Pneumopericardium Occurring as a Complication of Achalasia

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Esophagopericardial fistula is a rare complication of benign esophageal disease. It has not previously been described occurring in achalasia. The authors present such a case. This cause should be considered in the differential diagnosis of pneumopericardium in patients with achalasia. Early diagnosis is stressed and esophagoscopic examination should be performed if the result of barium swallow test is negative.

Immediate anterior relationships of the thoracic esophagus include the trachea, right pulmonary artery and the left main bronchus. From opposite the third to the tenth thoracic vertebrae, the esophagus is in direct contact with the pericardium, which separates it from the left atrium. Despite this intimacy, esophagopericardial fistulas are rare. Recorded causes include ingested foreign bodies, benign ulceration in association with hiatus hernia and esophageal carcinoma. It has not previously been reported complicating achalasia. We present such a case.

CASE REPORT

A 53-year-old man with four-year history of alcoholic cirrhosis was admitted for hematemesis of 24 hr duration. He gave a ten-year history of achalasia, for which mechanical dilatation had been performed on two occasions in the past.

The patient was emaciated and found to have anemia, cirrhosis and hypoproteinemia. Esophagogastrooduodenoscopic examination revealed a large blood clot in a dilated esophagus, with varices in its distal third. The stomach and duodenum were unremarkable. Initially, the patient improved on conservative management, but subsequently his course was complicated by pneumonia and septicemia. Despite treatment with appropriate antibiotics, his condition deteriorated and disseminated intravascular coagulation supervened.

Barium swallow study, performed two weeks after admission and prior to nasogastric intubation, demonstrated achalasia, a marked dilated esophagus and pneumopericardium (Fig 1). There was no leakage of barium into the pericardium. Repeat esophagoscopic examination disclosed a small perforating ulcer on the anterior wall of the esophagus at 42 cm. The surrounding mucosa was chronically inflamed and air was seen to bubble through the ulcer crater into the esophagus.

At thoracotomy, the anterior wall of the esophagus was thinned and adherent to the posterior pericardial wall. A fistula between the esophagus and pericardial space was identified, and milky fluid was evacuated from the pericardial sac. The patient remained febrile throughout the postoperative period. Four weeks after surgery, further massive hematemesis, presumed from esophageal varices, occurred; shortly after, the patient died.

Autopsy confirmed the pre-mortem diagnosis of esophagopericardial fistula occurring in an area of chronic ulceration, presumably from stagnation, and without evidence of malignancy.

DISCUSSION

While an esophagopericardial fistula is rare, it is most commonly associated with benign esophageal disease. It carries a high mortality which increases with delay in diagnosis. Of 27 patients with this disorder reported thus far, only four have survived. In the survivors, the fistula occurred as a result of benign ulceration in three, and as a complication of foreign body ingestion in the fourth.

Esophagopericardial fistula has not previously been described complicating achalasia. Considering the intimate

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FIGURE 1A. Supine film from barium swallow shows achalasia and marked esophageal dilatation. A nasogastric and left chest tube are in place. Pneumopericardium (white arrows) is identifiable.
anatomic relationship between the esophagus and pericardium, this is at first surprising. Undoubtedly, the explanation lies in the infrequency of esophageal ulceration in achalasia.

All authors emphasize the importance of early diagnosis and surgical intervention for treatment of esophagopericardial fistula. Clinical findings highly suggestive of esophagopericardial fistula include precordial pain, fever, dyspnea and the presence of a water-wheel (bruit de moulins) murmur.\(^5\) However, such clinical manifestations vary and, as in our patient, may be overshadowed by major, life-threatening complications of pericardial infection.\(^6,7\) This emphasizes the central role of radiographic studies in establishing diagnosis.

Diagnosis of pneumopericardium on plain erect chest radiographic examination is not difficult provided a high index of suspicion is maintained. Two previous reports have stressed the importance of obtaining an erect view of the chest in identifying the abnormal air collection within the pericardium.\(^4,8\) In our patient also, pneumopericardium was not present on the bedside supine film of the chest prior to barium swallow study.

Once pneumopericardium is recognized, both esophagographic and esophagoscopy studies should be performed to demonstrate possible fistulae. No barium was seen to enter the pericardium during the barium swallow study in our patient. This is not surprising as the patient was examined in a supine position, where gravity would not encourage passage into the pericardium. However, it emphasizes the need for endoscopic examination, which not only demonstrates such anterior fistulae, but may also reveal their nature. During esophagoscopy study, it is important that the amount of air used should be limited as complications from massive air leakage via the fistula could result. These include pneumomediastinum, pneumothorax or, most significantly, increasing pneumopericardium causing cardiac tamponade.

Other etiologies of pneumopericardium include injury to the chest, cardiopulmonary surgery, lung abscess, gas-producing infection of the pericardium and fistulae with either the bronchial tree or exterior.\(^9\) All such entities are easily excluded by clinical history and chest roentgenographic examination.

Our case illustrates that pneumopericardium may occur in achalasia as a result of esophagopericardial fistula due to an ulcer. It should be considered in the differential diagnosis of pneumopericardium in these patients and, if a fistulous tract is not identified on swallow examination, endoscopic study should be performed.

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**Endocarditis of a Tricuspid Prostheses Causing Valvular Stenosis and Shunting Through a Patent Foramen Ovale**

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A young intravenous drug user presented with *Staphylococcus aureus* endocarditis involving the tricuspid valve, which was replaced with a Hancock bioprosthesis. She presented again with fever and dyspnea five months later and was found to be cyanotic. Recurrent endocarditis involving the prosthesis with right-to-left shunting through a patent foramen ovale was documented by echo and confirmed at autopsy.

**Staphylococcus aureus** endocarditis involving the tricuspid valve is a relatively common problem in intravenous

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