Traumatic Ruptured Diaphragm: A Frequently Missed or Delayed Diagnosis

Author: Diane Gurney, MS, RN, CEN, CTRN, FAEN, Athol, MA
Section Editor: Diane Gurney, MS, RN, CEN, CTRN, FAEN

CE Earn Up to 7.5 Hours. See page 108.

Case A

A 67-year-old woman presented to the emergency department with a report of nausea and vomiting and abdominal pain after eating. Upon questioning, she revealed that she fell 3 months earlier and sustained 2 broken ribs on the left side.[1]

Case B

A 69-year-old man presented to the emergency department with left upper quadrant abdominal pain and reported no bowel movement or passing of flatus for 5 days. Upon obtaining a history, he recalled that 8 months earlier he had fallen from 6 feet and fractured his 7th and 8th left ribs.[2]

Both of these patients were ultimately diagnosed with a traumatic ruptured diaphragm with subsequent loops of bowel in the left thorax.

Discussion

Diaphragm injuries are theorized to be the result of a considerable and sudden increase in the pressure gradient between the pleural and peritoneal cavities.[3,4] Acutely the patient may be asymptomatic or demonstrate vague symptoms such as shallow breathing and some dyspnea. Indeed, a diaphragm injury can be misdiagnosed as a pneumothorax.[5]

A vehicle collision resulting from a lateral impact is 3 times more likely to cause a diaphragm tear than other types of impact.[3] The left side of the diaphragm is 67% to 84% more likely to tear, perhaps because the right side is somewhat protected by the liver.[2-4,6,7] These injuries seldom occur in isolation.[8] The energy necessary to cause this injury may result in other more obvious and critical concurrent injuries, and unless there is a suspicion or awareness of the risk for this injury, it may be missed. Reported concurrent injuries include hemothorax or pneumothorax (47%), pelvic fracture (40%), liver laceration (25% to 48%), spleen rupture (25% to 35%), and thoracic aorta tear (5% to 10%).[8,9]

Imaging studies can be inconclusive.[9] In one study it was reported that a chest radiograph was inconclusive in 59% of patients with traumatic diaphragm rupture.[4,5] Computed tomography subsequently revealed the defect in all study patients, but abdominal ultrasound was inconclusive.[4,5] Interestingly, reports from this study detailed the process of blowing gently into an inserted nasogastric tube while simultaneously listening to lung sounds. In 100% of those patients, gurgling was heard in the chest.[4,5] Yet another strategy is to insert a gastric tube and obtain another chest radiograph to determine if the tube is in the chest.

Chest radiograph findings have been interpreted as normal in 30% to 50% of cases.[5] The telltale radiographic images of a gastric tube or a loop of bowel in the chest can certainly divulge the problem. However, if it is a small tear or injury, the presentation may be more subtle and the diagnosis more difficult.[8] Years ago these injuries were found before surgery only 43.5% of the time; surgery or autopsy identified another 41.3%, and in 14.6%, discovery was delayed.[6] More recently a study revealed that 3 in 9 patients received the correct diagnosis with computed tomography (33%).[8] For patients for whom a diagnosis is unclear, strategies include a diagnostic laparoscopy, thoracoscopy, or open surgical exploration.[9] Laparotomies also may miss the injury in 45% of cases.[4]

Case Continuation

Patient A was found at surgery to have almost two thirds of her stomach and spleen in the chest through a 10-cm laceration in the diaphragm. She was discharged after an uneventful postoperative recovery.[1]

Diane Gurney, *President, Central MA Chapter ENA,* is Emergency Nursing Education Professional and Consultant, Athol, MA.

For correspondence, write: Diane Gurney, MS, RN, CEN, CTRN, FAEN, 3327 Chestnut Hill Ave, Athol, MA 01331; E-mail: dianegurney@twc.com.

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Patient B was taken to surgery, where no perforation or ischemic changes were found. A repair was performed with insertion of an abdominal drain. Postoperatively, pneumonia developed and the patient experienced a cardiac event. He died on day 49.[2]

Symptoms of a delayed presentation can include chest or epigastric pain, left shoulder pain, vomiting, tachypnea with shallow chest rise and fall, and loss of breath sounds on the affected side.[5] As cited in the medical literature, delayed traumatic diaphragm rupture results in mortality in 1% to 28% of cases. Pulmonary complications are the most common cause of death.[5] Other complications of a delayed or missed traumatic diaphragm tear include bowel herniation, incarceration, and strangulation.[8] If the bowel herniation is massive, it may cause a tension pneumothorax. Pericardial tamponade has been noted to occur, as well as a rare paralysis of the diaphragm.[8] Pneumonia, empyema, and subphrenic or intra-abdominal abscess are all a risk.[4]

Summary

Rupture of the diaphragm is not a common injury; frequently it may be missed initially and the diagnosis delayed.[2,7] When a patient presents with abdominal or thoracic trauma, it is wise to continue to reassess for possible signs and symptoms of a ruptured or torn diaphragm. In addition, when a patient presents to triage with gastrointestinal or abdominal symptoms, ask about a history of trauma, even if it occurred months ago.

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Diane Gurney, MS, RN, CEN, CTRN, FAEN
dianegurney@twc.com