Chapter 7

CHEST AND ABDOMEN

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Penetrating Chest Trauma. Victim of an assault suffered multiple gunshot wounds to his right chest. (Photo contributor: Lawrence B. Stack, MD.)

TRAUMATIC ASPHYXIA

Clinical Summary

The clinical findings of traumatic asphyxia are due to a sudden increase in intrathoracic pressure against a closed glottis. The elevated pressure is transmitted to the veins, venules, and capillaries of the head, neck, extremities, and upper torso, resulting in capillary rupture. Strangulation and hanging are common mechanisms. Survivors demonstrate plethora, ecchymoses, petechiae, and subconjunctival and retinal hemorrhages. Severe injuries may produce central nervous system injury with blindness, seizures, posturing, and paraplegia.

Management and Disposition

Treatment is supportive, with attention to other concurrent injuries. Long-term morbidity is related to the associated injuries.

Pearls

1. Facial petechiae are known as Tardieu spots.
2. One should be alert for associated rib and vertebral fractures.
3. Perthes syndrome is traumatic asphyxia following thoracic crush injury.

FIGURE 7.1 ■ **Traumatic Asphyxia.** This 45-year-old man was pinned when the truck he was working under fell on his chest. He was unable to breathe for 3 to 4 minutes until his coworkers rescued him. The violaceous coloration of the shoulders, face, and upper chest is apparent. (Photo contributor: Stephen W. Corbett, MD.)

FIGURE 7.2 ■ **Traumatic Asphyxia.** A closer view showing the petechial nature of this rash. The patient was observed in the hospital overnight and recovered completely. (Photo contributor: Stephen W. Corbett, MD.)

FIGURE 7.3 ■ **Tardieu Spots.** Facial petechiae, also known as Tardieu spots, are seen in this child after an accidental strangulation injury. (Photo contributor: Lawrence B. Stack, MD.)

FIGURE 7.4 ■ **Subconjunctival Hemorrhages.** Bilateral subconjunctival hemorrhages are seen after an intentional strangulation injury. (Photo contributor: Lawrence B. Stack, MD.)

Clinical Summary

A flail chest occurs when multiple rib fractures allow a section of the thoracic cage to move independently. The negative inspiratory pressure created by the diaphragm is less effective since the flail segment paradoxically moves in, creating problems with adequate ventilation. Pulmonary contusion, hemothorax, pneumothorax, and great vessel injuries frequently accompany a flail chest.

Management and Disposition

Pain control and pulmonary toilet are initial standard therapy. Mechanical ventilation should be reserved for those with respiratory compromise, not simply as a mechanism to stabilize the flail segment. Treatment of underlying pulmonary injuries and intensive care unit admission are required for these critically ill patients.

Pearls

1. Intercostal nerve blocks may help provide adequate analgesia so that pain does not prevent the patient from ventilating adequately.
2. Continuous positive airway pressure (CPAP) with patient-controlled analgesia may be as effective as mechanical ventilation.
3. Paradoxical movement of the flail segment is seen during the respiratory cycle in flail chest. As the rib cage expands with inspiration, the flail segment sinks into the chest. As it contracts in expiration, it balloons outward.

FIGURE 7.5 ■ **Flail Chest.** Localized blunt trauma to the left anterior chest 4 cm inferior to the midclavicle, with resultant flail segment. Positive intrathoracic pressure (**A**) and negative intrathoracic pressure (**B**) demonstrate the paradoxical movement of the flail segment. (Photo contributor: Lawrence B. Stack, MD.)

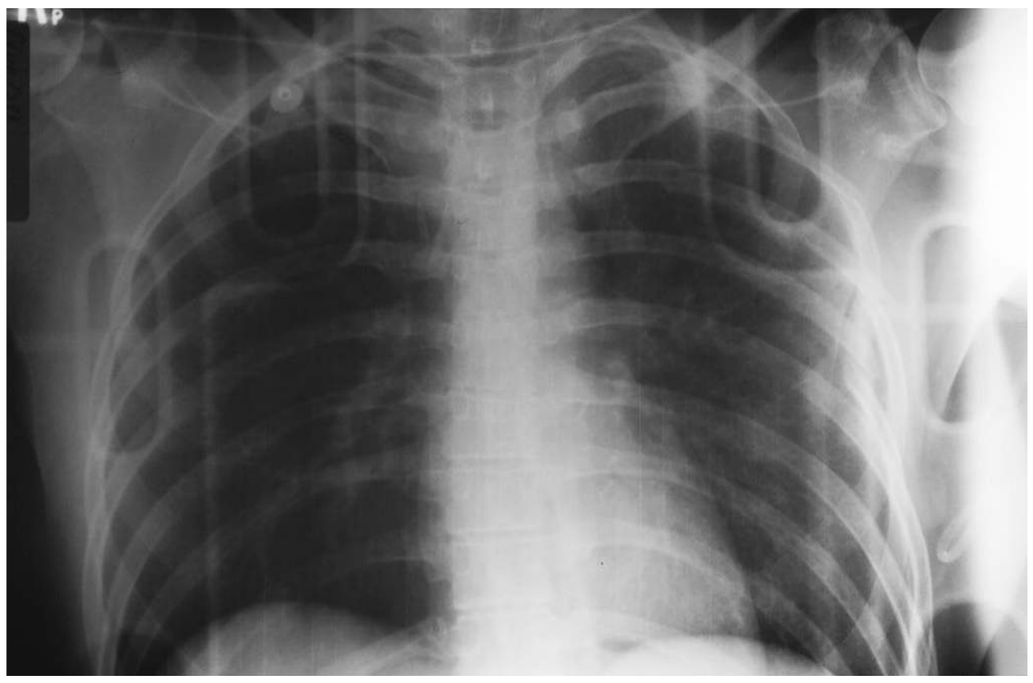


FIGURE 7.6 ■ **Flail Chest: Trauma Chest X-Ray.** Fractures in two places of left ribs 3 and 4 result in a flail segment. Ribs 2 and 5 have single fractures. This is the chest x-ray of the patient in Fig. 7.5. (Photo contributor: Lawrence B. Stack, MD.)

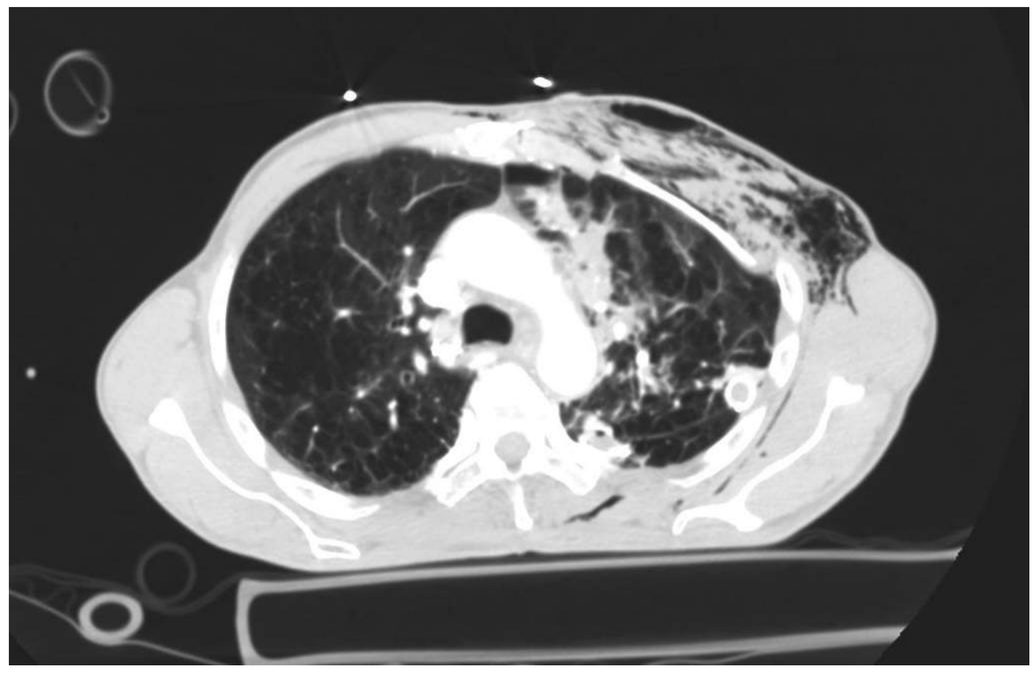


FIGURE 7.7 ■ **Flail Chest: Chest CT Scan.** A flail segment is seen of the left anterior chest on an axial cut of this chest CT scan. A chest tube is seen in the left pleural space. Subcutaneous emphysema is seen in the area of the fractures and tracking posteriorly. This is the chest CT of the patient in Fig. 7.5. (Photo contributor: Lawrence B. Stack, MD.)

STERNOCLAVICULAR DISLOCATION

Clinical Summary

Dislocations of the sternoclavicular joint (SCJ) are uncommon due to the strength of the supporting ligaments. Anterior dislocations are nine times more frequent than posterior dislocations. Posterior dislocations are clinically more important due to the potential for injury to underlying structures. SCJ dislocations typically occur from motor vehicle crashes and sports injuries. Examination findings of an anterior SCJ dislocation include tenderness and prominence of the proximal clavicle from the sternum. The arm is often held in adduction. Posterior SCJ dislocations may be more difficult to identify, as frequently they are associated with multiple injures. Pain and depression of the medial clavicle relative to the sternum may be seen. Superior and inferior dislocations may also be seen. CT scan through the SCJ is the best diagnostic study to evaluate this injury.

Management and Disposition

Orthopedic follow-up is required. Closed reduction of anterior SCJ dislocations is performed by placing the patient supine with a sandbag between their shoulders and placing downward pressure directly over the clavicle. A figure-of-eight clavicle harness is applied. Recurrence is common. Closed reduction of posterior SCJ dislocations may be attempted by an orthopedic surgeon by placing a towel clip around the medial clavicle and pulling the clavicle forward. Open reduction is often necessary.

Pearls

1. While typically it requires a tremendous force to cause an SCJ dislocation, spontaneous dislocations have been reported.
2. In the apical lordotic radiograph (serendipity view), the clavicular head will be higher than the unaffected side in anterior and lower than the unaffected side in posterior dislocations.
3. One-fourth of posterior SCJ dislocations result in mediastinal injury; they always require reduction.

FIGURE 7.8 ■ **Sternoclavicular Dislocation.** A 43-year-old man complains of left sternoclavicular pain after direct trauma to the shoulder. Prominent proximal clavicle is seen prompting CT scan confirmation. (Photo contributor: R. Jason Thurman, MD.)

Clinical Summary

Clavicle fractures are common and are classified by location into proximal, middle, and distal thirds. Most clavicle fractures occur in the middle third. Point tenderness and contusion typically overly the fracture site. Deformity is often seen. Proximal fractures are least common and require significant force, and, therefore, they may have underlying life-threatening mediastinal injuries. Displaced distal clavicle fractures suggest injury to the coracoclavicular and acromioclavicular (AC) ligaments requiring orthopedic follow-up.

Management and Disposition

Most clavicle fractures are identified on an AP view of the shoulder. A 45-degree AP cephalad view maybe helpful if AP films are normal and suspicion is high for fracture. A contrast-enhanced chest CT should be performed if a proximal fracture is identified, looking for mediastinal injuries. Nonoperative management using a simple sling, analgesics, and ice is adequate for most injuries. Orthopedic consultation is indicated for any medial fracture, tenting of the skin, fractures with 100% displacement, severely comminuted, and for displaced distal third fractures.

Pearls

1. Tenting requires closed reduction or surgical repair.
2. Stress radiographs (weighted views) help differentiate minimally or nondisplaced distal third fractures from an AC joint separation.
3. Glenoid neck fracture plus a clavicle fracture represents a "floating" shoulder and requires urgent orthopedic consultation.
4. Sixty percent of childhood clavicular fractures are nondisplaced.

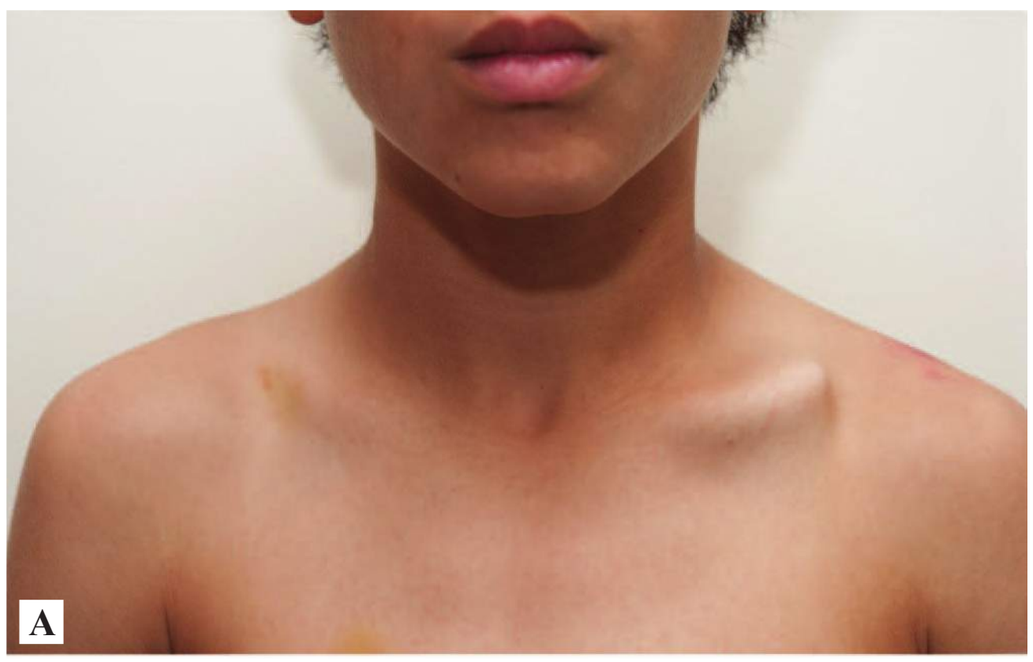


FIGURE 7.9 ■ **Clavicle Fracture.** This 12-year-old boy complains of pain, tenderness, and deformity over the mid left clavicle after an injury incurred during football drills. A "kick-stand" injury is seen on plain films (see Fig. 7.11). Fracture, though overriding, healed without reduction. (Photo contributor: Lawrence B. Stack, MD.)

FIGURE 7.10 ■ **Clavicle Fracture Radiograph.** Left mid clavicle fracture with 100% displacement and overriding fragments. A "kick-stand" injury is seen. Fracture, though overriding, healed without complication. (Photo contributor: Lawrence B. Stack, MD.)

FIGURE 7.11. ■ **Clavicle Fracture with Skin Tenting.** A 30-year-old unrestrained woman in a motor vehicle crash (MVC) complains of left clavicle pain. Skin tenting is seen. Closed reduction was required to avoid skin ischemia. (Photo contributor: R. Jason Thurman, MD.)

TENSION PNEUMOTHORAX WITH NEEDLE THORACENTESIS

Clinical Summary

A tension pneumothorax results when air enters but does not exit the pleural space. Air in the pleural space accumulates and compresses the ipsilateral lung and vena cava, with a rapid decrease in cardiac output. The contralateral lung may suffer ventilation/perfusion mismatch. Subcutaneous air, tracheal deviation, jugulovenous distention (JVD), and diminished or hyperresonant ipsilateral breath sounds can be clues. Subcutaneous emphysema may be visible on the neck and chest radiographs and is easily diagnosed by palpation. The released air from a tension pneumothorax can be heard escaping from a needle thoracostomy.

Management and Disposition

Treatment requires rapid recognition of the tension pneumothorax, frequently without benefit of chest radiographs. A 14-gauge or larger needle should be placed over the superior rib surface of the second interspace in the midclavicular line. A rush of air with improvement of vital signs confirms the diagnosis. If there is no immediate improvement, do not hesitate to place a second needle in the next interspace. A chest tube should be placed immediately.

Pearls

1. Do not overventilate patients with obstructive pulmonary disease. "Stacking" breaths trap air in the lungs and predispose to bleb rupture and pneumothorax. The pathophysiology of this disease requires a prolonged expiratory phase.
2. The diagnosis of a tension pneumothorax should be made clinically and treated immediately with needle thoracostomy and tube thoracostomy.
3. Tension pneumothorax may be a consequence of positive pressure ventilation in patients with undetected pneumothorax and a persistent air leak such as bronchopleural fistula.
4. Tension pneumothorax is a treatable cause of pulseless electrical activity (PEA).

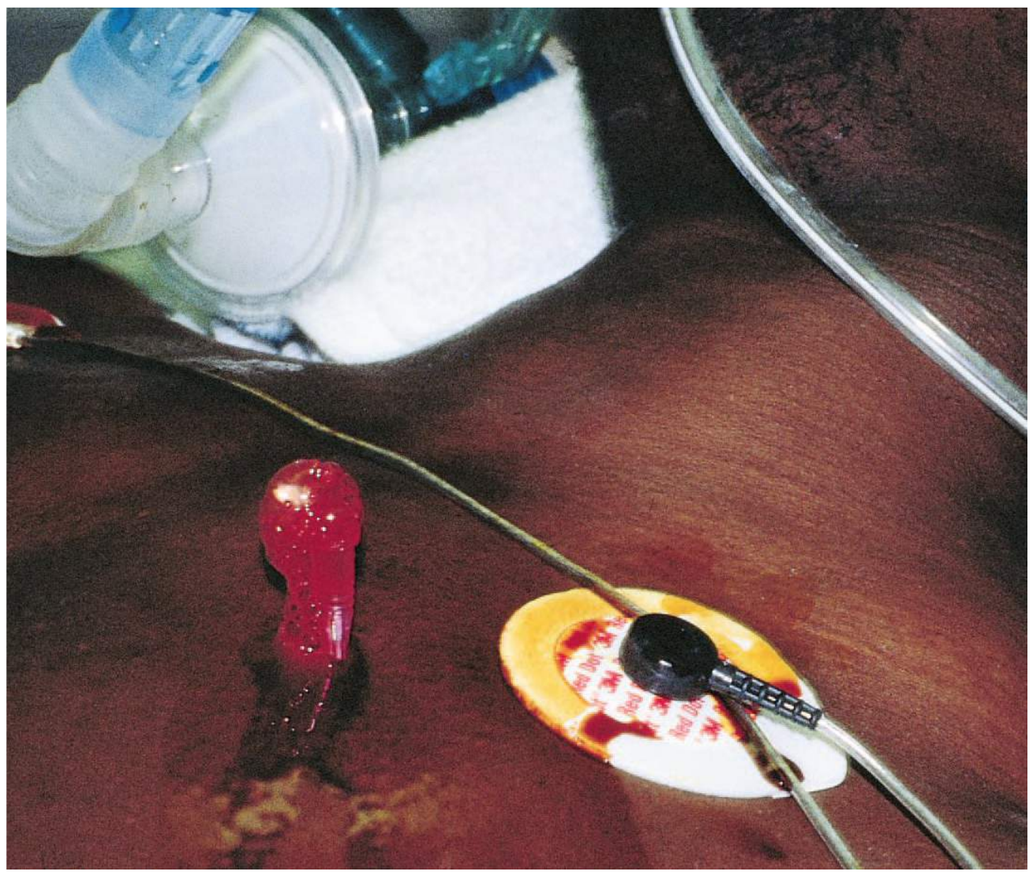


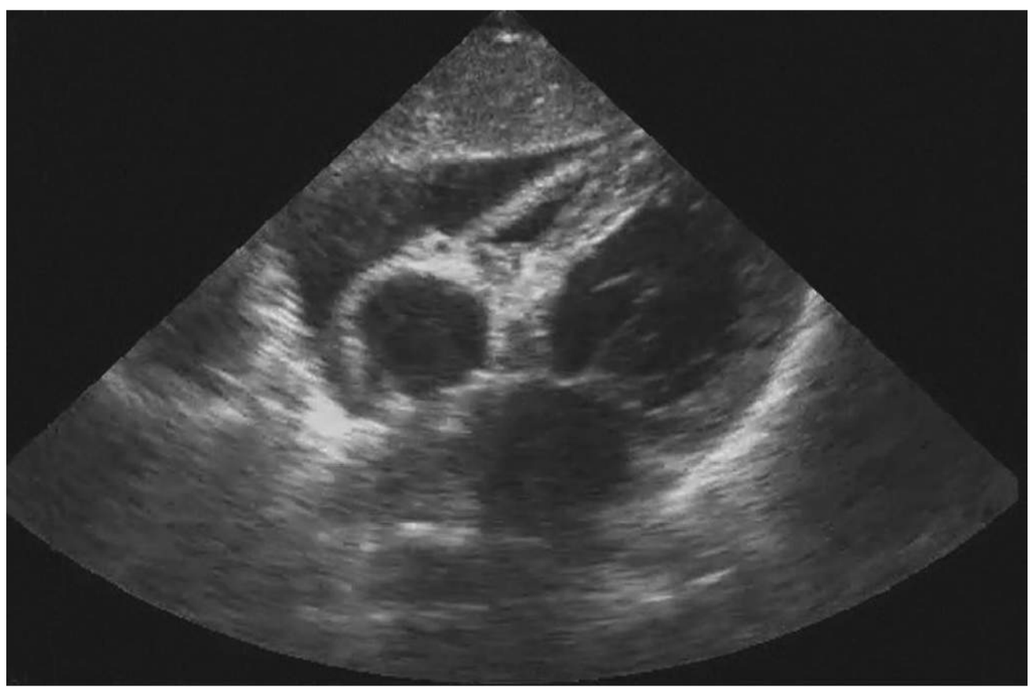
FIGURE 7.12 ■ **Tension Pneumothorax.** A 35-year-old man with severe asthma suffered respiratory arrest during transport by ambulance. He was intubated on arrival but soon became hard to ventilate and developed subcutaneous emphysema followed by hypotension. Needle thoracostomy produced a rush of air and bubbling from the needle with stabilization of vital signs. (Photo contributor: Stephen W. Corbett, MD.)

FIGURE 7.13 ■ **Deep Sulcus Sign.** Deepening of the left costophrenic angle is seen. Left to right mediastinal shift is also present. (Photo contributor: Lawrence B. Stack, MD.)

CARDIAC TAMPONADE WITH PERICARDIOCENTESIS

Clinical Summary

Beck's triad of acute cardiac tamponade includes JVD from an elevated central venous pressure (CVP), hypotension, and muffled heart sounds but is present only 10% to 40% of the time. JVD may not be seen in hypovolemic states such as trauma. The simultaneous appearance of all three physical signs is a late manifestation of tamponade and usually seen just prior to cardiac arrest. Symptoms include shortness of breath, orthopnea, dyspnea on exertion, syncope, and symptoms of inadequate perfusion. Causes include trauma (especially penetration wounds), malignancy, hypothyroidism, uremia, myocardial or aortic rupture, and pericarditis. Rapid filling of the pericardial sac (50-100 mL) is more likely to cause compromise.



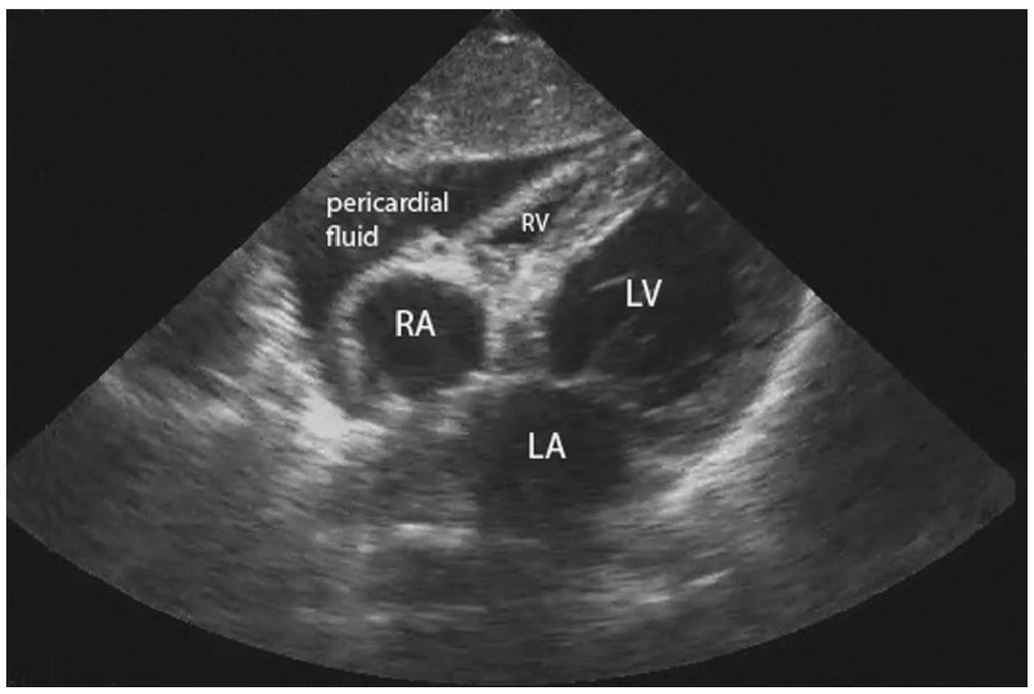


FIGURE 7.14 ■ **Ultrasound of Cardiac Tamponade.** This subxiphoid view of the heart reveals a large pericardial fluid collection and compression of the right ventricle (RV) suggesting tamponade physiology. (Photo contributor: Department of Emergency Medicine, Ultrasound Section, Vanderbilt University.)

Management and Disposition

The clinical diagnosis of tamponade requires suspicion and a careful evaluation of the signs and, when available, imaging techniques. Bedside ultrasonography provides rapid diagnosis and facilitates pericardiocentesis. Goals of emergency department (ED) pericardiocentesis include identification of pericardial effusion and removal of blood or other fluid from the pericardial space to relieve the tamponade.

Pearls

1. Electrical alternans seen on a 12-lead electrocardiography (ECG) suggests pericardial effusion.
2. Cardiac tamponade may cause a narrow pulse pressure, pulsus paradoxus (loss of palpable pulses on inspiration), and low-voltage ECG.
3. Ultrasonographic identification of pericardial fluid in patients with penetration chest trauma may lead to life-saving pericardiocentesis or thoracotomy.
4. Cardiac tamponade is a treatable cause of PEA.

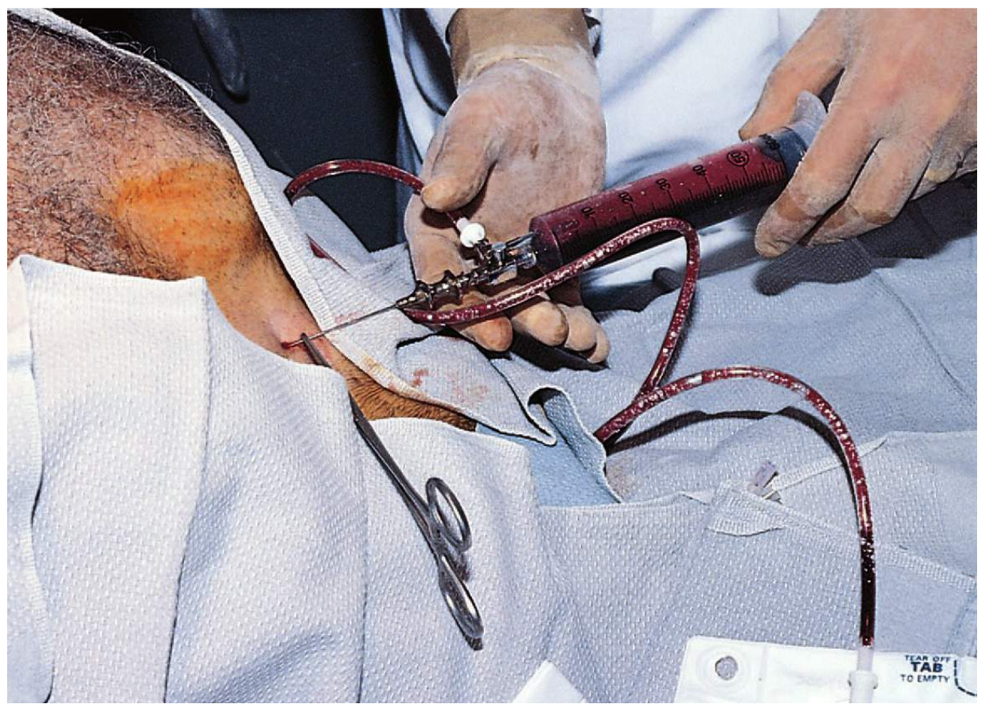


FIGURE 7.15 ■ **Emergency Department Pericardiocentesis.** A positive pericardiocentesis in a patient with a sudden onset of shortness of breath and electrical alternans. (Photo contributor: Lawrence B. Stack, MD.)

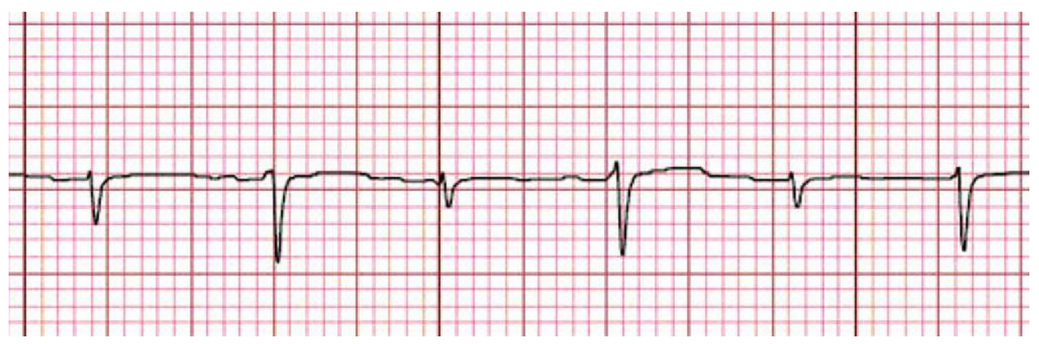


FIGURE 7.16 ■ **Electrical Alternans.** Lead V4 demonstrates a beat-to-beat change in axis, diagnostic of electrical alternans, suggesting pericardial effusion. Low voltage may also be a clue for pericardial effusion. (Photo contributor: R. Jason Thurman, MD.)

Clinical Summary

ED thoracotomy is a resuscitative procedure performed in patients with penetrating chest trauma, who have lost signs of life in the presence of prehospital or ED personnel. Thoracotomy in the ED has specific goals once the chest is opened: relief of cardiac tamponade, support of cardiac function (internal cardiac compressions, cross-clamping the aorta to improve coronary perfusion, and internal defibrillation), and control of hemorrhage from the heart, pulmonary vessels, thoracic wall, and great vessels.

Management and Disposition

Patients with penetrating thoracic trauma who lose their vital signs on arrival or have unstable vital signs despite resuscitation should receive an immediate thoracotomy in the ED. Survival rates following ED thoracotomy for penetrating trauma are 9%; stab wounds fare much better than gunshot wounds. Patients with blunt trauma who lose their vital signs en route to the ED should not undergo an ED thoracotomy, since they rarely survive. Surgical support should be obtained as soon as possible.

Pearls

1. Injuries potentially responsive to ED thoracotomy include cardiac tamponade, pulmonary parenchymal and tracheobronchial injuries, large-vessel injuries, air embolism, and penetrating heart injuries.
2. ED thoracotomy should be performed immediately once the indications have been met, since the likelihood of survival is greater when this is performed earlier in the resuscitation.
3. Stab wounds and measurable ED vital signs are the best predictors of survival.

FIGURE 7.17 ■ **Emergency Department Thoracotomy.** An unsuccessful resuscitative emergency department thoracotomy with pericardiotomy in a patient with penetrating chest trauma who lost signs of life in the field after the paramedics arrived at the scene. (Photo contributor: Lawrence B. Stack, MD.)

SEAT BELT INJURY

Clinical Summary

Two- and three-point seat belt restraints have reduced mortality and the severity of trauma due to motor vehicle crashes; however, they occasionally produce injury. Lap/shoulder belts are known to produce abdominal (most common), thoracic, and spinal injuries. The "seat belt sign," abrasions or ecchymoses to the neck, chest, and abdomen in the pattern of the belt, occurs in less than 20% of patients, but is associated with a four-fold risk of intrathoracic and an eight-fold risk of intra-abdominal injury.

Management and Disposition

Patients with a mechanism for significant trauma or with other injuries requiring admission need to undergo a careful search for related injures. Patients discharged home from the ED should be given appropriate precautions to monitor for a delayed injury presentation.

FIGURE 7.18 ■ **Seat Belt Injury.** Ecchymosis from the lap belt is evident. A subtle Destot's sign, which is inguinal or perineal ecchymosis, in a patient with a pelvis fracture. (Photo contributor: R. Jason Thurman, MD.)

Pearls

1. Up to 36% of those with a seat belt sign have an abdominal injury requiring laparotomy.
2. Lap-belt-only passengers are more likely to have Chance fractures and small bowel injury if they have an abdominal seat belt abrasion after a motor vehicle crash.

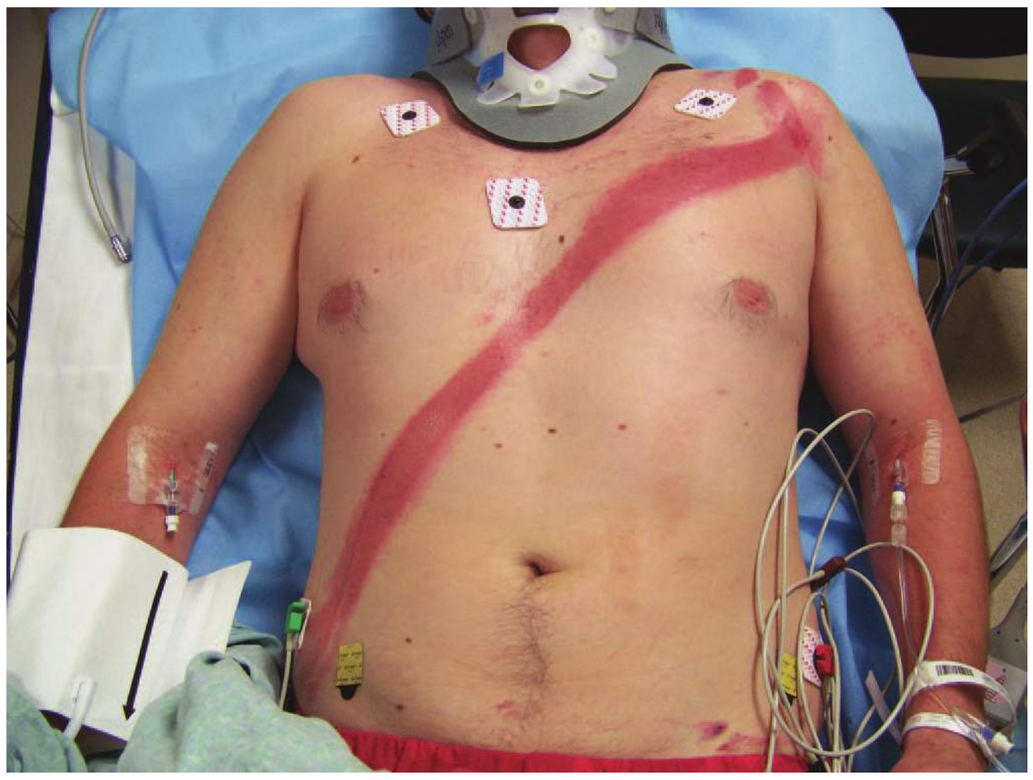


FIGURE 7.19 ■ **Seat Belt Injury.** Abrasions from a three-point restraint causing rib fractures and a pneumothorax. (Photo contributor: Brad Russell, MD.)

FIGURE 7.20 ■ **Seat Belt Injury.** Neck abrasions from a three-point restraint in a patient involved in a head-on motor vehicle crash. (Photo contributor: David Effron, MD.)

Clinical Summary

Bluish to purplish periumbilical discoloration (Cullen sign) and flank discoloration (Grey Turner sign) represent retroperitoneal hemorrhage that has dissected through fascial planes to the skin. Retroperitoneal blood may also extravasate into the perineum, causing a scrotal hematoma or inguinal mass. This hemorrhage may represent a hemodynamically significant bleed.

Cullen sign and Grey Turner sign are most frequently associated with hemorrhagic pancreatitis and are seen in 1% to 2% of cases, and typically are seen 2 to 3 days after onset. These signs may also be seen in ruptured ectopic pregnancy, severe trauma, leaking or ruptured abdominal aortic aneurysm, coagulopathy, or any other condition associated with bleeding into the retroperitoneum.

Management and Disposition

Treatment of patients with Grey Turner sign or Cullen sign depends on the etiology. Because the hemorrhage may represent a hemodynamically significant bleed, cardiovascular stabilization after airway stabilization is of the utmost importance. Once the patient has been stabilized, the source of bleeding can be elicited by selected laboratory tests (complete blood cell count, amylase, lipase, human chorionic gonadotropin, and diagnostic studies [ultrasound, computed tomography]). Because of the severity of diseases associated with Grey Turner and Cullen signs, these patients are usually admitted to the hospital.

Pearls

1. Mortality rate in patients with Cullen or Grey Turner sign may be as high as 37%.
2. These signs are typically seen 2 to 3 days after the acute event.
3. These signs are seen in only 1% to 2% of patients with hemorrhagic pancreatitis.

FIGURE 7.21 ■ **Grey Turner and Cullen Signs.** This patient displays both flank and periumbilical ecchymoses characteristic of Grey Turner and Cullen signs. (Photo contributor: Michael Ritter, MD.)

FIGURE 7.22 ■ **Grey Turner Sign.** A 68-year-old man with flank ecchymosis due to hemorrhagic pancreatitis. (Photo contributor: Stephen W. Corbett, MD.)

IMPALED FOREIGN BODY

Clinical Summary

Stab wounds cause injury to tissue in their path. Stab wounds to the chest, in addition to causing pneumothorax or hemothorax, may also cause life-threatening injuries to the heart and major blood vessels. One quarter of anterior stab wounds do not penetrate the peritoneum. Half of those that do penetrate require no surgical repair. For these reasons, local exploration, diagnostic peritoneal lavage (DPL), focused assessment with sonography for trauma (FAST), and serial examinations are often used as a management strategy. Penetrating flanks may be evaluated with triple-contrast computed tomography (CT). The size of the external wound frequently underestimates the internal injury. Impaled foreign bodies to the chest or abdomen pose a complex problem. The object inflicting the injury may also be preventing significant blood loss and therefore should be removed by the trauma surgeon in the operating room.

Management and Disposition

Initial stabilization of the patient (intravenous fluid resuscitation, oxygen, and monitoring), obtaining appropriate laboratory studies including blood type and cross-matching, and resource mobilization (trauma team) are important steps in the initial management of penetrating chest or abdominal trauma. Prior to surgical evaluation, stabilization of the impaled foreign object should be performed to prevent further injury.

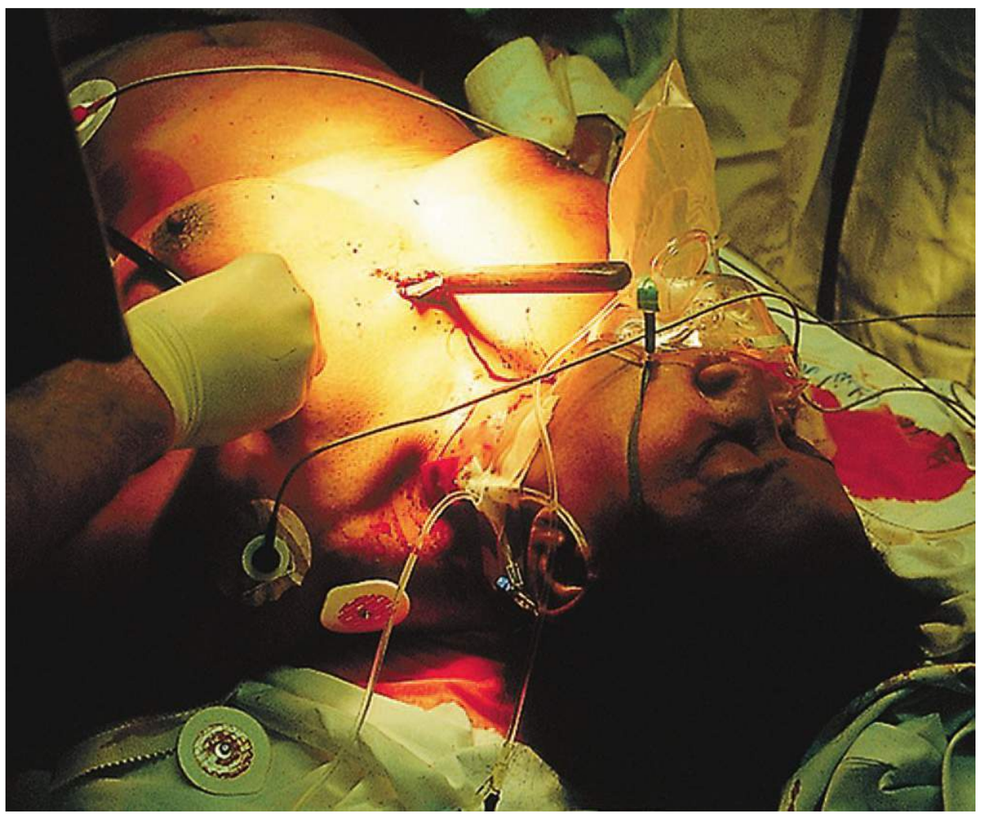


FIGURE 7.23 ■ **Impaled Chest Wound.** This patient was stabbed in the chest with a butcher knife in a family dispute. The knife was stabilized by EMS providers at the scene and removed in the operating room. Injury was isolated to the right atrium. (Photo contributor: Kevin J. Knoop, MD, MS.)

Pearl

1. Impaled chest or abdominal foreign bodies should be removed only by a trauma surgeon in a controlled setting.

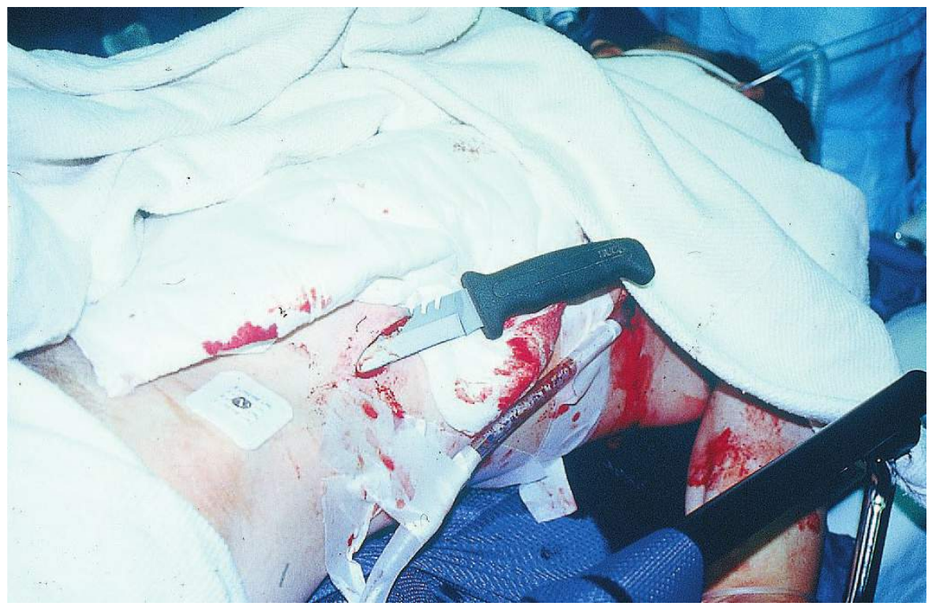


FIGURE 7.24 ■ **Impaled Abdominal Foreign Body.** Impaled knife to the left abdomen after a domestic argument. (Photo contributor: Ian D. Jones, MD.)

FIGURE 7.25 ■ **Impaled Nail in the Abdomen.** Impaled 16-penny nail to the right abdomen after an accidental discharge from a pneumatic nail driver. The nail penetrated the peritoneal cavity, but did not injure any organ. (Photo contributor: Lawrence B. Stack, MD.)

FIGURE 7.26 ■ **Impaled Chest Foreign Body.** Impaled car window frame to the left chest causing rib fractures and a pulmonary laceration. (Photo contributor: R. Jason Thurman, MD.)

ABDOMINAL EVISCERATION

Clinical Summary

Evisceration of abdominal contents usually occurs after a stab or slash wound to the abdomen. It is an indication for laparotomy. Other indications for laparotomy in penetrating abdominal trauma include unexplained shock and evidence of blood in the stomach, bladder, or rectum.

Consideration of the anatomic boundaries of the abdomen is important in differentiating abdominal injuries from penetrating chest or retroperitoneal injuries.

Management and Disposition

Initial stabilization (intravenous fluid resuscitation, oxygen, and monitoring), obtaining appropriate laboratory studies including a blood type and cross-matching, and resource mobilization (notifying surgical team, operating room, and anesthesiology) are important steps in the initial management of penetrating abdominal trauma. Eviscerated bowel should be covered with saline-soaked gauze. Antibiotics with enteric coverage should be provided.

Pearls

1. Evisceration, unexplained shock, or blood in the stomach, bladder, or rectum is an indication for laparotomy.
2. Selected patients with stab wounds to the abdomen and peritoneal penetration may be conservatively observed for delayed complications. Some centers are using a nonoperative approach for patients with gunshot wounds to the abdomen as well.
3. As many as 25% of patients with stab wounds to the abdomen can be discharged from the ED based on a negative wound exploration.
4. Although striking, evisceration should not distract the provider from the ABCs of a thorough resuscitation.

FIGURE 7.27 ■ **Abdominal Evisceration.** Self-induced evisceration with bowel perforation and spillage of food particles is clearly seen in this photograph. This patient went directly to the operating room. (Photo contributor: Lawrence B. Stack, MD.)

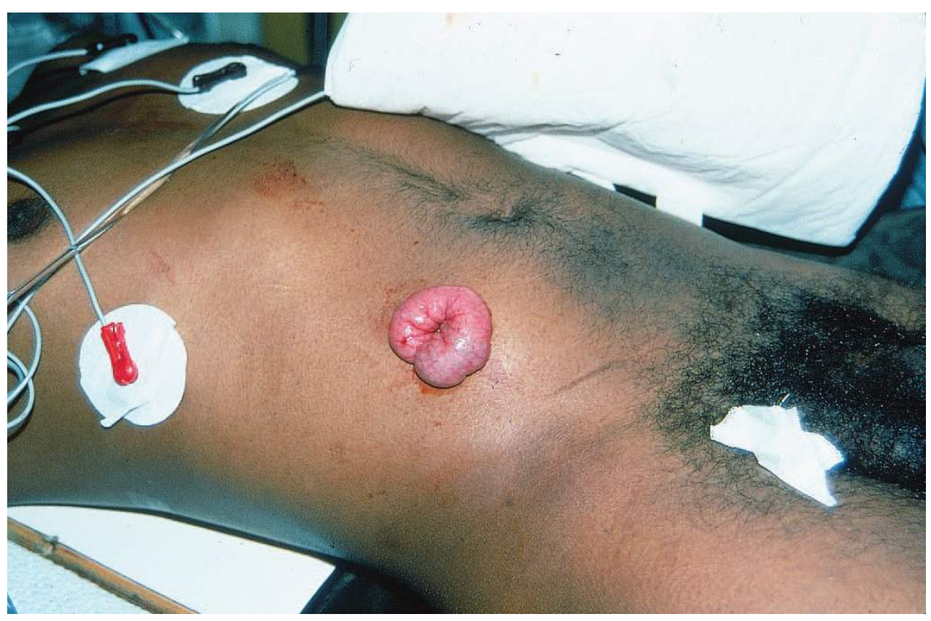


FIGURE 7.28 ■ **Abdominal Evisceration.** Evisceration of small bowel after assault and stab wound to the right lower abdomen. (Photo contributor: Frank Birinyi, MD.)

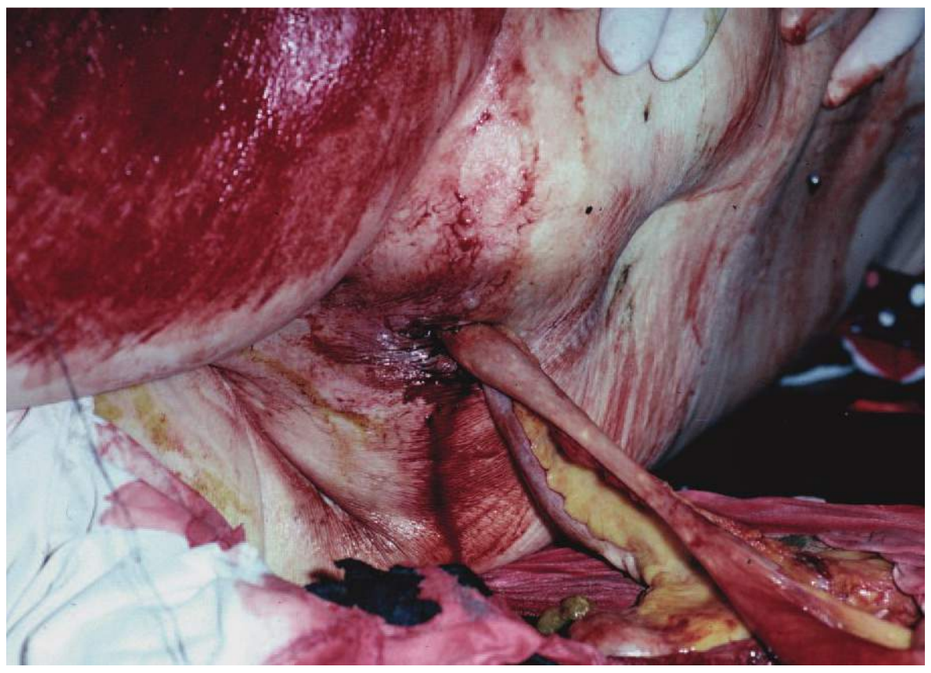


FIGURE 7.29 ■ **Bowel Evisceration through the Anus.** High-energy blunt abdominal trauma to this elderly man resulted in evisceration of small bowel and omentum through his anus. (Photo contributor: Alan B. Storrow, MD.)

TRAUMATIC ABDOMINAL HERNIA

Clinical Summary

Blunt traumatic abdominal hernia is defined as herniation through disrupted musculature and fascia associated with adequate trauma, without skin penetration, and no evidence of a prior hernial defect at the site of injury. This occurs when a considerable blunt force is distributed over a surface area large enough to prevent skin penetration but small enough to cause a focal defect in the underlying fascia or muscle wall. Most of these injuries are due to seat belt injuries in motor vehicle crashes; handlebar injuries are the second most common cause. Up to 44% of these patients require bowel resection.

CT of the abdomen and pelvis with intravenous contrast is the preferred diagnostic study for the evaluation of a traumatic abdominal hernia. Ultrasound may play a limited role in the diagnosis of abdominal wall hernia.

Management and Disposition

Identification and treatment of life-threatening associated injuries take priority over the hernia. The hernial defect should be repaired after the patient has been stabilized.

Pearls

1. Abdominal hernia due to blunt trauma is a rare injury, most frequently due to seat belt injuries in motor vehicle crashes.
2. CT scan is the preferred diagnostic study for abdominal wall hernias.

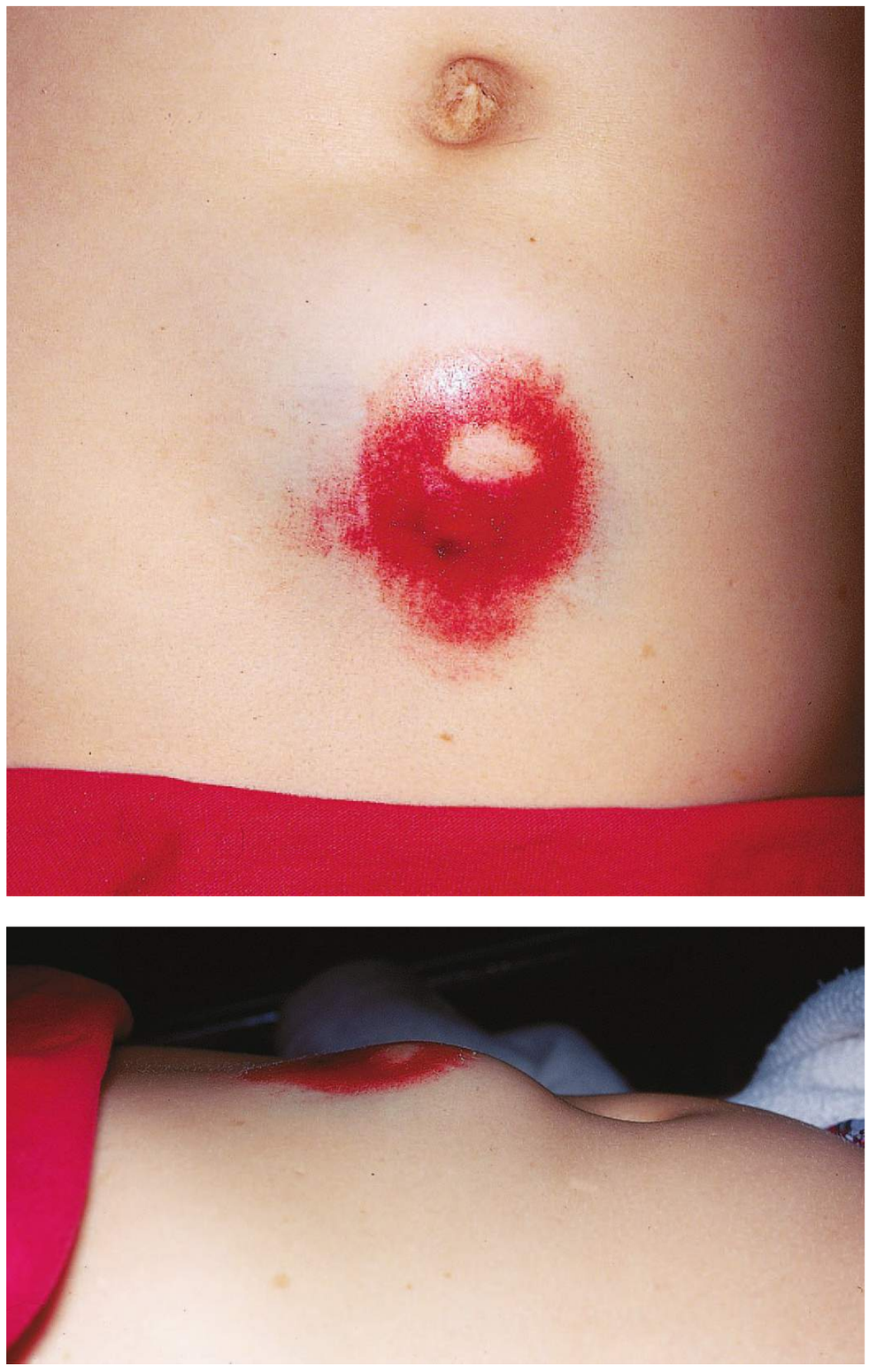


FIGURE 7.30 ■ **Traumatic Abdominal Wall Hernia.** This 5-year-old boy suffered a traumatic hernia from a handlebar injury. (Photo contributor: Lawrence B. Stack, MD.)

FIGURE 7.31 ■ **CT Scan, Abdominal Wall Hernia.** Abdominal contents are seen extruding through a fascial defect. (Photo contributor: Lawrence B. Stack, MD.)

Clinical Summary

Pelvic fractures are most often the result of motor vehicle crashes or falls and are fraught with complications. The pelvis should be regarded as a ring; identification of one fracture or dislocation should prompt surveillance for another. Trauma to the genitourinary (GU) tract is suggested by blood at the urethral meatus, a high-riding prostate, gross hematuria, or scrotal hematoma. Spinal nerves, the lumbosacral plexus, sacral plexus, and the major lower extremity peripheral nerves, such as the sciatic, femoral, obturator, and pudendal nerves, are found in close proximity to the pelvis. A neurologic examination of the lower extremities should include a rectal examination to assess tone and temperature sensation. The iliac arteries, veins, and their branches are also enveloped by the bony architecture of the pelvis and severe hemorrhage is a common complication. While ecchymosis of the anterior abdominal wall, flank, sacral, or gluteal region suggests hemorrhage, there may be no outward signs of a severe hemorrhage. Blood found during rectal or vaginal examination may indicate a puncture wound from the fracture.

The presence of a pelvic fracture is associated with mortality rates as high as 20% (5% in children).

Management and Disposition

All patients with a suspected pelvic fracture should undergo a radiographic evaluation with an anteroposterior (AP) x-ray of the pelvis. Fractures through the sacrum are subtle and may be appreciated by noting disruption of the sacral arcuate lines or sacroiliac joint widening. A CT scan is often necessary to identify associated injuries. A retrograde urethrogram may also be necessary if a GU injury is suspected. Angiography by interventional radiology with selective embolization may be performed to control arterial bleeding. In the face of a widened pubic symphysis or "open book" pelvic fracture and continued hemodynamic instability, orthopedic consultation for emergent external fixation can help to reduce blood vessel tension and reduce hemorrhage.

Pearls

1. A pelvic binder or a sheet tied around the pelvis may be used to temporarily stabilize pelvic fractures.
2. Posterior pelvic fractures are more likely to result in neurovascular injuries, while anterior pelvic fractures are more likely to cause urogenital injuries.
3. FAST exam is less sensitive (26%) in detecting hemoperitoneum in patients with pelvic fractures. A negative FAST is therefore inadequate to eliminate the need for laparotomy in an unstable patient.

FIGURE 7.32 ■ **Pelvic Fracture.** Scrotal and perianal ecchymosis is seen in this patient with a vertical shear pelvic fracture due to a fall. (Photo contributor: Lawrence B. Stack, MD.)

RESPIRATORY RETRACTIONS

Clinical Summary

Increased respiratory effort may be manifested by increased respiratory rate, increased chest wall excursion, and retractions of the less rigid structures of the thorax. Retractions of the sternum, suprasternal notch, intercostal retractions, and paradoxical abdominal movement reflect increased respiratory effort. This may be due to obstructive disease such as asthma or upper airway obstruction, pneumonia, or restrictive disease. The presence of stridor, wheezing, or rhonchi will help distinguish the cause.

Management and Disposition

An aggressive search for the cause of the retractions is required to direct therapy. Rapid evaluation of the airway for patency and breathing for oxygenation should be done immediately on presentation. High-flow oxygen by face mask is appropriate for patients in respiratory distress. Preparations for securing an airway should be underway for those patients in severe distress or respiratory failure. Arterial blood gas analysis may help identify impending respiratory failure. Routine measures for the mildly symptomatic patient depend on the cause of the retractions. For asthma or exacerbations of chronic obstructive pulmonary disease (COPD), nebulized β_2 agonists and steroid therapy may be appropriate. Patients with croup may require nebulized epinephrine or dexamethasone as initial therapy. Foreign-body aspiration requires imaging and consultation for confirmation of the suspected diagnosis and removal.

Pearls

1. Retractions are best observed with the patient at rest and the chest exposed.
2. Retractions from obstructive airway disease can be intercostal and supraclavicular and are usually accompanied by nasal flaring, increased expiratory phase, and increased respiratory rate.

FIGURE 7.33 ■ **Sternal Retractions.** Sternal retractions in a patient with croup. (Photo contributor: Stephen W. Corbett, MD.)

FIGURE 7.34 ■ **Suprasternal Retractions.** Suprasternal retractions in an adolescent with severe asthma. (Photo contributor: Kevin J. Knoop, MD, MS.)

Clinical Summary

This symptom complex develops from obstruction of venous drainage from the upper body, resulting in increased venous pressure, which leads to dilation of the collateral circulation. Superior vena cava (SVC) syndrome is most commonly caused by malignant mediastinal tumors. Dyspnea; swelling of the face, upper extremities, and trunk; chest pain, cough, or headache may be present. Physical findings include dilation of collateral veins of the trunk and upper extremities, facial edema and erythema (plethora), cyanosis, and tachypnea.

Management and Disposition

Radiation therapy is the optimal treatment for most malignant mediastinal tumors causing SVC syndrome. An exception is small cell carcinoma which responds better to chemotherapy. Elevating the head of the bed, oxygen, and administration of corticosteroids and diuretics initiated in the ED may provide temporary relief pending definitive therapy.

Pearls

1. SVC syndrome is most commonly caused by malignant mediastinal tumors.
2. Treatment of most mediastinal tumors causing SVC syndrome is radiation therapy.
3. CT scan of the chest is the diagnostic modality of choice for patients with SVC syndrome.
4. Signs of decreased cardiac output, cerebral edema, and laryngeal edema are life-threatening findings.

FIGURE 7.36 ■ **Superior Vena Cava Syndrome.** A middle-aged woman with plethora, distended superficial upper thorax veins, and headache with SVC syndrome due to lymphoma.

FIGURE 7.35 ■ **Superior Vena Cava Syndrome.** A 27-year-old man with SVC syndrome. Note the prominent collateral veins of the chest and neck. (Photo contributor: William K. Mallon, MD.)

FIGURE 7.37 ■ **Facial Plethora.** A 53-year-old woman presents with shortness of breath and facial plethora. She has SVC syndrome due to lung cancer. (Photo contributor: R. Jason Thurman, MD.)

SUPRACLAVICULAR ADENOPATHY

Clinical Summary

Adenopathy or masses in the supraclavicular fossa should heighten suspicion for metastatic or locally invasive disease. A Virchow node, also called a sentinel node (Troisier sign), is left supraclavicular node in the area where the thoracic duct enters the SVC. This node, located behind the sternocleidomastoid muscles, suggests metastatic abdominal cancer, particularly gastric cancer spread via lymphatics. Carcinoma affecting right supraclavicular nodes often arises from cancer of the breast or lung and are typically lateral to a Virchow node.

A Pancoast tumor involves the apical lung and may affect contiguous structures such as the brachial plexus, sympathetic ganglion, vertebrae, ribs, SVC, and recurrent laryngeal nerve (more common for left-sided tumors). Horner syndrome, extremity edema, nerve deficits, hoarseness, and SVC syndrome may result. Erosion of tumor through the chest wall can cause compression of venous outflow, with resultant JVD.

Management and Disposition

Treatment depends on the staging and type of tumor. The SVC syndrome can be treated acutely with radiation and diuretics. Thrombolytic therapy has been used successfully in some cases of acute vena caval thrombosis.

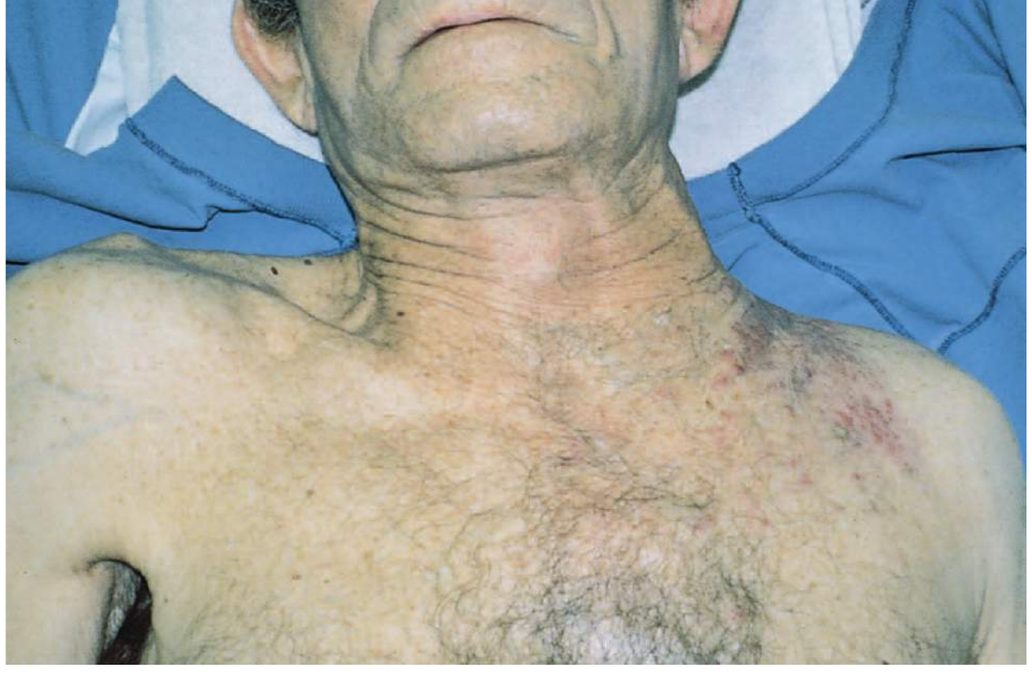


FIGURE 7.38 ■ **Apical Lung Mass.** This 68-year-old man cigarette smoker complained of cough and weight loss. A chest radiograph shows a left apical tumor. There is erosion of the tumor into the chest wall, with an indurated supraclavicular and infraclavicular mass. Moderate JVD is apparent, suggesting venous outflow obstruction. (Photo contributor: Stephen W. Corbett, MD.)

Pearls

1. Thrombosis may cause acute decompensation with edema, plethora, and airway collapse.
2. A Virchow node is made more evident if the patient performs a Valsalva.

FIGURE 7.39 ■ **Virchow Node.** This middle-aged woman presents with multiple complaints including lateral neck swelling. She was diagnosed with abdominal lymphoma. (Photo contributor: David Effron, MD.)

FIGURE 7.40 ■ **Left Supraclavicular Node.** This 16-year-old patient developed left supraclavicular swelling and intermittent fever. She was diagnosed with lymphoma. (Photo contributor: Lawrence B. Stack, MD.)

FIGURE 7.41 ■ **Right Supraclavicular Node.** This 25-year-old patient developed right supraclavicular swelling and intermittent fever. She was diagnosed with lymphoma. (Photo contributor: Alan B. Storrow, MD.)

Clinical Summary

Central venous (right atrial) pressure is reflected by distention of the internal or external jugular veins. Distention greater than 4 cm above the sternal angle of Louis with the head of the bed elevated 30 to 60 degrees should be considered abnormal. The presence of crackles, murmurs, rubs, percussed hyperresonance, or crepitus may help disclose the etiology.

The abdominojugular test (previously known as hepatojugular reflux) is performed by looking for JVD with pressure on the right upper quadrant. It is a marker for right ventricle dysfunction, constrictive pericarditis, cardiac tamponade, and tricuspid regurgitation.

Causes of JVD include right ventricular failure, left ventricular failure, biventricular failure, parenchymal lung disease, pulmonary hypertension, pulmonic stenosis, restrictive pericarditis, pericardial tamponade, SVC syndrome, pulmonary embolus, valvular disease, tension pneumothorax, increased circulating blood volume, and atrial myxoma. Temporary venous engorgement may result from Valsalva maneuver, positive pressure ventilation, and Trendelenburg position.

Management and Disposition

Treatment varies depending on the cause. Preload reduction may help in cases of congestive heart disease. Reversal of a traumatic etiology with needle thoracostomy or pericardiocentesis may be required.

Pearls

1. Right-sided myocardial infarction may produce JVD with clear lung fields.
2. JVD may be absent in the presence of the above-listed causes if hypovolemia is present.

FIGURE 7.42 ■ **Jugulovenous Distention.** An engorged external jugular vein is noted as it crosses the sternocleidomastoid muscle into the posterior triangle of the neck and disappears beneath the clavicle to join the brachiocephalic vein and the superior vena cava. This patient has severe congestive heart failure. (Photo contributor: Lawrence B. Stack, MD.)

CAPUT MEDUSAE

Clinical Summary

Veins of the abdomen normally are scarcely visible within the abdominal wall. Engorged veins, however, are often visible through the normal abdominal wall. Engorged veins forming a knot in the area of the umbilicus are described as caput medusae. The extent of associated findings depends on the underlying etiology. It is usually secondary to liver cirrhosis, with subsequent portal hypertension and development of circulation circumventing the liver.

Management and Disposition

Treatment is directed at the underlying cause. This finding by itself does not require acute treatment.

Pearl

1. Caput medusae have the same clinical significance as the more common pattern of venous engorgement.
2. If pressure on a prominent abdominal wall vein results in flow of blood to the head, the likely cause is inferior vena cava obstruction. If the flow is to the feet, it is caput medusa.

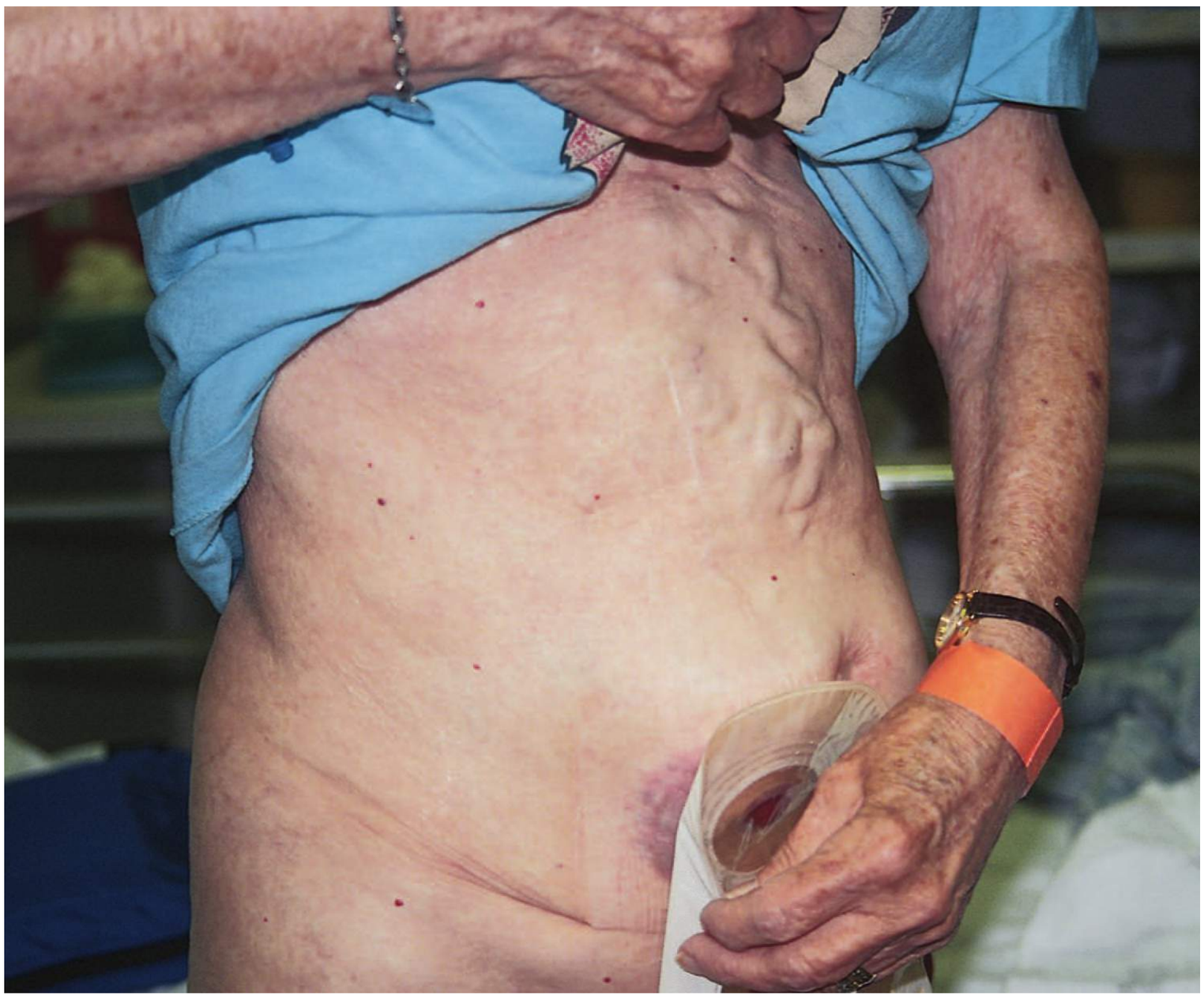


FIGURE 7.43 ■ **Caput Medusae.** This elderly female with alcoholic cirrhosis has engorged abdominal veins in the knotted appearance consistent with caput medusae. (Photo contributor: Gary Schwartz, MD.)

Clinical Summary

A hernia is a tissue protrusion through an abnormal body cavity opening. Most abdominal wall hernias occur at the groin and umbilicus. Incarceration is defined as the inability to reduce the protruding tissue to its normal position. Strangulation occurs when the blood supply of the hernia's contents is obstructed and tissue necrosis ensues. An incisional hernia may manifest clinically as a mass or palpable defect adjacent to a surgical incision and can be reproduced by having the patient perform the Valsalva maneuver. Obesity and wound infection, which interfere with wound healing, predispose to the formation of incisional hernias. The defect of an indirect inguinal hernia is the internal (abdominal) inguinal ring and may be manifest in either sex by a bulge over the midpoint of the inguinal ligament that increases in size with Valsalva maneuver. A fingertip placed into the external ring through the inguinal canal may palpate the defect. A direct hernia may be manifested by a bulge midway adjacent to the pubic tubercle and may be felt by the pad of the finger placed in the inguinal canal. The defect is in the posterior wall of the inguinal canal. Direct inguinal hernias are usually painless and occur in males. Femoral canal hernias are more common in women and are prone to both strangulation and incarceration.

Nausea and vomiting may be present if incarceration with bowel obstruction occurs. Strangulation can lead to fever, peritonitis, and sepsis.

Management and Disposition

When patients present without clinical evidence of strangulation (fever, leukocytosis, elevated lactate, systemic signs of toxicity), reduction should be attempted. In the presence of these signs, prompt surgical consultation is warranted for surgical reduction. Reduction in the ED is facilitated with systemic analgesia (as most patients present with significant pain), placing the patient in the supine position, and applying a cold pack to the hernia. Routine consultation for operative repair is indicated in asymptomatic patients with reducible hernias.

Pearls

1. Acutely strangulated or incarcerated hernias require immediate surgical evaluation.
2. Direct inguinal hernias are usually painless.
3. Evaluation and treatment of concomitant exacerbating conditions (cough, constipation, vomiting) prevent recurrences.

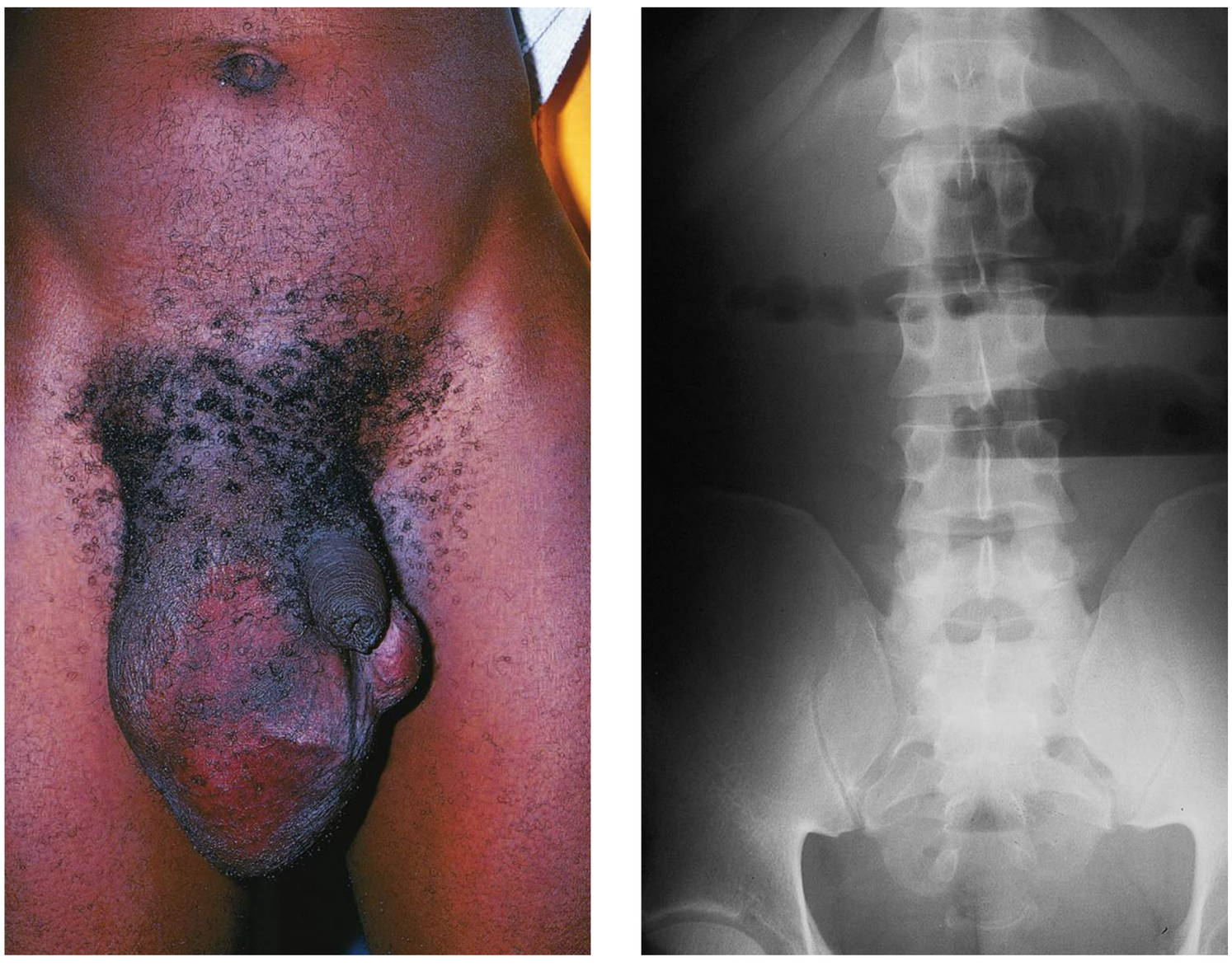


FIGURE 7.44 ■ **Indirect Inguinal Hernia.** This 35-year-old man has an incarcerated indirect inguinal hernia with small bowel obstruction seen on the upright abdominal film. (Photo contributor: Lawrence B. Stack, MD.)

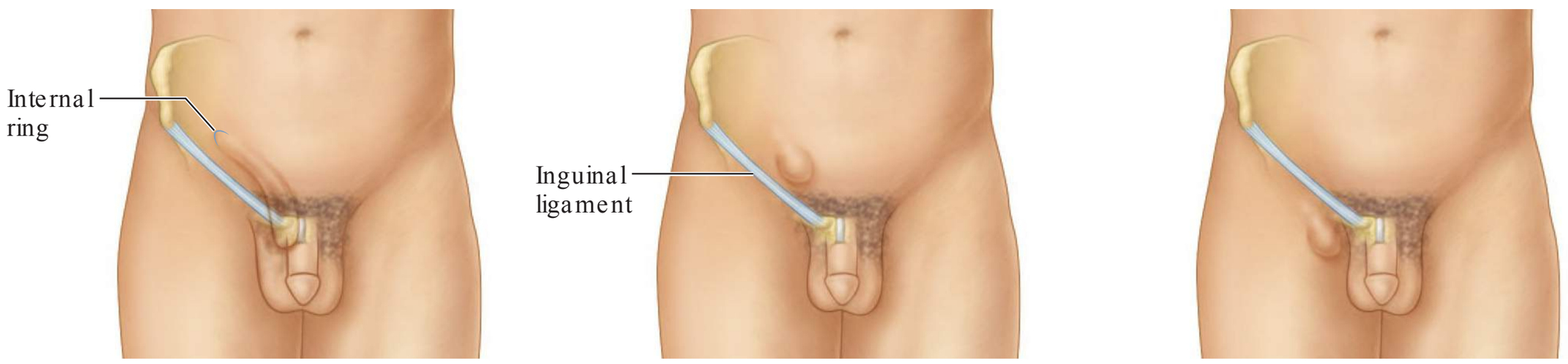


FIGURE 7.45 ■ **Hernia Types.** Drawings of the different hernia types using the landmarks of the inguinal ligament and pubic tubercle.

FIGURE 7.46A ■ **Incisional Hernia.** An asymptomatic incisional hernia in an obese male which developed after coronary artery bypass graft. The CT in Fig. 7.46B demonstrates a loop of bowel protruding through the abdominal wall defect. (Photo contributor: Lawrence B. Stack, MD.)

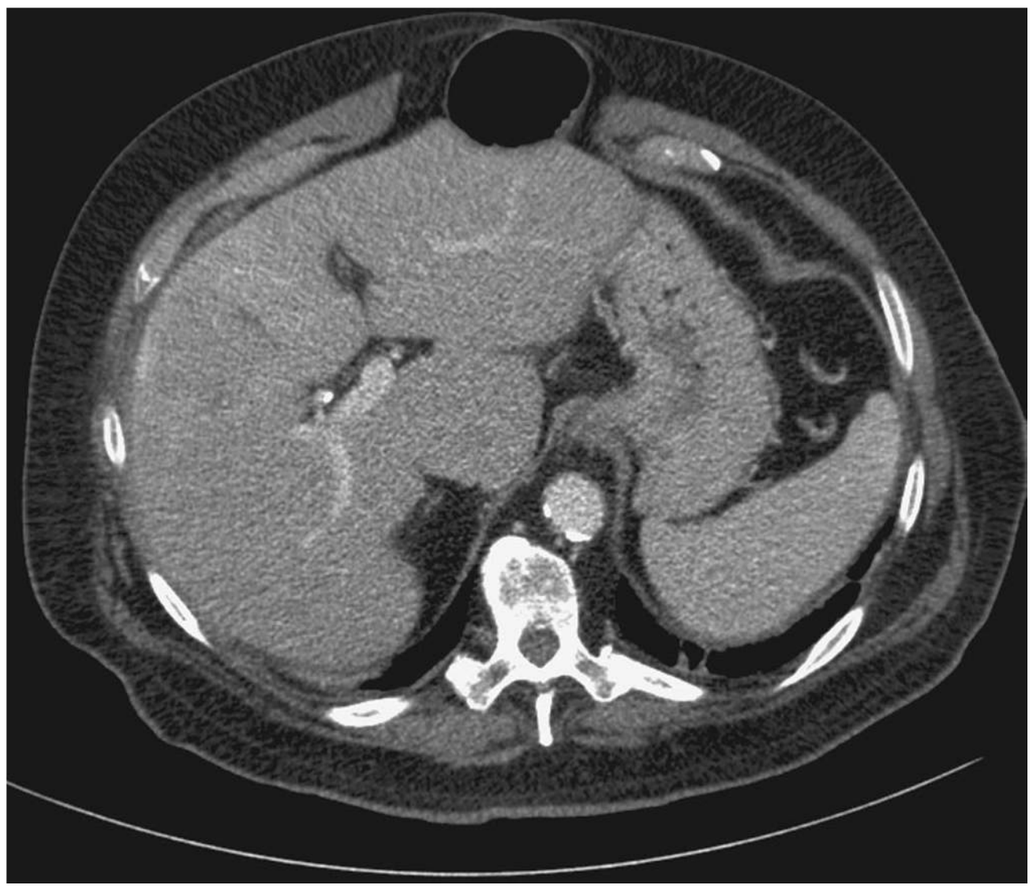


FIGURE 7.46B ■ **Incisional Hernia CT Scan.**

FIGURE 7.47 ■ **Indirect Inguinal Hernia.** A left indirect inguinal hernia in a female patient. (Photo contributor: Lawrence B. Stack, MD.)

FIGURE 7.48 ■ **Direct Inguinal Hernia.** A direct inguinal hernia. Note the bulge adjacent to the left pubic tubercle. (Photo contributor: Lawrence B. Stack, MD.)

Clinical Summary

The umbilicus is a common site of abdominal hernias. Predisposing conditions in adults most commonly include ascites and prior abdominal surgery. The size of the defect determines the symptomatology and incidence of incarceration, with smaller defects resulting in more pronounced symptoms and an increased incidence of incarceration. Pain is located in the area of the fascial defect. Contents of the hernia may be palpable and tender. Symptoms of obstruction (nausea, vomiting, and abdominal distention) may be present. If the hernia becomes strangulated, erythema of the overlying skin with fever and hypotension may occur.

FIGURE 7.49 ■ **Strangulated Umbilical Hernia.** The skin overlying a strangulated umbilical hernia is erythematous and tender. (Photo contributor: Lawrence B. Stack, MD.)

Management and Disposition

Reduction is attempted in the stable patient without clinical evidence of strangulation. Treatment of any predisposing conditions (ie, abdominal paracentesis in the patient with tense ascites) may cause spontaneous reduction and avoid progression of the hernia to strangulation. Routine consultation for elective repair is indicated in asymptomatic patients with reducible hernias.

Pearls

1. Umbilical hernias in children usually resolve without treatment.
2. Umbilical hernias in adults usually become worse and require elective repair.

FIGURE 7.50A ■ **Umbilical Hernia.** A 53-year-old man with umbilical pain and swelling. (Photo contributor: Lawrence B. Stack, MD.)

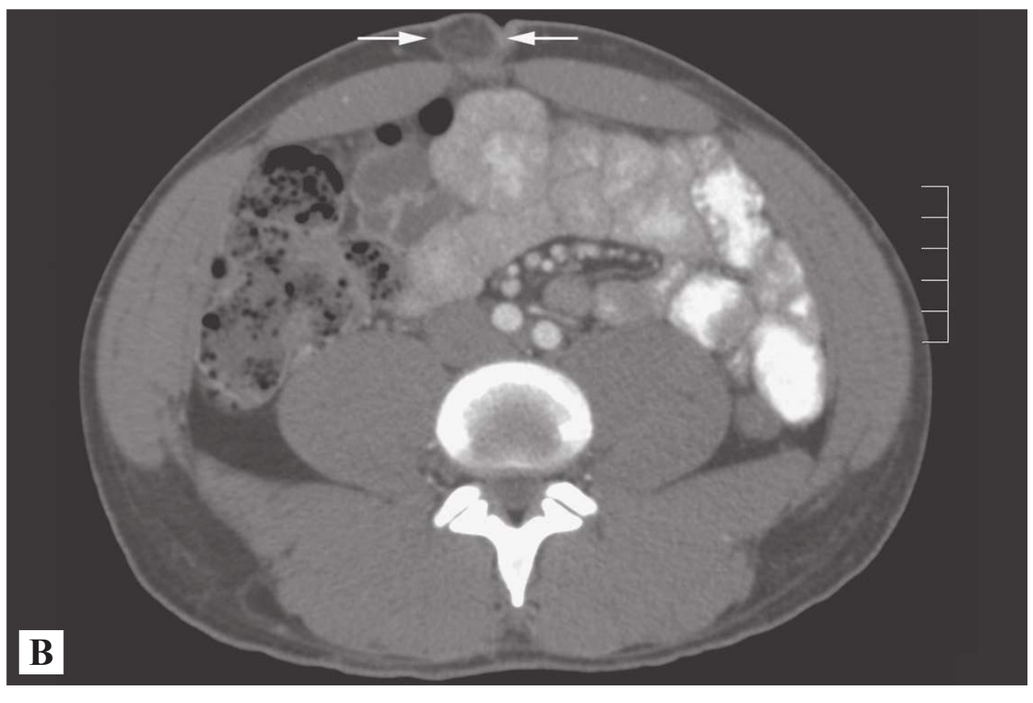


FIGURE 7.50B ■ **Umbilical Hernia CT Scan.** CT reveals omentum in the umbilical hernia defect (arrows). (Photo Contributor: Lawrence B. Stack, MD.)

PATENT URACHAL DUCT

Clinical Summary

When the vestigial urachal duct is not obliterated during development, drainage can occur from the bladder to the umbilicus. Urachal cysts may also be present, detectable as a painful mass between the umbilicus and pubis when they become infected or by ultrasound. Rarely, adenocarcinoma may form in these remnants.

Management and Disposition

Acute treatment is usually not required unless an infection is evident. Routine urologic consultation for surgical revision is indicated. A retrograde study with radiopaque dye will outline the patent duct.

Pearl

1. This finding should prompt a careful search for other urogenital anomalies.

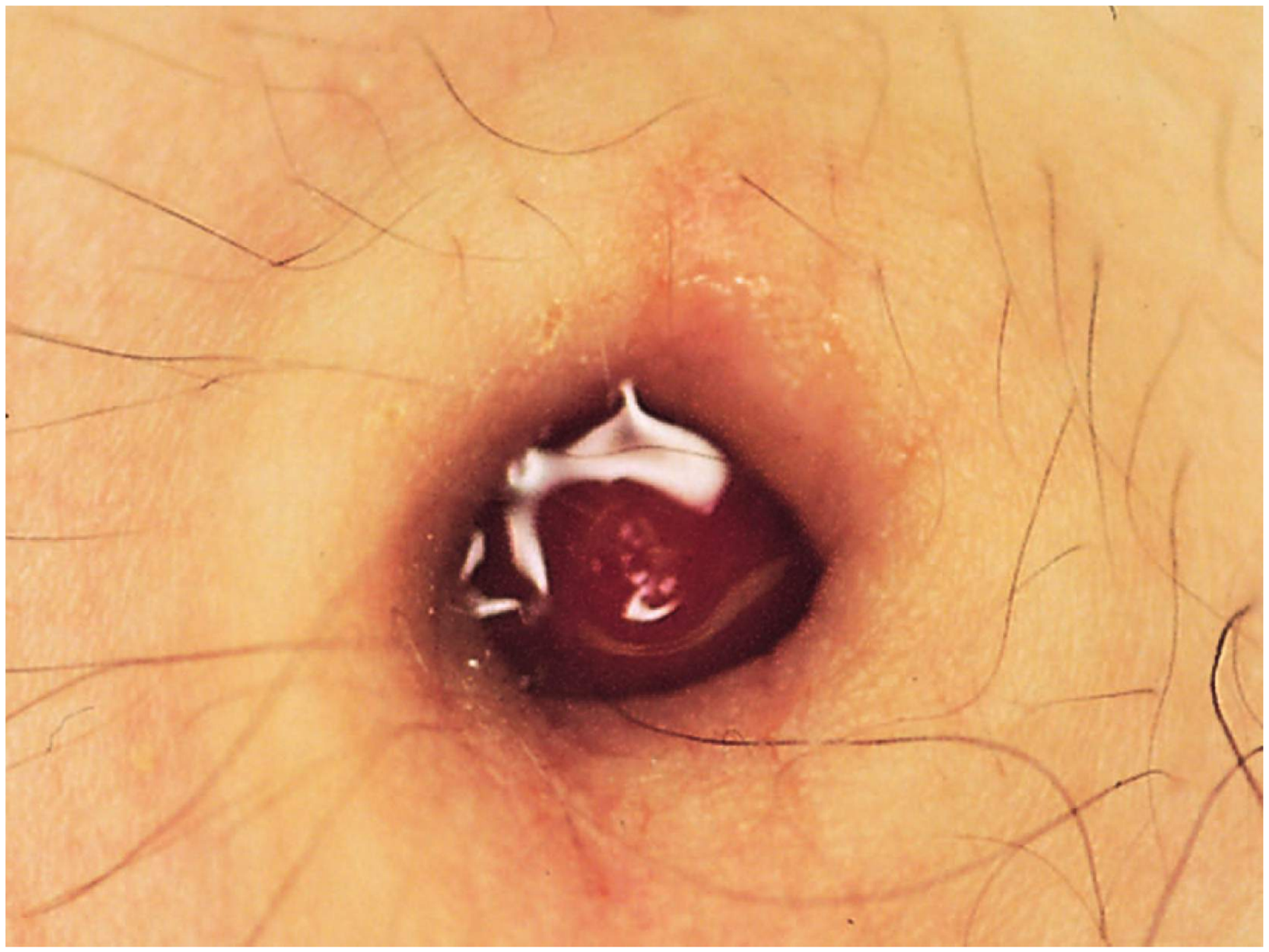


FIGURE 7.51 ■ **Patent Urachal Duct.** This 19-year-old man presented to the emergency department with clear fluid (urine) draining from the umbilicus, suggestive of a patent urachal duct. (Photo contributor: Kevin J. Knoop, MD, MS.)

SISTER MARY JOSEPH NODE (NODULAR UMBILICUS)

Clinical Summary

A Sister Mary Joseph node is a metastasis manifesting as a periumbilical nodule secondary to abdominal or pelvic cancers (one half are gastrointestinal, one quarter are gynecologic). Cancers of the colon may cause pain, change in bowel habits, anemia, and obstruction. In general, left-sided cancers cause obstruction, whereas right-sided tumors may have significant metastases before they create signs and symptoms. These metastases typically involve peritoneal and omental spread with distant metastases to the liver. Spread to the umbilicus is colloquially known as the Sister Mary Joseph node.

Prognosis is poor if cancer is the cause (survival time of 10 months).

Management and Disposition

Prompt referral for staging and treatment of the tumor is indicated. Other signs and symptoms (from obstruction, blood loss, malnutrition, and pain) should be addressed and treated.

FIGURE 7.52 ■ **Sister Mary Joseph Node.** Sister Mary Joseph nodule of patient with ovarian cancer. (Photo contributor: Stephen W. Corbett, MD.)

Pearls

1. Virchow node, presenting as a supraclavicular mass, also heralds bowel carcinoma.
2. A Sister Mary Joseph node is commonly due to gastric carcinoma.
3. All umbilical masses require evaluation.

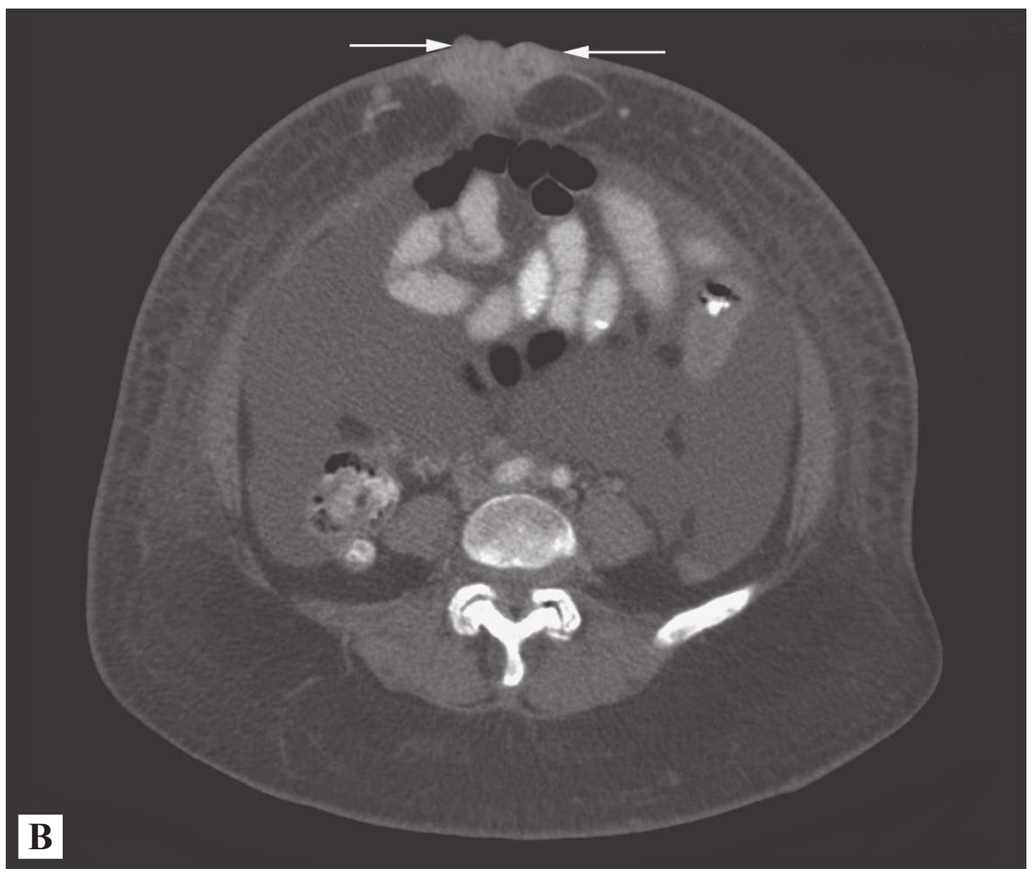


FIGURE 7.53 ■ **Sister Mary Joseph Node.** This 63-year-old woman presents with abdominal swelling and ascites. She was diagnosed with ovarian cancer. Axial CT scan of the abdomen at the level of the umbilicus demonstrates ascitic fluid and the umbilical nodularity (arrows). (Photo contributor: R. Jason Thurman, MD.)

ABDOMINAL DISTENSION

Clinical Summary

Abdominal distention may be a symptom—described by the patient as the feeling of being bloated—or a sign, a protuberance of the patient's abdomen. Obesity, ascites, pregnancy, neoplasms, aneurysm, tympanites (excess gas), organomegaly, and constipation are important etiologies to consider in the differential.

In obesity, the abdomen is uniformly rounded, while an increase in girth and fat concurrently accumulates in other parts of the body.

In patients with ascites, there may be shifting dullness, a fluid wave, bulging flanks, or hepatomegaly. The profile of the fluid-filled abdomen of ascites is a single curve from the xiphoid process to the pubic symphysis. The umbilicus may be everted, and there may be prominent superficial abdominal veins. Other physical findings suggestive of ascites include shifting dullness and a fluid wave.

In patients with neoplasms, there may be a palpable mass.

In gravid patients, fetal heart tones may be present and fetal motion may be felt. The pregnant abdomen profile shows the outward curve to be more prominent in the lower half of the abdomen. The umbilicus may be everted in the last trimester of pregnancy. Prominent abdominal wall veins may also be seen.

In patients with excess gas from bowel obstruction, there may be absent or high-pitched bowel sounds and absence of bowel movements or flatus. Excess abdominal air can be located in the lumen of the stomach or intestines or free in the peritoneum. This abdominal profile is a single curve from the xiphoid process to the pubic symphysis. Nausea, vomiting, decreased bowel sounds, and colicky pain are present in

FIGURE 7.54 ■ **Ascites.** Ascites in a male with alcoholic cirrhosis. Note the everted umbilicus and prominent superficial abdominal veins. (Photo contributor: Lawrence B. Stack, MD.)

FIGURE 7.55A ■ **Ascites with Paracentesis.** Midline approach to a paracentesis in the patient with ascites. (Photo contributor: Lawrence B. Stack, MD.)

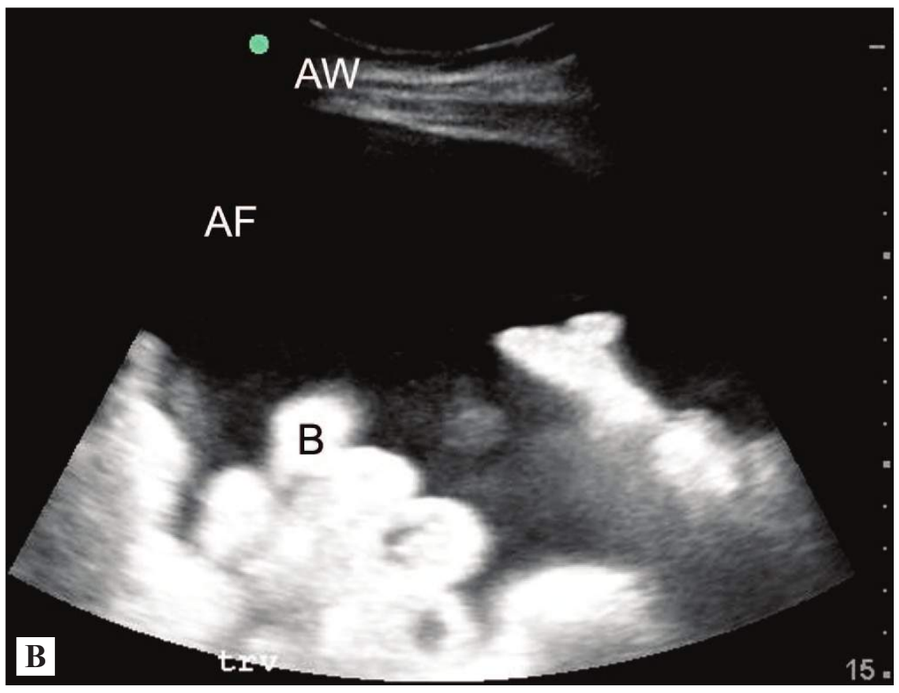


FIGURE 7.55B ■ **Ascites on Ultrasound.** Ascitic fluid (AF) seen between the abdominal wall (AW) and bowel (B) on this bedside ultrasound. (Photo contributor: Jeremy Simpson Boyd, MD.)

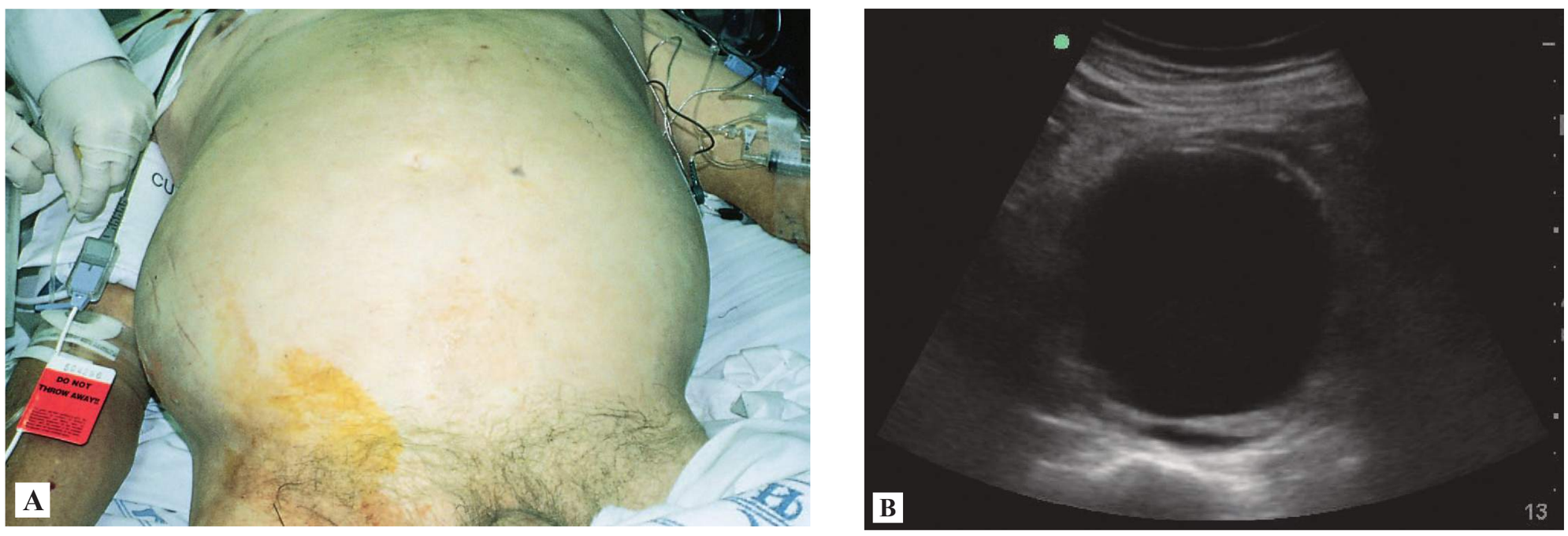


FIGURE 7.56 ■ **Abdominal Aortic Aneurysm.** (**A**) The abdomen of a patient with a leaking abdominal aortic aneurysm. Note the mottled abdominal wall and the prominent curvature of the right side of the abdomen. (Photo contributor: Stephen W. Corbett, MD.) (**B**) Eight-centimeter abdominal aortic aneurysm seen in cross-section on an ultrasound in different patient. (Photo contributor: Jeremy Simpson Boyd, MD.)

FIGURE 7.57 ■ **Gravid Abdomen.** The abdomen of a woman at 39 weeks' gestation. Note the abdominal wall striae, everted umbilicus, and prominent superficial abdominal wall veins. (Photo contributor: Stephen W. Corbett, MD.)

a small bowel obstruction. Large bowel obstruction may be accompanied by feculent vomiting and absent production of flatus.

The abdominal profile of a patient with a leaking abdominal aortic aneurysm shows a mottled abdominal wall reflective of hypoperfusion of this structure. There may be a curve of the midabdomen to either side of the aorta, more often on the left. Palpation of a pulsatile mass supports the diagnosis. Ultrasound or CT of the abdomen will confirm the diagnosis.

Management and Disposition

Treatment varies widely depending on the cause; thus, emergent management is directed at determining the etiology. Life-threatening causes (aneurysm, obstruction, neoplasms) require stabilization and referral for definitive treatment.

Pearl

1. The "six f's" can categorize conditions causing abdominal distention: fat, flatus, fetus, fluid, feces, and fatal growth.

FIGURE 7.58 ■ **Pseudoobstruction.** An 85-year-old woman was brought from a nursing home with a complaint of abdominal distention and pain for 1 to 2 days. An eventual diagnosis of Ogilvie syndrome, or pseudoobstruction of the large bowel, was made. This is usually seen in debilitated patients and can be treated with decompression. (Photo contributor: Stephen W. Corbett, MD.)

FIGURE 7.59 ■ **Constipation.** An 11-year-old boy complains of abdominal pain and abdominal distention. Stool is palpated throughout the abdomen. Flat and upright plain films of the abdomen reveal a large stool burden. (Photo contributor: Lawrence B. Stack, MD.)

Clinical Summary

Mild trauma may produce hematomas of the rectus sheath. This injury results in intense abdominal pain, which can mimic an acute abdomen. The diagnosis is difficult by physical exam since most hematomas are in the posterior rectus sheath and are not palpable or visible. Palpation of the abdominal wall may reveal a tender mass that is accentuated by contraction of the rectus. Ultrasound and CT can confirm the diagnosis.

Major traumatic force, especially when belted in a vehicle crash, may result in a massive abdominal wall hematoma that requires intervention. Active extravasation, demonstrated by a contrast blush within the hematoma, suggests active bleeding within the hematoma.

Management and Disposition

Assuming that there is no underlying blood dyscrasia or coagulopathy, hematomas of the rectus sheath usually resolve in 1 to 2 weeks. Expanding abdominal wall hematomas with active extravasation of blood may require embolization by interventional radiology.

Pearl

1. Fothergill sign is enhancement of a rectus sheath hematoma when the abdominal wall is tensed. The mass should not cross the midline and should be easier to palpate with abdominal muscle contractions. Intra-abdominal masses are more difficult to palpate with such contractions.
2. Carnett sign is also assessed after the abdominal wall muscles are tensed; decreased pain suggests an intra-abdominal source, increased pain suggests an abdominal wall source.

FIGURE 7.60 ■ **Abdominal Wall Hematoma.** This 50-year-old man with chronic obstructive pulmonary disease developed right-lower-quadrant pain after an episode of coughing. A repeat examination on the second visit showed clearly visible ecchymosis. There was no coagulopathy and amylase was normal. A CT scan revealed a 10- by 8-cm hematoma in the right rectus abdominis sheath. (Photo contributor: Stephen W. Corbett, MD.)

FIGURE 7.61 ■ **Abdominal Wall Hematoma.** A 60-year-old woman, restrained passenger in a MVC, has an expanding abdominal wall hematoma. Contrasted CT scan of the abdomen (Figure 7.62) reveals contrast extravasation into the hematoma. (Photo contributor: Lawrence B. Stack, MD.)

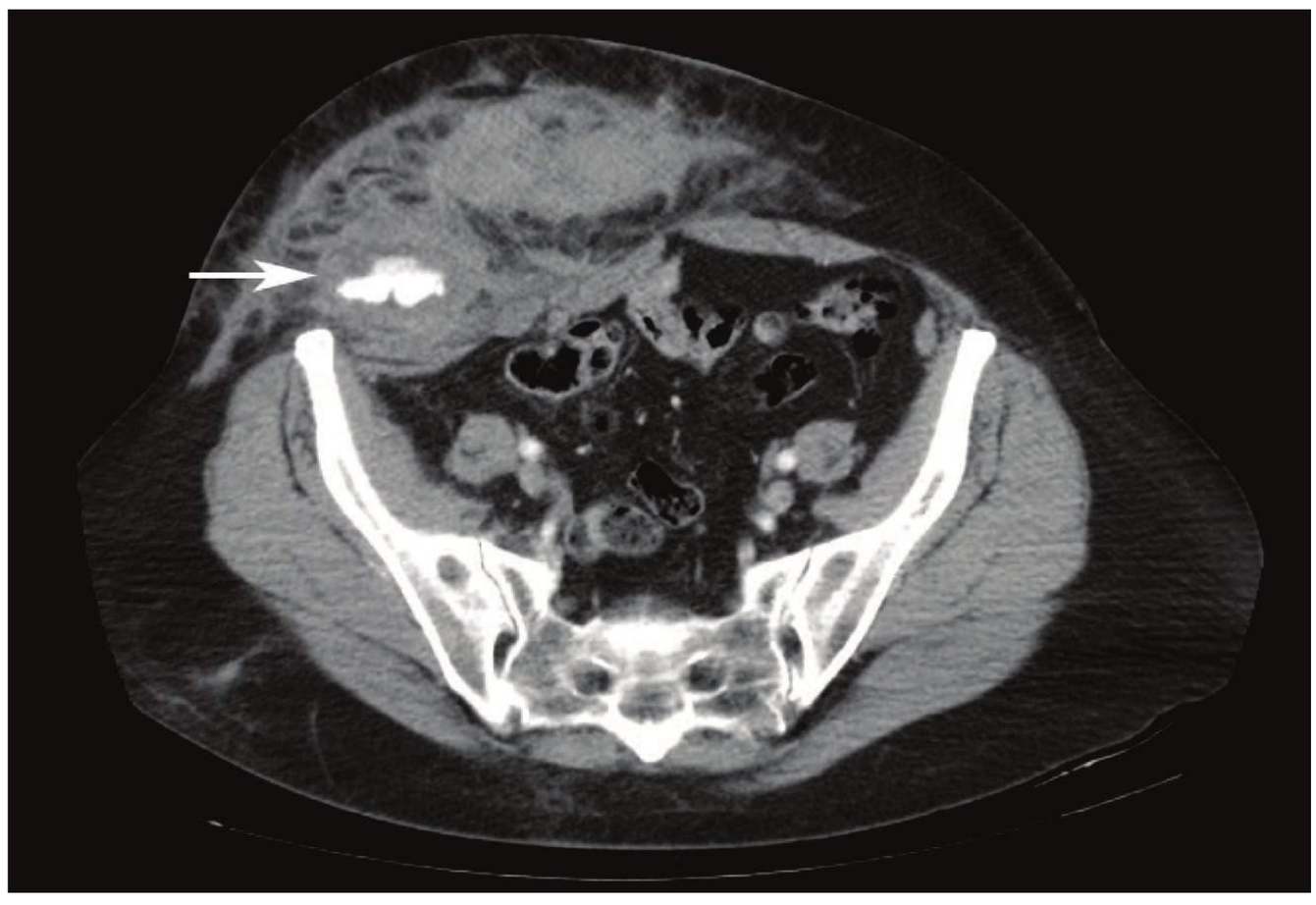


FIGURE 7.62 ■ **CT of Abdominal Wall Hematoma.** Contrast-enhanced CT of the patient in Fig. 7.61 demonstrates active extravasation of contrast (arrow) into the hematoma. Embolization of the hematoma ceased the hemorrhage. (Photo contributor: Lawrence B. Stack, MD.)

Clinical Summary

Pectus excavatum is a common developmental deformity of the anterior chest wall present in 0.25% of births. The cause is not well understood and may be related to intrauterine growth effects or muscle and connective tissue abnormalities within the thorax. In many cases, there is a family history of the condition.

The defect is a concavity of the anterior chest wall. Although the condition is occasionally associated with Marfan, scoliosis, and congenital heart disease, most patients are asymptomatic. In some, there is slightly decreased exercise tolerance, felt to be the effect of the consequence of the increased work of breathing caused by the chest wall mechanics.

Pectus carinatum is a chest wall deformity where the sternum protrudes forward and may involve the mid and lower sternum (chondrogladiolar prominence: 95%) or upper sternum (chondromanubrial prominence: 5%). It is an uncommon deformity and becomes evident in late childhood and worsens during adolescence. Most patients are asymptomatic and repair is most often for cosmesis.

Management and Disposition

No definite treatment is needed, although cosmetic repairs of the anterior chest wall are sometimes recommended.

Pearl

1. Congential heart disease and Marfan syndrome are present in 1.5% of patients with pectus excavatum.
2. Pectus excavatum may create a radiological artifact that appears like a right middle lobe opacity.

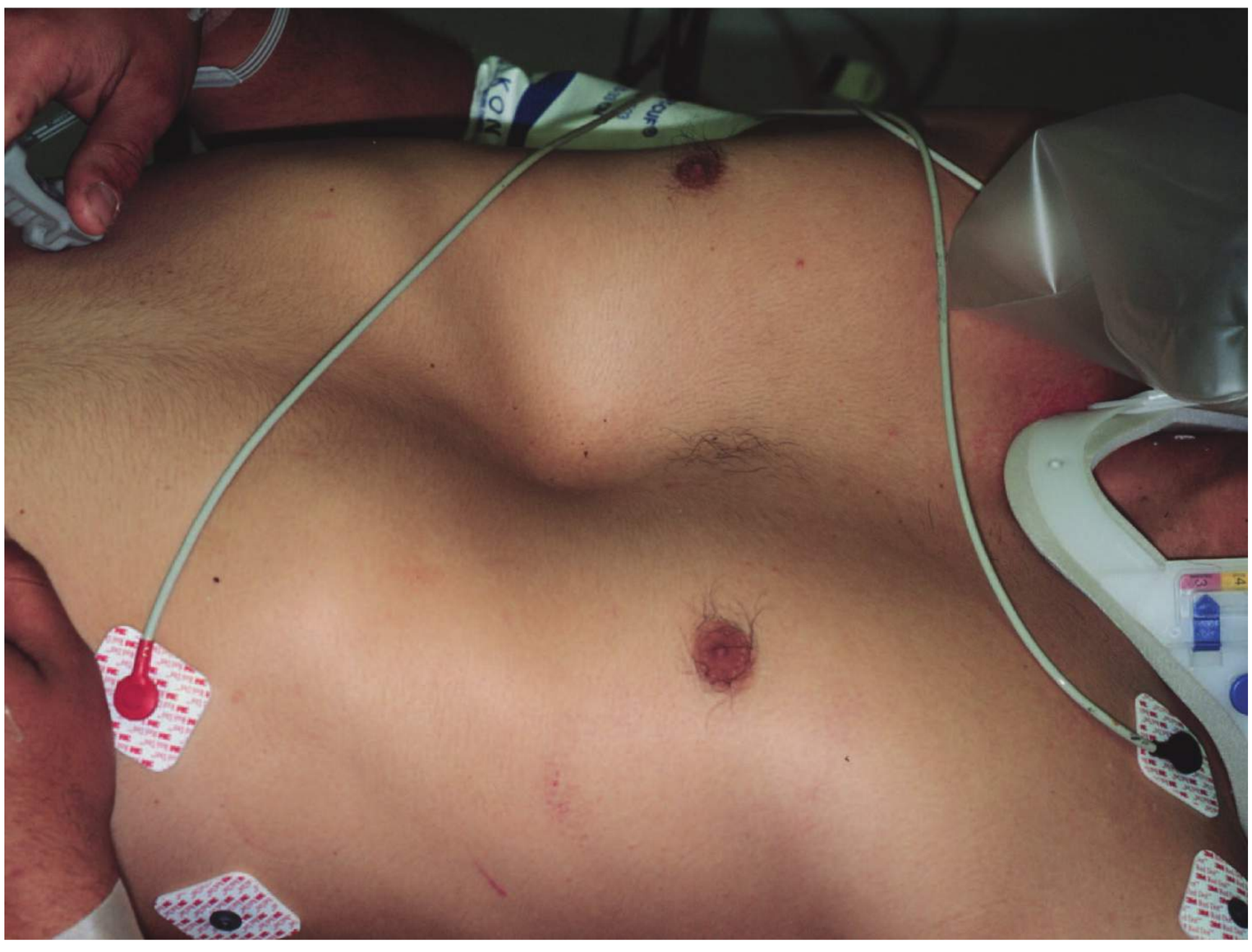


FIGURE 7.63 ■ **Pectus Excavatum.** A 26-year-old man presents to the emergency department with multisystem trauma after a motor vehicle crash. A longstanding pectus deformity is seen here. (Photo contributor: Lawrence B. Stack, MD.)

FIGURE 7.64 ■ **Pectus Carinatum.** A 14-year-old boy with sore throat was found to have pectus carinatum deformity of the chondrogladiolar prominence type. He had no chest complaint. (Photo contributor: Lawrence B. Stack, MD.)

Clinical Summary

When a stoma prolapses, bowel telescopes out on itself, lengthening the stoma. A stoma of the ileum may prolapse in 3% to 11% of patients over a lifetime. Causes of stomal prolapse include stomal construction difficulties, abdominal wall abnormalities such as obesity, increased intra-abdominal pressure, and weak abdominal musculature. Clinical findings of stomal prolapse include increase in size and length of the stoma; edema of the mucosa; bleeding; and if ischemic may be dusky, cyanotic, or purple in color.

Management and Disposition

Emergent surgical consultation should occur in patients with a gangrenous stoma or if the prolapse is not reducible. To reduce a prolapsed stoma, have the patient lie supine or in slight Trendelenburg to decrease intra-abdominal pressure. Apply continuous gentle pressure on the prolapsed stomal tissues, into the abdominal cavity. If the bowel is edematous, a cold compress or osmotic therapy using table sugar applied for 15 minutes before reduction attempt may reduce the edema. If stomal prolapse reduction is successful, general surgery follow-up should be arranged as soon as possible.

Pearls

1. Oral or intravenous diazepam may help facilitate prolapse reduction.
2. Your hospital stoma nurse may be a great resource to assist with management of stoma complications.

FIGURE 7.65 ■ **Prolapsed Stoma.** A 32-year-old man with inflammatory bowel disease and ileostomy presents with a prolapsed stoma. Note the bleeding, edema, and dusky appearance of the ileal mucosa. (Photo contributor: Lawrence B. Stack, MD.)

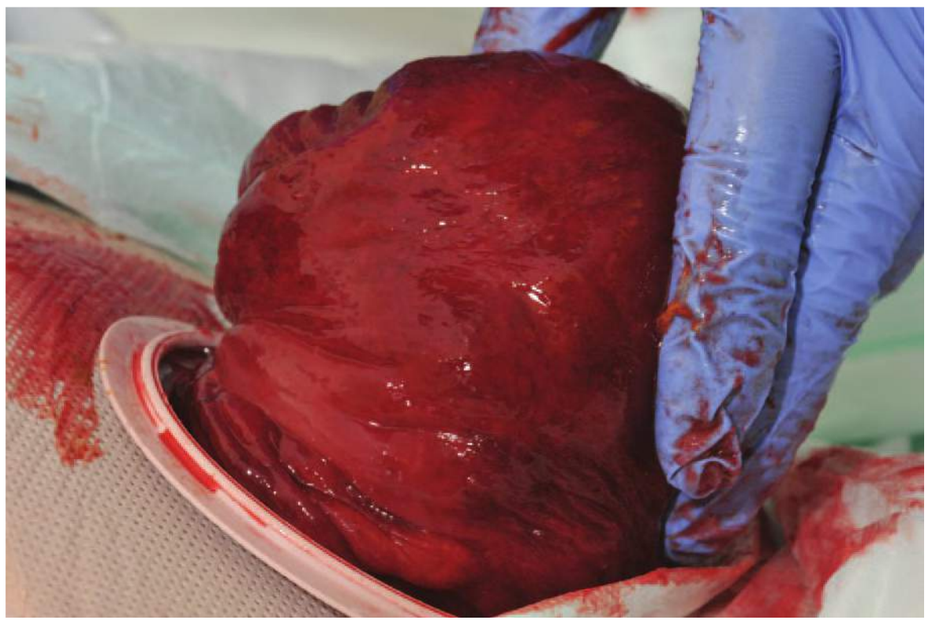


FIGURE 7.66 ■ **Prolapsed Stoma.** A 48-year-old man with pain and bleeding from stoma which was placed after a partial colectomy for complex diverticulitis. The bowel appears dusky and is oozing blood. (Photo contributor: Nakul Shekhawat, MD, MPH.)

PRUNE BELLY (EAGLE-BARRETT) SYNDROME

Clinical Summary

Prune belly syndrome (PBS) is a congenital disorder characterized by a partial or complete lack of abdominal musculature, severe urinary tract abnormalities, and bilateral cryptorchidism. The syndrome is typically recognized at birth or by ultrasound in utero. Severe renal dysplasia resulting in end-stage renal disease (ESRD) occurs in 50% of patients. ESRD and its complications are the most common reason a patient with PBS comes to the ED. Patients with PBS are at higher risk for recurrent urinary tract infection (UTI), chronic constipation, splenic torsion, and midgut and cecal volvulus.

Management and Disposition

Patients with PBS will most commonly frequent the ED because of complications of ESRD and their hemodialysis, continuous ambulatory peritoneal dialysis, or transplant. Because patients with PBS are at higher risk for splenic torsion and midgut or cecal volvulus, CT scan should be performed if sudden onset of severe abdominal pain occurs in these patients. Frequent UTIs and chronic constipation may prompt ED visits.

Pearls

1. About one-half of patients progress to ESRD.
2. Chronic constipation is a common symptom in patients with PBS.
3. Gastrointestinal abnormalities are seen in 30% of patients with PBS.

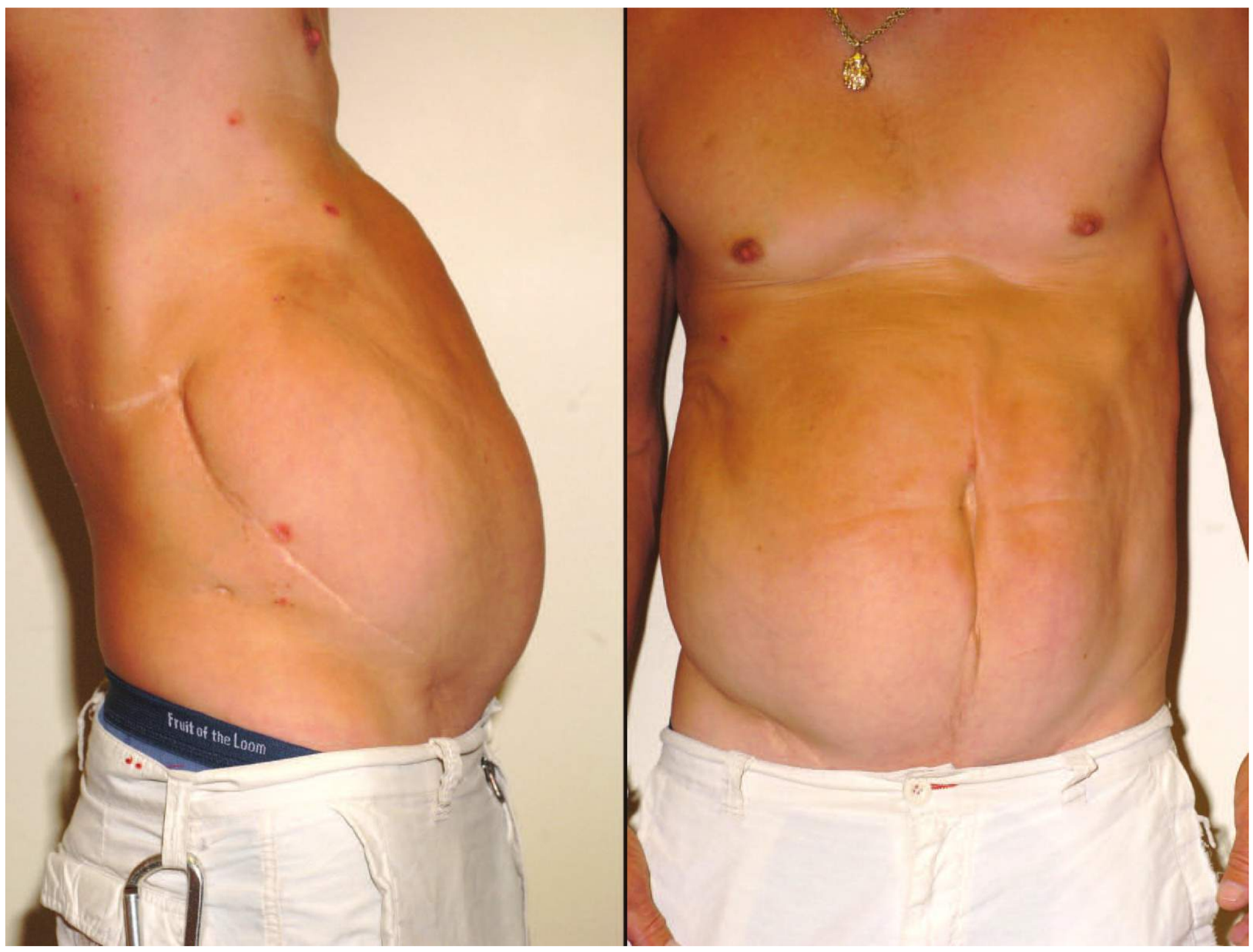


FIGURE 7.67 ■ **Prune Belly Syndrome.** A 44-year-old man with PBS, s/p renal transplant, comes to the ED for abdominal pain and was ultimately diagnosed with constipation. (Photo contributor: Lawrence B. Stack, MD.)

FIGURE 7.68 ■ **Prune Belly Syndrome.** A 2-year-old with PBS on hemodialysis comes to the ED for fever. Patient was bacteremic due to a dialysis catheter infection. (Photo contributor: Lawrence B. Stack, MD.)