

PRACTICE GUIDELINES: PENETRATING ABDOMINAL TRAUMA

OBJECTIVE:

Define suggested diagnostic and therapeutic guidelines for penetrating abdominal wounds. Specifically, these guidelines will help determine the presence of an intra-abdominal injury that may require exploratory laparotomy or laparoscopy.

DEFINITIONS:

Penetrating abdominal injury: Any penetrating injury that could have entered the peritoneal cavity or retroperitoneum inflicting damage on the abdominal contents. In general, the entry wounds for an abdominal injury extend from the fifth intercostal space to the perineum.

Anterior penetrating abdominal injury: An entry wound on the anterior abdomen or chest that could have penetrated into the peritoneal cavity. Usually these injuries occur anterior to the posterior axillary line.

Thoraco-abdominal penetrating abdominal injury: An entry wound below the fifth intercostal space and above the costal margin. These are wounds that could have initially entered the chest and then penetrated the diaphragm to enter the abdomen. These injuries are always associated with chest pathology (i.e., hemothorax, pneumothorax).

Posterior or flank penetrating abdominal injury: An entry wound posterior to the posterior axillary line. Wounds in this area are different in that the most likely organ to be injured will be in the retroperitoneum. Additionally, the large mass of flank and back muscle will make the diagnosis of organ injury more difficult and the possibility of organ injury less frequent.

GUIDELINES:

1. Follow the ABC's, and resuscitate patient according to findings of the primary survey.
2. Assess the abdomen looking for entry wounds, bleeding and peritoneal findings. Make sure that a good chest exam is performed, since chest injuries can be associated with penetrating abdominal injuries.
3. Determine if there are symptoms or signs suggestive of immediate need for operative intervention:
 - a. Herniated abdominal contents.
 - b. Massive bleeding from the wound.
 - c. Obvious peritoneal signs consistent with hollow viscous injury or hemoperitoneum.
 - d. Signs of hemodynamic instability associated with the abdominal injury.
 - e. Signs of lower extremity ischemia suggestive of vascular injury.
 - f. All gunshot wounds with path or other evidence of intraperitoneal penetration or retroperitoneal organ injury.
4. If any of the above signs are present, then take patient to the operating room immediately for exploratory laparotomy.

5. For stab wound and low velocity gunshot wounds (.22 and .25 caliber) in the right upper quadrant of the abdomen (in the area of the liver) consider using the "Right Upper Quadrant Penetrating Injury Protocol".
6. For stab wounds, if none of the above signs are present, determine the location of the wound and classify as:
 - a. Anterior.
 - b. Thoracoabdominal.
 - c. Posterior or flank.
7. If the stab wound is anterior:
 - a. Determine if the wound enters the peritoneal cavity by visually exploring the wound. This is done by infiltrating local anesthesia, after which the wound is prepped and draped. The wound is extended if necessary to allow a visual inspection of the wound to determine its depth. The liberal use of retractors and assistants will facilitate adequate wound exploration.
 - b. If the wound does not penetrate the anterior fascia, then the wound can be debrided, irrigated and closed. The patient may be discharged if no other injuries exist. If anterior fascia has been violated try and determine if there is peritoneal penetration
 - c. If the wound does penetrate the peritoneum, then laparotomy should be considered and will likely be performed at Upstate. If the patient has no evidence of peritoneal irritation, then a DPL may be performed. Prior to DPL, a Foley catheter and an NG tube should be placed. Laparotomy is indicated with gross hematuria or blood from NG tube. The threshold for a DPL in these circumstances is an RBC of $5000/\text{mm}^3$ and WBC of $500/\text{mm}^3$). Lavage fluid from the Foley catheter, NG tube or chest tube also mandates exploration. All patients with anterior fascia penetration who are not taken to the OR should be admitted for 24 hours of observation.
8. If the wound is thoraco-abdominal (remember there should be a chest injury – hemothorax, pneumothorax):
 - a. Obtain chest X-ray with wound markers to determine the presence of chest injury and to determine the relationship of the entry wound to the diaphragm.
 - b. If wound could possibly have penetrated the diaphragm, consider:
 - i. CT scan of the abdomen. This study will be positive if any fluid or air is in the abdominal cavity
 - ii. DPL with threshold for the RBC count of $5000/\text{mm}^3$.
 - iii. Diagnostic laparoscopy. If laparoscopy is performed, be prepared to insert a chest tube, as the insufflation gas may cause a tension pneumothorax through a hole in the diaphragm.
9. If the wound is posterior or flank:
 - a. Insert Foley catheter to determine the presence of hematuria.
 - b. Obtain a TRIPLE contrast CT scan to determine injury by retroperitoneal organs. Double contrast means contrast administered IV, by mouth or by NG tube and rectum. Consideration can be given to placing a skin clip onto the wound to help localize the injury.
10. For pelvic wounds (usually GSW) that may have traversed the rectum:
 - a. Perform anoscopy and sigmoidoscopy to determine the presence of a mucosal defect.

- b. Consider diversion and rectal washout if injury is found. Pre-sacral drainage should be used when contamination levels are high or there has been significant tissue destruction around the anus.
11. For "tangential" gunshot wound of abdomen
- a. Missile tract through subcutaneous tissue with no abdominal cavity entry.
 - i. Entry and exit wounds clearly identified
 - ii. No diffuse abdominal tenderness
 - b. Obtain CT scan, mark entry and exit wounds
 - c. If no evidence of abdominal cavity involvement (no fluid or air... none!!), then may observe
12. For all patients taken to OR for exploratory laparotomy:
- a. Once the decision to go the OR is made, don't delay!
 - b. Make sure that there is available blood in the blood bank.
 - c. Administer prophylactic antibiotics for bowel flora).
 - d. Prep widely for all contingencies (chin to knees, table to table).
 - e. Obtain a rapid one-shot IVP to determine the presence of bilateral kidneys if hematuria is present. Often this can be performed in the OR to avoid delay in initiating the laparotomy. Obtain KUB five minutes after injecting 1 ml per kg of renograffin or similar contrast agent. Alternatively an abdominal CT with IV contrast can be performed if patient stability and time allows.
 - f. After appropriate debridement and irrigation, consider primary closure of standard gunshot wounds