

A stylized landscape illustration featuring rolling green hills. In the foreground, there are orange autumn leaves and a small purple flower on a stem. A red bird is depicted in flight above a green tree with large, rounded leaves. The background consists of blue horizontal stripes.

Thoracic and Abdominal Trauma

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- I have nothing to disclose
- I have no conflict of interest

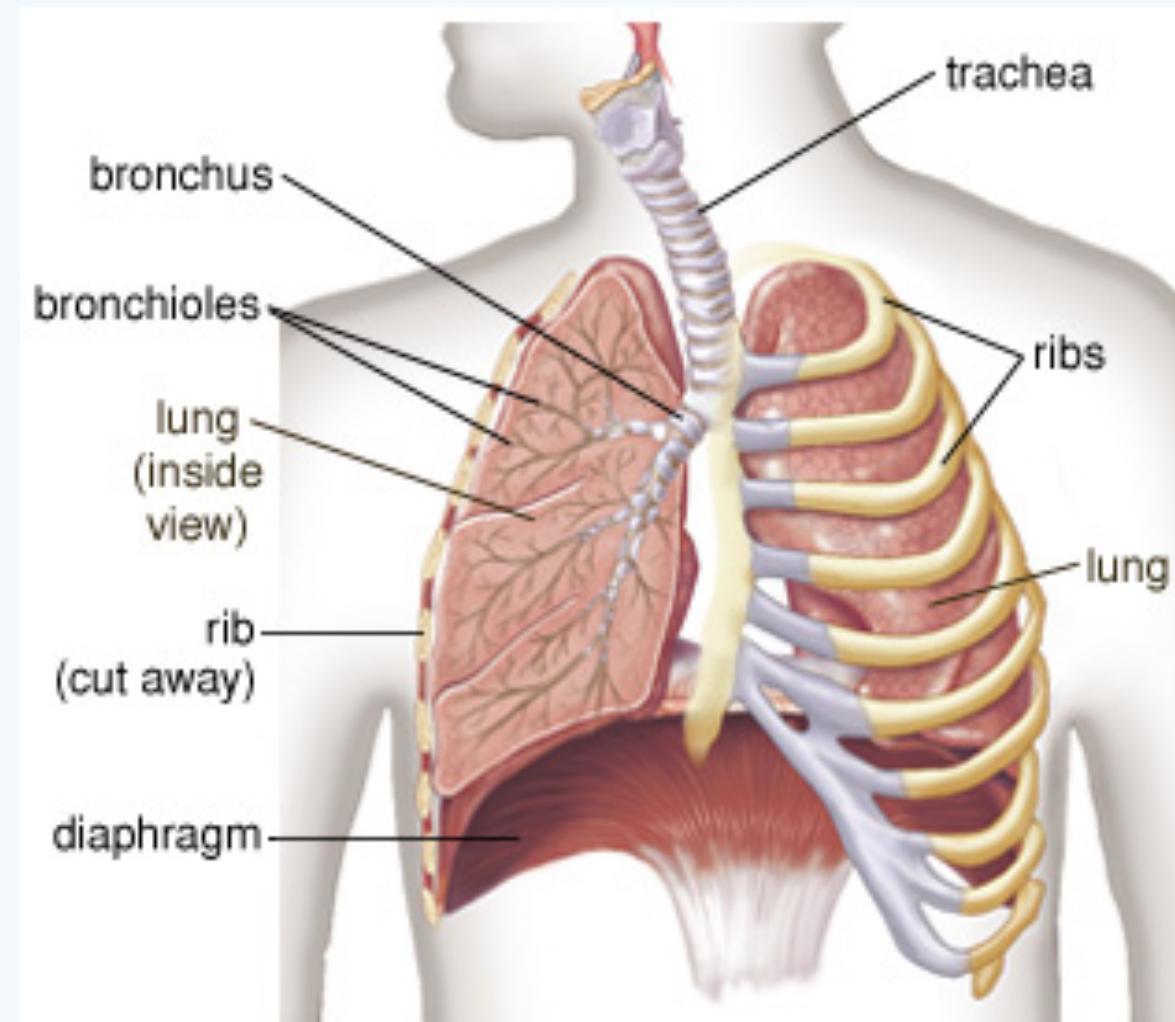
Objectives

- Identify Common Mechanisms for Thoracic Trauma
- Describe Pathophysiology of Thoracic Trauma
- Describe Nursing Assessment and Interventions for a Thoracic Trauma patient

Thoracic Trauma

- 25% of motor vehicle crash deaths are related to thoracic trauma
- Approximately 16,000 deaths per year
- Second only to brain and spinal cord injuries as the leading cause of traumatic death
- Motor vehicle crashes and interpersonal violence are the two main causes of thoracic trauma
- Most thoracic traumas will also involve the abdominal cavity

Thoracic Cavity



Thoracic Cavity

- Second largest hollow space of the body
- Contains the heart, lungs, diaphragm, great vessels, esophagus, ribs, vertebral column and various muscles
- Epicenter of all circulatory and oxygen flow for the body

Thoracic Injury

- Mechanisms of Injury
 - Acceleration and Deceleration forces
 - First and second rib fractures can severely injure the pulmonary and cardiac tissues underneath
 - Falls
 - Crush Injuries
 - Violence
 - Motor Vehicle Crashes

Thoracic Injury

- Pathophysiology
 - **Ineffective Ventilation** due to disruption in the anatomical structures in the thoracic cavity
 - Tears in the bronchial tree
 - Rib/Sternal fractures
 - Pain
 - Lung contusion
 - Impaled object in the chest

Thoracic Injury

- Pathophysiology
 - **Ineffective Circulation**
 - Internal or external hemorrhage due to injury to the great vessels
 - Blunt trauma can lead to decrease myocardial contractility and cardiac output
 - Pericardial tamponade
 - Air in thoracic cavity can cause venous congestion

Thoracic Injury

Blunt Trauma

- MVC, Falls

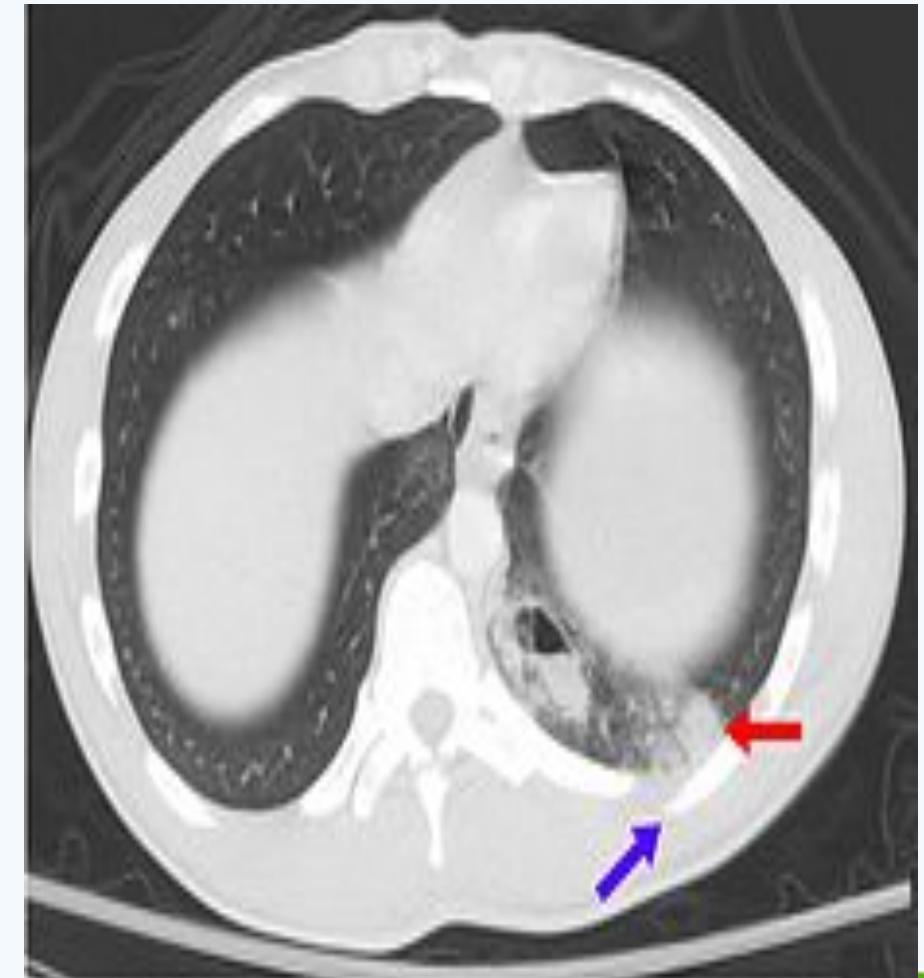


Thoracic Injury

- Blunt Trauma
 - Blast Injuries: Tear blood vessels, disrupt bronchial tree, diaphragm rupture
 - Crush Injuries: Body is crushed between an object and hard surface, direct pressure to chest
 - Deceleration Injuries: Body hits a hard object, Body stops but organs do not, can cause tearing of the aorta

Blunt Chest Trauma Injury

- **Pulmonary Contusion**
 - Erythema/Ecchymosis
 - Dyspnea
 - Chest wall pain
 - Crepitus
 - Hypoventilation
 - Decreased breath sounds



Blunt Chest Trauma Injury

- **Rib and Sternal Fractures**
 - Most common injury
 - Ribs 1-3: Require great force to fracture
 - Ribs 4-9: Most commonly fractured
 - Ribs 9-12: Least likely to fracture,
Associated with abdominal injuries



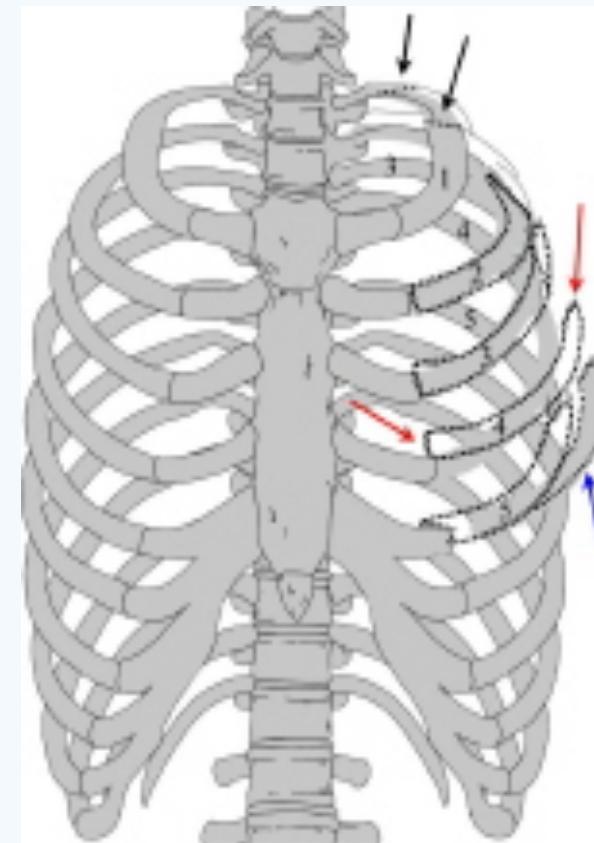
Blunt Chest Trauma Injury

- Rib and Sternal Fractures
 - Pain
 - Dyspnea
 - Chest wall bruising
 - Crepitus or bony deformity
 - Patient splints the chest for comfort

Blunt Chest Trauma Injury

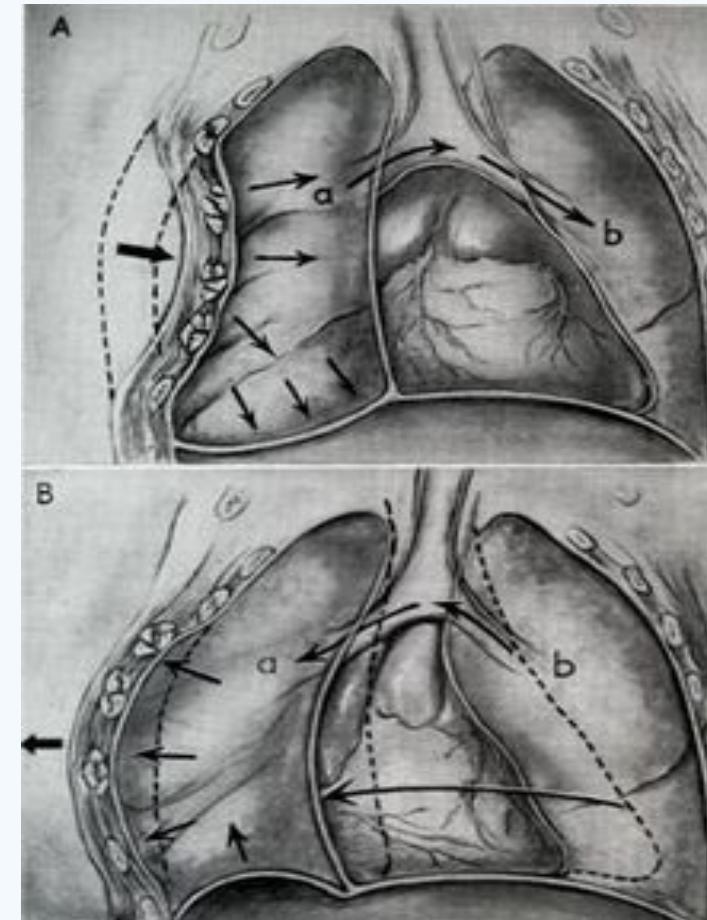
- **Flail Chest**

- Two or more broken ribs adjacent to one another
- Segment moves independently during respiration
- Dyspnea
- Chest wall pain



Blunt Chest Trauma Injury

- Flail Chest
 - Paradoxical chest movement



Blunt Chest Trauma Injury

- **Ruptured Diaphragm**
 - Gunshot wounds and MVC
 - More common on the left side
 - Abdominal organs move into thoracic cavity causing respiratory compromise
 - Decreased breath sounds
 - Bowel sounds in the lungs
 - Kehr's Sign – Should pair related to blood in the peritoneal cavity
 - Dyspnea/Abdominal pain

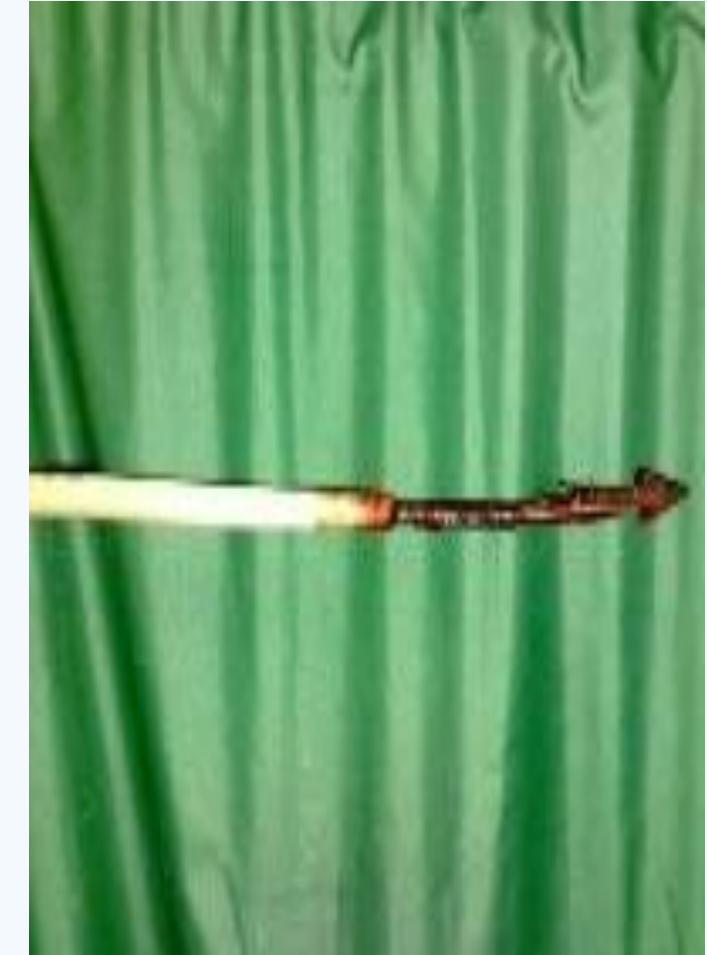


Blunt Chest Trauma Injury

- **Cardiac Contusion**
 - Bruise to the heart tissue
 - MVC, falls, sports injuries
 - CPR
 - EKG abnormalities
 - Chest Pain
 - Chest wall bruising
 - Irregular heart beat
 - Hypotension

Thoracic Injury

- Penetrating
 - Guns, Knives



Thoracic Injury

- Penetrating Trauma
 - Low Energy: Guns, Knives and direct contact
 - High Energy: High power firearms
 - Damage caused by firearms increases as the distance between the gun and person decreases
 - Type 1: >7 meters, soft tissue damage
 - Type 2: 3-7 meters, deep fascia and internal organ damage
 - Type 3: <3 meters, massive tissue destruction



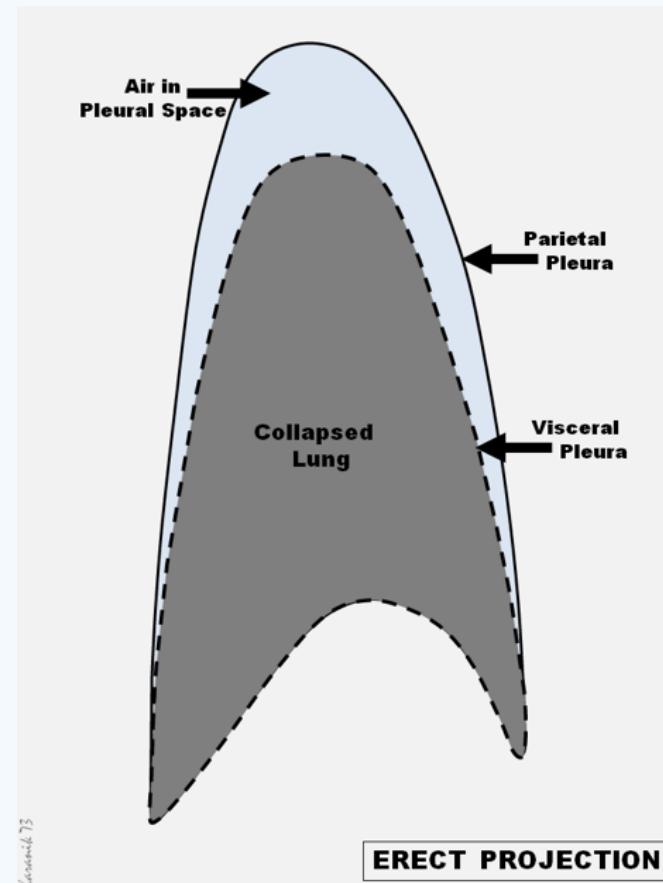
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Trauma.org

Penetrating Chest Trauma Injury

- **Pneumothorax**

- Air collects in pleural space eventually collapsing the lung
- Simple: collection of air
- Open: Air enters pleural space from a chest wound
- Dyspnea, Tachypnea
- Decreased or Absent breath sounds
- Chest pain
- Open sucking wound



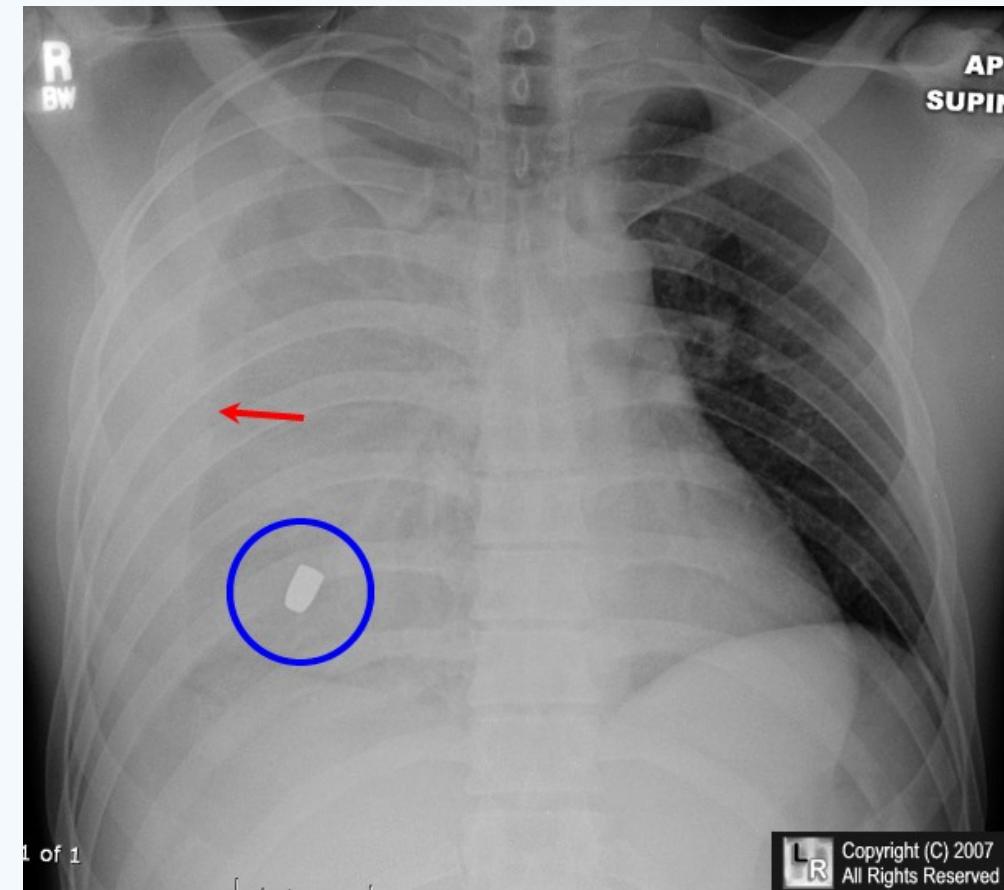
Penetrating Chest Trauma Injury

- **Tension Pnuemothorax**
 - Life Threatening
 - Lung collapses
 - Severe respiratory distress
 - Distended neck veins
 - Hypotension
 - Tracheal deviation
 - Cyanosis



Penetrating Chest Trauma Injury

- **Hemothorax**
 - Blood collects in the pleural space
 - 1500 ml +
 - Chest pain
 - Signs of shock
 - Dyspnea. Tachypnea
 - Dullness to percussion



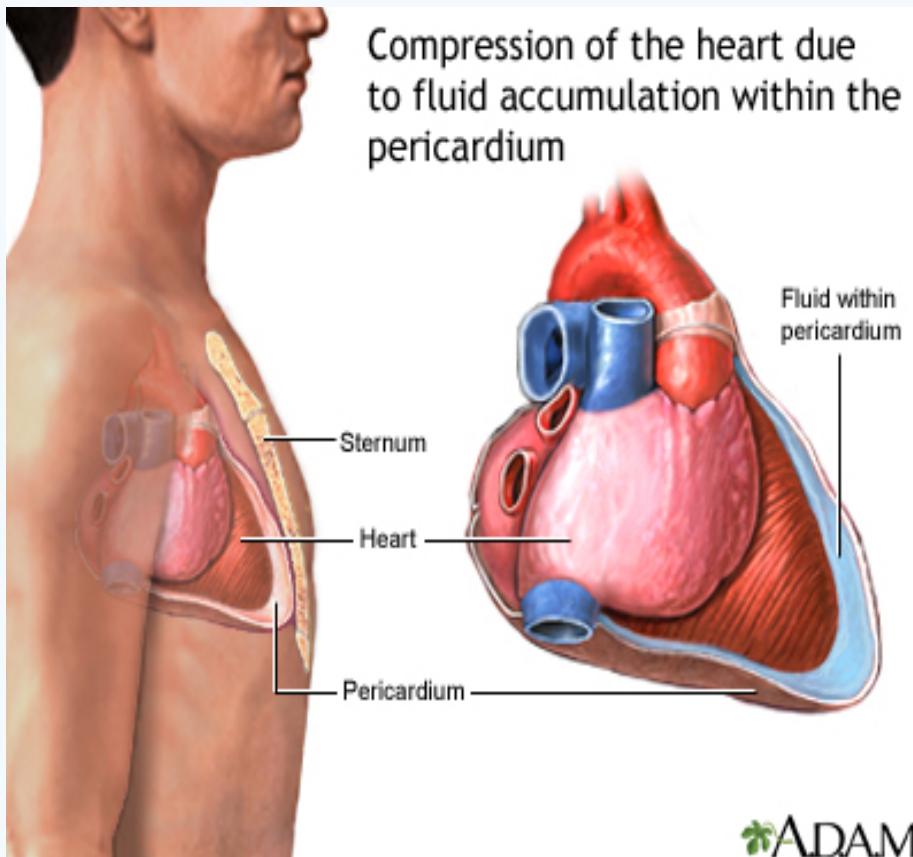
Penetrating Chest Trauma Injury

- **Cardiac Tamponade**

- Blood collects in pericardial sac
- Decreases cardiac output
- Dyspnea
- Cyanosis
- Beck's Triad: Distended neck veins, hypotension, muffled heart tones
- Signs of shock

Penetrating Chest Trauma Injury

- **Cardiac Tamponade**



Penetrating Chest Trauma Injury

- **Aortic Injury**

- 10-30% mortality
- Ascending aorta injury is immediately fatal
- Hypotension
- Widened mediastinum
- Loud systolic murmur
- Chest pain
- Decreased level of consciousness



Thoracic Injury

- Concurrent Injuries
 - Head
 - Extremities
 - Abdomen

Patient History

- What was mechanism of injury?
- If MVC, what was damage to the car?
- Patient complaints?
- Vital signs?
- Previous medical history?
- Medications?
- Treatment prior to hospital?

Nursing Assessment

- Airway
- Respiratory effort – Rate, Depth
- Symmetrical chest wall movement?
- Jugular vein distension?
- Look for chest wall injuries, bruising
- Percuss for dullness - Hemothorax

Nursing Assessment

- Palpate
 - Chest wall, clavicles and neck for crepitus, edema and pain
 - Central and peripheral pulses
 - Assess for tracheal deviation
- Auscultate:
 - Heart and lung sounds
 - Listen for bowel sounds in chest
 - Blood pressures in upper and lower extremities

Nursing Assessment

- **Diagnostic Procedures**
 - Chest X-Ray
 - CT
 - Bronchoscopy
 - EKG
 - Cardiac enzymes, CBC
 - Central venous pressure

Nursing Assessment

- Once chest tube is placed drainage must be monitored closely
- >200 ml/hour of blood from chest tube may need replaced
- **FOCA** for chest tube assessment
 - **F**: Fluctuation in the water seal chamber
 - **O**: Output
 - **C**: Color of drainage
 - **A**: Air leak

Nursing Interventions

- Maintain patent airway
- Oxygen
- Cover open chest wounds with sterile dressing and tape on 3 sides
- Prepare for needle thoracentesis or chest tube insertion
- 2 large bore IVs
- Pain meds
- Surgical interventions
- Stabilize impaled objects



Abdominal Trauma

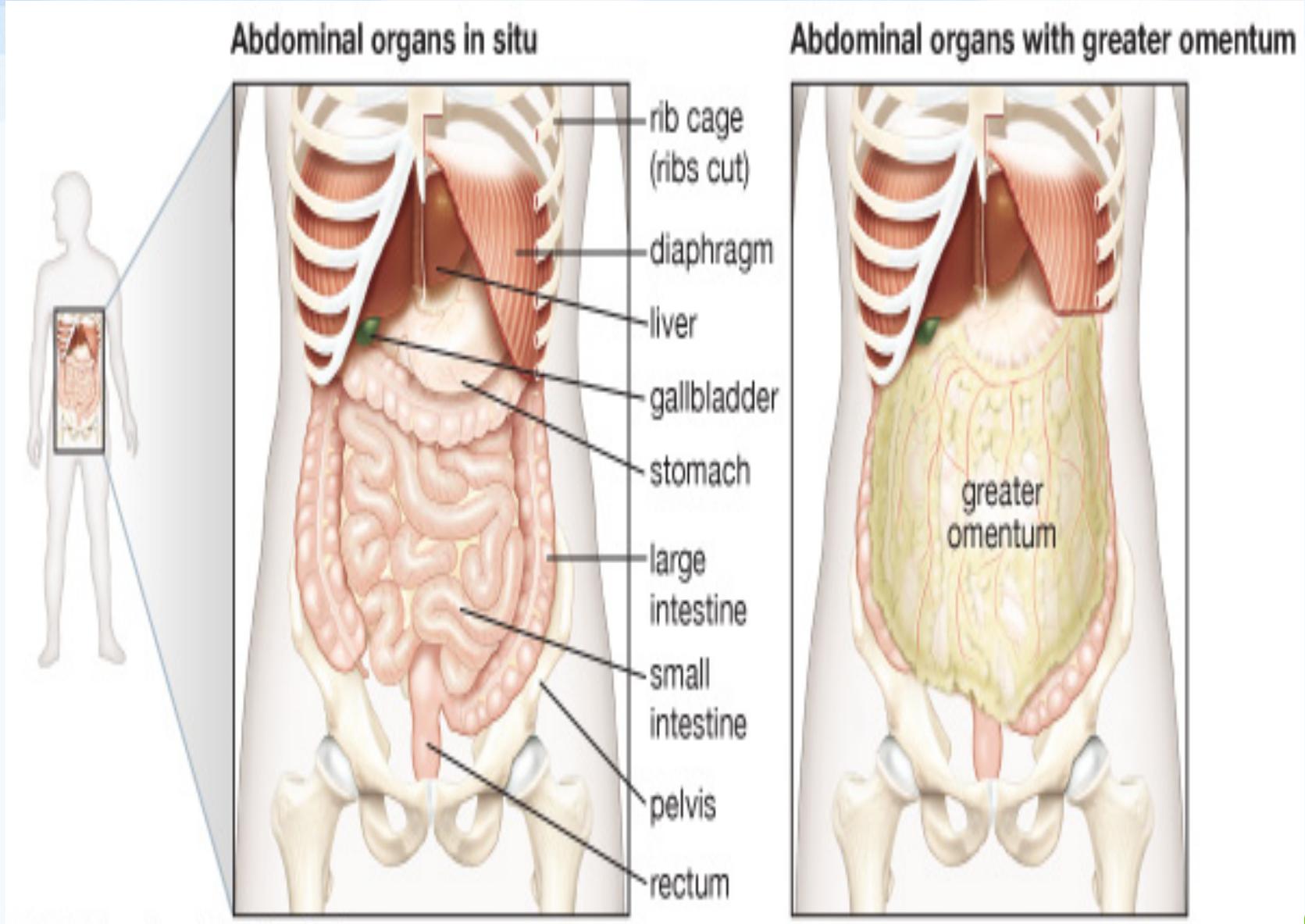
Objectives

- Identify common mechanisms for Abdominal Trauma
- Describe Pathophysiology of Abdominal Trauma
- Describe Nursing Assessment and Interventions for an Abdominal Trauma Patient

Abdominal Trauma

- 3rd leading cause of traumatic death after head and chest injuries
- Blunt injuries more deadly than penetrating
- 25% require surgical intervention
- Motor vehicle crashes most common type of blunt injury
- Stab wounds and gunshots are most common penetrating injuries

Abdominal Cavity



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Abdominal Cavity

- Largest hollow space in the body
- Separated from the thoracic cavity by the diaphragm
- Contains digestive tract, liver, pancreas, spleen, kidneys and adrenal glands
- Entire cavity is lined with peritoneum

Abdominal Cavity

- **Solid Organs:** Liver, Pancreas, Spleen, Kidneys, Ovaries
- **Hollow Organs:** Stomach, Small Intestine, Appendix, Large Intestine, Gallbladder, Bladder, Uterus, Aorta, Common Bile Duct, Fallopian Tubes

Abdominal Injury

- **Blunt Injuries**

- Compression forces from seat belts, steering wheel can cause rupture of hollow organs and capsules of solid organs
- Deceleration forces can tear organs from the peritoneum or blood vessels
- Symptoms may be subtle

- **Penetrating Injuries**

- Stab wounds 3x more likely than gunshot wounds
- Liver, bowel, and diaphragm most commonly injured

Abdominal Injury

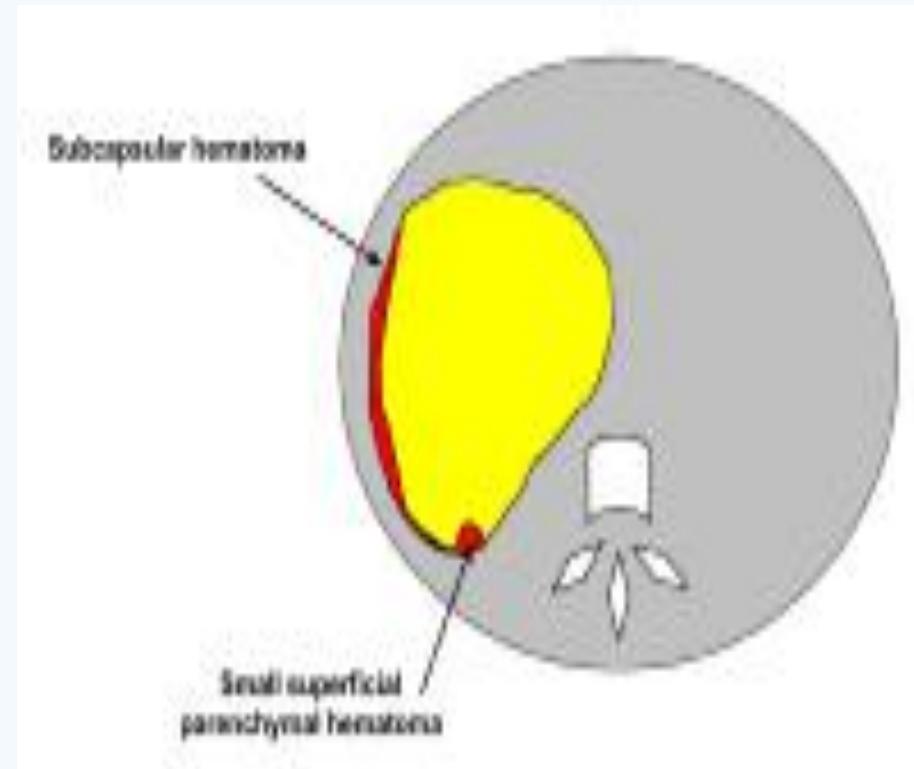
- Pathophysiology
 - Rapid blood loss – Liver and Spleen injury
 - Pain, Kehr's Sign
 - Guarding
 - Rigidity
 - Chemical Peritonitis with pancreas injury

Abdominal Injury

- **Hepatic Injury**
 - 5% of all admissions to ER
 - Graded by severity – 1-6 – Laceration to Avulsion
 - Profuse bleeding
 - Right upper quadrant pain
 - Hypoactive or absent bowel sounds
 - Hypovolemic shock
 - May require surgical intervention

Abdominal Injury

- Hepatic Injury



Abdominal Injury

- Hepatic Injury
 - Grade 4 injury
 - Gunshot



Abdominal Injury

- **Splenic Injury**

- Most common from blunt trauma – 49% of all blunt injuries
- Graded by severity – 1-5 – Laceration to shattered Spleen
- Signs of hypovolemic shock
- Kehr's sign – Pain in left shoulder
- Rigidity and guarding
- Bedrest if hemodynamically stable
- May require surgical intervention

Abdominal Injury

- **Bowel Injuries**
 - Small bowel injury most common
 - Blunt and penetrating trauma
 - Shearing injury may cause avulsion of small bowel
 - Compression may cause rupture
 - Hypovolemic shock
 - Bleeding from rectum
 - Abdominal wall rigidity, guarding, pain

Abdominal Injury



Abdominal Injury

- **Esophageal Injuries**
 - Rare
 - Associated with penetrating trauma
 - Neck, shoulder, chest or abdominal pain
 - Subcutaneous air in neck
 - Frank blood from NG/Vomit

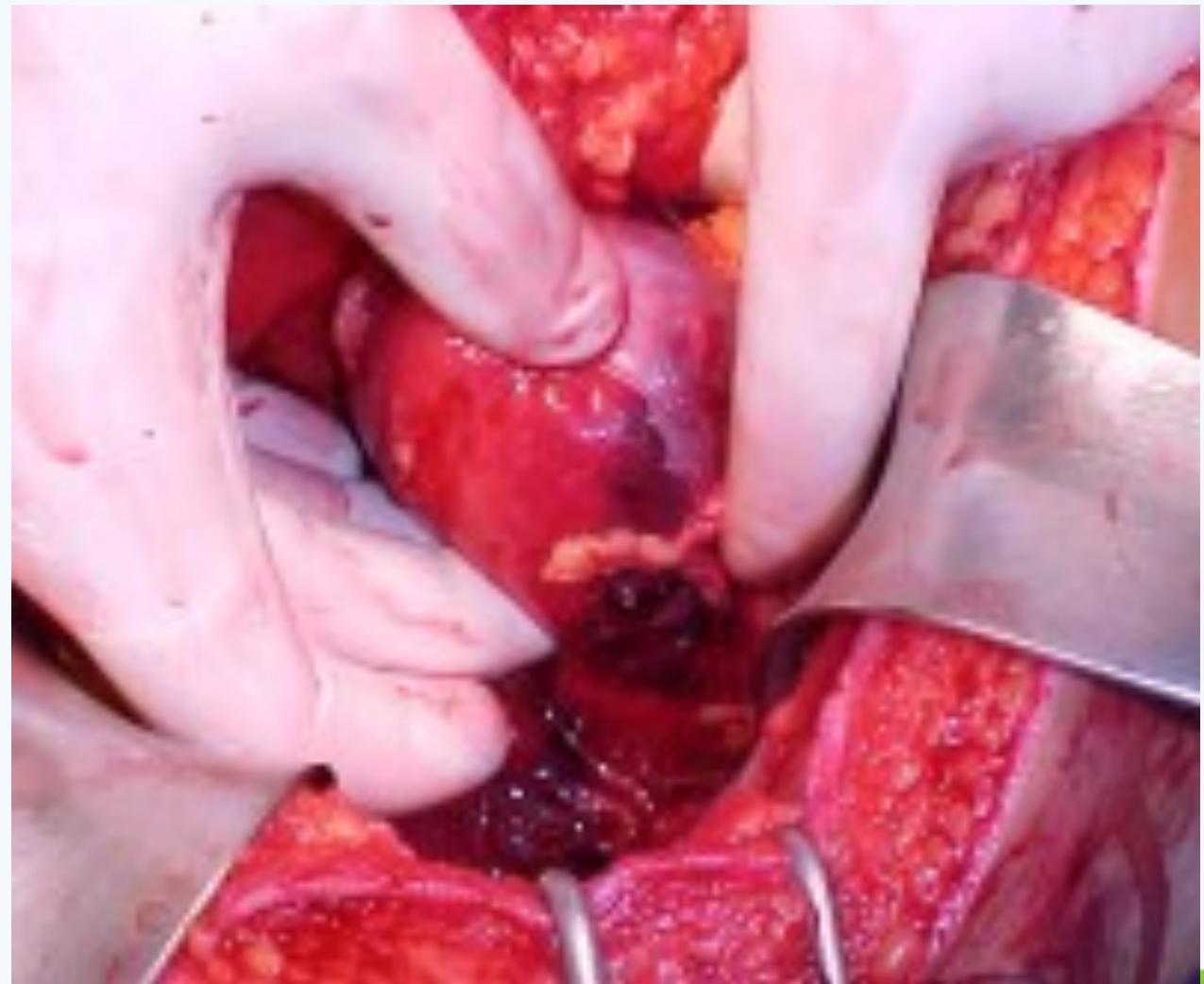
Abdominal Injury

- **Kidney Injuries**

- Contusion from blunt trauma
- 10% of ER visit
- Suspect renal injuries with posterior rib or lumbar vertebra fracture
- Hematuria
- Flank pain
- Ecchymosis over site
- Graded by severity

Abdominal Injury

- Grade 3 Kidney Laceration



Abdominal Injury

- **Bladder and Urethral Injuries**
 - Blunt trauma
 - Associated with Pelvic Fracture
 - Urethral injury more common in males
 - Suprapubic pain
 - Bleeding at the meatus
 - Urinary urgency
 - Abdominal rigidity, tenderness



Abdominal Injury

- **Concurrent Injuries**
 - Thoracic Injuries
 - Rib Fractures
 - Diaphragm Injuries
 - Pelvic and lower extremity injuries

Patient History

- What was mechanism of Injury?
- Blunt or penetrating trauma?
- Blunt – MVC? Seatbelts? Vehicle Damage? Height of Fall?
- Penetrating – Type of Weapon? Distance away from weapon? Blood Loss at scene? Pain?

Nursing Assessment

- Airway
- Abdominal injuries
- Respiratory effort – Rate, Depth
- Symmetrical Chest Wall Movement?
- Contour of abdomen
- Bleeding Perineum?

Nursing Assessment

- **Cullen's Sign**
 - Bluish sign at umbilicus
 - Indicative of bleeding in the peritonuem



Nursing Assessment

- **Grey Turner's Sign**
 - Bruising on the flanks indicating a retroperitoneal bleed



Nursing Assessment

- Auscultation
 - Bowel sounds in all 4 quadrants
- Percussion
 - Hyperresonance – Air
 - Dullness - Fluid
- Palpation
 - All 4 quadrants
 - Pelvis for instability
 - Anal sphincter for tone

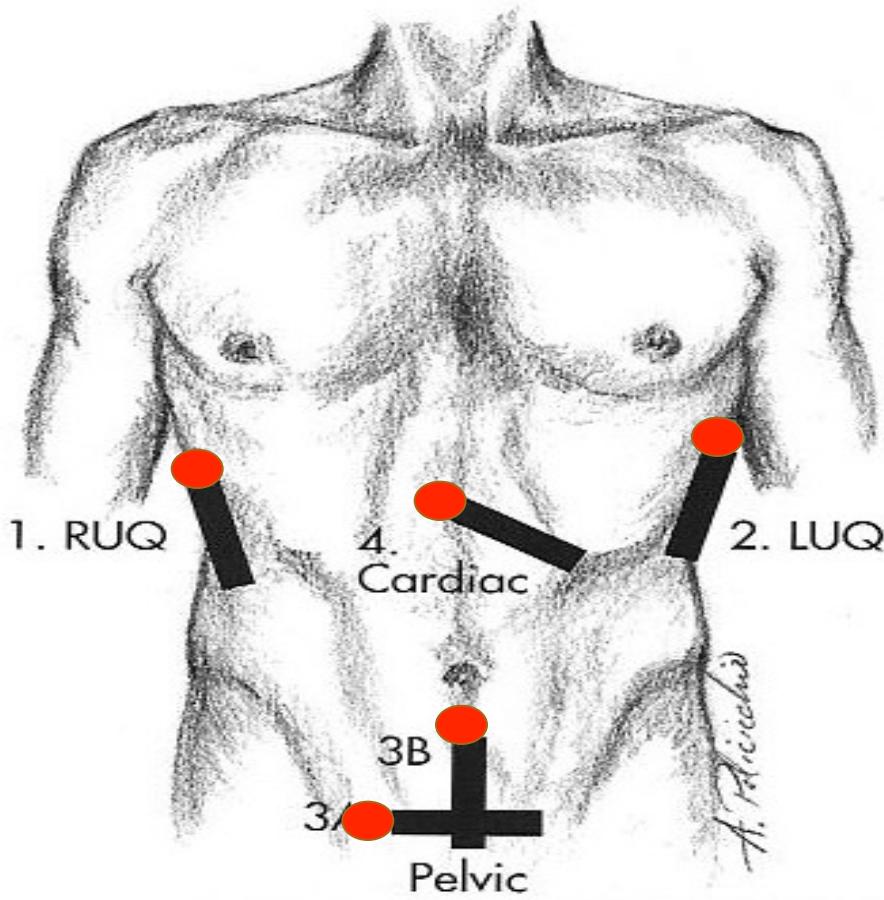
Nursing Assessment

- Diagnostic Procedures
 - X-Rays
 - Labs – CBC, Pregnancy, Coags, UA, Stool for blood,
 - CT
 - FAST Exam
 - Angiography
 - Cystogram

Nursing Assessment

- **Focused Assessment with Sonography for Trauma (FAST) Exam**
 - Used to diagnose free blood in the peritoneum after blunt trauma
 - Looks at 4 areas for free fluid
 - Perihepatic
 - Perisplenic
 - Pelvis
 - Pericardium
 - 94% effective
 - Test takes 4-5 minutes

FAST: Technical Considerations



Probe placement?

1. RUQ: Morrison's Pouch
 2. LUQ: Splenorenal
 3. Pelvis: Pelvic cul-de-sac
 1. Transverse
 2. Longitudinal
 4. Subxiphoid/Subcostal: Pericardium
- Remember: Probe almost ALWAYS facing either patient's *right* or patient's *head*

Nursing Interventions

- Maintain Patent airway
- 2 large bore IVs
- IVF or Blood Volume
- Pain Meds
- Foley
- NG
- Cover open wounds

Nursing Interventions

- Antibiotics
- Psychosocial support
- Stabilize impaled objects
- Surgical intervention
- Monitor urinary output
- Serial vital signs



Questions????