Esophageal diverticula are relatively rare.1,2 They are usually asymptomatic and clinically insignificant. A review of the literature suggests that perforation of the esophagus presenting as a hemothorax is uncommon. We report here a patient who had a hemothorax resulting from perforation of an esophageal diverticulum. This is the only report of its type in the English literature to date.

1. Case report

A 45-year-old man complaining of sudden back pain during sleep was referred to our hospital in September 2008. A chest radiograph showed tortuosity of the line of the descending aorta (Fig. 1A), and computed tomography (CT) showed a mediastinal tumor (Fig. 1B). There were no complaints of dysphasia or abdominal pain, and no reports of vomiting.

The next day, a left pleural effusion appeared (Fig. 2), and diagnostic thoracentesis revealed gross blood. The hemoglobin and hematocrit of the pleural effusion were 13.2 g/dl and 37.8%, respectively. The patient was diagnosed with a hemothorax. Gastrointestinal fiberoscopy suggested perforation of the esophagus; an esophagectomy was performed, and the patient was diagnosed with a pathologic perforation of the esophageal diverticulum. This is the only report of a hemothorax resulting from perforation of an esophageal diverticulum in the English literature to date.

2. Discussion

Esophageal diverticula are relatively rare and were reported by Mellius at an incidence of 0.15% (23 cases of over 15,000 consecutive autopsies).1 Less than 10% of patients develop symptoms or complications related to a diverticulum, such as dysphagia and regurgitation.2 Chronic diverticular stasis with bacterial overgrowth causes localized inflammation and ulceration, and results in perforation.2 The perforation of esophageal diverticula is exceedingly rare (only one of the 69 cases with diverticula).3,4 The most common signs and symptoms of perforation of the esophagus include chest pain, fever, subcutaneous emphysema, pneumothorax, and pneumomediastinum. However, these classic signs are frequently absent, and a lack of prominent physical or roentgenographic findings may lead to long delays in diagnosis and treatment.4 Hemothorax is uncommon as a complication of perforation of the esophagus. Our patient also had back pain and a slight fever, but no symptoms, such as chest pain, nausea, vomiting, and dysphagia, and no signs, such as subcutaneous emphysema and pneumothorax. To diagnose the

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**Keywords:**
- Hemothorax
- Esophageal diverticulum
- Perforation
- Mediastinal mass

**Abbreviation:** CT, computed tomography.

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condition as esophageal perforation, it is very important to suspect esophageal perforation, even if the patient has neither typical symptoms nor signs of an air leak.

Esophageal perforation can result in acute mediastinitis and sepsis\textsuperscript{5,6}; the mortality rate remains high. Abbas and colleagues\textsuperscript{5} reported that the mortality of thoracic perforation is 18%, and that of spontaneous perforation in patients who have undergone repair over a drain is 38.5%. Wright and colleagues\textsuperscript{6} reported no deaths when treatment was initiated within the first 24 h following esophageal perforation, but the mortality rate was 31% when treatment was initiated after 24 h, and the delay in diagnosis and treatment significantly influenced mortality. Controversy continues regarding treatment of thoracic esophageal perforation, especially when treated late. Management options include primary repair, repair over a drain, esophageal exclusion, esophagectomy, and nonoperative management in selected patients.\textsuperscript{5,6} As we suspected a malignant mediastinal mass in our case, esophagectomy was performed.

A hemothorax should be considered to be present only when the pleural fluid hematocrit is equal to or greater than 50% of the peripheral blood hematocrit.\textsuperscript{7} In this case, the pleural fluid hematocrit was 37.8%, and that of peripheral blood was 30.6%; therefore, the patient was diagnosed with a hemothorax. Most hemothoraces result from penetrating or nonpenetrating chest trauma. Nontraumatic hemothoraces are distinctly uncommon. The most common cause is metastatic malignant pleural disease, the second is a complication of anticoagulant therapy for pulmonary emboli, and the third is catamenial hemothorax. Other reported\textsuperscript{7} causes of spontaneous hemothorax are listed in Table 1. However, our case does not fit the above causes, and hemothorax is uncommon as a complication of perforation of the esophagus. A review of the literature shows that only...
3 cases of hemothorax resulted from spontaneous perforation of the esophagus, so-called Boerhaave syndrome.\textsuperscript{8–10} Boerhaave syndrome commonly results from a sudden increase in intraesophageal pressure combined with negative intrathoracic pressure caused by straining or vomiting.\textsuperscript{11} In most cases, the tear occurs at the left posterolateral aspect of the distal esophagus and extends for several centimeters. In our case, the onset was during sleep, without episodes that increased the intraesophageal pressure, the perforation point was very small in the middle thoracic esophagus, and the wall of the esophagus was thickened circumferentially along its entire length, representing chronic diverticulitis or esophagitis. In addition, it was shown that the squamous epithelium was interposed in the esophageal depression pathologically, providing evidence of the presence of an esophageal diverticulum. For these reasons, this case is a totally different condition from Boerhaave syndrome. As to the reason, why the hemothorax occurred in the absence of subcutaneous emphysema or pneumothorax, we suggest that there was a formation like a check valve in an orifice of the diverticular perforation, and the opening time was too short and the hole was too small to leak enough air to cause subcutaneous emphysema or a pneumothorax. We think that the bleeding inside of the esophageal adventitious tunica resulted in the hematoma surrounding the esophagus and hemothorax with no findings of bleeding inside the esophagus. In our search of the English literature, this is the only report of a hemothorax resulting from the perforation of an esophageal diverticulum to date.

Conflict of interest statement
The authors declare that they have no conflict of interest.

References