

# A Case Report of a Patient with Right Aortic Arch Complicated the Esophageal Perforation

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## Case Report

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# Abstract

**Introduction:** A 73-year-old female patient with right-sided aortic arch and permanent pacemaker installed was brought to Hebei General Hospital because of esophageal perforation at the first esophageal stenosis.

**Concerns of the patient:** She had severe chest pain as well as fever. Despite being treated with fasting, gastrointestinal decompression, anti-inflammation and other methods, but she did not find relief from her pain.

**Diagnosis:** The radiography revealed esophageal perforation at the initial esophageal stenosis. A right-sided aortic arch, anterosuperior mediastinal gas density shadow, and atelectasis of both inferior lobes of the lungs were discovered on a chest CT scan.

**Intervention:** The abscess in the mediastinum was cleaned with surgery, and mediastinal drainage was performed using a thoracoscope. Following the surgery, the patient had underwent ongoing gastric decompression, duodenal feeding, and anti-inflammation therapy.

**Outcomes:** The patient was successfully fed and discharged from the hospital on the 14 postoperative day.

**Conclusion:** The therapeutic management of this condition was hampered by a number of reasons. The most important thing is to identify the major inconsistency, select a good surgical approach, and develop an adequate perioperative care strategy.

## Introduction:

Esophageal perforation is a surgical emergency associated with a high rate of morbidity and mortality. The mortality remains high, with a pooled mortality of 11.9% from a recent assessment of published series[1],but the 30-day mortality rate from esophageal perforation in England was 30.0% at a national level [2]. Despite the fact that several therapeutic approaches have been investigated, no definitively effective strategy has yet been found. Iatrogenic esophageal injury, foreign body ingestion, and spontaneous rupture are the most common causes of this disease[3]. The source and location of the damage, the date of diagnosis, the underlying esophageal condition, and the time between injury and therapy commencement all influence the disease's treatment. The severity of the damage, as well as the surgeon's experience, are critical considerations[4, 5]. Here we described our therapeutic experience with a patient who had a history of anomalous right aortic arch and a permanent pacemaker and was suffering from cervical esophageal perforation caused by foreign body intake. So far, we haven't come across any such cases. To our knowledge, this is the first study to disclose esophageal perforation in the presence of a right aortic arch and a permanent pacemaker.

## A Case Report:

On December 25, 2020, a 73-year-old female patient was admitted into Hebei General Hospital with esophageal perforation. After swallowing a date pit by accident seven days ago, this patient developed significant chest pain behind the body of the sternum bone, which worsened with meal intake. Meanwhile, she was suffering with high fever up to 41°C. The patient visited the doctor at the local hospital two days later, and her radiography revealed esophageal perforation at the initial esophageal stenosis, as well as a heart with permanent pacemaker installed(see Fig. 1). A right-sided aortic arch, anterosuperior mediastinal gas density shadow, and atelectasis of both inferior lobes of the lungs were discovered on a chest CT scan (see Fig. 2). Despite treated with fasting, gastrointestinal decompression, anti-inflammation and fluid replacement etc, the patient's unpleasant symptoms did not improve; she therefore was referred to our hospital for additional treatment. The physical examination showed no flare and subcutaneous emphysema in patient's neck. A small inflammatory lesion on the right side of the esophagus wall, 23 cm from the incisor, was discovered during the gastroscopy. No obvious hole was observed in the esophageal wall. We inserted a naso-jejenum three lumen feeding tube that not only ensured sufficient enteral nutrition but also provided adequate gastrointestinal decompression, nevertheless, the patient's chest pain worsened, and he had a constant high fever. Then we considered esophageal perforation with mediastinal abscess, the patient had a high risk of death without surgery because the local infection could quickly spread throughout the whole body, making it hard to control. As a result, a procedure to clean the mediastinal abscess and place mediastinal drainage tube was urgently required. Because her permanent pacemaker prevented us from using an electrosurgical knife during the thoracotomy, we had to use a traditional approach to open her chest. Intrathoracic surgery was performed using an ultrasonic knife. From the fifth intercostal, the video-assisted thoracoscope was directed into the chest cavity. During the operation, we observed extensive adhesion between right lung and chest wall. About 500ml of purulent pleural effusion was removed. After the adhesion was separated, the right aorta was seen, the upper edge of the aortic arch was closed to the top of the the pleural cavity, and no full branches of the aortic blood vessels was seen. Instead, the internal mediastinal abscess of descending aorta appeared at the azygos vein level (see Fig. 3). After the mediastinal pleura was opened, about 300 ml of white pus flowed out. We fully separated the fibrous connective tissue of the abscess, removed the vomica, and then flushed the thoracic cavity by 200 ml of metronidazole and plenty of distilled water. A mediastinal drainage tube and an ordinary chest drainage tube were placed. The patient continuously received gastric decompression, duodenal nutrition, and anti-inflammation treatment after the surgery. The symptom of chest pain disappeared and the body temperature gradually returned to normal. The esophageal imaging performed after postoperative 12 days showed that the esophageal mucosa was intact, and no obvious breach was observed (see Fig. 4). We then removed the nasogastric feeding tube, gave the patient small amount of liquid diet. The patient did not complain of fever, chest pain or other special discomforts after the oral feeding. The follow-up chest CT scan showed no obvious abnormality. After removing the mediastinal drainage tube and observing for 2 days, the patient was successful discharged from the hospital.

## Discussion:

Due to the special anatomy of esophagus, it is easy to burst and perforate under pressure and trauma. The incidence of esophageal perforation is much higher than other parts of digestive tract. The common causes usually include the foreign body, iatrogenic and accidental injuries, spontaneous ruptures and others[3]. The disease of esophageal perforation is already difficult to deal with in thoracic surgery, the situation is even more complicated when combined with the vascular dysplasia and other complications.

Early diagnosis of esophageal perforation is the key to timely treatment and lower mortality[6]. The main reason of misdiagnosis of the disease is that it is rarely considered due to the low incidence of esophageal perforation. The principle of treatment for esophageal perforation are adequate drainage, prevention of further spread of infection, anti-inflammation and nutritional support[5]. Therefore, extra attention should be paid to the damage of surrounding tissue before treatment in addition to evaluating the severity of esophageal lesions. The following is our treatment experience based on this patient.

### 1. The diagnosis of esophageal perforation.

The main reason for the delayed diagnosis in this patient's was that her neck injury and infection were not obvious, since the perforation area was located in the first stenosis of the esophagus near the entrance of thorax. The physical examination on the neck did not reveal any positive sign. Mediastinal infection has developed by the time the patient presents with febrile symptoms. Barium is not recommended for esophageal radiography, because barium can infiltrate the mediastinum and lead to mediastinitis. Chest CT examination revealed barium residues around the esophagus. In this setting, Gastrografin was recommended to use for esophageal radiography examination[7], but we should keep in mind that small esophageal perforation may be negative with this method. Therefore, the injured area needs to be observed from multiple angles and positions, otherwise gastroscopy is required.

### 2. The choice for surgical approach.

The selection of appropriate surgical methods is the key to treatment of esophageal perforation. We didn't use traditional neck incision and esophageal repair since this patient's esophageal injury had lasted for a long time, although the neck infection was not severe and the anatomy of vessels in neck and chest had been changed by the right aortic arch. Our analysis was as follows: (1) the neck incision can increase the area of operation and increase the opportunity of iatrogenic infection; (2) the damage of the patient's esophageal mucosal has lasted for a long time, the surrounding tissue may have edema, so the chance of first-stage suturing of the esophageal tissue is low; (3) even if we used the neck incision, mediastinal drainage must be placed, it is still uncertain whether the reverse drainage can solve the problems of the mediastinal infection; (4) the abnormal anatomy of vessels with this patient will make it complicated to extend the surgery to mediastinum from the neck. Based on the above analysis, we adopted the method of thoracoscopic mediastinal abscess incision and drainage, and put two tubes for drainage in the thoracic cavity and mediastinum. The efficacy of this surgical method is satisfactory.

### 3. The instructions for use of surgical instruments.

The patient used permanent pacemaker due to the pathological sinus syndrome. The pacing rhythm was set at 60 times/min in operation. Considering the impact of surgical electrothrom energy on pacemaker, the electric knife was not allowed to use during the surgery. Ultrasonic knife was used instead during the intrathoracic operation because it will not affect the pacemaker. The surgery is successful along with the normal heart rhythm, heart function and intraoperative arterial blood oxygen saturation .

#### 4. The impact of right aortic arch on surgery.

After opening the chest, the superior border of the arcus aortae was found to be close to the cupula pleurae, the three main branches of the aortic arch were not seen. The superior vena cava and azygos vein contours showed to be normal. Based on above vascular abnormality of the patient, the patient's condition belongs to type II right aortic arch. The medial mediastinal abscess at the descending aorta azygos vein level showed the abscess parcel and aortic tissue edema. We opened the mediastinal pleura and abscess with the ultrasonic knife, removed pus, and then gradually expanded the area of clearing. During the operation, The superior vena cava presented as an abscess-like mass due to inflammation and must be protected.

#### 5. The nutritional support during perioperative period.

It is necessary for patient to fast before the operation. In this case, we placed a naso-jejunal three-lumen feeding tube (one is the stomach decompression tube and another two are duodenal nutrition tubes). The enteral nutritional support must be offered as soon as possible, which ensures the nutritional status of patients, as well as reduces patient's cost in hospital. The time of removing the nutrition tube is 5 days after starting oral food intake.

#### 6. The indication for removing the chest drainage tube.

Effective and favorable chest drainage is critical to successful surgery. After the operation, double-tube drainage was used, one for mediastinal drainage and one for ordinary thoracic drainage. The mediastinal drainage tube should be placed in the 7th intercostal space of the posterior axillary line with a depth of around 25 cm. The drainage tube should be placed on the top of the mediastinum(see figure 5). The ordinary chest drainage should be located in the 7th intercostal space in midaxillary line. After operation, doctors should observe the quantity, color, intermittent bacterial culture of the chest drainage, and regularly arrange chest CT examinations to understand the conditions of chest and mediastinum. The ordinary chest drainage tube can be removed if the quantity and quality of drainage are stable. The mediastinal drainage tube can be removed when the patient starts to eat normal food.

## Conclusion:

Based on the patient's treatment experience, several factors limited the treatment options for this disease. The key point is to find main contradiction, choose applicable surgical method and formulate an appropriate perioperative treatment strategy.

## Declarations:

### Conflict of Interest statement:

The authors declare no conflicts of interest in this study.

### Acknowledgments:

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### Statements of Ethics and consent:

This study conforms to the ethical guidelines in a priori approval by the local Ethics Committee of Hebei General Hospital. Our research was approved on Aug 10, 2021, by the Ethics Committee of Hebei General Hospital. Our research also obtained the consent of patients or patients' carer.

### Consent for publication

Our research obtained the consent of patients or patients' carer for publication.

### Conflict of Interest:

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### Author Contributions:

Peng Qie conceived the study. Qifan Yin and Xuejiao Xun drafted the manuscript. Shaohui Han and Xiaoning Li collected the information and medical records of this patient. Huien Wang provided important intellectual contributions and critically revised the manuscript. All authors read and approved the final manuscript.

### Data Availability Statement:

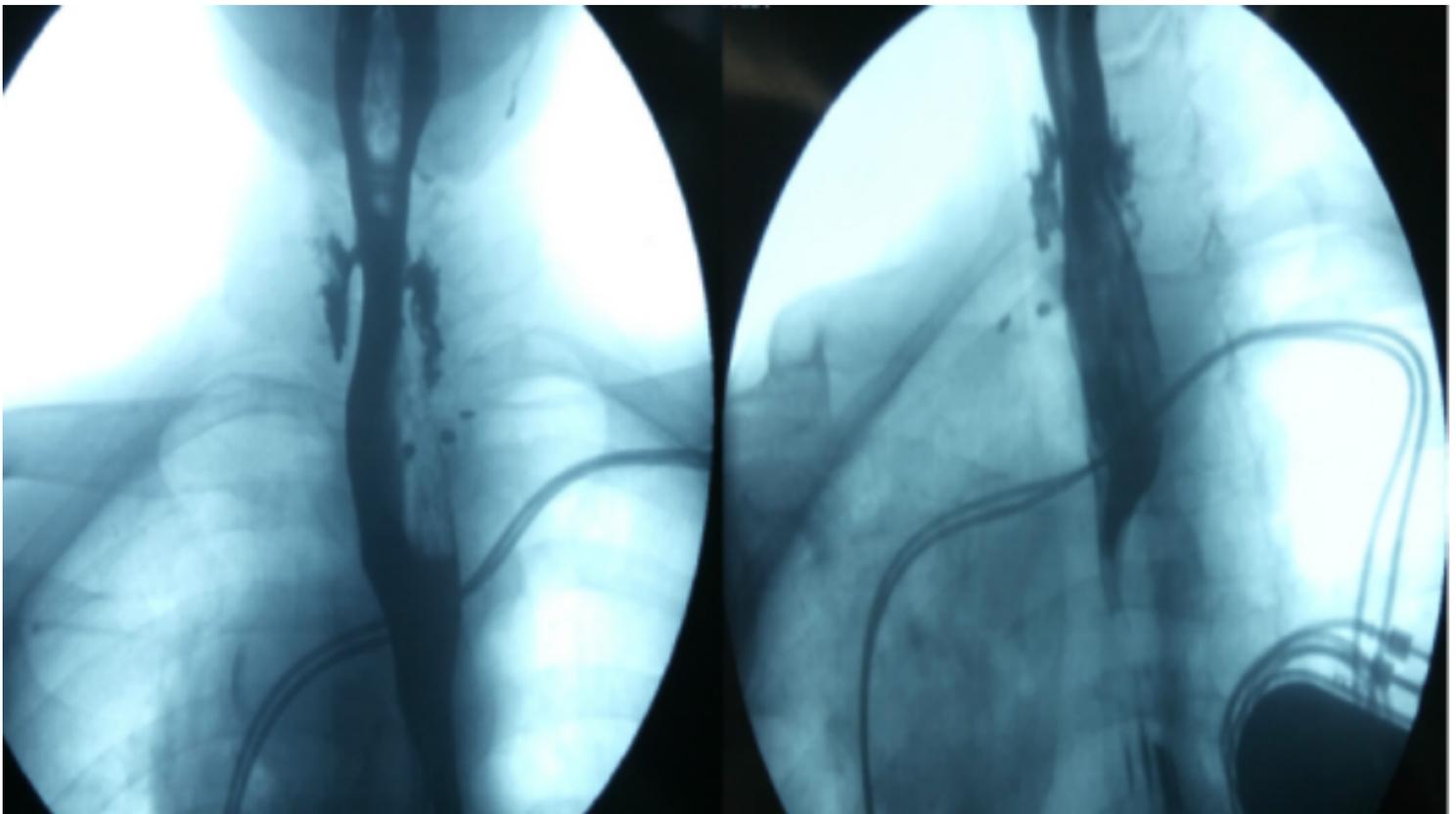
The data sets used and analyzed during the current study are available from the corresponding author and first author on reasonable request.

## References:

1. Biancari F, D'Andrea V, Paone R et al. Current treatment and outcome of esophageal perforations in adults: systematic review and meta-analysis of 75 studies. *World J Surg* 2013; 37: 1051–1059.

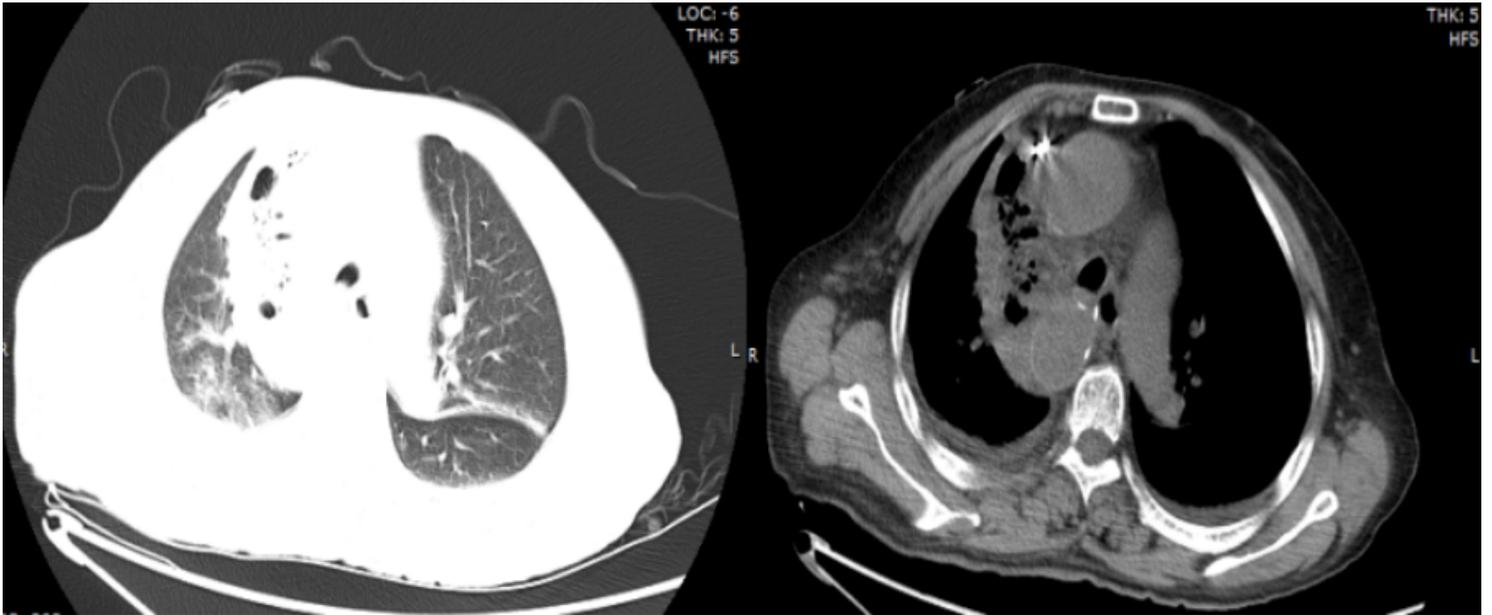
2. Markar SR, Mackenzie H, Wiggins T et al. Management and Outcomes of Esophageal Perforation: A National Study of 2,564 Patients in England. *Am J Gastroenterol* 2015; 110: 1559–1566.
3. Strohm PC, Müller CA, Jonas J, Böhler R. [Esophageal perforation. Etiology, diagnosis, therapy]. *Chirurg* 2002; 73: 217–222.
4. Junginger T, Schöfer W, Böttger T. [Esophageal perforation—indications for surgical therapy]. *Chirurg* 1991; 62: 800–804.
5. Welter HF, Becker G. [Therapy of spontaneous esophageal perforation]. *Chirurg* 1991; 62: 752–754.
6. Reeder LB, DeFilippi VJ, Ferguson MK. Current results of therapy for esophageal perforation. *Am J Surg* 1995; 169: 615–617.
7. Foley MJ, Ghahremani GG, Rogers LF. Reappraisal of contrast media used to detect upper gastrointestinal perforations: comparison of ionic water-soluble media with barium sulfate. *Radiology* 1982; 144: 231–237.

## Figures



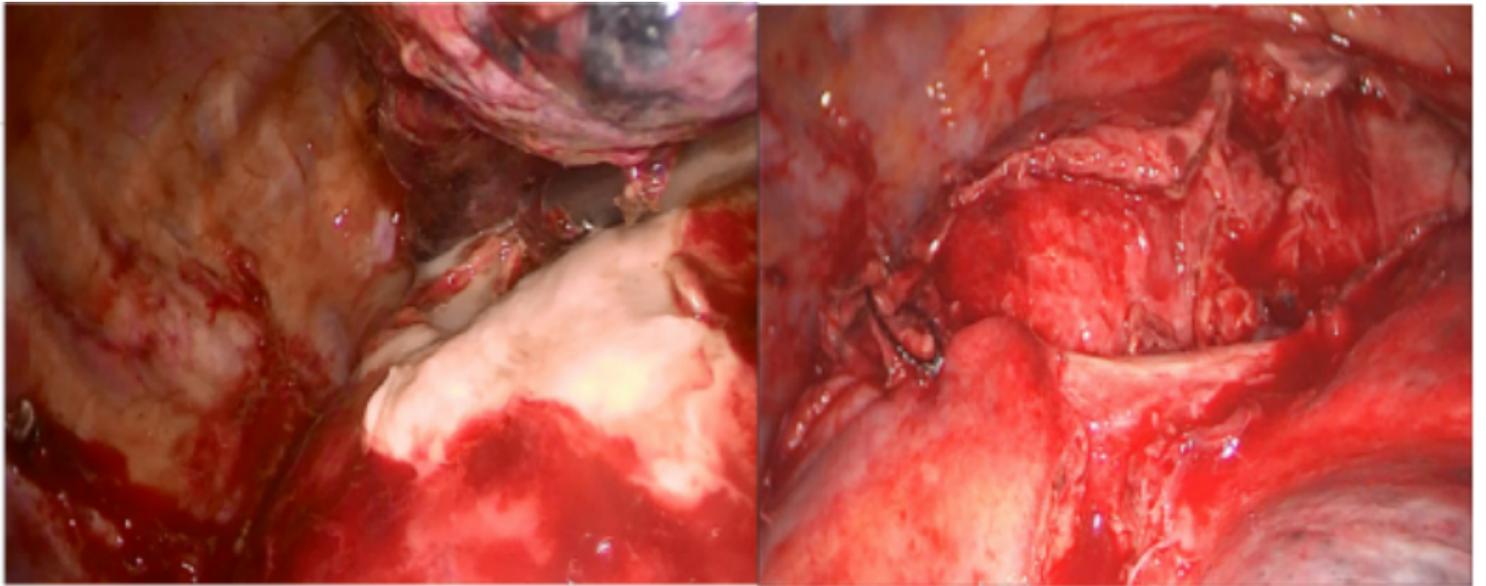
**Figure 1**

Esophageal perforation in the first narrow place.



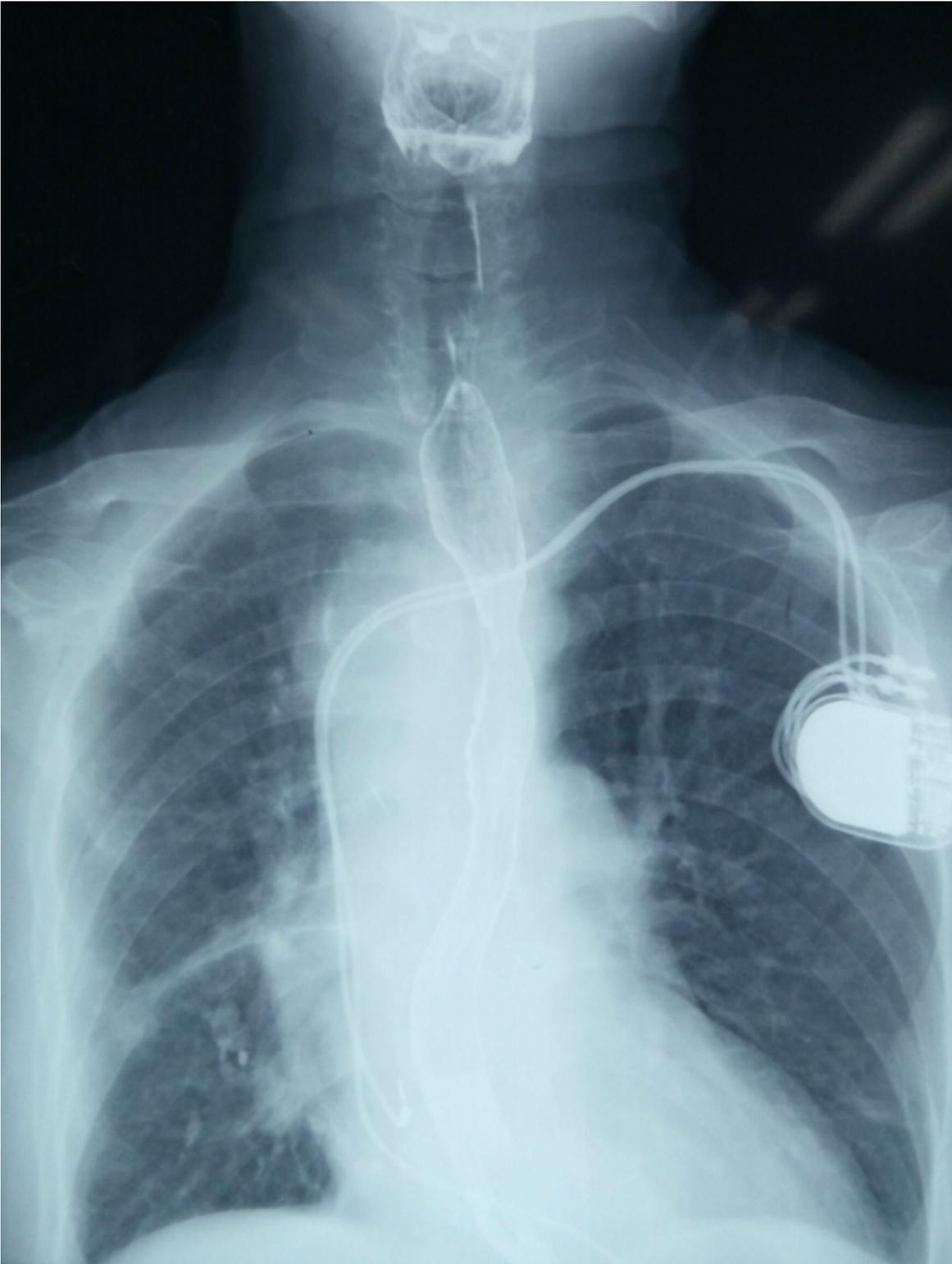
**Figure 2**

The mediastinal abscess of esophageal rupture.



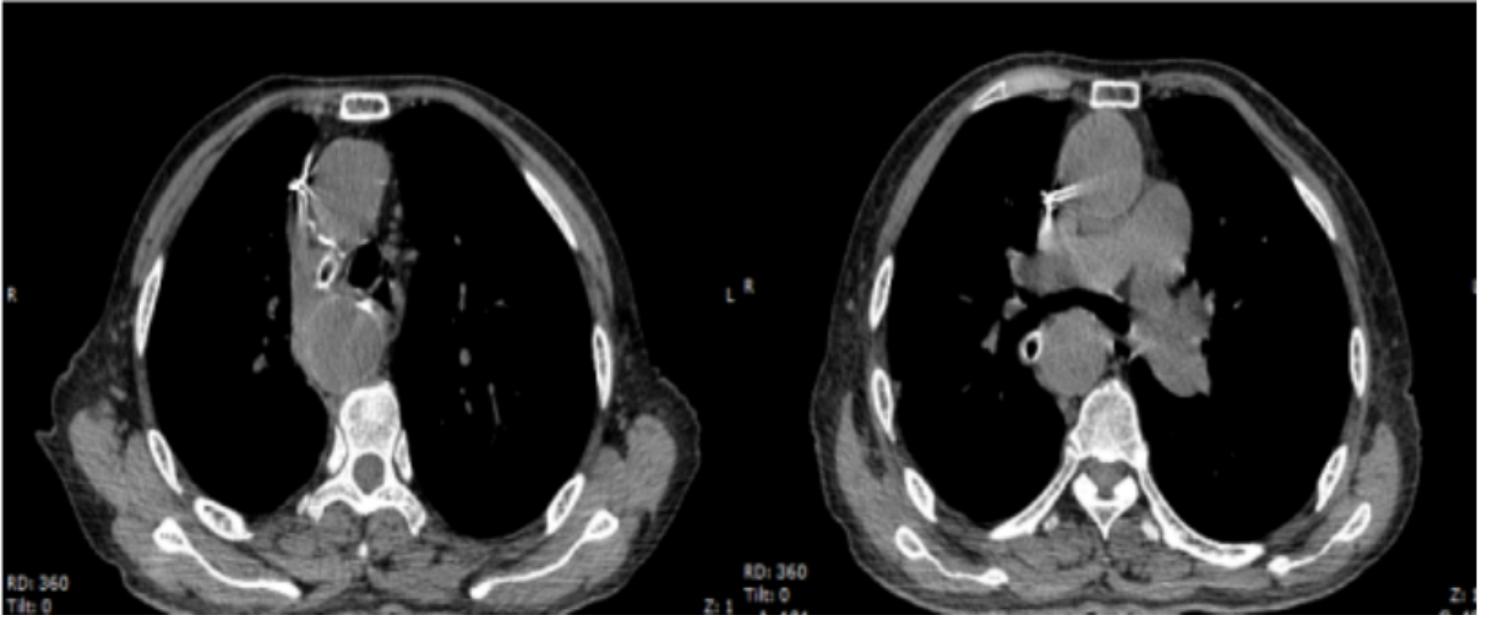
**Figure 3**

Intraoperative mediastinal abscess.



**Figure 4**

There is no obvious breach.



**Figure 5**

The position of mediastinal drainage tube