**Abdominal Trauma, Blunt**

**Background**

Blunt abdominal trauma is a leading cause of morbidity and mortality among all age groups. Identification of serious intra-abdominal pathology is often challenging. Many injuries may not manifest during the initial assessment and treatment period. Mechanisms of injury often result in other associated injuries that may divert the physician’s attention from potentially life-threatening intra-abdominal pathology.

**Pathophysiology**

Injury to intra-abdominal structures can be classified into 2 primary mechanisms of injury—compression forces and deceleration forces.

Compression or concussive forces may result from direct blows or external compression against a fixed object (e.g., lap belt, spinal column). Most commonly, these crushing forces cause tears and subcapsular hematomas to the solid viscera. These forces also may deform hollow organs and transiently increase intraluminal pressure, resulting in rupture. This transient pressure increase is a common mechanism of blunt trauma to the small bowel.

Deceleration forces cause stretching and linear shearing between relatively fixed and free objects. These longitudinal shearing forces tend to rupture supporting structures at the junction between free and fixed segments. Classic deceleration injuries include hepatic tear along the ligamentum teres and intimal injuries to the renal arteries. As bowel loops travel from their mesenteric attachments, thrombosis and mesenteric tears, with resultant splanchnic vessel injuries, can result.

The liver and spleen seem to be the most frequently injured organs, although reports vary. Small and large intestines are the next most injured organs, respectively. Recent studies show an increased number of hepatic injuries, perhaps reflecting increased use of CT scanning and concomitant identification of more injuries.

**Mortality/Morbidity**

- The National Pediatric Trauma Registry reported that 9% of pediatric patients with blunt abdominal trauma died. Of these, only 22% were reported as having intra-abdominal injuries as the likely cause of death.
- A review from Australia of intestinal injuries in blunt trauma reported that 85% of injuries occurred from vehicular accidents. The mortality rate was 6%.
- In a large review of operating room deaths in which blunt trauma accounted for 61% of all injuries, abdominal trauma was the primary identified cause of death in 53.4% of cases.
Sex
The male-to-female ratio is 60:40, according to national and international data.

Age
Most studies indicate that peak incidence occurs in persons aged 14-30 years. A review of 19,261 patients with blunt abdominal trauma revealed equal incidence of hollow viscus injuries in both children (ie, ≤14 y) and adults.

History
- Initially, evaluation and resuscitation occur simultaneously.
- In general, do not obtain a detailed history until life-threatening injuries have been identified and therapy has been initiated. However, to better predict injury patterns and to identify potential pitfalls, ascertain the mechanism of injury from bystanders, paramedics, or police.
- **AMPLE** is often useful as a mnemonic for remembering key elements of the history.
  - A llergies
  - Medications
  - P ast medical history
  - L ast meal or other intake
  - E vents leading to presentation

- A history of out-of-hospital hypotension is a predictor of more significant intra-abdominal injuries. Even if normotensive upon ED arrival, consider the patient as having an increased risk.

Physical
- Initial examination
  - After appropriate primary survey and initiation of resuscitation, focus attention on secondary survey of the abdomen.
  - For life-threatening injuries that require emergent surgery, delay comprehensive secondary survey until the patient has been stabilized.
  - At the other end of the spectrum are victims of blunt trauma who have a benign abdomen upon initial presentation. Many injuries initially are occult and manifest over time. Frequent serial examinations, in conjunction with the appropriate diagnostic studies, such as abdominal CT scan and bedside ultrasonography, are essential in any patient with significant mechanism of injury.

- Inspection
- Examine the abdomen to determine the presence of external signs of injury. Note patterns of abrasion and/or ecchymotic areas.
- Note injury patterns that predict the potential for intra-abdominal trauma (e.g., lap belt abrasions, steering wheel–shaped contusions). In most studies, lap belt marks have been correlated with rupture of the small intestine and an increased incidence of other intra-abdominal injuries.
- Observe the respiratory pattern because abdominal breathing may indicate spinal cord injury. Note abdominal distention and any discoloration.
- Bradycardia may indicate the presence of free intraperitoneal blood in a patient with blunt abdominal injuries.
- The Cullen sign (i.e., periumbilical ecchymosis) may indicate retroperitoneal hemorrhage; however, this symptom usually takes several hours to develop. Flank bruising and swelling may raise suspicion for a retroperitoneal injury.
- Inspect genitals and perineum for soft tissue injuries, bleeding, and hematoma.

**Auscultation**

- Abdominal bruit may indicate underlying vascular disease or traumatic arteriovenous fistula.
- During auscultation, gently palpate the abdomen while noting the patient's reactions.

**Palpation**

- Carefully palpate the entire abdomen while assessing the patient's response. Note abnormal masses, tenderness, and deformities.
- Fullness and doughy consistency may indicate intra-abdominal hemorrhage. Crepitation or instability of the lower thoracic cage indicates the potential for splenic or hepatic injuries associated with lower rib injuries.
- Pelvic instability indicates the potential for lower urinary tract injury as well as pelvic and retroperitoneal hematoma. Open pelvic fractures are associated with a mortality rate exceeding 50%.
- Perform rectal and bimanual vaginal pelvic examinations to identify potential bleeding and injury.²
- Perform a sensory examination of the chest and abdomen to evaluate the potential for spinal cord injury. Spinal cord injury may interfere with the accurate assessment of the abdomen by causing decreased or absent pain perception.
- Abdominal distention may result from gastric dilation secondary to assisted ventilation or swallowing of air.
• Signs of peritonitis (eg, involuntary guarding, rigidity) soon after an injury suggest leakage of intestinal content. Peritonitis due to intra-abdominal hemorrhage may take several hours to develop.

➢ Percussion

• Percussion tenderness constitutes a peritoneal sign.
• Tenderness mandates further evaluation and probably surgical consultation.

Causes

• The most common causes of blunt abdominal trauma are from motor vehicle accidents and automobile-pedestrian accidents.
• Other common etiologies include falls and industrial or recreational accidents.