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

- trachea
- bronchus
- bronchioles
- lung (inside view)
- rib (cut away)
- diaphragm
- ribs
- lungs
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
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 Pneumothorax**
  - 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

Compression of the heart due to fluid accumulation within the pericardium

![Diagram of heart and pericardium]

![X-ray image of chest cavity]
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
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

- **Spleenic 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 Perinuem?
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
    - Perisslenic
    - 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
   - Transverse
   - 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????