Abdominal Trauma

William Schecter, MD
Torso Trauma

- Both the spleen and the liver are located within the thoracic cage.
- Lower rib fractures are frequently associated with liver and spleen injuries.
- The diaphragm changes its position during the respiratory cycle.
- Penetrating chest injuries below the 5th intercostal space may traverse the diaphragm and enter the peritoneal cavity.
Injury to Abdomen or Chest?

http://www.trauma.org/imagebank/imagebank.html
Initial Approach to the Abdominal Patient

Primary Survey
A,B,C,D,E –

Stage of Resuscitation
Re-evaluation of ABC –
Monitors –
Gastric tube and Foley Catheter –
X-Rays: Chest, Pelvis (blunt trauma), –
C/Spine (blunt trauma, ?) –
Careful Abdominal Exam takes place in the Secondary Survey
Secondary Survey of the Abdomen

- Inspection
- Palpation
- Percussion
- Auscultation
Inspection

- Is the Abdomen distended or flat?
- Are there external signs of trauma?
- Are there any wounds in the back or perineum?
Evaluation of the Injured Abdomen

Inspection

http://www.trauma.org/abdo/pat.html
Seat Belt Sign
Palpation

• Cough tenderness?
• Pain to light tapping over an umbilical or ventral hernia?
• Gentle touch
• Palpation
• Search for rebound tenderness
Percussion

• Provides a graded stimulus which is useful in peritoneal stimulation
• Can be used to detect tympany
• Useful to detect an enlarged liver or a distended bladder
Auscultation

- Not particularly helpful in the trauma room
- May be useful to detect bowel obstruction (high pitched sounds and “rushes”)
- A “quiet” abdomen may suggest peritonitis but this finding is unreliable.
Questions re: the Abdomen in the Secondary Survey

• Is there blood in the peritoneal cavity
• Is there blood in the retroperitoneum
• Are there intestinal contents in the peritoneal cavity
• Is there a hole in a retroperitoneal hollow viscus
• Is there a solid organ injury?
• Is there an injury to the genitourinary tract?
Is there blood in the peritoneal cavity?

- FAST
- DPL (Diagnostic Peritoneal Lavage)
- Abdominal CT Scan
Focused Abdominal Sonography for Trauma (FAST)
Diagnostic Peritoneal Lavage

http://www.simcen.org/surgery/projects/dpl/
What is a positive diagnostic peritoneal lavage?

- Gross blood?
- 100,000 RBC/mm$^3$
- 175 units of amylase/mm$^3$
- Intestinal Contents

As we accept lower cell counts, the sensitivity increases but the clinical accuracy decreases.
Is the DPL positive???

1 cc of blood injected into 1 liter of saline
CT Scan - Blood in Peritoneal Cavity due to Ruptured Spleen
Is there blood in the Retroperitoneum

- AP Pelvis
- CT Scan
Are there intestinal contents in the peritoneal cavity

- **Physical Exam**
  - Unreliable in the unconscious, elderly, paraplegic or sedated patient
- **Upright Chest X-ray**
  - Free air under diaphragm?
- **CT Scan**
  - Fluid in the peritoneal cavity?
- **DPL**
  - Elevated WBC, amylase, presence of bile or intestinal contents
- **Exploratory Laparotomy**
Physical Exam

- Abdominal Distention
- Guarding
- Rebound Tenderness
Free Air under Diaphragm

Ischemic Bowel due to late diagnosis of mesenteric laceration

http://www.trauma.org/imagebank/imagebank.html
Is there a hole in a retroperitoneal hollow viscus

• Duodenum, colon, rectum
• High index of suspicion
• Plain film of abdomen
• CT Scan
• Proctoscopy
• Exploratory Laparotomy
Retroperitoneal Air to due blunt injury to duodenum
Is there a solid organ injury?

- Spleen
  - CT excellent
  - Ultrasound +/-

- Liver
  - CT excellent
  - Ultrasound +/-

- Pancreas

- CT +/-
  - ERCP excellent
  - Ultrasound useless except for pseudocyst (a late finding)
Liver Injury: Clinical vs CT Findings
Pancreatic Injury due to blunt trauma

Mild edema of body of pancreas

Extensive extravasation
Rx- distal pancreatectomy
Distal Pancreatectomy with Preservation of the Spleen
Is there an injury to the Genitourinary tract?

• CT with iv contrast excellent for kidney and ureter but NOT bladder—Patient must have a retrograde cystogram (CT retrograde cystogram ok)

• Retrograde urethrogram if
  – Blood at the urethral meatus
  – High riding prostate on rectal exam
  – Edema in perineum
Renal Trauma

http://www.trauma.org/imagebank/imagebank.html
Why do a Single Shot IVP

- Patient in shock with penetrating wound to abdomen going straight to OR
- Question: If a nephrectomy is necessary on one side, does the patient have a functioning contralateral kidney?
- Answer: Single shot IVP with 150 cc of contrast (in an adult), Flat plate of the abdomen 10 minutes later. If bilateral nephrograms are present, patient has 2 functioning kidneys.
Most Common Clinical Dilemma

- Patient in shock
- Multiple Trauma
- Severe pelvic fracture
- Question: Is the source of hemorrhage intraperitoneal or retroperitoneal?
- Question: OR or Angiography??
Diagnostic Options

• FAST Exam (Ultrasound exam of abdomen)
• CT Scan of Abdomen
• DPL (Diagnostic peritoneal lavage)
• Angiography
• Laparotomy (based on “surgical intuition”)
Supraumbilical DPL if Pelvic Fracture is present
Controversy: Control Pelvic Fracture bleeding by:

- Pelvic Binder
- External Fixator
- Embolization

http://www.trauma.org/imagebank/imagebank.html
21 year old man involved in bar brawl at approximately 04:00 on 22-6-03
Beaten and run over by his assailants
Patient dragged under auto 3-4 city blocks
GCS in field 3
Emergency Room

- BP=0, P=0, Breathing spontaneously, GCS=6, EKG=Sinus tachycardia
- Traumatic amputation left arm
- Near amputation right leg
- Open left pelvic fracture
- Subcutaneous air right chest
- 3rd degree road burn anterior abdomen
Operating Room

- Intubated
- Right tube thoracostomy
- Ligation of bleeding vessels left upper arm stump
- Laparotomy: splenectomy, packing of liver, (abdomen left open)
- ICP bolt insertion: ICP=11
- Washout open left iliac fracture, left femur fracture (grade 2) and left tibia fracture (3B)
Operating Room

- External fixators applied to femur and tibia
- Eschar debrided from anterior abdominal wall
- QUESTION: Where do we go from here?
  - ICU?
  - CT?
  - Angiography?
Head CT

- Normal
- **Rationale for Head CT**: Bleeding relatively controlled. If unsurvivable head injury: withhold further diagnostic and therapeutic procedures

http://www.imaginis.com/ct-scan/history.asp
Pelvic Angiogram

External and internal iliac arteries
Multiple areas of Extravasation
Post embolization
Hepatic Arteriogram
Extravasation from branch of hepatic artery
Post hepatic artery embolization
Portal vein extravasation
Complication

Femoral artery pseudoaneurysm due to Cordis catheter arterial placement in ER
June 24, 2003 – 2nd look lap
Post op CT of Liver
Outcome

- Patient expired on post injury day 10 of multiple organ failure
Abdominal Trauma

Blunt
  - Unstable
    - Fluid in Abdomen
      - OR
      - Pelvic Fx
        - Angio
      - No Pelvic Fx
        - CT
      - ?
    - No fluid
      - Concern?
        - OK
        - OR
          - Anterior
        - Wnd exp
          - DPL/Exp
          - CT/Exp
  - Stable
    - CT

Penetrating
  - Unstable Evisceration Peritonitis
    - OR
    - Anterior
    - Posterior
  - Stable
    - CT/Exp