Chapter 26 Abdominal Trauma

Introduction to Abdominal Injury
- One of body’s largest cavities
- Multiple vital ____________________________
- Large volumes of blood can be lost before signs and symptoms manifest
- Must be alert for signs of transmitted injury
  - Deformity, swelling, & ____________________________

Abdominal Anatomy and Physiology (1 of 2)
Boundaries:
- Superior: ____________________________
- Inferior: ____________________________
- Posterior: vertebral column and posterior and inferior ribs
- Lateral: muscles of the flank
- Anterior: ____________________________ muscles

Abdominal Anatomy and Physiology (2 of 2)
Three specific spaces
- ____________________________ space
  - Organs covered by abdominal (peritoneal) lining
- ____________________________ space
  - Organs posterior to the peritoneal lining
- ____________________________ space
  - Organs contained within pelvis

Organs by Abdominal Quadrant

Penetrating Trauma
- Energy transmitted to surrounding tissue
- Projectile ____________________________ , pitch & yaw
- Results in
  - Uncontrolled hemorrhage
  - Organ damage
  - Spillage of ____________________________ organ contents
  - Irritation & Inflammation of abdominal lining
- Liver most commonly affected organ
- Shotgun trauma results in multiple ____________________________

Blunt Trauma
- Produces least ____________________________ signs of injury
- Causes
  - ____________________________ : Contents damaged by change in velocity
  - ____________________________ : Organs trapped between other structures
  - ____________________________ : Part of an organ is able to move while another part is fixed
Blast Injuries
• Blunt & Penetrating MOI’s
• Irregular shaped __________________________ and debris
  • __________________________ wave
    -Compresses and relaxes air-filled organs
    -Contuse or __________________________ organs
• Abdominal injury is secondary concern during blast injury

Injury to the Abdominal Wall (1 of 2)
• Skin and muscles transmit blunt trauma to internal structures
  -Typically only show __________________________ (red skin)
  -Visible swelling and ecchymosis occur over several hours
• Penetrating trauma may appear minimal __________________________ in comparison to internal trauma
  -Muscle may mask the size of the external wound
    - __________________________ may be present

Injury to the Abdominal Wall (2 of 2)
• Trauma to thorax, buttocks, flanks & back may penetrate abdomen
  -Lower chest may injure __________________________, liver, stomach or gallbladder
• __________________________ tears
  -Herniation of abdominal contents into thorax

Injury to the Hollow Organs (1 of 2)
• May rupture with compression from blunt forces
• May tear due to penetrating trauma
• Spillage of contents into
  Retroperitoneal space (behind abdominal cavity)
    - __________________________ space (abdominal cavity)
    - __________________________ space
• Intestines have a large amount of bacteria
  -Leakage can result in __________________________

Injury to the Hollow Organs (2 of 2)
• Manifestations of Blood Loss
  - __________________________ : Blood in stool
  - __________________________ : Blood in emesis
  - __________________________ : Blood in the urine

Injury to the Solid Organs (1 of 2)
• Dense and less strongly held together
• Prone to __________________________
  -Bleeding
    - __________________________ (rupture)
• Unrestricted hemorrhage if organ capsule is ruptured

14 Injury to the Solid Organs (2 of 2)

Pain patterns of specific organs:
• ____________________________________ : pain referred to left shoulder
• ____________________________________ : pain radiate to back
• ____________________________________ : pain radiate from flank to groin & hematuria
• ____________________________________ : pain referred to the right shoulder

15 Injury to the Vascular Structures

• Abdominal ___________________________ & Vena Cava
  - Prone to direct blunt or penetrating trauma
  - May be injured in ___________________________ injuries
• Blood accumulates beneath diaphragm
  - Irritation of muscular structures
  - Produces referred pain in the ___________________________ region
  - Greater volume of blood can be lost
  - Presence of blood in abdomen, stimulates vagus nerve resulting in ___________________________ of heart rate
• Blood can isolate in any of the abdominal spaces

16 Injury to the Mesentery and Bowel

• ____________________________________ : double fold of tissue in the peritoneum that supports the major portion of the small bowel, suspending it from the posterior abdominal wall
• Provides bowel with circulation and attachment
• Blood loss ___________________________
• Tear of mesentery may rupture bowel
• Penetrating trauma to the lateral abdomen likely to injure ___________________________ bowel

17 Injury to the Peritoneum (1 of 2)

• Delicate & sensitive lining of anterior abdomen
• ____________________________________ : inflammation of the peritoneum due to:
  - ___________________________ irritation: due to torn bowel or open wound
  - ___________________________ irritation
    - Caustic nature of digestive enzymes
    - Urine initiates inflammatory response

18 Injury to the Peritoneum (2 of 2)

• ___________________________ does not induce peritonitis
• Progression
  - Slight ___________________________ at location of injury
  - ___________________________ tenderness
- Guarding
  - ____________________________________, board-like feel

19 Injury to the Pelvis
  • Serious skeletal injury
  • Life threatening hemorrhage
  • Potential injury to pelvic organs
    - ____________________________
      - Bladder
    - ____________________________
      - Female Genitalia
    - ____________________________
      - Rectum
    - ____________________________

20 Injury During Pregnancy (1 of 4)
  • Trauma is the number one killer of pregnant females
    - Penetrating abdominal trauma accounts for 36% of maternal mortality
      - ____________________________________ account for 40-70% of penetrating trauma
    - Blunt trauma due to improperly worn seatbelts
      - Auto collisions are leading cause of mortality
    • Changing dimensions of uterus
      - ____________________________ abdominal organs
      - Endangers ____________________________ & fetus

21 Changing Dimensions of the Pregnant Uterus

22 Injury During Pregnancy (2 of 4)
  Maternal Changes:
  • Increasing size & weight of uterus
  • Compression of ____________________________ vena cava
  • Reduced venous return to heart
  • Uterus is thick and muscular
    - Distributes forces of trauma ____________________________ to fetus
      - ____________________________ chances for injury

23 Injury During Pregnancy (3 of 4)
  Maternal Changes:
  • Increasing maternal blood volume
    - Protect mother from ____________________________
      - ____________________________ % of blood less necessary before signs of shock
  • Risk of uterine & fetal injury increases with the length of gestation
    - Greatest risk during ____________ Trimester

24 Injury During Pregnancy (4 of 4)
• Penetrating trauma may cause fetal and maternal blood...

• Blunt trauma complications
  - ________________________ rupture
  - ________________________ placentae
  - Premature rupture of ________________________ sac

25 Injury to Pediatric Patients
• Children have poorly developed ________________________ musculature & smaller diameter
• Rib cage has more cartilage
  - Transmits injury to organs beneath easier
• Increased incidence of injury to the liver, kidneys, and spleen
• Shock
  - ________________________ well for blood loss
  - May not show signs and symptoms until ____________% of blood is lost

26 Evaluation of MOI (1 of 4)
• Must evaluate ________________________ to assess seriousness of injury
• Identify strength and direction of forces
  - ________________________ of impact
  - Focus observations and ________________________ on that site
  - Develop a mental list of possible organs involved
• If auto crash
  - Determine if ________________________ used properly
  - Interior signs of impact
    - Steering wheel & ________________________ deformity

27 Evaluation of MOI (2 of 4)
Auto Crash Injury Patterns:
• ________________________ Impact
  - Compress abdomen
  - Liver, spleen, and rupture of hollow organs
• ________________________ Impact
  - Liver, ascending colon, & pelvis
• ________________________ Impact
  - Spleen, descending colon and pelvis

28 Evaluation of MOI (3 of 4)
Auto Crash Injury Patterns (Cont’d):
• Children & Pedestrians
  - ________________________ injuries common
Gunshot Wounds:
• Type & ________________________ of weapon
• Distance
Evaluation of MOI (4 of 4)
For the patient who has sustained ____________________________ injury, the analysis of the mechanism of injury is the most important element of the scene size-up and possibly of the entire assessment.

Assessment of Abdominal Injuries (1 of 4)
Scene Size-up
- Safety
- Evaluation of MOI
Primary Assessment
- ____________________________
- Drug or alcohol use
- Evaluate ABC’s and ____________________________ threats

Assessment of Abdominal Injuries (2 of 4)
Rapid Trauma Assessment (Scan):
- Rapid & Full Trauma Assessment
- Closely examine regions with a high index of ____________________________
- Expose & Examine for ____________________________
  - If suspected pelvic injury DO NOT test ____________________________
  - Palpate ____________________________ abdomen
  - Evaluate for entrance & exit wounds

Assessment of Abdominal Injuries (3 of 4)
- ____________________________ Assessment
  - Characteristics of pain: Tenderness versus Rebound tenderness
- ____________________________ History
- Vital Signs

Assessment of Abdominal Injuries (4 of 4)
Reassessment:
- Trend vital signs: every 5 minutes
- Evaluate for:
  - Progressive ____________________________
  - Progressive hemorrhage
    - BP & Capillary Refill
    - Pulse rate & Pulse ____________________________
    - Mental Status
    - Skin condition
    - Ineffective aggressive ____________________________ resuscitation

Pregnant Patients (1 of 2)
Be observant for signs of ____________________________
• ____________________________________ : signs may not develop until 30% of blood volume is lost
• Body begins shunting blood from GI/GU to primary organs
• Supine ____________________________________ syndrome

35 Pregnant Patients (2 of 2)
Be observant for:
• ____________________________________ contractions
• ____________________________________ hemorrhage
  -Uterine rupture versus abruptio placentae
• Uterus development
  -Abnormal ____________________________________

36 General Management of Abdominal Injuries
• Position Patient
  – Position of ____________________________ unless spinal injury
  – Flex ____________________________ or left lateral recumbent
• General shock care
  • ____________________________________ application
• Specific injury care
  -Impaled Objects or Eviscerations
  • Fluid Resuscitation

37 Fluid Resuscitation of Abdominal Injuries
• Large bore IV with ____________________________ solution
  – Consider 2nd line
• Fluid challenge ____________________________ ml or ____________________________ ml/kg
  – Limit to ____________________________ L
  – Titrate to SBP of ____________________________ mmHg

38 Abdominal Evisceration Care
• Clean of ____________________________
• Do not reinsert organs
• Cover with ____________________________, sterile dressing
• Secure with ____________________________ tight covering

39 Evisceration Care

40 PASG Use in Abdominal Injuries
1 Contraindications:
• Concurrent penetrating ____________________________ trauma
• Abdomen inflation contraindicated in pregnancy
  – Inflate legs only

2 Indications:
• Evisceration
  – If BP<__________________________
• Intra-abdominal bleeding
Management of a Pregnant Patient With Abdominal Injury

- Positioning
  - Left Lateral Recumbent
  - If on backboard tilt ___________________________ slightly
    - Facilitates ___________________________ return
- Oxygenation by NRB or BVM
- Maintain high index of suspicion for intra-abdominal bleeding
- Consider IV and ___________________________
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<tr>
<th>Upper</th>
<th>Lower</th>
<th>Right</th>
<th>Left</th>
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<td>Liver, Gallbladder, Stomach (Small Part) Small and Large Intestine Head of Pancreas Upper Part of Kidney</td>
<td>Stomach, Tail of Pancreas Tail of Liver Small and Large Intestine Upper Part of Kidney</td>
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<td>Small and Large Intestine Lower part of Kidney Half of Bladder, Appendix, Female Reproductive Organs</td>
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**Organs by Abdominal Quadrant**

- **Upper Right**: Liver, Gallbladder, Stomach (Small Part), Small and Large Intestine, Head of Pancreas, Upper Part of Kidney
- **Upper Left**: Stomach, Tail of Pancreas, Tail of Liver, Small and Large Intestine, Upper Part of Kidney
- **Lower Right**: Small and Large Intestine, Lower part of Kidney, Half of Bladder, Appendix, Female Reproductive Organs
- **Lower Left**: Small and Large Intestine, Lower part of Kidney, Half of Bladder, Female Reproductive Organs