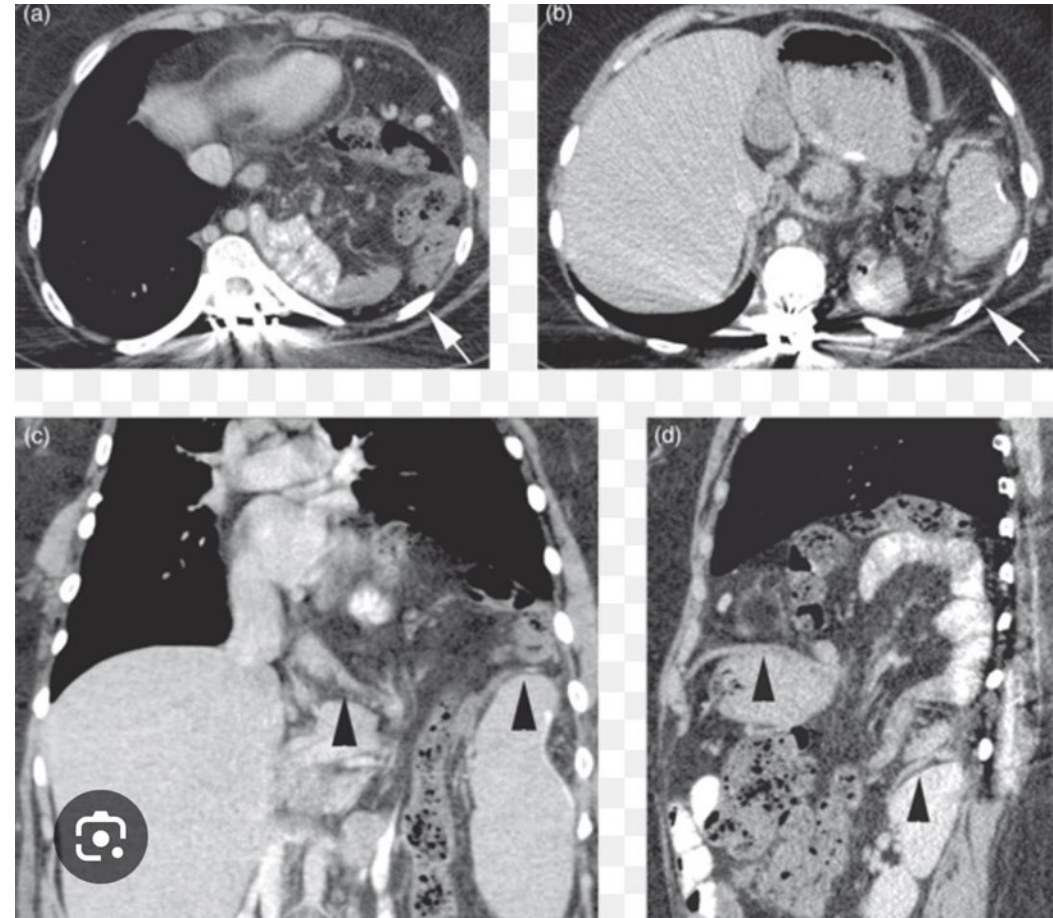
Represented by the absence of part or all of the hemidiaphragm without demonstration of a tear in areas where the diaphragm is expected to be well demonstrated .



Indirect CT scan signs of TDR

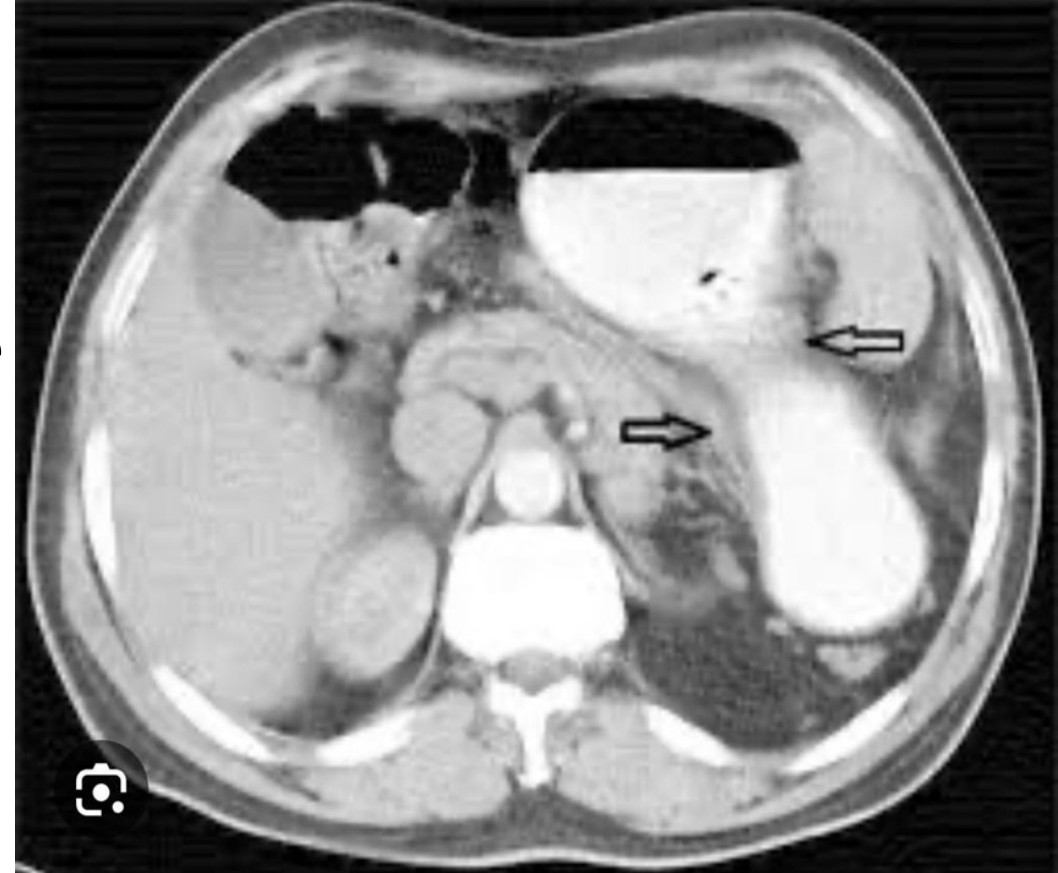
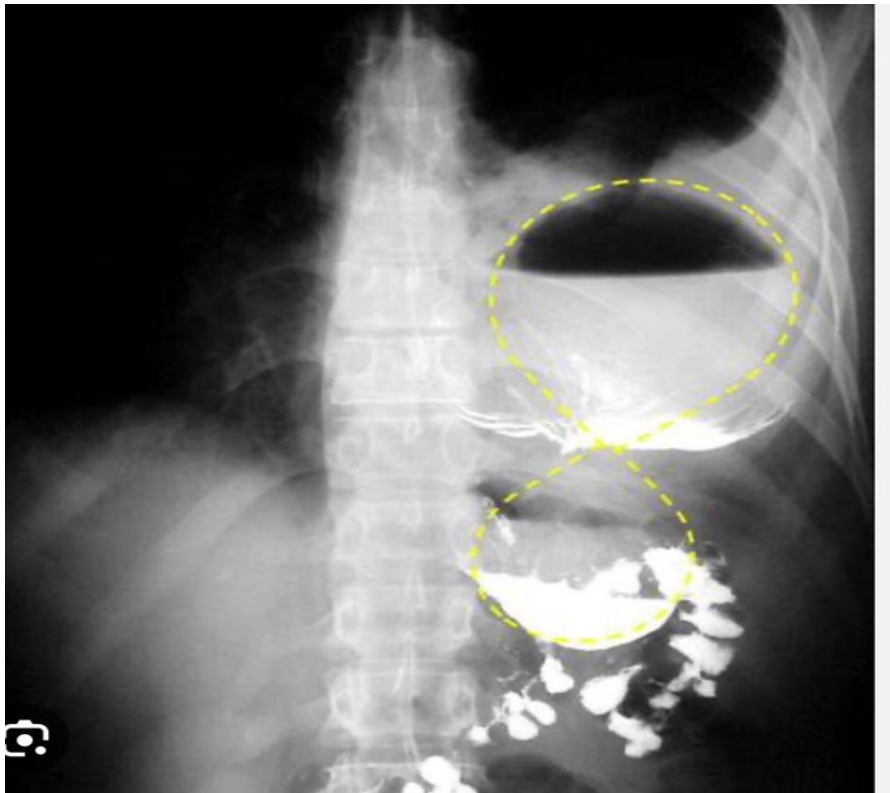
1-The herniation through a defect sign :

Produced by the passage of abdominal organs or peritoneal fat into the pleural space or more rarely the pericardial space .



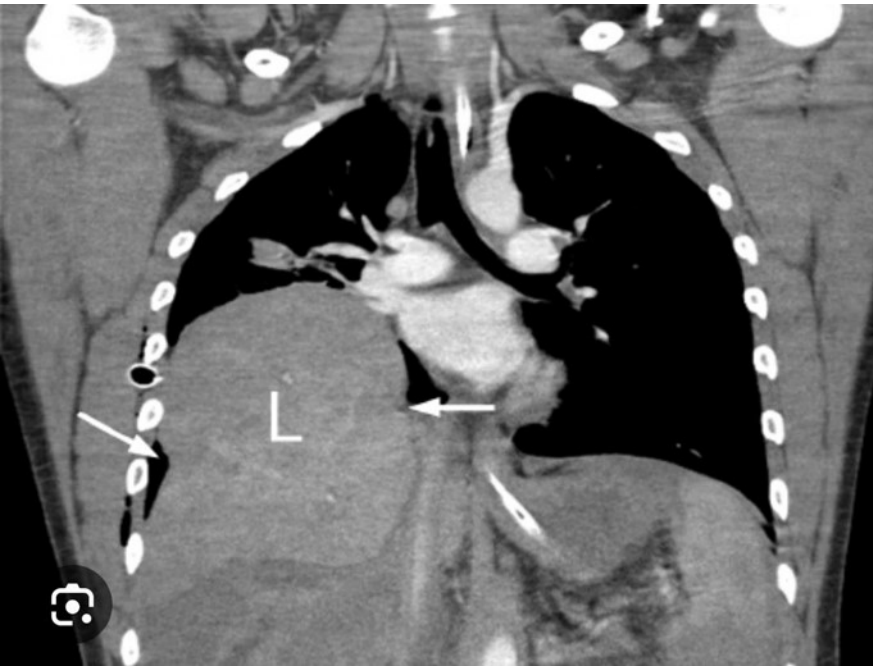
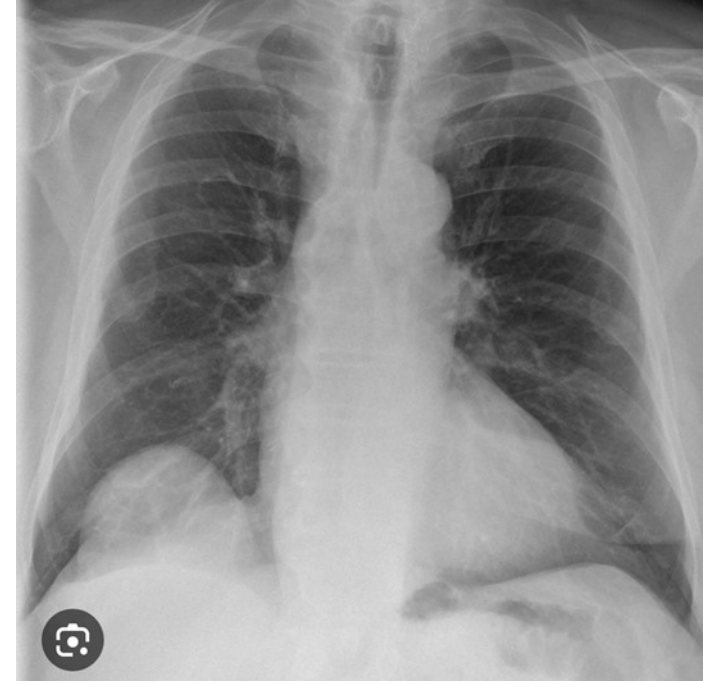
2-The collar sign :

- Corresponds to a waist like constriction of the herniated structure at the site of the diaphragmatic rupture .



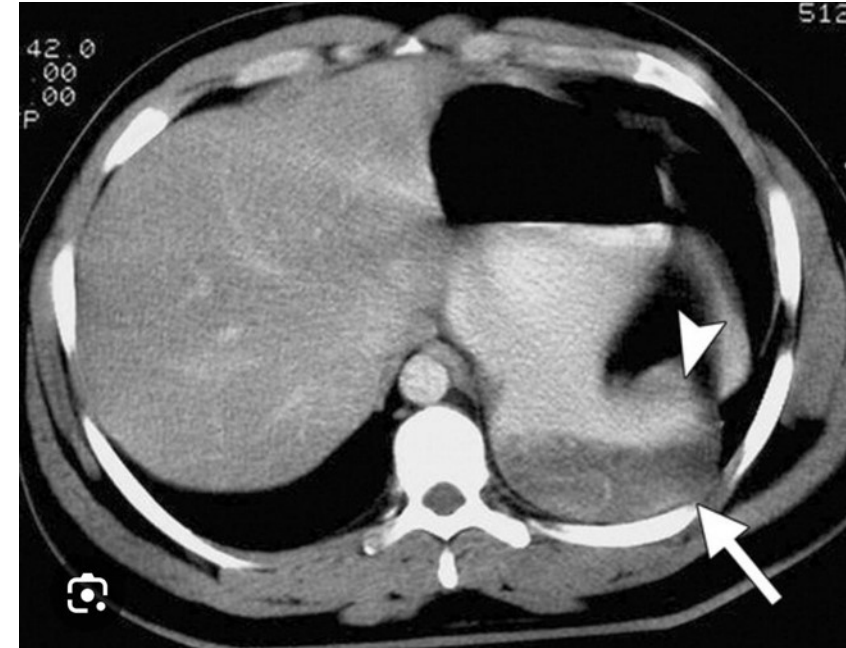
3- The hump and band signs

- Both result from herniation of the liver through a right sided diaphragmatic rupture .



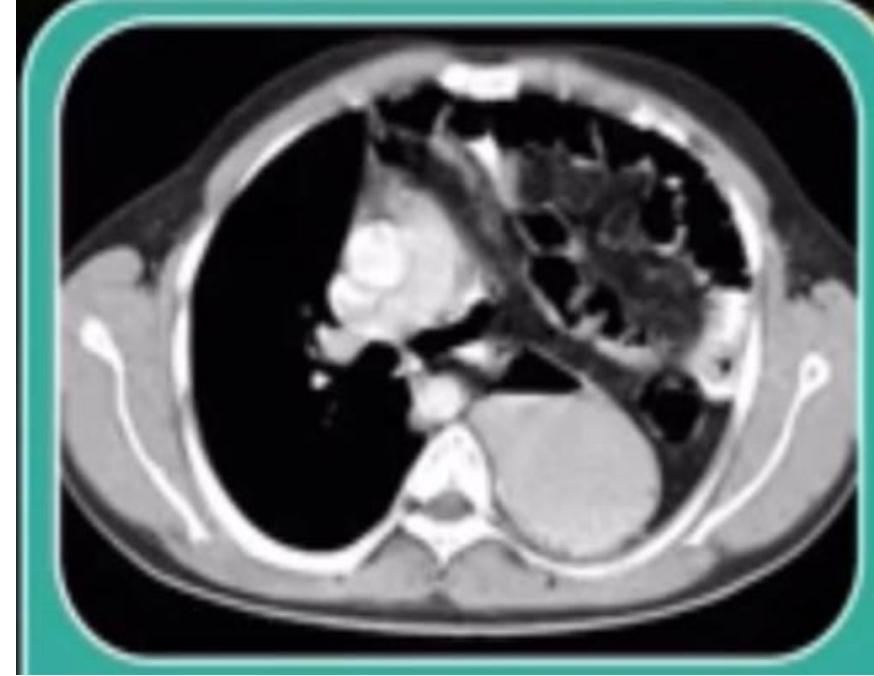
4- Visceral depending sign

Represents direct contact between the abdominal organs and the posterior chest wall without interposition of the lung .



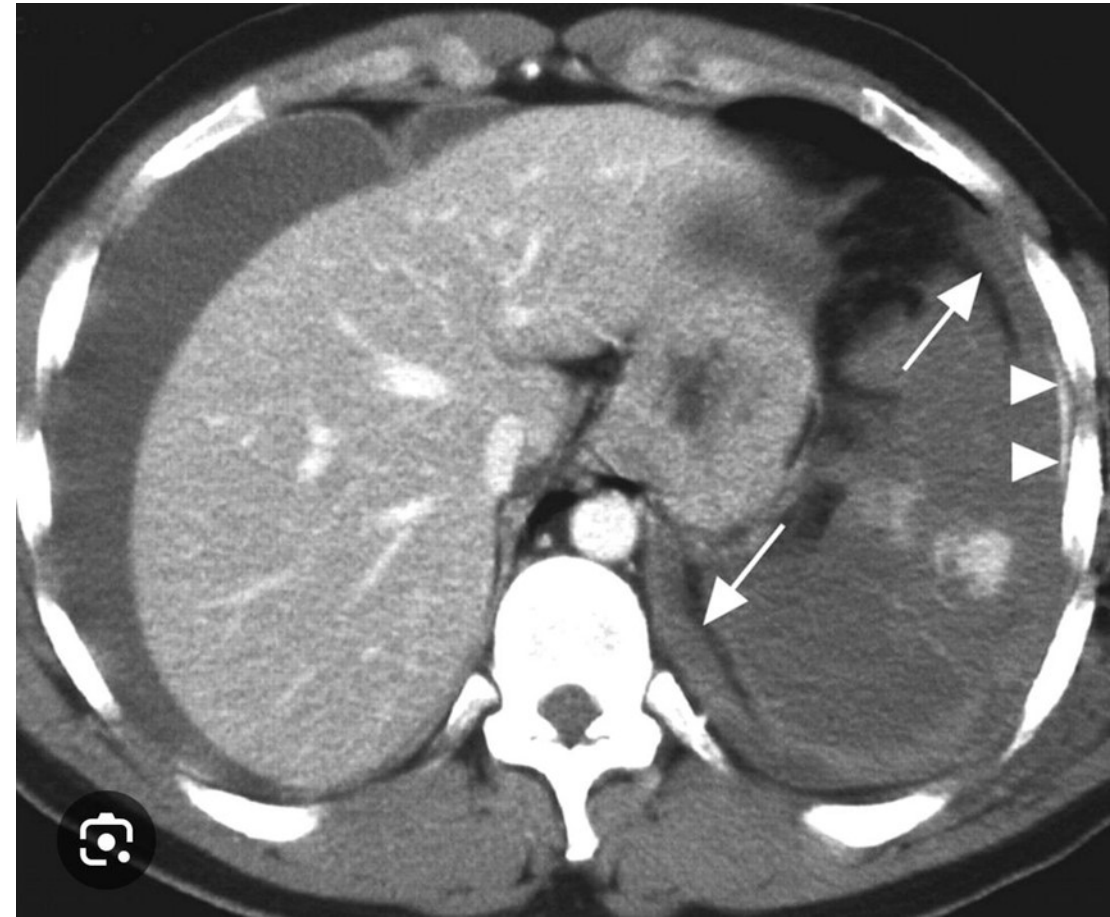
5-The elevated abdominal organs sign :

Is produced by the displacement of abdominal structures cephalad above the level of the hemidiaphragm contralateral to the side of the lesion on supine images .



6-Thickened diaphragm

- Due to diaphragmatic torn edges retraction

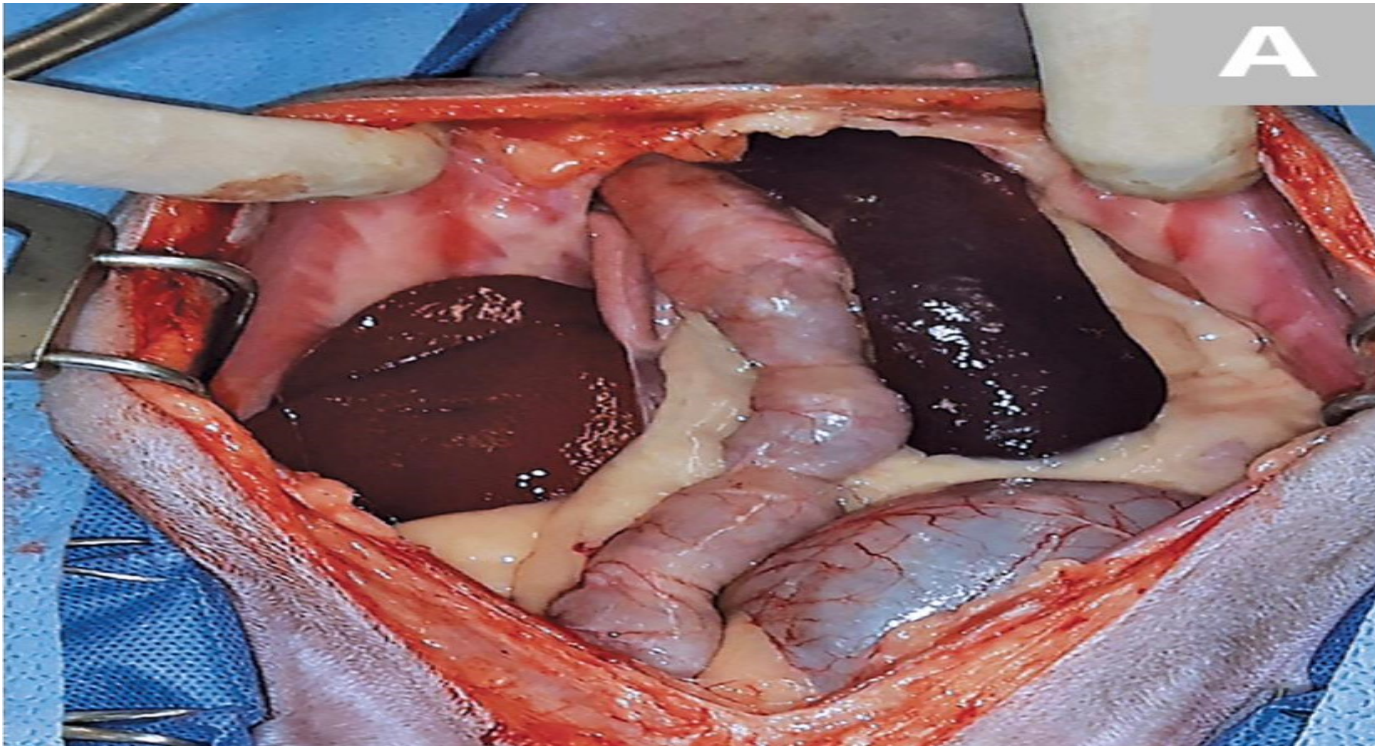


Medical Therapy

- For traumatic rupture first provide initial resuscitation according to Advanced Trauma Life Support (ATLS) protocol with particular attention to airway control
- Prepare the patient for surgery . Sometimes ,surgical intervention can be briefly delayed until the patient condition is stabilized
- However ,the high incidence of concomitant injuries necessitates emergency exploration in most cases .

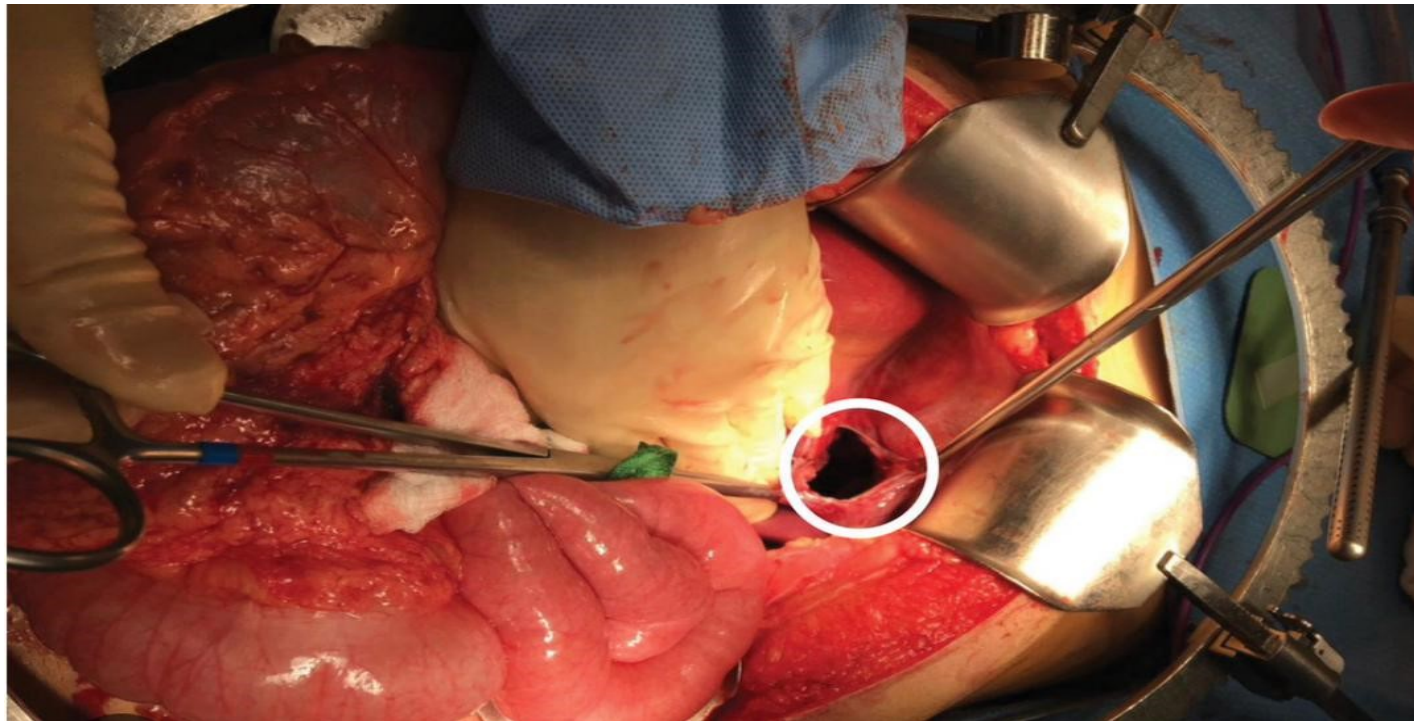
Surgical Management

- All hernias should be repaired for fear of complications (strangulation ,obstruction ,volvulus)



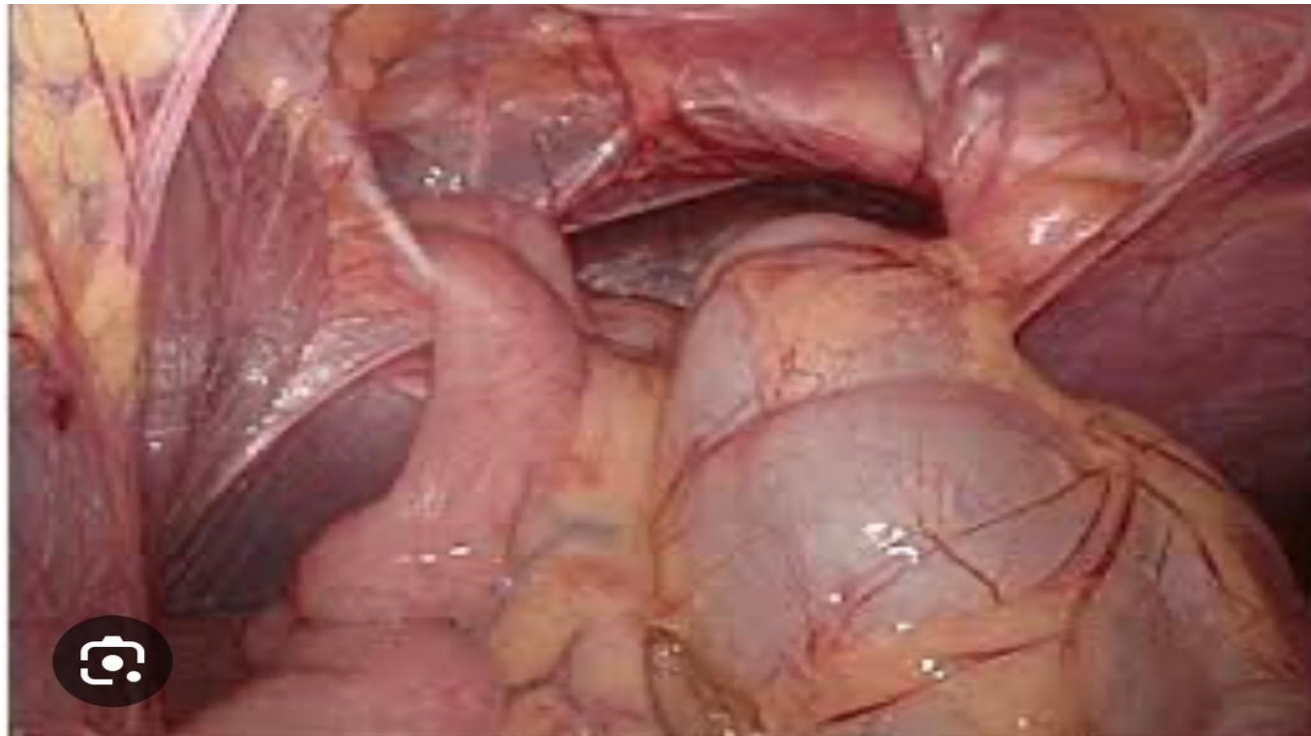
Surgical Management

- Acute traumatic diaphragmatic hernia can be approached through laparotomy or thoracotomy ,however in the presence of injured abdominal organ that warrant resection laparotomy is usually utilized



Surgical Management

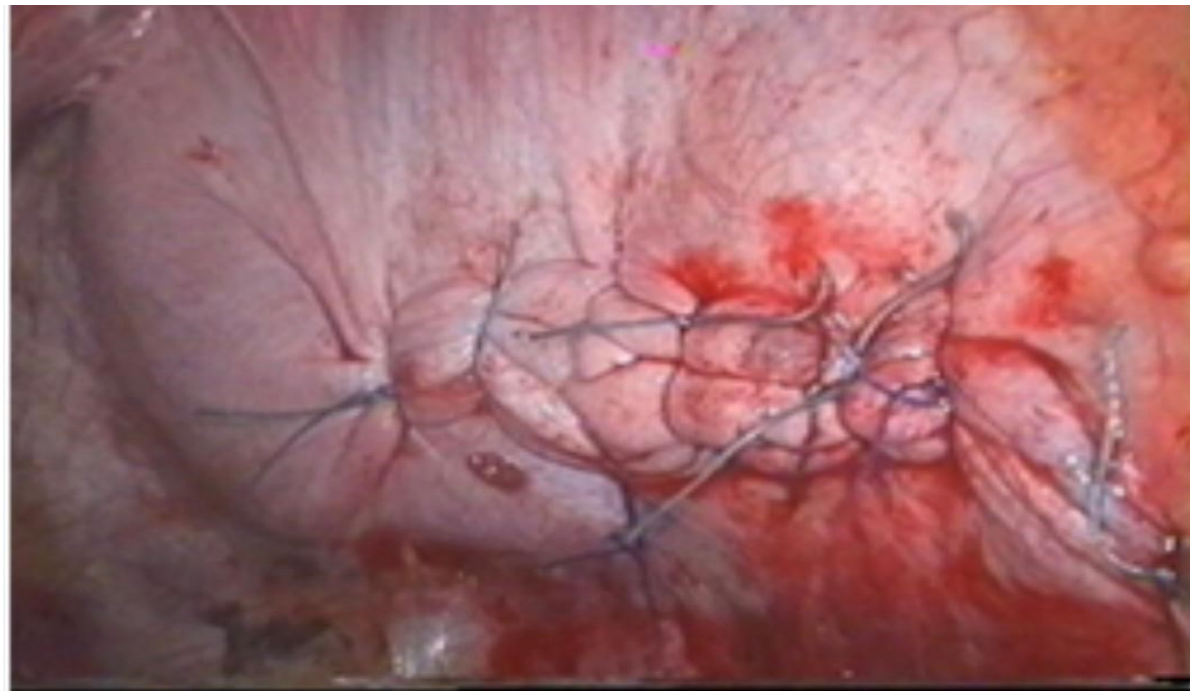
- Chronic traumatic diaphragmatic hernia is usually approached through thoracotomy to free anticipated adhesions of herniated organs .



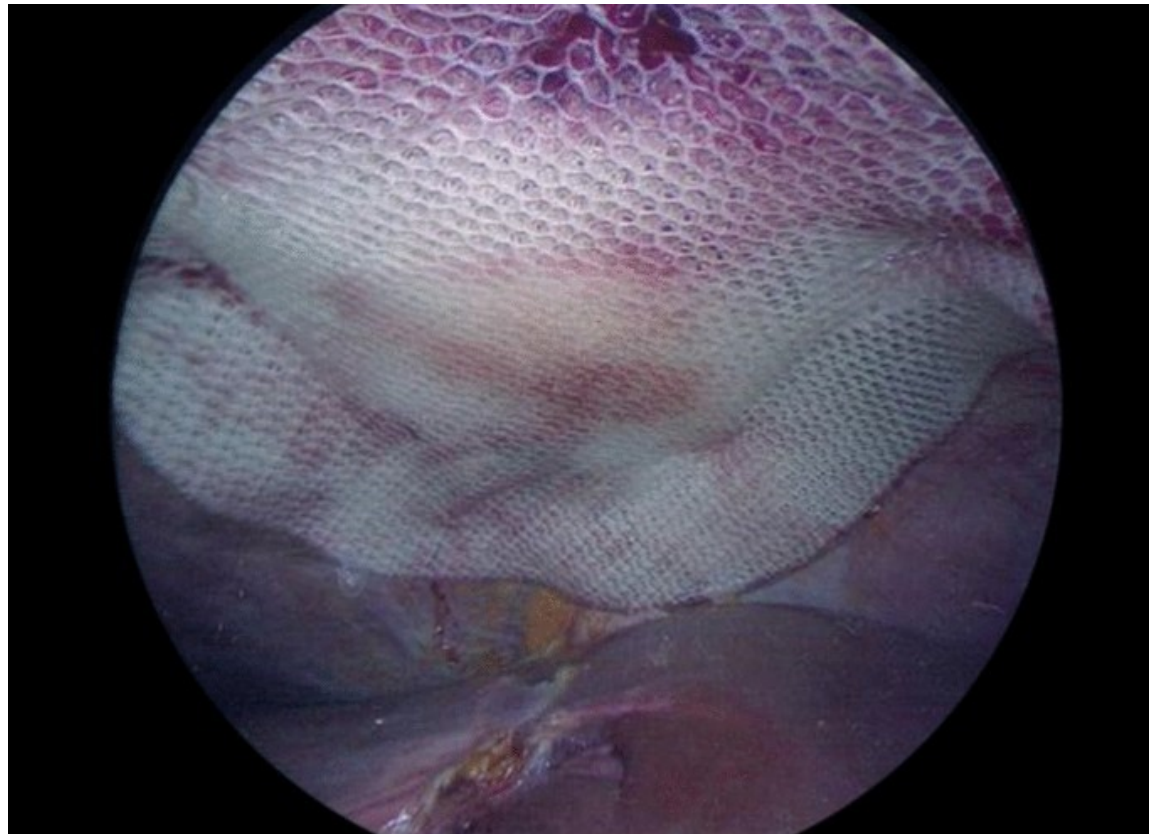
Surgical Management

- Combined thoracoabdominal approach is less commonly utilized ,should adhesions ,combined viscous resection ,and \or pulmonary parenchymal repair are needed.

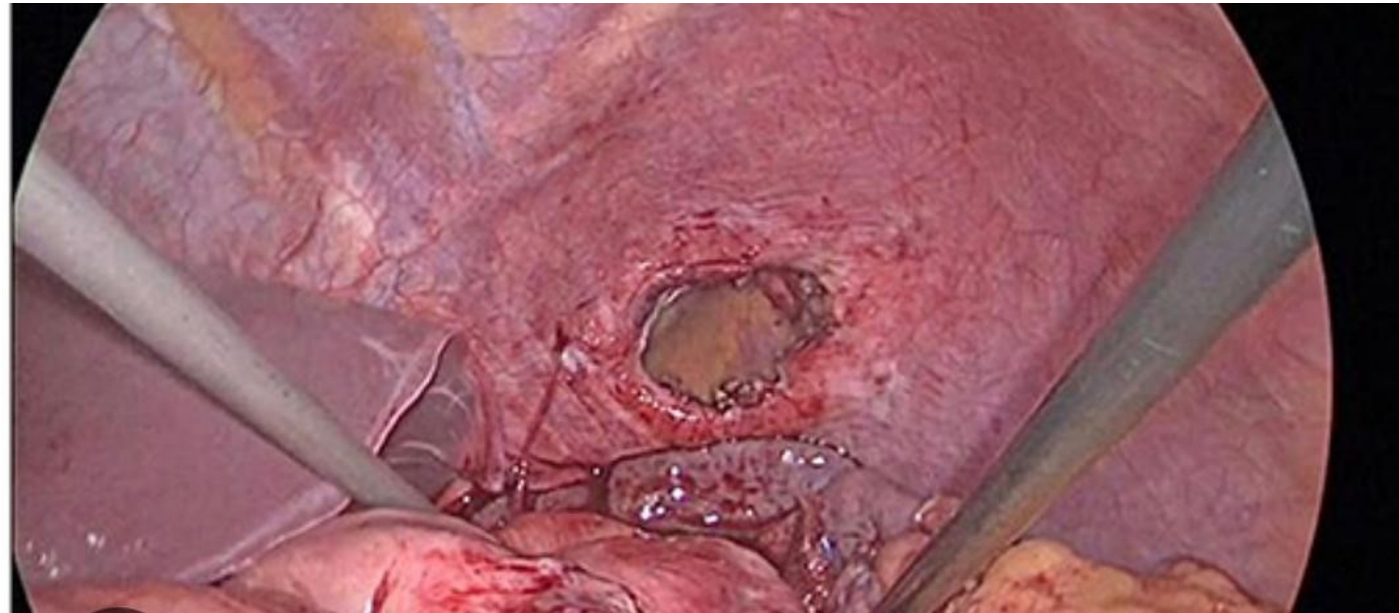
- The procedure includes ,reduction of herniated organs into the abdominal cavity and repair of the diaphragm utilizing non absorbable suture in two layers (mattress ,figure of eight ,continuous) first line sutures and reinforced by continuous second row .



- The use of mesh as a reinforcement or when tissue loss and tension is to be avoided can be an add on in diaphragmatic repair .



- Minimal invasive surgery VATS or laporatomy was advocated by some authors particularly in chronic traumatic diaphragm hernia





**THANK
YOU**
for
**LISTENING TO
MY PRESENTATION**