

Abdominal Trauma

1. Evaluation and management depends on:
 - a. Mechanism (Blunt versus Penetrating)
 - b. Injury complex in addition to abdomen
 - c. Haemodynamic stability assessment:
 - i. Classically patient's haemodynamic responsiveness is classified as responder or non-responder to fluid resuscitation. This is a crude assessment and more granularity of the response to resuscitation can be more discriminatory.
 - ii. The Western Trauma Association Splenic Trauma Algorithm Guidelines provides a useful framework for classifying a trauma patient's hemodynamic status. Abdominal trauma patients exhibiting Grade 4 and 5 hemodynamic instability generally requiring immediate laparotomy (or exploration of other anatomical area involve. Patients with lesser grade may be investigated with CT prior to necessary intervention (surgical, interventional radiological or selective non-interventional management)

38. Allen GS, Moore FA, Cox CS, Mehall JR, Duke JH. Delayed diagnosis of blunt duodenal injury: an avoidable complication. *J Am Coll Surg.* 1998;187:393-399.

Table 2 Hemodynamic Instability Score³⁸

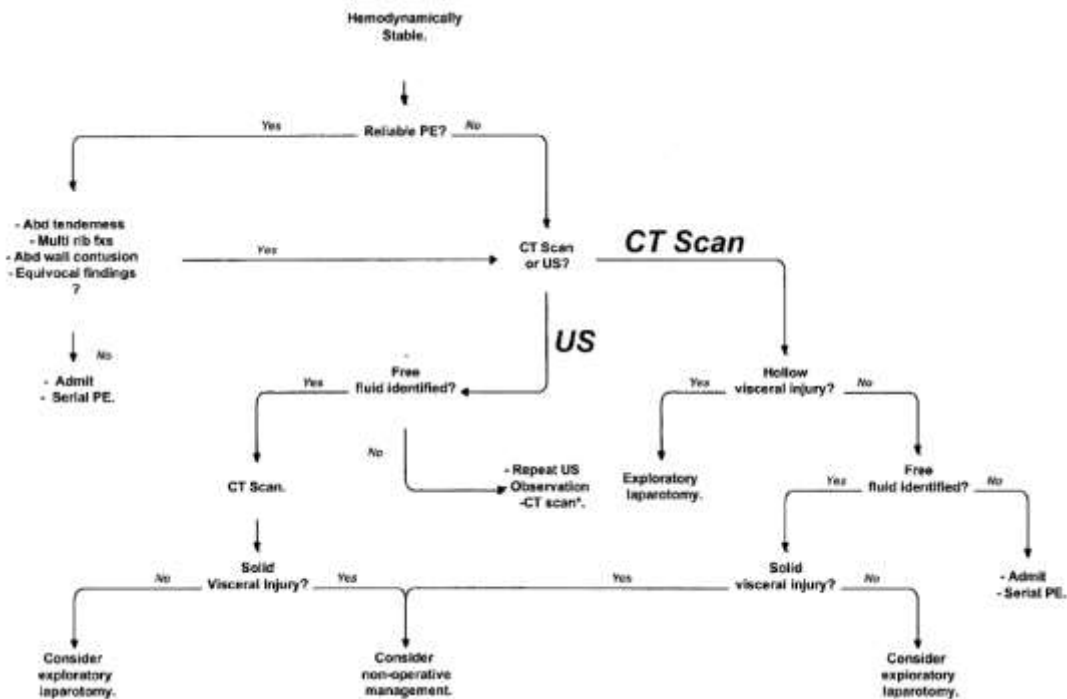
- Grade 0: No significant hypotension (systolic blood pressure [SBP] <90 mm Hg) or serious tachycardia (heart rate [HR] >130)
- Grade 1: Hypotension or tachycardia by report but none recorded in emergency department (ED)
- Grade 2: Hypotension or tachycardia responsive to initial volume loading with no ongoing fluid or PRBC requirement
- Grade 3: Hypotension or tachycardia responsive to initial volume loading with modest ongoing fluid (<250 mL/h) or PRBC requirement
- Grade 4: Hypotension or tachycardia only responsive to >2 L of volume loading and the need for vigorous ongoing fluid infusion (>250 mL/h) and PRBC transfusion
- Grade 5: Hypotension unresponsive to fluid and PRBC transfusion
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2. Blunt abdominal Trauma

- a) ATLS guides the initial evaluation and management of blunt trauma patients.
- b) Initial hemodynamic status and early response to resuscitation will determine the subsequent investigation and management.
- c) Patients requiring aggressive ongoing resuscitation (i.e. Grade 4 or 5 instability) should be considered for emergent surgery. Focused Abdominal Sonography for Trauma (FAST) may give corroborating evidence of free intra-abdominal blood. An exception to this is (i) futility due to brain injury, (ii) pelvic hemorrhage that may be more amenable to immediate angioembolization (if not available in a timely way pre-peritoneal pelvic packing may be considered).
- d) Damage Control Resuscitation principles should guide the on-going resuscitative efforts.
- e) A negative FAST scan in a grade 4 or 5 hemodynamically unstable patient should focus consideration of haemorrhage outside the abdominal cavity. Repeating the FAST during the resuscitation should be performed and consideration that the haemorrhage may be retroperitoneal.
- f) In the blunt abdominal trauma patient with lesser degree of haemodynamic instability should be considered for CT scan with iv contrast. CT evaluation of the abdomen and pelvis in blunt trauma does not require the use of oral contrast. Free intra-abdominal fluid in the absence of identifiable solid organ injury should raise a concern for hollow viscus injury.
- g) Suspected or confirmed solid organ injuries (splenic, hepatic, renal, pancreatic injuries) should be managed according to their respective management algorithms and protocols.
- h) Patients with active contrast extravasation on abdominal CT should generally be promptly referred for angioembolization or surgery. A Damage Control Surgical approach (including therapeutic packing) should be considered dependent on patient physiological dynamics (haemodynamics, pH, lactate, temperature, clotting).
- i) Gross hematuria in a trauma patient mandates a further investigation of the genitourinary system (eg. retrograde urethrography, and CT cystoscopy) . Bladder perforation from pelvic fractures must be considered. Microscopic hematuria does not necessarily mandate performance of CT imaging.
- j) Limitations of serial abdominal physical examination in the assessment of a blunt abdominal trauma due to distracting injuries or obtunded responses due to drugs or alcohol must be recognized and may change thresholds for investigation and management.

- k) Changes on serial abdominal physical examination, decreasing hemoglobin, fever, persisting or worsening acidosis / lactate should prompt re-evaluation and further imaging / surgical exploration to find missed injuries (eg. mesenteric tear and bowel ischaemia).
- l) There is evidence that a normal-appearing CT may negate the need to admit a patient to the hospital for observation. In a select group of patients who sustain trivial trauma and in whom the physician has a low index of suspicion for injury, a negative ultrasound may be adequate basis to consider discharging a patient from the ER.

Blunt Abdominal Trauma Algorithm in patient with Instability Index 0-3



From: Practice Management Guidelines for the Evaluation of Blunt Abdominal Trauma: The EAST Practice Management Guidelines Work Group
 J Trauma. 2002;53:602-615.

3. Penetrating Abdominal Injury

- a. Haemodynamically unstable patients (Grade 4 /5) or who have diffuse abdominal tenderness after penetrating abdominal trauma should be taken emergently for laparotomy.
- b. Patients with an unreliable clinical examination (i.e., severe head injury, spinal cord injury, severe intoxication, or need for sedation or intubation) should be investigated & / or explored to determine if there is intraperitoneal injury.
- c. Other patients may be selected for initial non-operative management. In these patients:
 - i. A triple-contrast (oral, intravenous, and rectal contrast) abdominopelvic computed tomography (CT) should be strongly considered as a diagnostic tool to facilitate initial management decisions as this test can accurately predict the need for laparotomy.
 - ii. Serial examinations should be performed, as physical examination is reliable in detecting significant injuries after penetrating trauma to the abdomen. Patients requiring delayed laparotomy will develop abdominal signs.
 - iii. If signs of peritonitis develop, laparotomy should be performed.
 - iv. If there is an unexplained drop in blood pressure or haematocrit, further investigation is warranted.
- d. Most patients with penetrating abdominal trauma managed non-operatively may be considered for discharged after twenty-four hours of observation if a reliable abdominal examination is possible and minimal to no abdominal tenderness elicited.
 - i. Penetrating injury to the right upper quadrant of the abdomen with injury to the right lung, right diaphragm, and liver may be safely observed after CT scan, in the presence of stable haemodynamics, a reliable clinical examination and minimal abdominal tenderness.
 - ii. Exploration for all penetrating renal trauma is not necessary and may be undertaken selectively dependent on the renal injury sustained.
- e. In UK most commonly penetrating abdominal injury is a stab injury.
- f. The impact of management guidelines for penetrating injuries of the abdomen was reported (*British Journal of Surgery* 2008; **95**: 515–521). In 206 patients stabbing accounted for 96.4%, impalement 2.7 % and gunshot wound 0.9%. Laparotomy was performed in 48 patients (21.4 per cent), and was positive in 33 and unnecessary or negative in 15. Haemodynamic instability and peritonitis were strong indicators of positive laparotomy; seven of 13 laparotomies for evisceration alone were negative, as were two of four for retained foreign bodies.
- g. The same Instability index may be adopted as described above.
- h. Laparoscopy may have utility in assessment of abdominal stab injury. Main indications for laparoscopy are:
 - i. hemodynamically stable patients,
 - ii. thoraco-abdominal stab wounds,
 - iii. Anterior or flank stab wounds without obvious indications for laparotomy,

- iv. abdominal stab wounds with omental herniation
- i. The limitations of laparoscopy are diagnosing hollow viscus and retroperitoneal injuries
- j. Abdominal stab injury algorithm from : K. Taviloglu Scandinavian Journal of Surgery 91: 58–61, 2002

