Gastro-Pleural Fistula as a Complication of Esophageal Hiatal Hernia *

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THE PAST DECADE has witnessed a growing awareness and understanding of the pathological anatomy and physiology of the esophageal hiatal hernia. The presence of esophagitis, esophageal stricture and gastric hemorrhage are now well recognized as sequelae of neglected hiatus herniae.

We should like to report two instances of an unusual and severe complication of this condition—perforation of the herniated stomach into the chest cavity with the formation of a gastro-pleural fistula. In both patients the hiatus hernia was essentially asymptomatic prior to the perforation, and in both cases this complication proved to be fatal.

Case Reports

Case 1. J. K. (F. D. H. #6350). This 64-year-old white man was admitted on May 3, 1956 to the Francis Delafield Hospital for a survey biopsy of the prostate. He had no gastro-intestinal or respiratory complaints. Examination revealed only mild prostatic hypertrophy. Routine chest x-ray films showed on the lateral view, an air-fluid level suggestive of a large hiatal hernia (Fig. 1).

On May 11, 1956 the patient underwent an open perineal prostatic biopsy. During the operation he was placed in extreme lithotomy position with the thighs flexed sharply on the abdomen, producing marked flexion of the lumbar spine.

On the first postoperative day the patient developed sudden severe pain in the right lower posterior thorax. The pain was made worse by deep breathing and coughing. It was accompanied by shortness of breath. His temperature rose to 38.3° C. Examinations of the chest revealed very distant heart sounds. There was a hyperresonant percussion note over the right chest with distant breath sounds. At the right base the percussion note was dull and the breath sounds had a broncho-vesicular quality. Chest x-ray taken the following day revealed a small amount of fluid at the right base (Fig. 2). By the third postoperative day, the right pleural effusion had increased. On May 15, a thoracentesis was performed and 1,000 cc. of brown turbid fluid resembling gastric fluid was obtained. Methylene blue instilled into the stomach via a nasogastric tube appeared in the thoracentesis fluid. Because of this finding, a closed thoracotomy was performed with some improvement in the clinical status of the patient. On May 16, 1956, an open thoracotomy was performed with insertion of a large bore chest tube into the right pleural cavity. A gastrostomy was also performed via an abdominal incision. The only infra-diaphragmatic abnormality was a 5 cm. esophageal hiatus defect. The patient did poorly, and expired on the fourth post thoracotomy day.

Postmortem examination revealed that the cardia of the stomach as well as 25 per cent of the fundus of the stomach lay above the diaphragm. There was necrosis and a 0.5 cm. defect in the gastric wall which communicated with the mediastinum and the right pleural cavity. There was no peritonitis. Microscopic examination of the thoracic portion of the stomach revealed multiple acute ulcers.

Case 2. D. P. (F. D. H. #11581). This 70-year-old white man was admitted to Francis Delafield Hospital on February 6, 1959 because of hiccoughs, increasing constipation, abdominal cramps and weight loss. Examination revealed a moderate anemia, occult blood in the stools and a normal chest x-ray (Fig. 3). A barium enema x-ray showed the presence of an obstructing lesion in the ascending colon. After suitable preparation a laparotomy was performed on February 16, 1959 and a large tumor of the hepatic flexure adherent to the undersurface of the liver was found. An ileocolectomy with removal of a portion of the liver was performed. Pathological examination showed a large adenocarcinoma and multiple polyps, several of which had undergone malignant change. None of the mesenteric lymph nodes was involved by tumor.

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FIG. 1. Lateral view of the chest of patient J. K. with air-fluid level behind the cardiac shadow that is suggestive of a hiatal hernia.

Recovery was somewhat delayed by the patient's difficulty in taking oral fluids. On the fifth postoperative day, 36 hours after having had the nasogastric tube removed, he developed acute gastric dilatation. Reinsertion of a nasogastric tube quickly relieved this difficulty and progress on to an adequate oral intake was then rapid, despite continued hiccoughing. He remained afebrile and was discharged on the 23rd postoperative day.

He was seen in the outpatient department six weeks after his operation. At that time he was noted to be markedly dehydrated and emaciated. His wife stated that he had refused to eat or drink and continued to have hiccoughs. There was no abdominal pain or vomiting, and bowel movements were described as normal. He was re-admitted.

Physical examination revealed a well healed scar, a "doughy" feel to the abdomen, but no tenderness. There was marked pedal edema. The chest was clear to percussion and auscultation. With rehydration his appearance improved, and on the following day he took a regular diet without difficulty.

On the morning of the third hospital day he was noted to be moderately dyspneic in bed. Physical examination at this time revealed absence of breath sounds over the left chest. Emergency chest x-ray revealed complete collaspe of the left lung, and a hydropneumothorax of the tension type with deviation of the trachea to the right (Fig. 4). The patient's condition rapidly deteriorated. A closed thoracotomy was performed, and a large amount of brown fluid as well as air was removed from the left pleural cavity. Methylene blue given by mouth promptly appeared in the chest bottles, confirming the impression of a gastro-pleural fistula. He was given vasoconstrictors, blood and fluids,

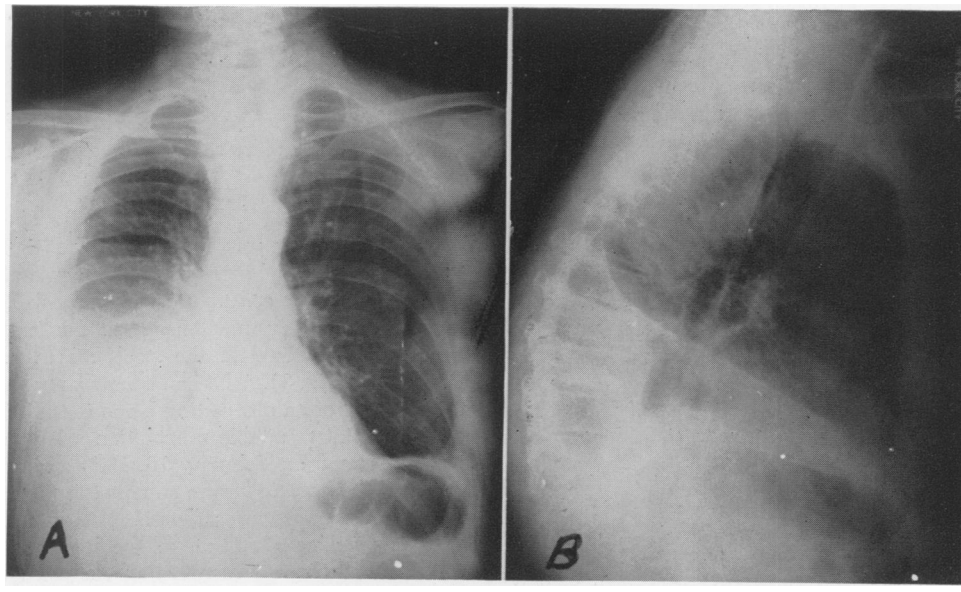

FIG. 2. Chest x-rays taken on the second postoperative day demonstrating the appearance of fluid in the right pleural cavity.

and was made ready for operation that afternoon. A left thoracotomy was performed. The left pleural cavity was filled with food particles. There was a hiatus hernia of the sliding type. In the cardia of the stomach there was a 0.5 cm. perforation which lay just anterior to the descending aorta (Fig. 5). Dissection in this area was deemed hazardous due to the inflammation and edema of the gastric wall and adjacent pleura. In addition, the patient's general condition was precarious. It was, therefore, elected to simply close the perforation and not attempt reduction of the hernia. A two-layer closure of the perforation was achieved with great difficulty due to the extensive tissue reaction. The pleural cavity was drained. A nasogastric tube was placed into the stomach and attached to suction.

Postoperatively the patient required huge doses of vasoconstrictors to maintain his blood pressure at a reasonable level. On the second postoperative day, the chest tube began to drain large amounts of gastric juice, and it was evident that the repair of the perforation had broken down. The patient received multiple blood transfusions because of continued gastric bleeding. He rallied for a while, but on the sixth postoperative day, he developed severe chest pain which appeared to be cardiac in origin. Despite supportive measures he expired later that evening.

Permission for only a limited postmortem examination was obtained. A sliding type of hiatus hernia was present. Approximately one third of the stomach lay within the chest cavity. There was retrograde intussusception of the greater curvature of the fundus of the stomach through the perforation in the cardia (Fig. 6).

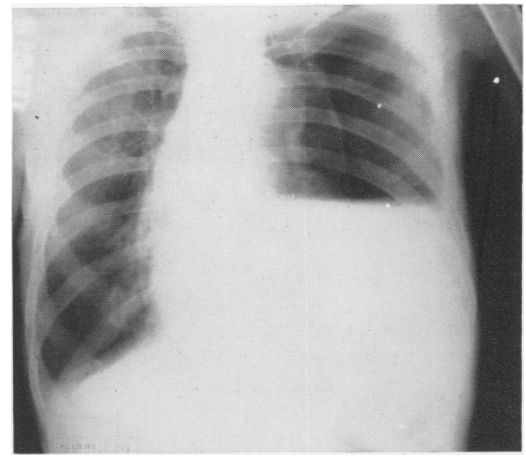

FIG. 4. Portable chest x-ray demonstrating a tension hydropneumothorax as a manifestation of a gastro-pleural fistula.

Discussion

Gastro-pleural fistulae may arise as a result of three different pathological conditions:

1. Perforation of the intrathoracic portion of the stomach in an esophageal hiatal hernia.

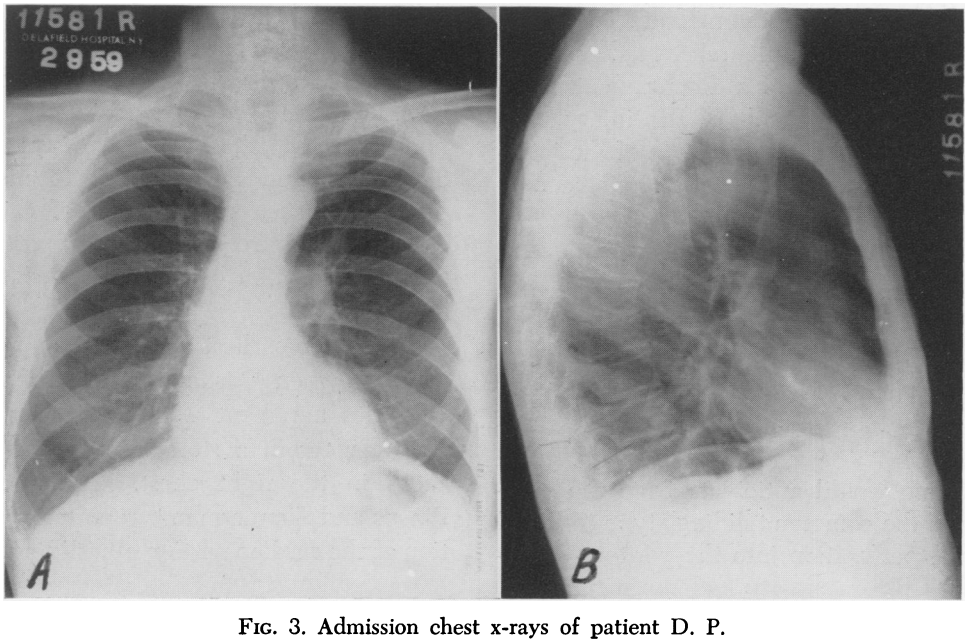

FIG. 3. Admission chest x-rays of patient D. P.

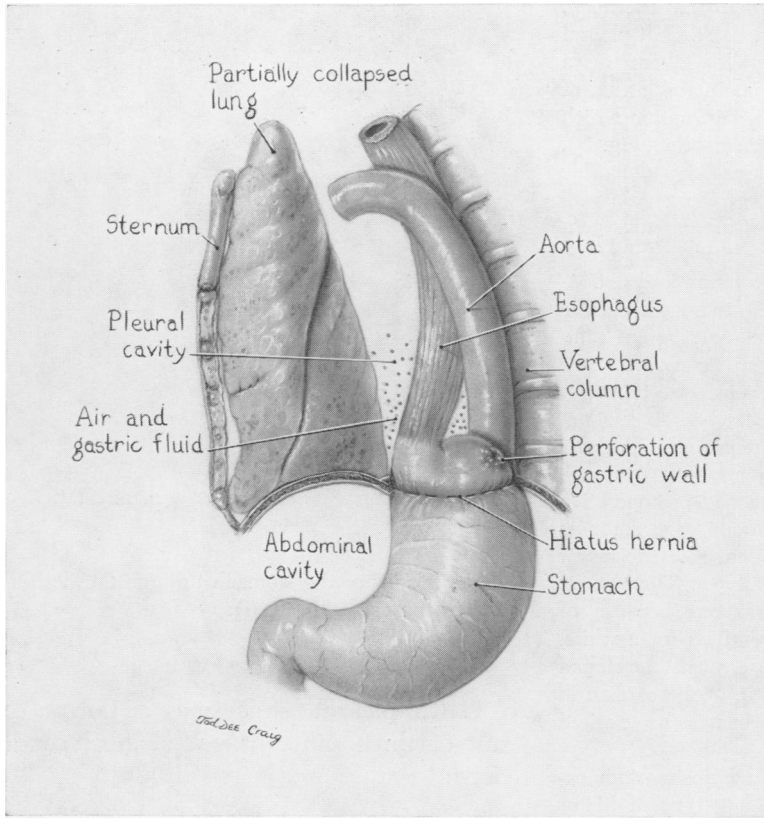

FIG. 5. Schematic representation of findings at operation. There is perforation of the gastric wall in the herniated portion of the stomach with resultant gastro-pleural fistula.

2. Traumatic:
   a. Acute injury to the structures involved with immediate formation of a gastro-pleural fistula.
   b. Formation of a diaphragmatic hernia as a result of the injury with subsequent perforation of the intrathoracic portion of the stomach at some later date.

3. Perforation of the stomach lying entirely within the peritoneal cavity, secondary abscess formation and erosion through the diaphragm into the pleural cavity.

Hiatal Hernia Perforation

As one would anticipate from the anatomy of the common "sliding" type of hiatal hernia, perforation into the peritoneal cavity, the pleural cavity and the mediastinal structures are all possible. Ulceration of the intrathoracic portion of the stomach in hiatal hernia occurs with such frequency that one might expect perforation and subsequent gastro-pleural fistula as a common complication. Apparently such is not the case. Reports of large series of hiatal herniae as published by Humphreys *et al.*,[7] Stensrud,[15] and Sweet[16] fail to mention perforation as a complication of this disease. Only infrequent case reports describe perforation of the stomach into the chest.

One of the earliest descriptions appeared in 1916, when Gordon[4] in a brief report describes a patient with perforation of a gastric ulcer in a stomach which was located in the right chest. More recently, Pincus and Zimmerman[13] reported perforation of the cardiac portion of a sliding hiatal hernia giving rise to bilateral gastro-pleural fistulae and death. Magendie *et al.*[11] also re-

ported in detail a patient in whom a known hiatal hernia caused obstruction, strangulation and finally perforation of the intrathoracic portion of the stomach with the formation of a gastro-pleural fistula. Blades and Hall [2] mention one case of a gastro-pleural fistula in a series of 66 patients with hiatal hernia but no details are given. Likewise Harrington [5] in a large series of hiatal herniae mentions two perforated gastric erosions but does not state whether a communication was established with the pleural cavity. Prompt surgical intervention resulted in cure.

Traumatic Gastro-Pleural Fistula

Acute gastro-pleural fistula as a result of trauma requires no discussion here.

Diaphragmatic hernia may occur secondary to wounds with herniation of the stomach through the weakened portion of the diaphragm. Reports of gastro-pleural fistulae occurring as a complication of "traumatic" diaphragmatic hernia appear with greater frequency as compared to the "spontaneous" hiatal hernia. Johnson and Twente [8] report perforation of a gastric ulcer into the pleural cavity four days after traumatic diaphragmatic hernia; however, one must consider the possibility of direct injury to the stomach wall at the time of injury, with delayed rupture. Of greater interest are the detailed case reports of Lindskog and Lawrence,[10] in which perforation took place long after the trauma in two patients. In one, the gastro-pleural fistula was iatrogenic occurring after a mistaken diagnosis of pneumothorax led to a thoracentesis and subsequent gastro-pleural fistula.

Erosion of gastric ulcers into thoracic structures other than the pleura following traumatic diaphragmatic hernia have oc-

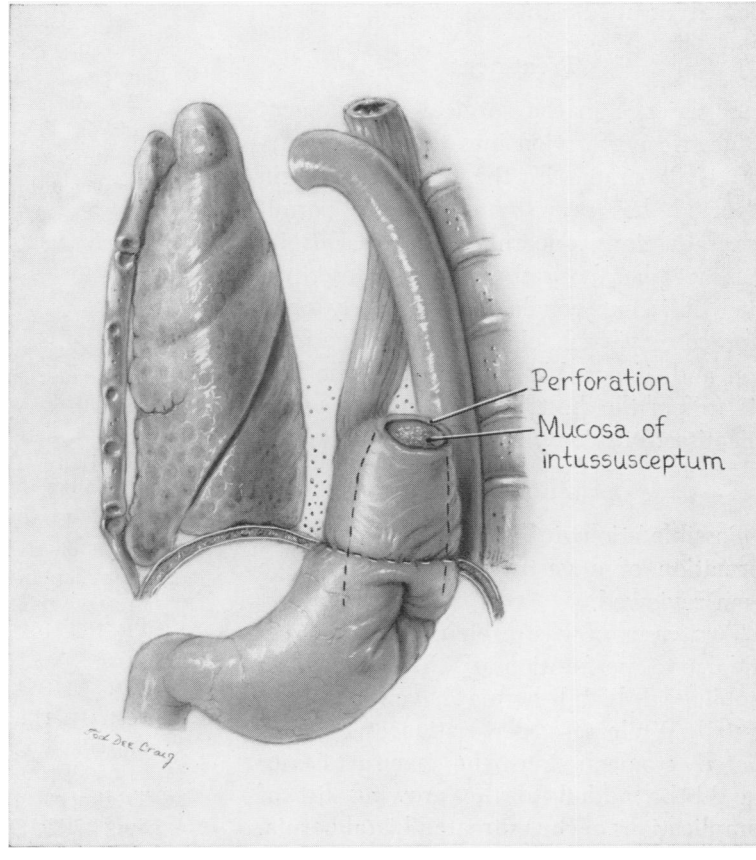

FIG. 6. Schematic representation of the findings at autopsy. There is intussusception of a portion of the greater curvature and reperforation of the herniated portion of the stomach.

casionally been reported. Liavaag [9] reports formation of a gastro-bronchial fistula several years after a war wound. Schaper [14] reports erosion of a gastric ulcer into a branch of the pulmonary artery 10 years after injury received in World War I. Erosion into but not through the wall of the thoracic aorta was reported by Frank and Hamilton [3] four years after a gunshot wound of the chest.

Gastro-Pleural Fistula Secondary to Intraperitoneal Perforation of the Stomach

Perforation of an ulcer in a stomach lying entirely within the abdominal cavity, leading to a gastro-pleural fistula, is unusual. Hudson *et al.*[6] reported only 25 such instances in a review of the literature. The majority of these cases were local abscesses in the peritoneal cavity with subsequent erosion through the diaphragm into the pleural or mediastinal spaces.

Treatment

Experience in the surgical management of gastric perforation into the pleural cavity, as illustrated by the two cases herein reported, has been too limited to permit generalizations concerning therapy. Despite the fact that both the patients described died, it is our conclusion that early open thoracotomy with closure of the perforation and, if possible, reduction of the hernia, offers the best hope in patients with this disastrous complication of hiatus hernia.

Summary

Possible etiological factors leading to the formation of a gastro-pleural fistula have been reviewed.

Two cases of gastro-pleural fistulae secondary to perforation of the stomach in esophageal hiatal hernia have been presented. While rare, perforation of the herniated stomach into the pleural cavity should be added to the growing list of complications of the untreated hiatal hernia.

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