

5. INTRA- ABDOMINAL INJURIES
B. Penetrating Abdominal Injuries

OBJECTIVE: To define the management protocol for penetrating injuries to the anterior abdomen, the flanks, the back, and the thoraco-abdominal regions.

DEFINITIONS: The anterior abdomen is the area defined superiorly by a line that traverses both nipples, inferiorly by the groin folds and laterally by the anterior axillary line on each side.

The flanks are the regions delimited superiorly by 6th ICS and inferiorly by the iliac crests between the anterior and posterior axillary lines.

The back is the area delimited by the tips of the scapula bilaterally, laterally by the posterior axillary lines and inferiorly by the gluteal folds.

Guidelines: The following guidelines are extracted from the EAST guidelines ¹.

All trans-abdominal GSWs regardless of the hemodynamic status of the patient should undergo laparotomy unless the trajectory of the bullet is considered to be tangential. In this case, the patient should undergo either a CT scan or laparoscopy to exclude the violation of the peritoneum.

Penetrating anterior abdominal injuries

- a. Patients who are hemodynamically unstable or with diffuse abdominal tenderness should undergo emergently laparotomy (Level 1). This applies to both SWs and GSWs.
- b. Patients with evisceration from SWs should undergo laparotomy² (Level 2).
- c. Patients hemodynamically stable with an unreliable clinical examination (i.e., brain injury, spinal cord injury, intoxication, or need for sedation or anesthesia) should undergo further diagnostic investigation to establish peritoneal penetration (Level 2).
- d. A routine laparotomy is not indicated in hemodynamically stable patients with abdominal SWs without signs of peritonitis or diffuse abdominal tenderness (away from the wounding site).
- e. Hemodynamically stable patients with tangential abdominal GSWs and no peritoneal signs should undergo either diagnostic laparoscopy or interval PEs for 24 hours, if evaluable.
- f. Serial PE is reliable in detecting significant injuries after penetrating trauma to the abdomen when performed by the same experienced clinicians (Level 2).
- g. In patients treated with NOM, CT of the ABD/Pelvis should be considered as a diagnostic tool to facilitate initial management. If there is peritoneal penetration and the patient can be assessed reliably by PE then he should be monitored for 24 hours. If not evaluable, the patient should have a diagnostic laparoscopy.

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- h. Stable patients with SWs to the anterior abdomen, who are cooperative, can undergo local wound exploration (LWE). If the anterior fascia has not been penetrated, the patient may be discharged from the ED. If the anterior fascia has been penetrated, the patient will undergo either 24 hours observation with q4h PE and serial CBC or diagnostic laparoscopy.
- i. The majority of patients with penetrating abdominal trauma with NOM may be discharged after 24 hours of observation in the presence of a reliable abdominal examination and minimal to no abdominal tenderness (Level 3).

Penetrating thoraco-abdominal injuries

The thoraco-abdominal region is the area delimited by a line that traverses the nipples superiorly, by the costal margins inferiorly and extends circumferentially to the back for 360 degrees.

- Unstable patients (SBP < 90 mmHg, base deficit > 6) and patients with peritonitis should undergo laparotomy.
- Hemodynamically stable patients without peritonitis with penetrating injuries to right thoracoabdominal region can be evaluated with CT scan to evaluate the liver. A small laceration to the right diaphragm does not need repair. An injury by either a stab wound or a gunshot wound limited to the liver can be treated with nonoperative management (Level 3).
- Hemodynamically stable patients without peritonitis with penetrating injuries to the left thoraco-abdominal region and hemothorax requiring tube thoracostomy should undergo thoracoscopy or laparoscopy to evaluate the diaphragm.
- Hemodynamically stable patients without peritonitis and a negative FAST should undergo DPL with a RBC count threshold of 5000/mm³. If the DPL is positive, they should undergo diagnostic laparoscopy in view of the high incidence of missed diaphragmatic injuries. If there is any injury, it can be repaired laparoscopically depending on your expertise.

Back or flank stab wounds

There are two available options for the evaluation and management of these patients:

1. Observation with serial abdominal examinations, serial CBC every 4 hours and vital signs measurement every 2 hours until discharge. The patient can be discharged after 24 hours of observation if there has not been any change in the physical examination, no increased pain and no drop in hemoglobin.
2. Evaluation of the patient with a triple contrast CT scan (oral, intravenous, and rectal contrast). If the CT scan is negative the patient may be discharged home. If the CT scan shows penetration into muscle or a retroperitoneal hematoma, not adjacent to a critical

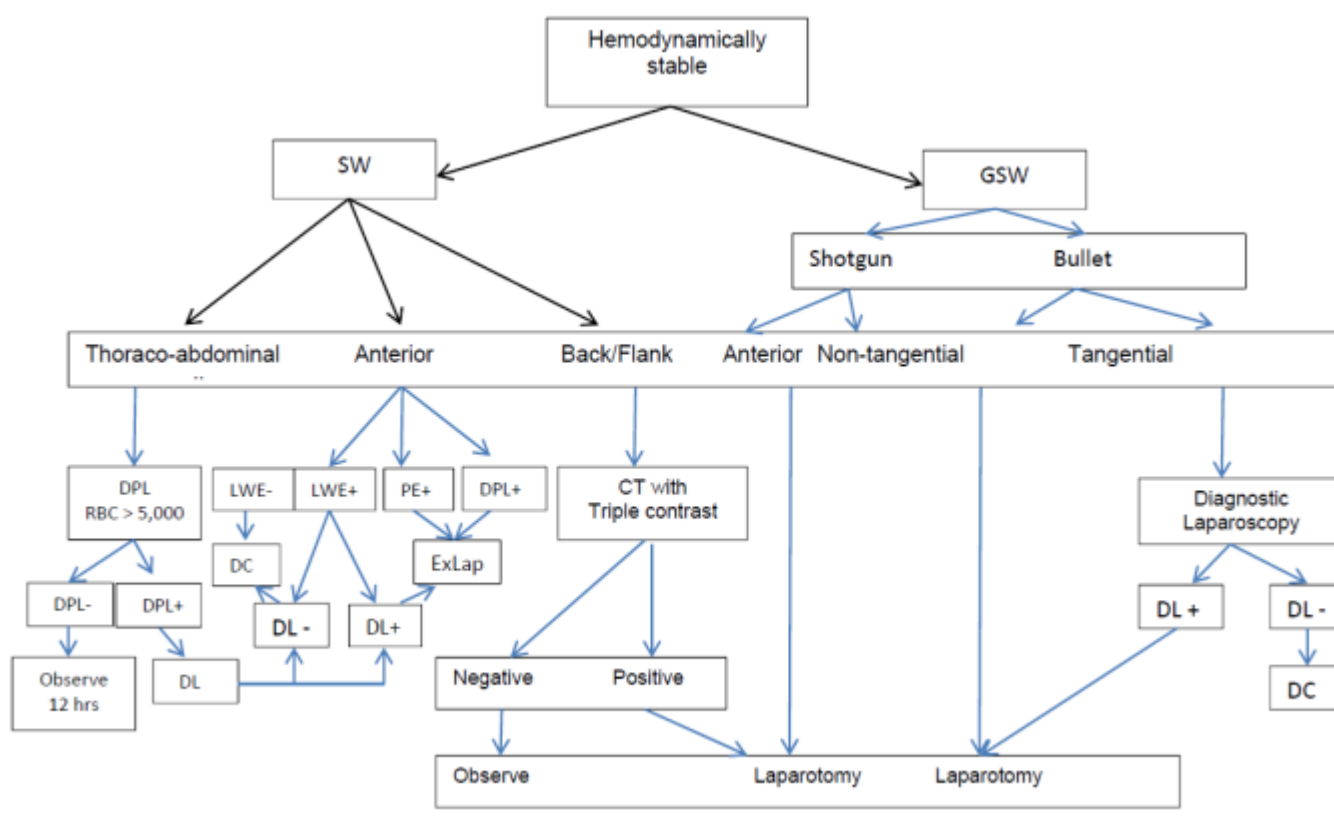
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structure, the patient can be admitted for observation for a period of 12-24 hours. If the patient presents with hematuria or if there is an injury to the kidney then delayed CT cuts (10 minutes) of the kidneys, ureters, and bladder should be obtained to exclude urinary extravasation.

If the CT scan shows contrast extravasation from the colon, hematoma adjacent to a major retroperitoneal vessel, free air in the retroperitoneum not attributable to the penetrating injury itself, then the patient should undergo a laparotomy.

If the CT scan shows free fluid into the abdominal cavity without solid organ injury, the patient should be evaluated further with laparoscopy or laparotomy. If there is evidence of solid organ injury alone, namely, spleen or liver, then depending on the trajectory and the potential for associated injuries and the extent of the hemoperitoneum, the patient can either be observed or undergo a laparotomy. Observation for this type of patients should occur in the intensive care unit.



References

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