

Acutely Obstructed Hiatal Hernia *

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DURING the past decade many worthwhile contributions have been made to the subject of esophageal hiatal hernia. Improved radiologic technics for detection of the hernia, a more intelligent selection of patients for operation, and simplification and refinements of the repair have increased the range of operability to include a host of sufferers to whom operation had formerly been denied. However, one phase of the problem which has received too little attention is the management of the acutely obstructed hiatal hernia in its various forms.

The repair of a hiatal hernia is undertaken either to relieve the patient of troublesome symptoms, or to deal with its more serious complications, and since acute obstruction is one of the less frequent it is not surprising that there is a general lack of understanding of this most serious condition. There would also appear to be some confusion of the terminology that has been used to describe hiatal hernia associated with obstruction. We are, therefore, including our own classification as it relates to incarceration and obstruction in the region of the esophageal hiatus.

Case reports of 15 patients, 13 dealing with acute obstruction and two with chronic incarceration without obstruction, in an operative experience of 537 cases of hiatal hernia at Rhode Island Hospital, are included in the present communication.

Case Reports

Case 1. I. K., a 71-year-old woman, was admitted at 11:40 p.m. on November 1, 1959. Fol-

lowing a heavy meal on the evening of admission, she had severe upper abdominal pain and retching. She was known to have heart disease and had been taking digitalis and for over two years, had required cortisone daily for severe asthma.

Examination revealed an acutely ill, elderly woman complaining of severe upper abdominal distress. She retched constantly, but was unable to vomit. A nasogastric tube was passed, but it did not appear to enter the stomach and no drainage was obtained. There was a firm, rounded, slightly tender mass palpable in the epigastrium. An emergency gastro-intestinal x-ray series showed the distal half of the stomach above the diaphragm with the greater curvature as its upper border and the proximal half of the stomach below the diaphragm with the pylorus overlying the cardio-esophageal junction (Fig. 1).

After adequate hydration, an emergency operation was performed through a right subcostal incision. A portion of tremendously dilated stomach presented in the left upper quadrant. The antral portion of the stomach had migrated into the chest through a large defect in the region of the esophageal hiatus where a volvulus had occurred. After inserting a trocar, and aspirating the abdominal segment of 2,000 cc. of fluid and a considerable amount of gas, fluid drained from the thoracic into the abdominal segment after which the thoracic portion literally fell out of the chest. There was no compromise of the blood supply to the stomach. A large, thickened, edematous sac was excised and the defect firmly closed with 1-0 silk, and a gastrostomy performed using a No. 22 catheter.

The patient's convalescence was uneventful and she had no further difficulty.

Case 2. N. J., a 75-year-old woman, was admitted on January 16, 1959, with a history of epigastric and left upper quadrant pain and intractable vomiting of 48 hours' duration. The vomitus was tea-colored, but there was no history of frank hematemesis, or melena. There had been a 40-pound weight loss in the preceding six-month period. Five years before, she had been admitted to another hospital with similar, but less severe symptoms and x-ray study revealed a large

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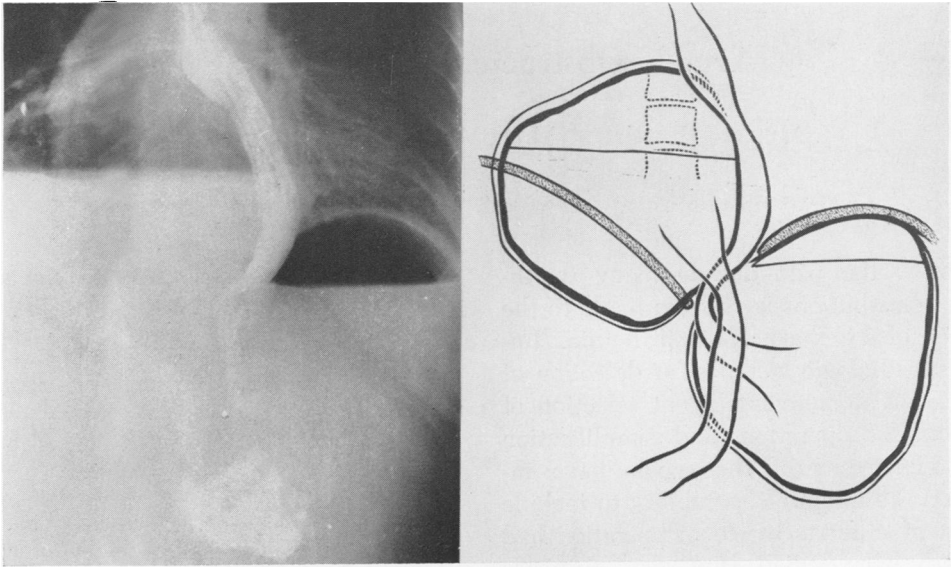


FIG. 1 (Case 1). A combination of the organo-axial and the mesentero-axial types of volvulus. This also is an example of the partial type of volvulus with the proximal portion below the diaphragm and the distal portion above.

hiatal hernia. Surgical treatment at that time was believed to be inadvisable.

Examination of the chest revealed hyperactive bowel sounds in the left hemithorax. There was hyper-resonance anteriorly on the left side up to the fourth rib which was interpreted as dilated stomach. Abdominal examination was essentially negative. Her temperature was 37.7° C., respirations 18, and blood pressure 110/86. A gastro-intestinal x-ray series revealed twisting of the stomach in the region of the proximal portion of the body as it was directed upward through the hiatus suggesting the presence of a volvulus. The x-ray impression was "upside-down stomach with evidence of a volvulus, the point of twisting being located at the junction of the cardia and media."

The patient obtained complete relief of symptoms after evacuation of a large amount of gastric contents by means of a Levin tube. At operation on January 22, the distal two-thirds of the stomach was found to be in the chest. The duodenum, which was tremendously elongated, extended upward to within one inch of the hiatus. The stomach was drawn down into the abdominal cavity without difficulty after which the hiatal opening was seen to be very large, easily admitting the entire fist. The defect was repaired, and a gastrostomy performed. The patient had a benign convalescence except for a partial atelectasis of the left lower lobe and she was discharged from the hospital on February 1.

Case 3. J. B., a 79-year-old woman, was admitted on September 12, 1955, with a chief complaint of moderately severe upper abdominal pain of five days' duration. The pain radiated to the back and chest. She had not vomited, and no history of previous gastro-intestinal disturbance was given.

Examination revealed an elderly woman with moderate upper abdominal distress. Loud gurgling bowel sounds were heard on auscultation of the lower chest bilaterally. There was some distention and tenderness in the upper abdomen with high pitched bowel sounds. Her temperature was 37.4° C., pulse 84, respirations 20, blood pressure 110/70, hemoglobin 13.9 Gm., and white blood cell count 11,600 (84% polys).

X-ray films of the chest and abdomen showed the stomach and a dilated loop of bowel above the diaphragm, and a distended loop of bowel in the right abdomen. Since the insertion of a Levin tube gave no relief, operation was performed on the day of admission after adequate intravenous therapy.

On opening the peritoneal cavity, the ascending and proximal transverse colon were found to be greatly dilated. The right colon was decompressed by placing a No. 28 catheter in the cecum through which a large quantity of gas and fluid was evacuated. There was an obstruction due to incarceration of both the transverse colon and the entire stomach in the thoracic cavity through

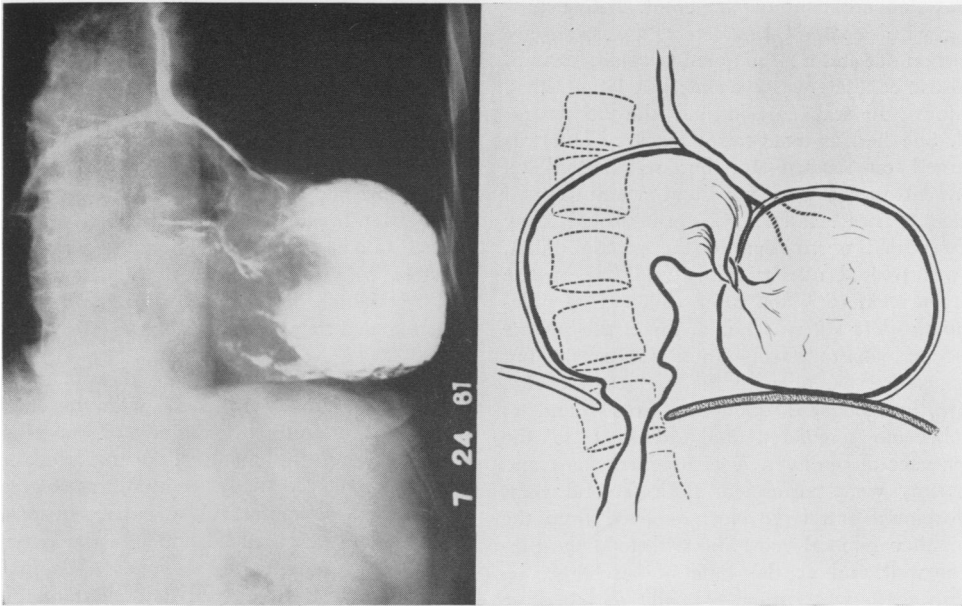


FIG. 2 (Case 4). The only case in the present series of acute obstruction within a sliding hiatal hernia. X-ray demonstrates torsion at the mid portion of the stomach.

the esophageal hiatus. Using gentle traction, the stomach and transverse colon were delivered into the abdominal cavity. The esophageal hiatus was found to be tremendously enlarged and measured 16×12 cm. It extended anteriorly to the sternum and posteriorly to the vertebral column. However, despite its large size, the margins were relaxed and it was easily closed to a normal size.

The patient withstood the procedure well and left the operating room in good condition. She obtained complete relief from her preoperative symptoms and was doing well until the evening of the second postoperative day when she developed a left hemiplegia and became unconscious. She never regained consciousness, and expired on September 22.

Case 4. E. L., a 75-year-old woman, was admitted on July 24, 1961, with a 48-hour history of abdominal pain and persistent vomiting. The pain was crampy in character and was generalized throughout the abdomen.

Ten years prior to admission, a hiatal hernia had been demonstrated by x-ray. Through the years this had been treated with diet, antacids, demerol, and by sleeping with her head elevated. An abdominal hysterectomy had been performed 35 years before. She was a moderately severe diabetic with a history of heart failure, and she was taking digitalis.

Examination revealed a thin, dehydrated

woman complaining mildly of abdominal pain. There was moderate abdominal distention with hyperactive bowel sounds. Her temperature was 36.6° C., pulse 90, respirations 24, blood pressure 116/64, hemoglobin 13.5 Gm., and the white blood cell count was 25,700 (84% polys).

An emergency gastro-intestinal x-ray series revealed a large sliding hiatal hernia with the entire stomach in the chest with complete twisting at the junction of the fundus and media. The esophagus was angulated and displaced to the left (Fig. 2). Barium entered the fundus, but did not pass into the remaining portion of the stomach. A narrowing was visualized between the fundus and media with torsion of the folds in this region. Numerous distended loops of small bowel were present in the lower two-thirds of the abdomen consistent with small bowel obstruction.

After routine preparation, operation was performed on July 25. The preoperative diagnosis was small bowel obstruction due to adhesions and incarceration of the hiatal hernia from increased abdominal distention. Therefore, a long paramedian, rather than the usual right subcostal, incision was used. The terminal ileum, which was collapsed, was followed to the pouch of Douglas where adhesive bands were divided and an obstruction relieved. The pylorus was visible below the diaphragm, but the remainder of the stomach was in the chest. By making gentle traction on the pylorus, a tremendously dilated stom-

ach was delivered out of the chest. Before proceeding with repair of the defect, a gastrostomy was carried out and a large quantity of air, barium, and gastric contents was evacuated. A large, thick, edematous sac was excised and the hernia repaired. She had an uneventful recovery and was discharged on August 16, but re-admitted on August 18 because of persistent vomiting and evidence of heart failure. Gastro-intestinal x-ray series revealed obstruction of the gastric outlet. This was treated conservatively and the cardiac decompensation corrected after which deep phlebitis in the left leg was noted. Since the pyloric obstruction persisted, reoperation was carried out on August 25. On opening the peritoneal cavity, the greatly elongated duodenum was found to have become angulated and adherent to the undersurface of the liver. A gastroenterostomy and gastrostomy were performed. Both femoral veins were explored and large clots removed from the left common femoral vein. She withstood the procedures well and at the time of discharge, on September 19, was eating normally and had no further evidence of obstruction. A gastro-intestinal series showed a normally-functioning gastroenterostomy.

The patient was last seen on December 4, 1962, at which time her general condition was excellent. She was free of all complaints and leading a normal and active life.

Case 5. E. A., a 72-year-old woman, was admitted on February 7, 1955, with symptoms and findings consistent with a deep thrombophlebitis of the right lower leg. At the time of admission she gave a three-year history of intermittent severe episodes of epigastric distress, retrosternal pain, and nausea and vomiting which were aggravated by lying down. These attacks usually lasted three to four days during which time she was able to retain very little of her oral intake. The most recent attack occurred two weeks prior to the present admission. A gastro-intestinal x-ray series obtained eight months previously demonstrated a large hiatal hernia. She had lost 40 pounds during the past year.

The patient did not appear acutely ill, but was malnourished and seemed older than her stated age. Calf tenderness and edema were present in the right lower extremity. Numerous extrasystoles were detected and there was minimal cardiac enlargement to the left. Epigastric tenderness was elicited by deep palpation.

Chest x-ray films demonstrated a large hiatal hernia. An electrocardiogram revealed an irregular rhythm due to occasional ventricular and auricular extrasystoles.

The patient was treated with bed rest and anticoagulants. The thrombophlebitis subsided, but she continued to vomit intermittently. In spite of a strict medical regimen, the vomiting persisted, and on the 22nd hospital day repair of a huge incarcerated paraesophageal hernia was carried out. She tolerated the operative procedure well and her convalescence was uneventful until the seventh postoperative day when she suddenly went into shock. An electrocardiogram was consistent with the diagnosis of pulmonary embolus. Her condition deteriorated rapidly and she expired on her eighth postoperative day.

Case 6. J. T., a 67-year-old woman, was admitted on January 15, 1957, with the chief complaint of intermittent vomiting of one-year duration. During the month prior to admission she had experienced daily vomiting associated with substernal discomfort of a rather severe nature. Nine years before this admission the patient had had a severe episode of upper abdominal pain radiating to the anterior mid-chest. Subsequent work up at another hospital at that time demonstrated a hiatal hernia. She had been a known hypertensive for the past six years and had had occasional syncopal episodes.

At the time of admission the patient was not acutely ill. Her blood pressure was 210/112, and the heart was enlarged slightly to the left. Examination of the lungs and abdomen was negative. A chest x-ray film demonstrated a very large esophageal hiatal hernia extending beyond the cardiac borders in the posteroanterior view producing a shadow 18 cm. in diameter. The electrocardiogram demonstrated some degree of coronary insufficiency and left ventricular strain.

At operation, all of the stomach, which was four to five times its normal size, and most of the transverse colon were found to be contained within a hernial sac in the posterior mediastinum. The hernia was easily reduced and a routine repair carried out and a gastrostomy performed.

The patient tolerated the procedure well, but on the second postoperative day developed a transitory shock-like state and a left hemiplegia. She was transferred to the medical service on the tenth postoperative day for further care, but expired soon afterward following a second similar episode.

Case 7. J. W., a 76-year-old woman, was admitted on November 24, 1960, with a history of sudden and severe pressure-like pain in the substernal and epigastric regions of six hours' duration. Two hours after the onset of pain, she had vomited once. This was followed by persistent retching. She stated that the pain was worse when

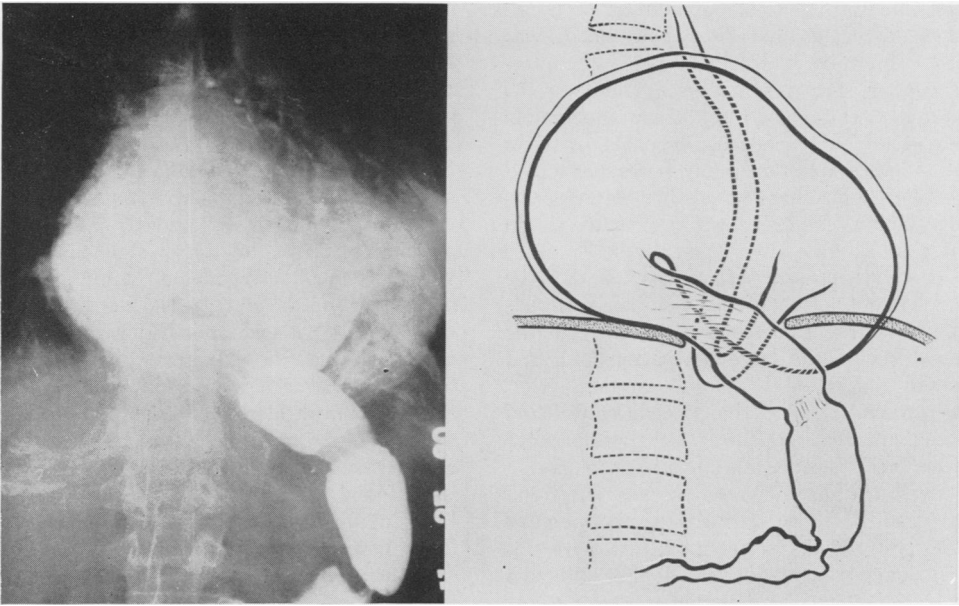


FIG. 3 (Case 7). The most common type representing an upside-down stomach and a complete volvulus. The stomach has rotated through its long axis (organo-axial).

lying down and on deep breathing and radiated to her back and shoulders. It was somewhat relieved by sitting up and leaning forward. She had had a similar attack one year before which lasted for a few hours. A gastro-intestinal x-ray series done four years prior to admission revealed an esophageal hiatal hernia.

The patient was an elderly, well developed, and well nourished woman. She was sitting up in bed complaining of constant lower substernal pain and appeared to have some difficulty breathing. Her temperature was 36.1° C., pulse 88, respirations 32, blood pressure 180/108. Breath sounds were diminished at the base of the left chest. The abdomen was negative except for moderate tenderness in the epigastrium. Her white blood cell count was 10,500 (80% polys) and hemoglobin 10.4 Gm.

On the day following admission, she was seen in consultation and an emergency gastro-intestinal x-ray series ordered. X-ray films of the chest disclosed an air fluid level behind the heart consistent with a large hiatal hernia. X-ray of a barium swallow demonstrated "an unusually large paraesophageal hiatal hernia with the entire fundus and media of the stomach situated in the thoracic cavity in an inverted position." It was possible to pass a Levin tube into the stomach with the recovery of a large amount of gastric contents with some relief of symptoms.

At operation on November 26, the pylorus was

visible beneath the diaphragm, but the remainder of the stomach was in the chest. Using gentle traction the stomach was delivered into the peritoneal cavity, a large edematous sac excised, and a routine repair of the defect carried out.

The patient's convalescence was uneventful and she was discharged on December 7 and has remained well.

Case 8. E. C., an 83-year-old woman, was admitted on June 15, 1959, after a 48-hour history of nausea and vomiting. These complaints started suddenly, awakening her from sleep, and subsequently she vomited each time she ingested solid food or liquid. During the two-year period prior to admission, she had experienced several similar attacks of prolonged vomiting. She also gave a history of epigastric distress following meals of many years' duration that was somewhat relieved by standing.

Physical examination revealed a well developed and well nourished, moderately dehydrated, elderly woman who did not appear acutely ill. Her temperature was 37.2° C., respirations 20, pulse 80, and blood pressure 188/98. A few fine rales were present at both lung bases and the heart was enlarged slightly to the left. A Grade III harsh systolic murmur was present over the aortic area and A_2 was barely audible. The abdominal examination was negative.

Shortly after admission a Levin tube was in-

roduced into the stomach and 700 cc. of coffee ground material, positive for occult blood, was obtained. The tube was left in place on intermittent suction. The patient's hemoglobin was 8.3 Gm. and her white blood cell count moderately elevated. Mild azotemia and hypokalemia were present. A gastro-intestinal x-ray series performed shortly after admission revealed a large para-esophageal hernia with the entire stomach within the chest.

At operation on the second hospital day the preoperative impression of incarceration was substantiated and the stomach was returned to the abdominal cavity, the large defect repaired, and gastrostomy performed.

The patient tolerated the procedure well and had a benign course until the ninth postoperative day when she became febrile and developed a rapid irregular pulse. Her course was downhill thereafter, and she died on the 14th postoperative day. At postmortem examination, extensive bilateral pulmonary emboli were found, although the source could not be determined.

Case 9. M. W., a 71-year-old woman, was admitted on November 14, 1960. She had two previous admissions, the first on December 11, 1956, with severe and persistent vomiting and upper abdominal pain. X-ray examination revealed gallstones and an incarcerated hiatal hernia which reduced itself during the course of the gastro-intestinal study. She was discharged on December 16, but re-admitted on November 18, 1958, with the complaint of nausea and vomiting for four days. Since discharge she had mild symptoms relating to her stomach, but no acute attacks. She appeared weak and she was severely dehydrated. BUN level was 69 mg.%. Stools were negative for occult blood. A Levin tube was passed with the evacuation of a large quantity of gastric contents with immediate relief of symptoms. She was discharged on November 23.

Three days prior to the present admission, she again had recurrence of persistent and severe vomiting. She appeared critically ill and was semi-comatose. Her pulse was weak and her blood pressure unobtainable, but she showed marked improvement after intravenous therapy and insertion of a nasogastric tube which resulted in escape of a considerable amount of gastric contents. Her hemoglobin was 12.9 Gm., white blood cell count 15,200 (83% polys) and blood glucose 169, urea 47, creatinine 2.1 mg.%. On November 16, her hemoglobin dropped to 8.8 Gm. and she was passing tarry stools. A gastro-intestinal x-ray series again revealed the stomach to occupy an upside-down position within the chest with narrowing and twisting of the mucosal folds of the esophago-

gastric junction and of the gastric outlet. The patient was seen for the first time in surgical consultation on November 20. On November 22, she suddenly passed 800 cc. of bright red blood through the gastric tube and became shock-like and at 8:30 p.m. she had a convulsion and fainted. Her condition improved following multiple blood transfusions but bleeding continued and an emergency operation was performed. On opening the peritoneal cavity, the upper abdomen was filled with a tremendously dilated gastric fundus with obstruction of the outlet. The antrum, transverse colon, and great omentum had herniated into the chest through the hiatus. After reducing the hernia, the stomach was widely opened and found filled with fresh blood and clots which were evacuated. The stomach was thoroughly flushed out and a search made for bleeding points, but none were found. The stomach was closed, a gastrostomy performed, and the hernia repaired. Nine hours postoperative, the patient had another massive hemorrhage and went into shock. She was again taken to the operating room and the stomach opened and found to be filled with fresh blood. This was evacuated and a high subtotal gastrectomy carried out. Multiple bleeding points from the mucosa of the remaining small cuff of stomach were sutured before performing the gastrojejunostomy. She was returned to the ward in poor condition. Frequent tracheobronchial aspirations were required and on the following morning a tracheotomy was performed with rather dramatic improvement in her general appearance. No further bleeding occurred and the remainder of her convalescence was unremarkable except for wound infection which delayed her discharge from the hospital.

The patient has remained well and has had no further gastro-intestinal symptoms.

Case 10. E. G., a 59-year-old woman, was admitted on November 9, 1957, with severe dyspnea. The respiratory distress was so acute that the patient was unable to give a history, but it was determined from previous records that she had sporadic digitalis therapy in the past because of a history of *heart disease*. Four years previously the patient had been admitted to this hospital because of dyspnea and intermittent anterior chest pain. A profound iron deficiency anemia was detected and a gastro-intestinal x-ray series demonstrated a large, para-esophageal hernia involving the entire fundus and a portion of the media. Electrocardiogram at that time was normal.

At this admission the patient was markedly orthopneic and cyanotic. Her temperature was 37.7° C., pulse 160, respirations 40, and blood pressure 100/60. Coarse rales and rhonchi were

present throughout both lung fields. The abdominal examination was negative. No peripheral edema was present. A technically unsatisfactory portable chest x-ray film was interpreted as showing bilateral pleural effusion.

A provisional diagnosis of acute pulmonary edema secondary to heart failure was made and the patient was treated intensively with rotating tourniquets, aminophylline, morphine, phlebotomy, and rapid digitalization despite which her condition deteriorated rapidly, and she expired 4½ hours after admission.

At autopsy a severe pneumonic process in the right lung was apparent. In addition, a large obstructed, incarcerated para-esophageal hernia was found severely compressing the left lung and displacing the heart anteriorly and to the right. Within the sac was 75 per cent of the stomach containing 1,000 cc. of fluid, almost the entire gastrocolic omentum, and 22 cm. of transverse colon. The heart itself showed only mild coronary arteriosclerosis, and there was a notable lack of signs of chronic cardiac disease, or failure.

Case 11. L. H., a 73-year-old woman, was admitted on May 28, 1957, because of nausea, vomiting, and epigastric pain occurring intermittently over the previous ten-year period. As a rule the pain subsided shortly after vomiting. The episodes gradually became more frequent, the most recent attack, which lasted for two weeks, occurring four weeks prior to the present admission. A gastro-intestinal x-ray series performed soon after this demonstrated a large incarcerated and obstructed parahiatal hernia which also contained transverse colon. Since the attack, liquids were tolerated only in small amounts.

Physical examination on admission was unrevealing. The routine laboratory studies were all normal. Operation was promptly carried out in the routine fashion. The hiatal defect was five inches in diameter, but was closed easily after returning the stomach to the abdominal cavity. After a smooth postoperative course, the patient was discharged and remained asymptomatic until the time of her death from an unassociated condition almost two years later.

Case 12. M. W., a 57-year-old woman, was admitted on October 1, 1962, with upper abdominal and low anterior chest pain associated with intermittent vomiting of one week duration. Three days prior to admission the pain became intense and all oral intake was vomited soon after ingestion. In the patient's own words, "it felt as if a large balloon was continuously expanding" in the lower chest and upper abdomen. Two years previously a hiatal hernia had been detected by

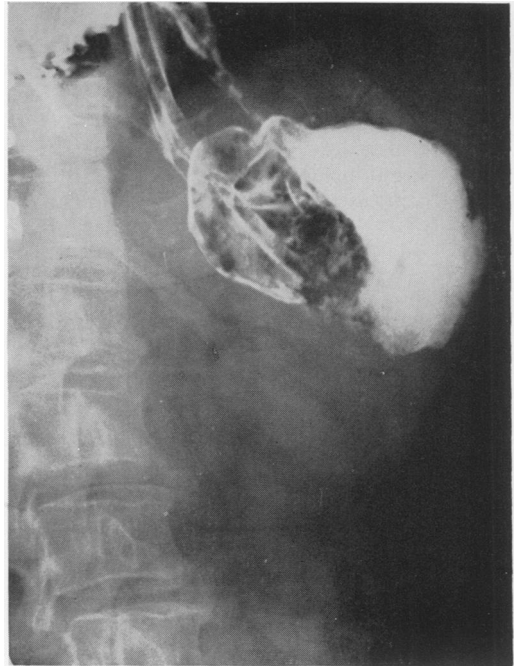


FIG. 4 (Case 12). This x-ray is of interest since it demonstrates the Levin tube lying within the proximal dilated segment allowing for decompression with relief of obstructive symptoms. Another example of partial organo-axial volvulus.

chest x-ray during work up for hypertension, but except for occasional heartburn during the past year there were no gastro-intestinal complaints.

On admission the patient was in moderate distress from abdominal pain and nausea. Her blood pressure was 180/110, pulse 104, temperature 37.6° C. White blood cell count was 17,200 with a shift to the left in the differential count. BUN level was 73 mg.%. Chest x-ray films demonstrated a large air fluid level behind the heart. The heart and lungs were negative. There was moderate tenderness to palpation in the left upper quadrant. A nasogastric tube was inserted with the recovery of 1,200 cc. of fluid and a large amount of gas, affording great relief to the patient. Gastro-intestinal x-ray series performed soon thereafter confirmed the presence of an obstructed parahiatal hernia (Fig. 4). The media and antrum of the stomach were herniated into the thoracic cavity in an upside-down position.

After three days of nasogastric suction and vigorous intravenous therapy, operation was performed and the roentgenological findings were corroborated. The hernial defect measuring 9.0 × 6.0 cm. was easily closed after reducing the distal two-thirds of the stomach into the abdominal

TABLE 1
Classification

- A. Incarcerated hiatal hernia with obstruction
 1. Acute
 - a. Progressive
 - b. Fulminating
 - c. Intermittent
 2. Chronic
- B. Incarcerated hiatal hernia without obstruction
 1. Chronic
 2. Intermittent
- C. Strangulated hiatal hernia
 1. Progressive
 2. Fulminating

cavity. A gastrostomy was also carried out. A benign postoperative course ensued and when seen one month later patient was asymptomatic.

Classification and Symptomatology

The acutely obstructed hiatal hernia has been discussed under various subject headings in the literature, but relatively little has been written about this disorder in those reports dealing specifically with the complications of hiatal hernia.^{2, 4} Scattered case reports have appeared in articles concerning incarcerated and obstructed diaphragmatic hernias, strangulated diaphragmatic hernias, and gastric volvulus.^{5-7, 12, 15} Publications which refer to incarcerated or strangulated diaphragmatic hernias have usually grouped traumatic cases, hernias through the foramina of Morgagni and Bochdalek, and hiatal varieties together, with the traumatic in vast preponderance.^{3, 8, 11, 15, 16} Gastric volvulus is usually the cause of acute obstruction within hiatal hernia, but articles on volvulus have not been primarily concerned with stressing this as a complication of hiatal hernia. As a result of these factors, the entity of the acutely obstructed hiatal hernia has not received proper emphasis and there has been some confusion regarding terminology.

In describing the acutely obstructed hiatal hernia, the word incarceration has

sometimes been used alone, implying obstruction. This is incorrect since incarcerated hiatal hernia not infrequently occurs without obstruction. We have used the term *incarceration* regarding hiatal hernia to signify irreducibility as determined by clinical and roentgenographic means. It has been our experience that the acutely obstructed cases are reduced at operation without difficulty and that adhesions about the herniated organ are generally minimal, or absent. We would thus disagree with those who believe that it is necessary for the herniated organ to be bound down by adhesions in order to fulfill the requirements for incarceration.¹⁵

The terms *incarceration* and *strangulation* have sometimes been used interchangeably, which, of course, is incorrect since the term *strangulation* should only be used if the blood supply to the stomach is so compromised that resection must be seriously considered or actually carried out. Strangulation is most likely to occur in the organo-axial type of gastric volvulus when the degree of rotation continues beyond 180 degrees. Although it is relatively uncommon, a number of cases have been reported, most often secondary to gastric volvulus within para-esophageal hernia.^{1, 7, 9, 13, 14} There was only one case of strangulation with perforation in the present series. Although relatively rare in hiatal hernia, it is a much more common occurrence in the traumatic type of diaphragmatic hernia.

Our classification of incarcerated and strangulated hernia is presented in Table 1.

Incarcerated Hiatal Hernia With Obstruction. The acute group with progressive or fulminating symptoms is the one with which we are primarily concerned. We have treated 13 such cases whose case reports are included in this paper. Twelve were operated upon and one died on the medical service before the diagnosis was established. The acute obstructive symptoms were secondary to a

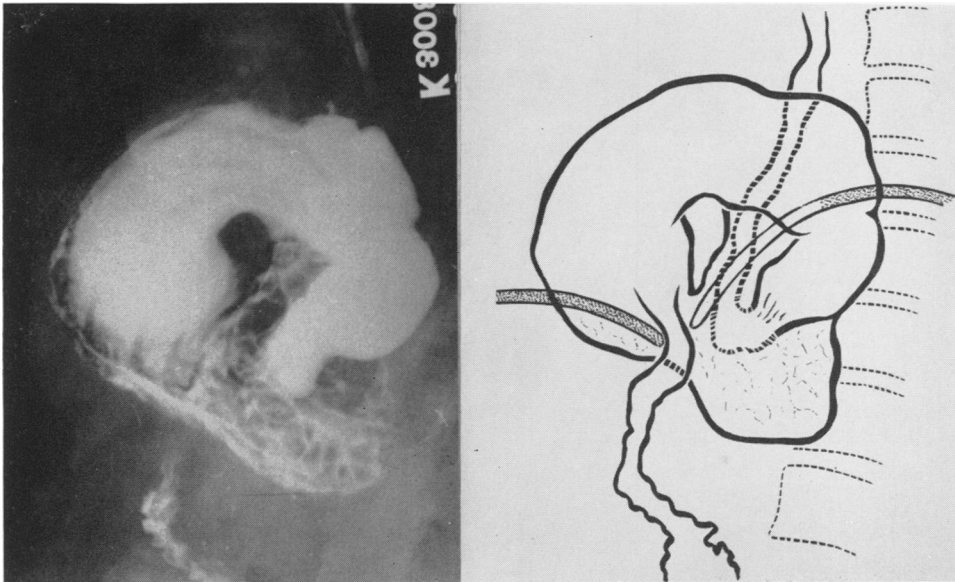


FIG. 5 (Case 13). An example of chronic incarceration without obstruction.

gastric volvulus in 12 cases and to a torsion of the stomach in the other case. All 12 cases of volvulus occurred within para-esophageal hernias, or in a combination of the para-esophageal and sliding types and the case of torsion within a huge sliding hiatal hernia. All except two of the patients gave a history of sudden onset of epigastric and/or retrosternal pain followed by vomiting or retching, and in several the pain radiated to the back. As a rule there was very little frank vomiting but persistent retching was common. Three patients noted marked shortness of breath and one was unable to give a history because of pronounced orthopnea. Two gave a history of marked weight loss. In this series most of the patients had a steadily progressive course during which the clinical status worsened until surgical intervention became a necessity and in others a fulminating course was observed with rapid deterioration of their clinical condition. However, when it was possible to pass a Levin tube beyond the point of obstruction, or in the case of a partial volvulus, if the proximal

segment could be decompressed, the acute symptoms often were relieved. Some gave a past history of intermittent acute attacks lasting from hours to days, but finally resolving spontaneously.

There is another group of individuals with sliding hiatal hernia who have developed esophagitis, or stricture with secondary shortening of the esophagus and retraction of the stomach into the chest. Obstruction, when present, is partial but vomiting and retching may occur. We have included this group under the chronic subdivision of incarcerated hiatal hernia with obstruction for completeness, but have made no attempt to include our experience with this group.

Incarcerated Hiatal Hernia Without Obstruction. In our experience incarceration without obstruction is relatively common, and two case reports from this group are included because of the striking x-ray findings (Fig. 5, 6) and are particularly remarkable in view of the relative lack of symptoms. Each patient has had a chronically incarcerated para-esophageal hernia

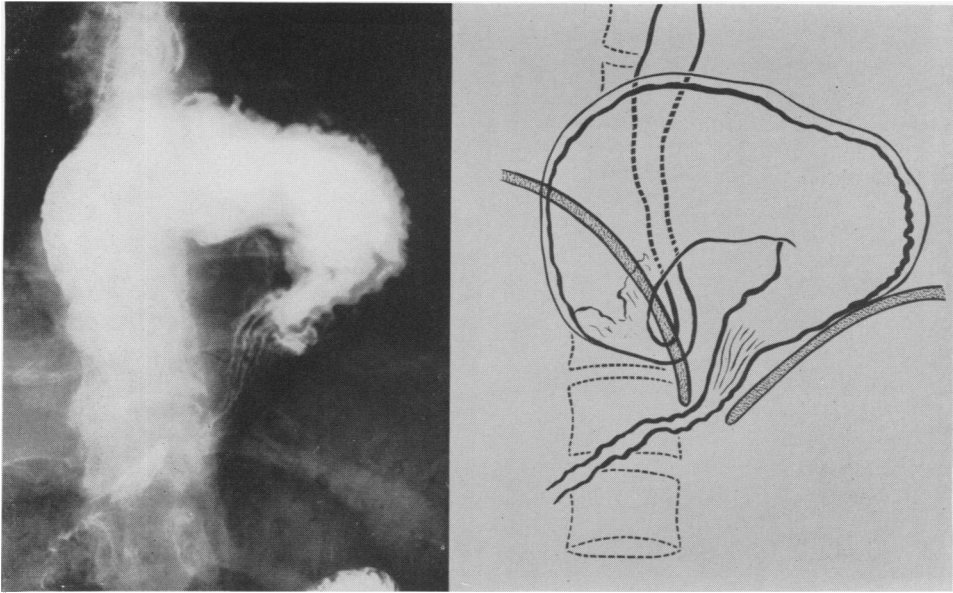


FIG. 6 (Case 14). Another nonobstructed chronic incarceration. A good demonstration of the mesentero-axial variety of volvulus.

containing inverted stomach as demonstrated by periodic x-ray studies over a span of years.

Case 13. F. S., a 66-year-old woman, was admitted on October 24, 1961, with a four-year history of paroxysmal tachycardia. She had been fairly well controlled by digitalis until one month prior to admission. At that time she began to notice more frequent palpitations associated with generalized weakness and electrocardiogram showed auricular fibrillation.

Examination on admission revealed a moderately obese female in no acute distress. The blood pressure was 150/100, the apical rate 100 and irregular, and the radial rate 86 and irregular. A gastro-intestinal x-ray series demonstrated a large para-esophageal hernia containing a completely inverted stomach (Fig. 5). Despite increasing the digitalis dosage and a trial of quinidine, the fibrillation persisted intermittently. It was believed that the large hernia within the chest was the cause of the cardiac instability and therefore a repair of the hiatal hernia was carried out on the seventh hospital day. At operation the findings of the gastro-intestinal x-rays were substantiated and reduction of the stomach and repair of the hernia were carried out. The irregular rhythm persisted for six days postoperatively. It then disappeared and the patient was discharged in excellent condition on the eighth postoperative

day. Regular follow up has failed to demonstrate a recurrence of the irregular heart rate.

Case 14. A. S., a 48-year-old priest, was seen on January 21, 1960, with a chief complaint of pain in the lumbodorsal region for several years. For five years he had had epigastric distress following most meals. This had been somewhat worse during the past year. Recently, on two occasions, he had been awakened at night with a sensation of smothering which was relieved after sitting up. He had no heartburn and no loss of weight. Except for an inguinal herniorrhaphy at the age of 14, his past history was negative. Intravenous pyelogram and x-rays of the spine were negative. A gastro-intestinal x-ray series revealed that the entire stomach was within the thoracic cavity and inverted (Fig. 6). There was no obstruction and no intrinsic gastric lesion. Operation was recommended but refused by the patient.

The other group of chronically incarcerated hiatal hernia without obstruction includes those of the short esophagus type with the proximal portion of the stomach retracted into the chest. Intermittent incarceration may occur with either para-esophageal or sliding varieties. On numerous occasions, roentgenologists have noted the entire stomach completely herniated

TABLE 2. Summary of Cases with Obstruction

	Sex, Age	Type	Classification	Results	Cause of Death
1.	F, 71	Para-esophageal	Fulminating	Living and well	
2.	F, 75	Para-esophageal	Progressive	Living and well	
3.	F, 79	Combined	Progressive	Died	Cerebral vascular accident
4.	F, 75	Sliding	Progressive	Living and well	
5.	F, 72	Para-esophageal	Progressive	Died	Pulmonary embolism
6.	F, 67	Para-esophageal	Progressive	Died	Cerebral vascular accident
7.	F, 76	Para-esophageal	Progressive	Living and well	
8.	F, 83	Combined	Progressive	Died	Pulmonary embolism
9.	F, 71	Para-esophageal	Fulminating	Living and well	
10.	F, 73	Para-esophageal	Progressive	Living and well	
11.	F, 57	Para-esophageal	Progressive	Living and well	
12.	F, 67	Para-esophageal	Fulminating	Died	Gangrene and perforation of stomach, mediastinitis, and peritonitis
13.	F, 59	Para-esophageal	Fulminating	Died (not operated)	Acute obstruction, pneumonia

into the chest only to find at later examination that it had returned to the abdominal cavity.

Strangulated Hiatal Hernia. We have had only one patient with strangulation of the stomach and perforation. In this group the course is usually steadily progressive, or fulminating. Although the history is similar to that of the incarcerated type, physical findings are generally more striking and no doubt exists as to the severity of the illness. Once gangrene and perforation of the stomach have occurred with peritonitis and mediastinitis, irreversible shock is the rule and the salvage rate is extremely small.

Case 15. L. F., a 63-year-old woman, was admitted to the medical service on November 10, 1962, complaining primarily of chest pain. While eating her evening meal on the day prior to admission, she noted sudden inability to swallow which was almost immediately followed by vomiting and then by left lower chest pain. The pain, dull in quality, persisted and vomiting occurred each time fluid or solid was ingested. A provisional admission diagnosis of coronary thrombosis was made.

The examining physician noted on admission that the patient was not in acute distress. Her blood pressure was 150/100 and the pulse 100. Except for obesity, there were no significant findings. Complete blood count was normal and an electrocardiogram demonstrated no evidence of coronary artery disease. A chest x-ray film showed a large air fluid level behind the heart and this gave the initial clue to the correct diagnosis.

Shortly after admission the chest pain worsened and the patient continued to vomit after taking fluids by mouth. A gastro-intestinal x-ray series performed approximately 24 hours after admission demonstrated a completely obstructed parahiatal hernia with the distal stomach in the chest. Unsuccessful attempts were then made to pass a Levin tube into the stomach. The patient's discomfort increased, her pulse rate became rapid, her blood pressure dropped to hypotensive levels, and there was a rapid deterioration of her general condition. A surgical consultant who saw the patient at this time advised immediate operation.

At operation, gas escaped on entering the peritoneal cavity and it became apparent that there was massive peritoneal contamination with gastric contents and barium. After copious irrigation, an irregular perforation measuring 2.5×7.5 cm. in diameter was seen in the posterior wall of the stomach with a large area of surrounding gangrene. Because of the patient's precarious condition, it was believed unwise to repair the large hernial defect. The stomach was returned to the abdominal cavity and after excision of the gangrenous areas, the viable edges were reapproximated and a gastrostomy performed.

The patient remained in poor condition following operation and despite energetic efforts to resuscitate her, she died 24 hours following operation. Postmortem examination demonstrated severe peritonitis, pleuritis, and mediastinitis.

Clinical and Roentgenological Findings

All 13 patients in the incarcerated group with acute obstruction were women, the oldest being 83 and the youngest 57 with an average age of 71. Although several

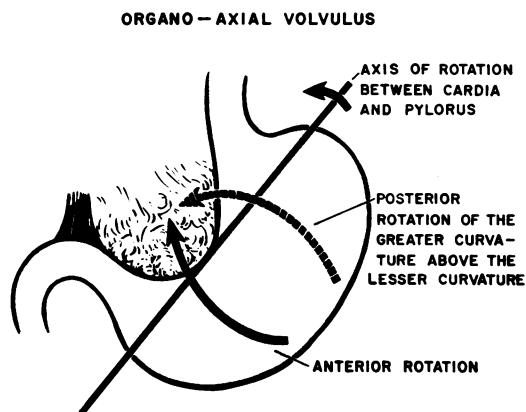


FIGURE 7.

appeared acutely ill at the time of admission, the majority were not in serious straits, and none were in shock. Five of the 13 patients were moderately dehydrated, but there were no pronounced derangements in electrolyte balance. Some degree of emaciation was exhibited in two patients. Five had an essentially negative abdominal examination and the remainder demonstrated a moderate degree of abdominal tenderness, usually localized in the epigastrium. Two were noted to have abdominal distention, one of which however also had small bowel obstruction from pelvic adhesions, and none were found to have the concavity in the epigastrium that has been recorded in cases in which the stomach has migrated into the chest. Examination of the chest revealed decreased breath sounds at the left base in two patients and in two others bowel sounds were present with associated hyperresonance. Rales at the base of the lungs were detected in six patients and in seven examination of the chest was reported as negative. The only patient who had a pleural effusion had severe associated pneumonia. Notation was made in several charts that a Levin tube could not be introduced into the stomach. Practically all patients had at least one cardiovascular abnormality which is not unusual for the age group under consideration, and all but one had some abnormality

of the electrocardiogram, but no specific defect was characteristic of the group.

Chest x-ray films generally demonstrated a simulated high diaphragm on the left due to herniated and distended stomach with a gas fluid level. When barium was introduced into the stomach, the resultant contrast studies clearly demonstrated gastric volvulus as the underlying cause of the obstruction. We have included contrast films from six patients, four in the obstructed group (Fig. 1-4) and two in the nonobstructed group (Fig. 5, 6). X-rays of two patients demonstrate the end results of rotation of the stomach through its long axis (Fig. 3, 4), or the characteristic organo-axial type of rotation (Fig. 7). In these instances the greater curvature has moved forward, upward, and to the right and then backward, the greater curvature forming the upper border of the stomach. Rotation usually stops before going beyond 180 degrees. Sometimes with migration, the stomach brings the gastrocolic omentum and transverse colon into the chest. This occurred with four of our patients. An example of the less common type of volvulus or mesentero-axial type (Fig. 8) in which the stomach rotates in a clockwise direction around an axis perpendicular to the gastrohepatic ligament is shown in Figure 6. It will be noted that the pylorus

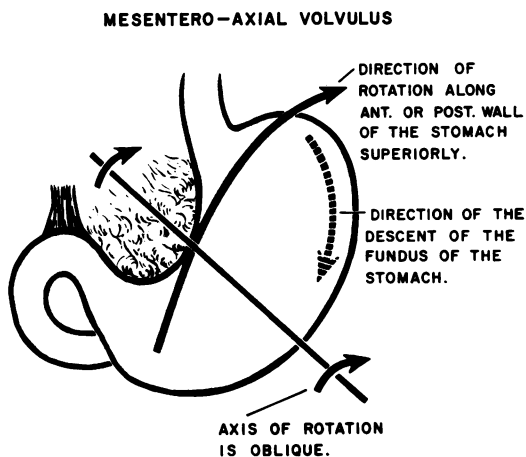


FIGURE 8.

and antrum have ended up in front of the esophagus. Combinations of the two types may occur as is shown in Figure 1. Figure 2 demonstrates a complete twisting of the mid portion of the stomach or a gastric torsion within a huge sliding hiatal hernia. In this case, small bowel obstruction was also present, and the gastric torsion and obstruction can definitely be attributed to intra-abdominal pressure from dilatation of the small bowel. It was necessary to first relieve this before dealing with the gastric obstruction and repair of the large hiatal hernia.

Volvulus may be total with rotation of the entire stomach into the thoracic cavity giving rise to obstruction at the esophago-gastric junction, or partial in which only a segment of the stomach, usually the antral end, lies above the diaphragm and the remainder below, each with separate fluid levels. In the latter, torsion of the stomach at the level of the hiatus is responsible for the obstruction.

Management

The rationale of treatment of acutely obstructed hiatal hernia follows the same general pattern as for acutely obstructed hernias in other locations. An attempt is first made to decompress or reduce the hernial contents, which, if unsuccessful by conservative means, must of necessity be accomplished by early operation.

The fact that we are dealing with an acute incarceration within the chest has led many observers to conclude that the transthoracic approach is mandatory. Our experience is to the contrary and all operations in the present series have been performed by the abdominal route. The stomach and other incarcerated viscera have been returned to the abdominal cavity without the slightest difficulty and in only one instance was it necessary to aspirate the intra-abdominal segment of a gastric volvulus in order to reduce the incarcerated stomach. One important advantage of the

abdominal approach is that the source of gastric hemorrhage may be investigated as in Case 9. Traumatic diaphragmatic hernia on the contrary, unless operated upon immediately following injury, should be approached through the chest since in the absence of a sac the herniated structures rapidly become adherent within the thoracic cavity. If for any reason early operation is indicated the abdominal approach is preferable, however, since during this early period there is no difficulty in reducing the herniated contents, and one must always have in mind that intra-abdominal injuries may have to be dealt with. In as much as we are frequently dealing with critically ill, elderly patients, there may be instances in which it is wiser to resort to gastropexy (Nissen¹⁰) rather than meticulous repair of the hernial defect. Since the stomach is usually greatly distended, a gastrostomy is routinely employed to obviate the necessity of prolonged Levin tube drainage. The value of gastrostomy in elderly patients has been recognized by many surgeons but would seem to have a special place here.

In the present series, delay was the most important single factor that contributed to a high mortality; first, delay in recommending operation in patients who for years had been known to have a large, symptomatic hiatal hernia, but were continued on medical management until obstruction occurred, and, second, delay in making a diagnosis of obstruction after the patient had reached the hospital. In the former group, in the absence of obstruction, repair of the hernia would have been a simple matter and accomplished at an earlier age. Delay in diagnosis after the obstruction occurred was responsible for two deaths in this series, both of whom were thought to be suffering from acute coronary thrombosis. Although admittedly it may at times be difficult to arrive at an early diagnosis, an x-ray of the chest should usually alert us to the possibility. Operation, however, should never be undertaken without a con-

firmatory barium swallow since chronic incarceration without obstruction is a relatively common finding and could confuse the picture in patients who might also be suffering from coronary thrombosis or other acute conditions.

The fact that two patients died of pulmonary embolism and a third had clots removed from the femoral vein suggests that prophylactic femoral vein ligation might be a wise precaution.

Summary

Thirteen cases of hiatal hernia with acute obstruction are presented.

All patients were women, the oldest being 83 and the youngest 57, with an average age of 71.

Of the 13 cases of obstruction, ten were of the para-esophageal type, one sliding, and two a combination of the para-esophageal and sliding.

A clinical classification, based on the various types of incarceration and obstruction, is submitted.

The varieties of gastric volvulus responsible for the obstruction are described.

Delay in recommending operation in patients known to have large symptomatic hiatal hernias, and delay in establishing the correct diagnosis after the patient had reached the hospital, were the most significant factors contributing to a high mortality.

The diagnosis was most frequently confused with acute coronary artery disease.

All hernias were easily reduced by the abdominal approach which would seem to have many advantages over the thoracic operation.

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