INCARCERATED DIAPHRAGMATIC HERNIATION OF THE STOMACH MIMICKING EMPYEMA THORACIS

Agatha Te1, Li-Chen Lin1, Jau-Yeong Lu2, Pen-Fong Yeh2, Ming-Sung Yang3, Wein-Shung Kuo1,4

Abstract

A patient presented to our hospital complaining of chest pain and fever for two days. A chest x-ray revealed opacity of the left hemithorax suggesting massive pleural effusion. Thoracocentesis under the guidance of chest sonography aspirated a foul-smelling muddy-brown fluid. During a left posterolateral thoracotomy for decortication, a gangrenous proximal third of the stomach was found within the left thoracic cavity incarcerated in the left hemidiaphragmatic defect. The stomach contained muddy-brown, foul-smelling necrotic gastric contents which made us realize that the empyema we aspirated before was actually the contents of the stomach. A partial gastrectomy of the proximal gangrenous stomach and decortication of the pleura was performed and the ruptured diaphragm was repaired. An incarcerated diaphragmatic hernia of the stomach is a surgical emergency. We should keep a high index of suspicion of the diagnosis and it should be included as a differential diagnosis in the case of intestinal obstruction with a history of trauma. Aggressive surgical treatment may save the patient’s life.

Key words: Empyema thoracis, Incarcerated diaphragmatic hernia, Stomach gangrene

Case Report

We report a case of a 55-year-old Taiwanese male who presented to the emergency room complaining of left chest pain and fever for two days. The chest pain was exacerbated by deep breathing and movement. There was no dyspnea, cough, vomiting, dysphagia, or melena.

The past history was traced back twenty years to when he had been stabbed with a screwdriver on the left posterior chest during a street fight. A thoracostomy tube had then been inserted in the stab wound site to drain the left hemothorax and he recovered completely without any other complications. Ten years before admission, he had been treated for massive gastrointestinal bleeding of undetermined etiology. Two years before admission, he had experienced repeated episodes of melena, but a colonoscopy, RBC scan, and abdominal computed tomography showed no pathologic lesions. No abnormal findings were noted on chest film (Figure 1). An upper
GI panendoscopy demonstrated a duodenal ulcer but without active bleeding. He was treated with hemostatic agents and proton pump inhibitor, and the bleeding ceased. There had been no recurrence of gastro-intestinal bleeding since then.

On admission, his body temperature was 39°C, blood pressure 120/90 mm.Hg, pulse rate 120 beats/min. and respiration 24 cycles/min. On examination, decreased breath sounds with dullness to percussion on the left chest were recognized. Midepigastric tenderness was elicited and there was no bowel sound observed. Laboratory tests revealed a hemoglobin level of 13.6 g/dl, and a white cell count of 20,800 /ul. A chest radiograph demonstrated a massive left pleural effusion with LLL atelectasis (Figure 2). Chest sonography disclosed elevation of the left diaphragm to the level of the 6th thoracic vertebra with stomach air appearing at the 6th ICS. There was a loculated, complex, non-septated, pleural effusion (Figure 3). An initial thoracentesis obtained turbid serosanguinous exudative fluid. A follow-up chest x-ray showed air and fluid levels. There was rapid re-accumulation of pleural fluid. A second attempt of thoracentesis aspirated a thick muddy-brown, foul-smelling fluid with a WBC of 27,330/mm³, neutrophils of 97%, glucose 14 mg/dl, total protein 5 g/dl, amylase 87 IU/ml, and LDH 3278 IU/ml. The aspirated fluid yielded Klebsiella pneumoniae and group D Enterococcus on culture. The patient was treated with antibiotics and analgesics. A computed tomography scan of the chest was arranged but the patient could not tolerate lying in a supine position due to respiratory distress. A series of repeated chest radiographs revealed gas bubbled with persistent opacity of the left hemithorax and the heart was deviated to the right (Figure 4). A rapid deterioration of the patient’s condition prompted consultation with a chest surgeon for thoraco-
Incarcerated diaphragmatic herniation of the stomach mimicking empyema thoracis

Fig. 2. Chest radiograph on admission showing left lower lung opacity with atelectasis.

Fig. 3. Chest sonography revealed anechoic density with thick walled cavity.
scopic investigation and decortication. However, during induction of general anesthesia and double-lumen endobronchial intubation, the patient vomited fresh blood which resulted in aspiration. The patient was immediately intubated with a conventional endotracheal tube and fiberoptic bronchoscopy was performed to clear the airway of gastric contents and blood clots. Trachea and bronchi were found patent. Due to failure to perform selective ventilation for video-assisted thoracoscopy, a left posterolateral thoracotomy was performed to explore the thoracic cavity instead of thoracoscopy. At a glance, a huge gangrenous mass resembling the stomach was noted in the left epiphrenic area within the thoracic cavity. After exploration, the mass was proved to be a gangrenous stomach incarcerated within a defect in the left hemidiaphragm. About one-third of the stomach had protruded into the left chest cavity. The proximal stomach was resected, the diaphragm repaired, and decortication of the pleura done. A gross histopathologic report of the resected stomach demonstrated an opened stomach 13x12x0.4 cm attached to a dark red to black omentum measuring 13x10x2.5 cm. A black necrotic area of 13x9 cm was noted (Figure 5). Microscopic findings disclosed coagulative necrosis with intensive acute and chronic inflammatory cell infiltrations in the wall. The omentum showed adipose tissue with focal hemorrhage. There was no evidence of malignancy. The patient’s post-operative course was complicated with aspiration pneumonia and respiratory failure and he was transferred to the intensive care unit for mechanical ventilatory support. The patient was extubated on the 3rd post-operative day, the chest tube was removed on the 9th post-operative day and he was discharged on the 18th post-operative day.

Fig. 4. Follow-up chest x-ray after thoracentesis showing air-fluid density over the left lung field leading to suspicion of strangulated hernia.
Incarcerated diaphragmatic herniation of the stomach mimicking empyema thoracis

Discussion

Traumatic rupture of the diaphragm can follow a penetrating wound, an improperly repaired diaphragmatic incision, or a severe blunt injury. According to the literature, the left hemidiaphragm is most commonly injured in 70-80% of cases of traumatic rupture. It is generally accepted that the liver protects the right hemidiaphragm. Rupture of the diaphragm during trauma is often missed because attention is directed to other associated injuries such as fractures of the ribs, pelvis, pneumothorax, subcutaneous emphysema and abdominal hemorrhage.

Several radiological features may also mimic those of chest injuries making recognition of the diaphragmatic hernia more difficult. If diaphragmatic injury is not recognized during the immediate posttraumatic period or acute phase, the patient may: (1) recover spontaneously and remain asymptomatic, (2) suffer from chronic abdominal and/or chest symptoms in the interval phase, which may occur over months or years until complications arise, or (3) present with an acute crisis, with signs of intestinal obstruction or strangulation. Delaying the diagnosis until the time of visceral herniation and strangulation is associated with significant morbidity and a mortality rate as high as 40%. A recent review of 42 cases of traumatic diaphragmatic hernia disclosed that 24% of cases were diagnosed in the early acute phase, 33% in the interval phase and 43% were not diagnosed until the obstructive phase.

Patients with incarcerated diaphragmatic hernia may experience sporadic pain in the left upper abdomen or left chest. Pearson et al. observed postprandial precordial distress in 43 of the 53 patients with massive incarcerated hernia. Twenty-four patients manifested with upper gastrointestinal bleeding, thirteen patients with severe dyspnea and complete obstruction associated with organoaxial volvulus in four. Coughing, sneezing, vomiting, straining at stool, or physical exertion, may precipitate an attack often related to an increase in intra-abdominal pressure. The patient may be obviously in acute distress or may be in shock which signaled the rapid onset of strangulation. Pathognomonic findings of bowel sounds in the thorax may be auscultated in one-third of patients. Abnormal physical chest findings may lead to chest radiography. The chest x-ray, especially when performed after insertion

Fig. 5. Gangrenous stomach found on surgery.
of a nasogastric tube, is a useful screening tool. Careful interpretation of the chest x-ray is necessary to avoid confusing the findings with other more common conditions. Chest radiography is the primary diagnostic modality with 52% sensitivity, and repeated imaging may increase diagnostic sensitivity to 64%. The characteristic roentgenogram patterns of traumatic diaphragmatic hernia have been well described by Carter, Giuseffi and Felson and are: (1) an arch-like shadow resembling an abnormally high diaphragm (61% sensitivity), (2) extraneous shadows such as gas bubbles (45% sensitivity), or other abnormal markings above the usual level of the diaphragm (39% sensitivity), (3) a shift of the heart and mediastinal structure to the side opposite that of the defect, (4) disc or plate-like areas of the atelectasis in the lung adjacent to the arch-like shadow, and (5) the presence of air fluid levels in the affected hemithorax.

However, a normal chest roentgenogram does not rule out the diagnosis, for the hernia may lie entirely behind the heart shadow. The clinical diagnosis can be confirmed by contrast radiography, upper endoscopy, or exploratory laparotomy. When the stomach has been incarcerated and obstruction has occurred, gastric necrosis might develop. Perforation of the stomach may occur in the thorax or in the abdomen and cause mediastinitis, hydro pneumothorax, pleural effusion, empyema, tension pneumothorax, gastropleural fistula, pericarditis, peritonitis, subphrenic abscess, and respiratory embarrassment.

On admission, our patient presented with left chest pain and a left pleural effusion was found on the chest roentgenogram. A necrotic stomach was mistaken as a loculated pleural effusion on chest sonography. An old scar of about 1.5 cm in length over the left posterior axillary line at the level of the 6th thoracic vertebra was noticed during thoracentesis. This led us to retrospectively examine the patient’s history where he confessed to a long-forgotten history of a stab wound and subsequent thoracostomy drainage of the hemothorax 20 years previously. This trauma may have resulted in the diaphragmatic rupture and the herniation of the stomach into the thoracic cavity may have caused the unexplained recurrent gastrointestinal bleeding before. Initially, the herniated portion of the stomach was too small to be detected which explains the negative findings during the series of examinations two years previously. A recent sudden increase in intra-abdominal pressure causing a delayed herniation into the diaphragmatic defect is another probability to explain the normal chest x-rays previous to this admission. The history of trauma and the finding of gas bubbles in the series of repeated chest radiographs led us to consider diaphragmatic hernia in our differential diagnosis.

The stomach herniated into the thoracic cavity may have caused the unexplained recurrent gastrointestinal bleeding before. Initially, the herniated portion of the stomach was too small to be detected which explains the negative findings during the series of examinations two years previously. A recent sudden increase in intra-abdominal pressure causing a delayed herniation into the diaphragmatic defect is another probability to explain the normal chest x-rays previous to this admission. The history of trauma and the finding of gas bubbles in the series of repeated chest radiographs led us to consider diaphragmatic hernia in our differential diagnosis. Because an incarcerated gastric hernia is a surgical emergency, immediate surgery was employed by a left posterolateral thoracotomy approach. What was initially suspected as empyema was later confirmed as gastric contents. Retrospectively, we found that five radiologic characteristics described by Carter et al. were all present in the chest x-ray of this patient.

The mortality rate of patients with stran-
gulated diaphragmatic hernias has been reported to be as high as 50% with optimal treatment.\textsuperscript{11} Successful treatment depends on early diagnosis and prompt surgical intervention.\textsuperscript{1} Diaphragmatic rupture should be repaired. If gangrene or perforation of the stomach is encountered, localized resection of the involved stomach with reestablishment of gastric continuity is the procedure of choice. The empyema resulting from gastric perforation and the thoracogastric or gastro-pleural fistula should be managed by drainage of the empyema and decortication should be performed in the presence of a trapped lung.\textsuperscript{17}

**Conclusion**

Traumatic diaphragmatic hernias are rare and are sometimes not discovered until many years later. Correct diagnosis is often missed or delayed until during surgery or autopsy. The diagnosis of acute or chronic traumatic diaphragmatic hernias may be difficult and mostly depend on clinical suspicion. History and physical examination are important tools for diagnosis. In the majority of cases, there is a history of trauma,\textsuperscript{7} therefore, this entity should be looked for in all patients presenting with major trauma. Characteristic radiographic findings together with symptoms of acute abdomen or respiratory distress may suggest the diagnosis. Abnormal gas collection or gas bubbles above the diaphragm representing herniation of the stomach or bowel into the thoracic cavity and the presence of pleural effusion suggested that the herniated abdominal structures might be strangulated. Therefore, a high index of suspicion, past history of thoracoabdominal trauma, physical examination of the chest, and proper interpretation of chest x-rays are sufficient to ensure that diaphragmatic injuries are not overlooked.

**References**

箱頓性膈疝胃突出模擬膿胸

戴佩玲¹，林麗真¹，盧朝勇²，葉本芳²，楊明松³，郭文雄⁴

摘要

這位病人來院時表現胸痛和發燒兩天。胸部影像及胸腔超音波呈現左側大量肋膜積水。以胸腔超音波指引肋膜穿刺引流土褐色液體認為是膿胸。經左後側胸廓切開術後發現有部份的胃壞死來自橫膈破裂之處突出在左側胸腔內，並發現胃內裝著土褐色有臭味的胃液，證實左側肺無大量肋膜積水或膿胸，而是箱頓性膈疝胃突出。病患接受肋膜切除術，和部份切除胃近端有壞死的地方，並進行橫膈破裂之修補。箱頓性膈疝胃突出是外科急診。能夠及時診斷並積極外科治療可以拯救病人的生命。

關鍵詞：膿胸，箱頓性膈疝，胃壞死

聯絡人：戴佩玲醫師
112 台北市北投區振興街 45 號 振興復健醫學中心內科加護中心
電話：02-2826-4400 轉 6516, 6526 或 2097；E-mail: agathahuang2002@yahoo.com.tw
振興復健醫學中心內科部胸腔內科²，心外科部胸腔外科³，麻醉科⁴