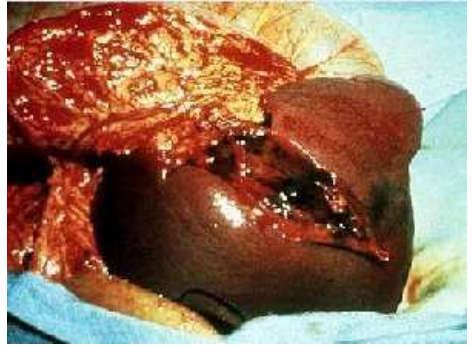


Abdominal trauma

Scope

The following injuries will be considered:

- liver
- spleen
- kidney
- gut and mesentery



Mechanism

Blunt trauma, typically low velocity as in contact and collision injuries, e.g. shoulder pad, helmet, contact with playing surface.

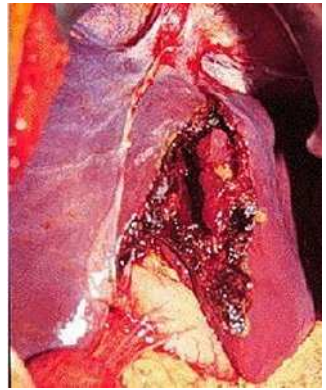
High velocity injuries may occur in skiing, biking, motor sports, etc. but are beyond the scope of this presentation, as are knife and gunshot wounds.

Triage

- Most low velocity injuries, and the majority of non-vehicular injuries, will involve contusion or sprain of musculo-tendinous injuries.
- Consequently, the approach to management consists of triage, to identify those episodes in which injury to a solid organ, or gut, may have occurred.
- If injury to a solid organ or gut has occurred then all grades of severity may exist, and the first priority is to recognize significant and continuing blood loss.

ATLS

- Advanced Trauma Life Support (ATLS) optimizes assessment and stabilization in tense situations.
- A focused primary exam to rapidly assess airway, breathing, circulation. A worst case scenario is assumed, e.g. high velocity, abdominal penetration, no witness account.
- This is followed by an abbreviated neurologic assessment (D) and complete exposure (E) to search for injuries that may have gone unrecognized in the urgency of the situation.



Follow-up

- A secondary survey, after the first priorities have been secured, includes a head-to-toe physical examination, including abdomen, to identify all injuries.
- If the patient has been hospitalized, a third survey, 24 hours after admission, including follow-up head-to-toe examination to minimize risk of missed injuries, is performed.



Witnessed injury

The majority of contact/collision sports injury at UND should have been witnessed. This may allow departure from strict ATLS guidelines - although the principles always apply.

The major priority is:

- Separate contusions, musculo-tendinous injuries etc. from involvement of solid organs and gut.
- Recognize developing/potential hypovolemia due to blood loss.

With major injury, anticipate/assume:

- organ contusion/laceration
- perforation of the gut
- bleeding and/or hypovolemia
- combinations of above

Signs & symptoms

Pain

- Upper abdominal quadrant
- Generalized abdominal
- Back or renal angle

Difficulty inspiring

- With/without pleuritic pain (rib, liver, spleen)
- Shoulder pain (referred, peritoneum, spleen, liver)
- Faintness (hypovolemia)
- Apprehensiveness (hypovolemia)
- Air hunger (developing acidosis)



Exam essentials

Apprehensiveness

- Tachycardia and/or low BP
- Air hunger

Tenderness

- upper quadrant
- renal angle
- generalized

Guarding

- upper quadrant
- renal angle
- generalized



Rigidity

Rebound tenderness

Alteration of bowel sounds

- Hypoactive, absent

Definitions

Air Hunger

- Deep, sighing respirations probably indicating respiratory compensation of developing metabolic acidosis

Guarding

- Voluntary contraction of muscles in response of palpation or anticipated palpation of tender structure

Rebound Tenderness

- A secondary increase or impulse in pain when the examining hand is quickly removed from a tender abdomen. May signify peritoneal irritation but lacks sensitivity

Rigidity

- Subtle but involuntary increase in muscle tone, localized or generalized, usually indicating underlying peritoneal irritation



Liver

- Largest solid abdominal organ, second most commonly injured, and commonest cause of death after abdominal trauma.
- Commonest cause of liver injury is blunt trauma secondary to motor vehicle accident.
- The size, friability, and thin capsule create proness to injury.



Right lobe more commonly injured than left.

Trauma may result in:

- Subcapsular or intrahepatic hematoma
- Laceration, Contusion
- Hepatic vascular disruption
- Bile duct injury
- 80% of blunt trauma to liver is currently treated conservatively.

Spleen

The spleen is the most vascular organ receiving 350L of blood daily. It contains one unit of blood at any given time and is the organ most commonly injured with thoraco-abdominal trauma, representing 25% of blunt injuries to viscera.

The presentation often subtle:

- Abdominal tenderness and distension - 50%
- Hypotension in only 25-30%
- Left upper abdominal or flank pain
- Lower left rib injury most common associated injury

Elevation of left hemidiaphragm following blunt trauma should be considered splenic injury until disproved.



Kidney

- Blunt injury, most commonly motor vehicle accidents, accounts for 85% of injuries.

- Collision with other players or equipment during sport accounts for a further 10%

- Life threatening injuries to renal pedicle make up 1-2%



Signs and Symptoms

- may be subtle initially but most associated with hematuria (95%), which is profuse in more severe injuries
- diffuse abdominal tenderness
- associated rib or vertebral fractures may be present
- hypovolemic shock

Gut

5% of the time, intestinal and mesenteric injury accompanies blunt trauma most commonly from motor vehicle accidents, falls, and assaults, including collision sports.

There are two categories of physical force:

- Compression increases intraluminal pressure or compresses fluid-filled bowel against solid structures (e.g., duodenal compression on the spine) resulting in stretching of bowel wall to full-thickness perforation.
- Deceleration causes stretching /tearing of bowel loops at points of fixation, such as ligament of Treitz and phrenicocolic ligament and includes tearing the bowel wall, shearing the mesentery, and injuring the vascular supply to segment of gut.



Diagnostic studies

There are three categories:

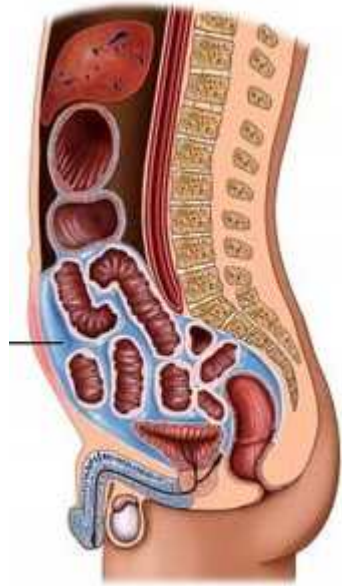
- Diagnostic Peritoneal Lavage (DPL)
- Focused Assessment by Sonography in Trauma (FAST)
- CT with/without contrast

Each has its strengths, but urgency of situation and likelihood of continuing bleeding will drive choice. X-ray may still give useful information e.g., rib fracture, pulmonary atelectasis or hemothorax, elevation of hemidiaphragm and abnormal gas patterns. Intravenous pyelography may still currently be important in renal trauma.



Diagnostic peritoneal lavage

- Before CT and FAST, the modality of choice for assessment of abdominal injury was Diagnostic Peritoneal Lavage (DPL).
- It now plays much lesser role but may be indicated when CT scanning is unavailable or the patient is hemodynamically unstable.
- Although very sensitive for the detection of intra-abdominal blood and/or hollow visceral injuries, it is nonspecific, is invasive, and has associated although low morbidity. However, it requires only equipment that is available under most circumstances, and does not need any technology support.



FAST

Focused assessment by sonography in trauma (FAST) is a standard part of initial evaluation of blunt injury in trauma centers.

Advantages

- permits rapid assessment of peritoneal cavity
- is highly sensitive for free fluid
- can be performed on site by trauma staff

Disadvantages

- results are operator dependent
 - lacks specificity
 - cannot grade organ injury
 - role in pediatrics not substantiated
- Because of the speed with which it can be deployment, it is of most importance in unstable patients.



Computerized tomography

Computerized Tomography with double contrast (IV and oral) is the standard for assessment of the abdominal cavity in a hemodynamically stable patient.

Oral contrast increases the sensitivity for diagnosis of pancreatic, duodenal, and proximal bowel injuries, but may delay scheduling of scan and pose aspiration risk if vomiting induced.

Advantages

- rapid (and ever increasing) scan times
- quality images
- accurate grading of solid organ injuries
- contrast extravasation indicates acute hemorrhage

