Chapter 264: Trauma to the Flank and Buttocks

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INTRODUCTION AND EPIDEMIOLOGY

The number of serious retroperitoneal, intraperitoneal, or vascular injuries that can occur, many of which require operative repair, complicates the evaluation of penetrating injuries to the flank or buttocks. Imaging assists in diagnosis and can direct selective conservative management. The choice of management, conservative or operative, is based on the emergency evaluation, making the emergency physician's input essential to a correct decision and a clinically successful outcome.

PENETRATING FLANK TRAUMA

PATHOPHYSIOLOGY

The flank is located between the anterior and posterior axillary lines, bordered superiorly by the sixth rib and inferiorly by the iliac crest. Although a penetrating wound to the flank can produce intraperitoneal injury with the associated findings of peritonitis or hemoperitoneum, it is possible that a penetrating flank injury could injure only the retroperitoneal organs. A solitary injury to the retroperitoneum from a penetrating flank injury may not induce peritoneal signs initially, and reliance on physical exam findings alone could lead to a delay in diagnosis, resulting in septic or hemorrhagic shock. Essentially any intra-abdominal organ is at risk for injury from a penetrating flank wound, and injuries to the kidney, ureter, bladder, liver, spleen, gallbladder, pancreas, colon, adrenal gland, diaphragm, stomach, duodenum, lung, esophagus, heart, and vascular structures have all been reported.[1,2,3,4]

The path of a gunshot or stab wound to the flank could track in any direction. Once inside the abdominal cavity, bullets may ricochet off the bony structures of the spine and produce a unique bullet path and injury pattern. The extent of injury caused by a projectile depends on its velocity, with higher-velocity objects causing more injury than lower-velocity objects, as well as on the construction of the projectile, which affects the movement of the object once inside the abdominal cavity. The greater the surface area interface, the greater is the tissue damage. Stabbing injuries are low velocity and induce injury through direct contact with tissue.[5]

CLINICAL FEATURES

Obtain information about the mechanism of injury, how much time has passed since the event, and the nature of the weapon. In the case of a gunshot wound, determine the nature of the gun (e.g., shotgun, handgun, BB gun) and the distance between the gun and the patient at the time of the gun's discharge. **For gunshot wounds, attempt to identify an exit wound and reconstruct the bullet path.** For stab wounds, determine the size of the weapon and, if possible, estimate a measure of the depth of penetration. Perform a rectal examination because the presence of red blood in the stool may indicate bowel injury. Note any blood around the urinary meatus or blood in a Foley catheter drainage that would suggest bladder or urethral injury.

DIAGNOSIS

Patients with penetrating flank trauma who are hemodynamically unstable or who have peritoneal signs require emergent laparotomy. Patients who are not taken emergently to the operating room require further evaluation to ascertain the extent of injury and to determine if the wound has penetrated the peritoneum and caused intraperitoneal organ injury. Evaluation of flank trauma represents challenges related to its unique anatomic position and potential for retroperitoneal injury with late manifestations. Few data exist on isolated penetrating flank trauma, and most of the recommendations for management come from studies of both flank and back trauma or flank and abdominal trauma.[6] Several diagnostic modalities exist to further evaluate penetrating flank trauma, each with some degree of limitation in its ability to exclude injury. Table 264-1 lists the diagnostic modalities available (see also chapter 263, "Abdominal Trauma"). Triple-contrast CT scan can detect the trajectory of the penetrating object and evaluate the retroperitoneum and is highly accurate in detecting injuries requiring laparotomy, but is less sensitive for the detection of injuries to the diaphragm or colon.[2,3,7,8] US has limited ability to detect hollow viscous or retroperitoneal injury and cannot be used alone in penetrating flank trauma to exclude occult injury.[9,10,11] Diagnostic peritoneal lavage can detect intraperitoneal penetration, but cannot evaluate the retroperitoneum, and has a high false-positive rate leading to nontherapeutic laparotomy. Local wound exploration has a false-positive rate of 14% to 45%.[7] Diagnostic laparoscopy is very sensitive for the detection of peritoneal violation and can help prevent the morbidity and mortality associated with unnecessary laparotomy.[11,12,13]

TABLE 264-1

Diagnostic Modalities for Evaluation of Flank Trauma

CT
Ultrasonography
Diagnostic peritoneal lavage
Local wound exploration
Laparoscopy

LABORATORY TESTING

Table 264-2 lists the baseline laboratory and imaging studies that should be obtained.

TABLE 264-2

Baseline Studies for Penetrating Flank or Buttock Trauma

Hematocrit
Type and screen
Chest radiograph
Urine pregnancy test (as appropriate)
Urinalysis

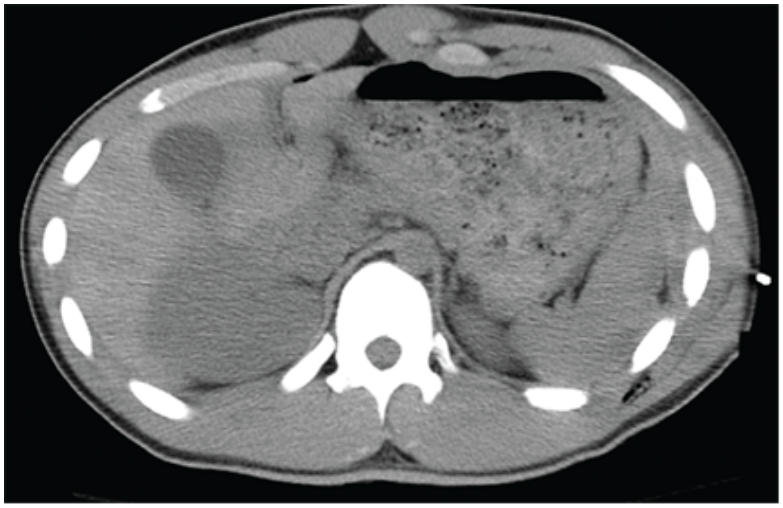
IMAGING

CT is the diagnostic modality of choice in hemodynamically stable patients with penetrating flank trauma.[2,3,6,7,14] Use double (PO and IV) contrast or triple (PO, IV, and PR) contrast; add rectal contrast if there is any likelihood of a rectal or sigmoid injury.[3,6,7] Fine cuts through the site of injury may be required (**Figures 264-1** and **264-2**). Free intraperitoneal fluid or air suggests peritoneal perforation. Bowel wall thickening with hematoma near the bowel or contrast extravasation from the bowel suggests bowel injury. The presence of a wound track near either the diaphragm or bowel mandates close scrutiny for injury to either of those organs.[3,6,15]

FIGURE 264-1.
IV contrast abdominal CT demonstrating a renal laceration from a stab wound. [Reproduced with permission from Block J, Jordanov MI, Stack LB, Thurman RJ (eds): *The Atlas of Emergency Radiology*. New York: McGraw-Hill, Inc.; 2013, Fig. 6-21.]

FIGURE 264-2.

Noncontrast abdominal CT demonstrating splenic hematoma after a stab wound.



TREATMENT AND DISPOSITION

Evaluate and resuscitate patients with penetrating trauma to the flank according to standard protocols (see chapter 254, "Trauma in Adults"). Following stabilization, try to find an exit wound and reconstruct the bullet path. Obtain emergent surgical consultation. Administer broad-spectrum IV antibiotics to cover for gram-negative aerobic and anaerobic organisms for peritonitis.

Exploratory laparotomy is indicated for patients who are hemodynamically unstable or who exhibit peritoneal signs after sustaining a gunshot wound to the flank. Historically, all patients with gunshot wounds to the flank underwent exploratory laparotomy, but a more conservative approach should be taken at trauma centers when penetrating wounds are found to be tangential and there are no peritoneal signs. In the case of high-velocity gunshot wounds, take into account the blast effect. Depending on the exact location and type of injury, consideration of the blast effect may lead to exploratory laparotomy if there is concern about bowel, bladder, or vascular integrity.

Patients with stab wounds to the flank who are hemodynamically stable and lack peritoneal signs or diffuse abdominal tenderness may be managed conservatively after triple-contrast CT scan or local wound exploration.[2,3,6,7,11,14] Patients with either gunshot or stab wounds who are managed nonoperatively will usually require admission to the hospital for observation and serial abdominal exams.

PENETRATING BUTTOCK TRAUMA

PATHOPHYSIOLOGY

The gluteal region extends from the iliac crest to the gluteal fold and is bordered by the greater trochanters. The gluteal region is divided into an upper zone and a lower zone by a line drawn at the level of the trochanters. Although any pelvic or intra-abdominal structure is susceptible to injury following a penetrating injury to the buttocks, the most common structures injured in a stab wound to the buttock are the rectum, superior gluteal artery, and iliac artery, and the most common structures injured in a gunshot

wound to the buttock are the small bowel, colon, rectum, bony pelvis, and bladder. Most of the major pelvic vascular structures, the sciatic nerve, ilium, sacrum, lower colon, upper rectum, bladder, and female reproductive organs reside in the upper zone, and penetrating wounds in the upper zone have a higher risk of major injury compared to wounds in the lower zone. The lower zone contains the male bladder, prostate, urethra, and external genitalia as well as the lower part of the rectum.[1,16,17,18] An important component of the history is information regarding the weapon used and the patient's position at the time of injury, because this information will help determine the trajectory of the bullet or knife.

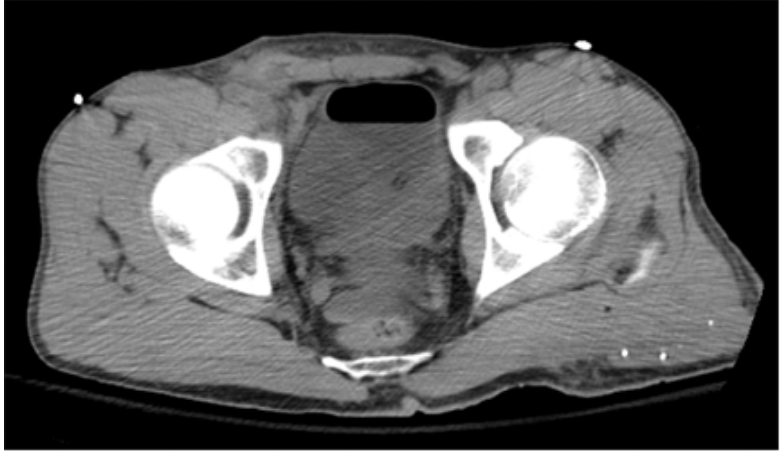
DIAGNOSIS AND TREATMENT

The evaluation of penetrating buttock wounds focuses on identification of potential injury to the lower GI and GU tract, as well as to pelvic vasculature. Perform a rectal examination to identify gross blood, and perform stool guaiac testing. Guaiac testing is not completely sensitive for GI injury; therefore, a negative guaiac test does not rule out rectal injury. Evaluate for the presence of hematuria. Assess the peripheral pulses in the lower extremities for decreased pulses or pallor as evidence of a more proximal injury. Perform a neurologic examination of the lower extremities searching for any injury to the sciatic or femoral nerve. Buttock wounds rarely cause direct damage to the sciatic plexus or femoral plexus. Injury could include transection, partial transection, or stretch injury secondary to the trauma. Table 264-2 lists the needed baseline laboratory and imaging studies.

Exploratory laparotomy is indicated for patients with hemodynamic instability or peritoneal signs. For peritonitis, obtain emergent surgical consultation and administer broad-spectrum IV antibiotics to cover for gram-negative aerobic and anaerobic organisms.

Patients with penetrating buttock injury who do not meet criteria for emergent laparotomy may be candidates for nonoperative management.[1] Selective nonoperative management uses a combination of serial exams and adjunctive modalities, including the focused assessment with sonography for trauma exam, CT, sigmoidoscopy, cystourethrogram, and angiography. Upper zone gluteal stab wounds can undergo local wound exploration to evaluate for muscle violation. Patients without muscle violation can be observed with serial exams, whereas those with muscle violation require CT and rigid sigmoidoscopy, plus cystography for hematuria.[19] Selective nonoperative management for lower zone gluteal stab wounds and all gluteal gunshot wounds is similar. CT scan, preferably with triple contrast, should be used to evaluate for injury in the stable patient (Figure 264-3). Obtain a cystourethrogram if there is blood on urinalysis or the wound is close to the GU tract. Perform a cystourethrogram either as a separate study or in conjunction with CT with rectal and IV contrast material, with clamping of the urethral catheter to obtain a CT cystogram.

FIGURE 264-3.
Noncontrast abdominopelvic CT scan after gunshot wound to the buttock. This CT scan shows bullet fragments in the gluteal muscles but no pelvic injury.



In most cases, sufficient diagnostic workup may be obtained with CT, but rigid sigmoidoscopy is advised if there is any concern about injury to the rectum or because of the trajectory of the bullet. If the CT demonstrates a pelvic hematoma, angiography or venography may be indicated to document a significant vascular injury; in many centers, CT angiography has replaced these techniques, but interventional angiography may be required for extensive pelvic bleeding.[1]

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