**Abdominal and Pelvic Trauma**

- In the primary survey, the circulation part includes thinking about the abdomen as a source of occult hemorrhage
- The OBVIOUS THING is a penetrating abdominal injury
- Generally speaking: ANY BLUNT TORSO INJURY FROM IMPACT OR DECELERATION HAS ABDOMINAL SOLID ORGAN TRAUMA UNTIL PROVEN OTHERWISE
- The likelihood of organ injury is GREATER when the airbag goes not deploy
- In blunt trauma, this is the breakdown of organ damage frequency:
  - 40-55% = the spleen
  - 35-45% = the liver
  - 5-10% = small bowel
  - There is a 15% incidence of retroperitoneal hematoma in patients who end up needing a laparotomy
- In stab wounds:
  - 40% = liver
  - 30% = small bowel
  - 20% = diaphragm
  - 15% = colon
- In gunshot wounds:
  - 50% = small bowel
  - 40% = colon
  - 30% = liver
  - 25% = abdominal vascular structures
  - Likelihood of major abdominal injuries decreases markedly if the weapon was a shotgun and the shooter was more than 3 metres away

**PHYSICAL EXAMINATION:**

- History should suggest how much insult the abdomen had suffered
- **INSPECTION:**
  - Looking for tenderness, obvious wounds, and hematoma.
  - Look for perineal hematoma, scrotal hematoma, blood in the vagina or urethra
- **AUSCULTATION**
  - NO BOWEL SOUNDS = ILEUS = MAYBE DUE TO HEMATOMA
- **PERCUSSION AND PALPATION**
  - Mainly looking for a pregnant uterus
  - Peritonitis from hematoma or ruptured viscus
  - Tenderness due to organ injury
- **ASSESS PELVIC STABILITY**
  - Manually compress the iliac spines to see if the pelvis opens like a book.
• ASSESS THE PERINEUM, URETHRA AND RECTUM
  o Rectal exam: a high riding prostate = urethral disruption
  o Blood in rectal exam = colonic perforation
• Gluteal examination: for penetrating injuries

ADJUNCTS TO PHYSICAL EXAMINATION

• NG tube:
  • Aspirate gastric contents to prevent aspiration
  • If there is blood in the aspirate, there may be oesophageal or gastric rupture

• Urinary catheter:
  • If there is blood in the urethra, DO NOT ATTEMPT THIS
  • If the patient is unable to void, a suprapubic catheter may need to be inserted under ultrasound guidance

• Xrays of the chest and abdomen
  • Abdominal films are useless
  • Chest Xrays will show you subdiaphragmatic gas, if they are erect
  • In a supine patient, you are better off CT scanning them than getting laterals

• FAST ultrasound
  • Scans are obtained of the pericardial sack, hepatorenal fossa, splenorenal fossa, and pelvis or pouch of Douglas
  • A SECOND SCAN NEEDS TO BE PERFORMED IN 30 MINUTES
  • Accuracy is comparative to that of DPL

• Diagnostic Peritoneal Lavage
  • Contraindicated if there is an impending laparotomy
  • Think twice in the obese patient, the cirrhotic, and the coagulopathy
  • If gas, blood or food is aspirated in the lavage → LAPAROTOMY
  • If blood is not aspirated immediately, 1000ml of saline is infused and then drained out again. Lavage is positive if:
    • There is > 100,000 RBCs per cubic mm
    • There is > 500 WCCs per cubic mm
    • There is bacteria on Gram stain

• CT of the abdomen and pelvis
  • For stable patients with no indications for immediate laparotomy
  • Most surgeons would do a laparotomy if the CT finds free fluid
  • With contrast, the kidneys and ureters should light up; if one kidney does not, it may have a renal artery rupture or massive parenchymal disruption

• Urethrography
  • A small amount of contrast is injected up the urethra
  • The pelvic Xray should show you if there is urethral disruption

Penetrating Injuries

• STABBING: If there is any sign of peritonism, hemodynamic instability, or if you can see the fascia, they need a laparotomy.
• Otherwise... 33% of stab wounds to the anterior abdomen do not penetrate the peritoneum, so you can explore them under local: follow the wound track and see if you can feel bowel through the wound.
• If you can't explore the wound, it's probably still time for a laparotomy.
  ▪ GUNSHOT: EVERYONE needs a laparotomy. The bullet tracks are too unpredictable.

THORACOABDOMINAL LOWER CHEST WOUNDS
  ▪ You can't explore these under local, or you might cause a pneumothorax
  ▪ Stab wounds here tend to cause small diaphragmatic tears; so laparotomy or laparoscopy tend to be the best exploratory measures

ANTERIOR ABDOMINAL WOUNDS: WHICH IS BETTER: DPL OR LOCAL EXPLORATION?
  o DPL has a sensitivity of 90%, and exploration plus serial examination over a 24hr period has a sensitivity of 94%.
  o This is only true for patients who are HEMODYNAMICALLY SABLE

POSTERIOR WOUNDS: CT vs. Serial examination
  o Triple phase CT assesses the integrity of the colon.
  o Accuracy of CT vs serial physical examinations is about the same, but the CT doesn't take 24 hrs.
  o Occasionally, BOTH miss the injury. Hence, you have follow-up.

WHO GETS A LAPAROTOMY?
  ▪ Blunt abdominal trauma with
    o Hemodynamic instability
    o Clinical findings suggestive of peritoneal bleeding
    o Positive FAST
    o Positive DPL
  ▪ Penetrating abdominal trauma with hypotension
  ▪ Any gunshot wounds to the abdomen
  ▪ Any evisceration
  ▪ Penetrating trauma with bleeding from the NG tube, genitals or rectum
  ▪ Any trauma with peritonitis
  ▪ Free air under the diaphragm
  ▪ Diaphragmatic rupture
  ▪ CT evidence of hollow or solid organ injury
SPECIFIC PROBLEMS

DIAPHRAGM INJURIES
- The left hemidiaphragm is most commonly injured in blunt trauma
- Most of the time it’s the posterolateral left hemidiaphragm
- Most of the time it’s a 5-10cm tear
- Most of the time, the xray is abnormal

DUODENAL INJURIES
- Frequently, bicyclist vs. handlebars, or unrestrained driver vs. steering wheel
- NG aspirate may contain blood… or may not
- Chest Xray – free air may appear
- Double contrast CT confirms the injury

PANCREATIC INJURIES
- Again, direct epigastric blow eg. bicyclist vs. handlebars
- The first 8 hours is the crap-time:
  - Double contrast CT won’t pick it up this early
  - Amylase and lipase may be normal at this stage
- Surgical exploration is pretty much the only way you’ll find out.

GENITOURINARY INJURIES
- Associated with direct injuries to the back or flank, especially those that result in bruising
- Hematuria in a trauma patient suggests it
- Hematuria in a trauma patient with an episode of shock suggests other abdominal injuries, not just limited to the urinary tract
- Blunt renal injury can be treated non-operatively in 95% of cases
- Renal injuries which do not cause hematuria:
  - Thrombosis of the renal artery
  - Disruption of the renal pedicle due to deceleration trauma
  - Both are rare and picked up on CT
- Urethral injuries usually mean pelvic fracture
  - Those posterior (above the urogenital diaphragm) are usually associated with numerous other serious injuries
  - Those anterior (below the urogenital diaphragm) may be a stand-alone injury resulting from a straddle impact

SMALL BOWEL INJURIES
- This is usually the consequence of deceleration
- A lumbar vertebral distraction (Chance fracture) and “seat-belt sign” are associated
- Torn intestine = not much bleeding; also not much free subdiaphragmatic air
- May not be picked up on CT or early ultrasound
- This is the one injury which DPL is most accurate test
PELVIC FRACTURES AND ASSOCIATED INJURIES

- With a pelvic fracture, there are 4 places you could be bleeding from:
  - Fractured Bone
  - Pelvic venous plexus
  - Pelvic arteries
  - Extrapelvic sources
- Once you see this, the fracture must be reduced with a compression device or sheet.

CLASSIFICATION OF PELVIC FRACTURE

- AP compression
  - Motor vehicle accident or fall from a great height
  - Symphysis pubis and sacrum may be fractured
  - With disruption of the posterior ligamentous complex, there is bleeding from the pelvic venous plexus or iliac arteries, and the pelvis is unstable
- Lateral compression
  - Results in a lateral rotation of the crushed hemipelvis
  - This causes it to intrude into the pelvic organs
  - However, this puts pressure on the pelvis, and so there is LESS BLEEDING in this fracture
- Vertical shear
  - Dislocates the sacroiliac joint and causes major pelvic instability
- Combination of all 3 may occur

SIGNS OF PELVIC FRACTURE

- Hematoma of the flank, scrotum, or perianal area
- Laceration of the vagina or rectum
- Mechanical instability of the pelvic ring

MANAGEMENT OF A PELVIC FRACTURE

- The idea is to close the pelvic volume, causing internal rotation of your limbs
  - Wrap the pelvis in a sheet tightly
  - There are also pelvic splints and compressors etc...
  - EARLY TRANSFER

Diagnostic peritoneal lavage

- OPEN TECHNIQUE
  - Decompress the stomach and bladder with the appropriate catheters
  - Use local with adrenaline, to reduce blood contamination
  - Anaesthetize in midline just below the umbilicus
  - Cut vertically, and dissect down to the peritoneum
  - Make a small nick in the peritoneum and insert a small peritoneal catheter
  - Advance the catheter into the pelvis
  - Aspirate
  - If there is no gross blood, infuse 1 liter of normal saline
  - Aspirate some more after “agitating” the abdomen
  - Send the fluid for cell count: >100,000 RBCs or >500 WCCs is abnormal
CLOSED TECHNIQUE

- Decompress the stomach and bladder with the appropriate catheters
- Again, you anaesthetize the area just below the umbilicus
- Elevate the skin with forceps
- Insert the needle through the abdominal wall. You will feel resistance as the needle encounters the fascia
- Use the Seldinger technique: insert the lavage catheter via a guidewire
- Aspirate and lavage as above