

abdominal trauma
- assessment
[created by Paul Young 28/10/07]

definition

abdominal trauma consists of blunt and penetrating trauma

Penetrating abdominal trauma:

- most commonly injured organs with stab wounds are small intestine, liver and colon
- only one third of abdominal stab wounds penetrate the peritoneum & only 50% of these require surgical intervention
- 85% of abdominal wall gun shot wounds penetrate the peritoneum & 95% of these require a surgical procedure for correction

Blunt abdominal trauma

- spleen and liver are the most commonly injured organs; small and large intestines are the next most commonly injured

initial assessment

Primary survey:

(i) **Airway** (ability of air to pass unobstructed to the lungs):

critical findings include:

- obstruction of the airway due to direct injury, oedema, foreign body or inability to protect the airway because of depressed level of consciousness

key treatment is:

- establishment of airway

(ii) **Breathing** (ability to ventilate and oxygenate):

key clinical findings are:

- absence of spontaneous ventilation, absent or asymmetrical breath sounds, dyspnoea hyperresonance, dullness, gross chest wall instability or defects that compromise ventilation

key conditions to identify are:

- pneumothorax, endotracheal tube malposition, tension pneumothorax, haemothorax, sucking chest wounds, flail chest

key treatment is:

- chest tube

(iii) **Circulation:**

key clinical findings are:

- collapsed or distended neck veins, signs or tamponade, external sites of haemorrhage

key conditions identified are:

- hypovolaemia, cardiac tamponade, external haemorrhage

key treatment is:

- iv access, fluid resuscitation, compression of sites of bleeding

(iv) **Disability:**

key clinical conditions are:

- decreased level of consciousness, pupillary asymmetry, gross weakness

key conditions identified are:

- serious head and spinal cord injury

key treatment is:

- definitive airway if indicated, emergency treatment of raised icp

(v) **Exposure and control of immediate environment:**

- expose patient and prevent hypothermia

Other procedures:

several monitoring and diagnostic adjuncts occur in concert with the primary survey:

- (i) ECG and ventilatory monitoring and continuous pulse oximetry
- (ii) decompress stomach with NG or OG tube once airway is secured
- (iii) insert a foley catheter during resuscitation phase (foley catheter placement is contraindicated if urethral injury is evident as identified by blood at the meatus, ecchymosis or scrotum or labium majora or high riding prostate - retrograde urethrogram is required for these patients)

Resuscitation phase:

- continues throughout primary and secondary survey and until treatments are complete
- fluids are required to sustain intravascular volume, tissue and organ perfusion and urine output
- administer blood for hypovolaemia that is unresponsive to crystalloid boluses
- end points are normal vital signs, absence of blood loss, adequate urine output and no evidence of end organ dysfunction; blood lactate and base deficit on an ABG may be helpful in patients who are severely injured

resuscitation & comprehensive assessment

Secondary survey of abdominal trauma:

(i) **inspection:**

- examine for the presence of external signs of injury noting patterns of abrasion and/or ecchymotic areas
- lap belt bruising is positively correlated with rupture of the small intestine and increased incidence of other intraabdominal injury (20-30% of patients with lap-belt marks have associated mesenteric or intestinal injuries)
- bradycardia may indicate free intraperitoneal blood
- Cullen sign (periumbilical ecchymosis) may indicate retroperitoneal haemorrhage; however, this usually takes hours to develop
- flank bruising and swelling may raise suspicion for retroperitoneal injury
- inspect genitals and peritoneum

(ii) **palpation:**

- fullness may indicate haemorrhage
- crepitation of lower rib cage may indicate hepatic or splenic injury
- rectal and vaginal examination identify potential bleeding and injury
- signs of peritonitis soon after injury suggest leakage of intestinal contents; peritonitis due to intra-abdominal haemorrhage may take several hours to develop
- ongoing haemorrhage is the most likely cause of persistent or recurrent haemodynamic instability
- initial goal is not to diagnose specific abdominal organ injury but rather to determine whether there are signs & symptoms that indicate a need for immediate laparotomy

imaging and laboratory studies

trauma series:

- CXR identifies haemothorax, pneumothorax and pulmonary contusion
- AP pelvis can confirm presence of significant pelvic fracture
- lateral c-spine can identify non-survivable neck injury

FAST:

- used to identify free fluid in the peritoneal cavity
- FAST has a sensitivity of 70-95%
- involves directing to ultrasound probe in four regions:
 - (i) the subxipoid location to determine whether there is fluid in the pericardial space & to make a rough assessment of contractility & filling state
 - (ii) the right upper quadrant
 - (iii) the splenorenal recess
 - (iv) the pelvis
- problems with FAST:
 - (i) operator dependent
 - (ii) false negative rate in children is high
 - (iii) technically more difficult with obesity & sc emphysema

DPL:

- has an accuracy of 98% for detection of haemoperitoneum but does not determine source
- generally performed in patients too unstable for CT
- involves performing a minilaparotomy with placement of a lavage catheter into the peritoneal cavity directed towards the pelvis
- the return of gross blood is a positive result
- if DPL is grossly negative then 1L of warmed saline is instilled into the the abdominal cavity & then drained back into the intravenous fluid bag by gravity. The effluent lavage is sent to the laboratory for analysis.
- laboratory criteria for a positive DPL in blunt trauma are:
 - (i) >100000 RBCs/mm3
 - (ii) >500 WBC/mm3
 - (iii) presence of food particles
 - (iv) presence of bile
 - (v) presence of bacteria
- problems with DPL:
 - (i) an invasive procedure
 - (ii) 1/4 of patients with a positive DPL will have a non-therapeutic laparotomy
 - (iii) 5% false negative rate with retroperitoneal, hollow viscus or diaphragm injuries

CT abdo/pelvis:

- is the diagnostic modality of choice for haemodynamically stable patients
- the major reason not to obtain a CT scan is haemodynamic instability
- allows haemoperitoneum & its source to be identified & allows specific injuries to be graded
- CT also permits evaluation of retroperitoneal structures including the kidneys, major blood vessels & bony pelvis
- the majority of blunt solid organ injuries are now managed non-operatively in trauma centres; however, a blush of intravenous contrast agent indicates active extravasation from a bleeding vessel and is strong predictor of failure of non-operative management
- problems with CT scanning are:
 - (i) the need to transfer the patient to radiology
 - (ii) the time associated with transfer and scanning
 - (iii) risks associated with intravenous contrast agents
 - (iv) the fact hollow viscus, diaphragmatic & pancreatic injuries are frequently missed on initial scanning

30% of patients with lumbar Chance fracture have associated bowel or mesenteric injuries

criteria for positive DPL

	Blunt injury	Penetrating injury
Clinical		
Initial aspiration of > 10 ml frank blood		
Egress of lavage fluid via chest tube or urinary catheter		
Bile or vegetable material in lavage fluid		
Laboratory		
Red cells		
Definite	> 100 × 10 ⁹ /l	> 20 × 10 ⁹ /l
Indeterminate	50–100 × 10 ⁹ /l	5–20 × 10 ⁹ /l
White cells	> 0.5 × 10 ⁹ /l	0.5 × 10 ⁹ /l
Amylase	> 20 IU/l	> 20 IU/l
Alkaline phosphatase	> 10 IU/l	> 10 IU/l