Case report
Bronchogenic cyst infected by *Salmonella enteritidis* followed gastroenteritis

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Abstract
Congenital bronchogenic cysts of the lung and mediastinum develop from the ventral foregut during embryogenesis. Bronchogenic cysts are seldom seen in the adults and most are thought to be asymptomatic and free of complications unless they become infected or are large enough to cause pressure on contiguous vital structures such as the tracheal carina, the lung or the esophagus. We present the unique case of a 24-year-old man who developed respiratory symptoms after *Salmonella enteritidis* infected bronchogenic cyst following *Salmonella gastroenteritis*.

1. Case report
A previously healthy 24-year-old man was admitted to the hospital with complaints of chest pain, mild non-productive cough and shortness of breath. Symptoms were initiated 10 h before admission and progressively became more severe. Review of medical history was relevant for symptoms of gastroenteritis 3 days prior to presentation. He had fever, vomiting, nausea, cramping abdominal pain and diarrhea and he had been treated symptomatically for viral gastroenteritis. Pulmonary examination revealed decreased breath sounds of the left lower hemithorax and rales. Vital signs included a blood pressure of 130/85 mmHg, heart rate of 90 beats per minute, respirations of 20 per minute while oxygen saturation was 94% on room air. Routine laboratory studies were unremarkable. Chest radiograph revealed an unsuspected, well-circumscribed retrocardial mass in the lower left hemithorax, without an air-fluid level. Computed tomography showed a large unilocular cyst (transverse diameter 9 cm, 18 Hounsefield units) located behind the pericardium, paravertebral, adjacent to the aorta and the esophagus (Fig. 1). Fiberoptic bronchoscopy examination revealed a normal tracheobronchial tree. Esophagogastroscope showed a slight extrinsic compression of the distal third of the esophagus with intact mucosa and normal peristalsis.

Left thoracotomy was subsequently performed. A large encapsulated cyst, located just above the left diaphragm was identified. The cyst compressed the basic segments of the left lower lobe and partially involved the esophageal wall but had no communication with the tracheobronchial tree or the lung parenchyma. Dissection of the cyst was complicated by extensive pericystic adhesions and for complete excision esophagomyotomy was required. A specimen from cyst content was submitted for microbial culture. Results were surprisingly interesting. A lactose negative microorganism was isolated and identified by PASCO MIC/ID and Api 20E as *Salmonella* spp. The serological identification showed that the isolated bacterium was *Salmonella enteritidis*. Taking into account symptoms of gastroenteritis prior to admission, blood sample and stool were then submitted for microbial culture. Blood culture was negative whereas stool culture was positive for *Salmonella enteritidis*. The susceptibility test showed that the infecting organism was susceptible to most antibiotics and resistant only to ampicillin and mezlocillin.

Histological examination revealed a true bronchogenic cyst lined by ciliated columnar epithelium containing cartilage within its wall (Fig. 2).

The postoperative course of the patient was uneventful. No antibiotic regimen was administered preoperatively. Postoperative antibiotic therapy was initiated with cefuroxime and later modified (third postoperative day) by including pefloxacin when culture results were notified.
Gastrointestinal symptoms were already in remission at the time of admission and were completely absent during the postoperative course. The patient was discharged from the hospital on the 12th postoperative day.

2. Discussion

Bronchogenic cysts are uncommon congenital defects. They are usually found in the mediastinal around the tracheobronchial tree or in the pulmonary parenchyma [1]. These cysts frequently cause life-threatening compressive symptoms in infants and children but are often incidental radiological findings in adults [2–4]. Enlargement caused by hemorrhage or infection can lead to a subacute clinical presentation in adults sometimes with episode of respiratory compromise [3,5]. Cyst infection is usually caused by its communication with the tracheobronchial tree. Intraparenchymal cysts are more likely to have a connection with the tracheobronchial tree and are thus more prone to infections complications [3]. Mediastinal bronchogenic cysts rarely communicate with the tracheobronchial tree [3]. A more extremely uncommon situation is that of infected mediastinal bronchogenic cyst without fistulization in a distal bronchus or lung parenchyma. In the largest reported series of 86 patients, St Georges et al. found only one cyst, which was infected without fistulization [3]. The source of this focal infection was not identified. To our knowledge no other case has been published so far reporting superinfection of a bronchogenic cyst following extrathoracic infection. In fistulized cysts symptoms such as cough, fever, sputum production and hemoptysis are frequently present [1,3,6]. Roentgenography of the chest may show an air-fluid level [7]. In contrast, chest pain is the most common symptom in non-fistulized cysts and likely is the result of irritation or inflammation of the surrounding parietal or mediastinal pleura [2]. Fever and shortness of breath are usually present due to pericystic pneumonitis or pneumonia in the adjacent compressed lung [3,4].

In the presented case an undiagnosed mediastinal bronchogenic cyst became symptomatic following intestinal Salmonella infection. No communication with the tracheobronchial tree or lung parenchyma was documented by diagnostic imaging modalities, bronchoscopy examination or intraoperative findings. On the other hand, same bacterium was isolated from both the cyst and the stool specimens. Although blood culture was negative 5 days after the initial
symptoms of gastroenteritis, it seems that cyst infection was secondary to bacteremia. The incidence of documented bacteremia after *Salmonella* intestinal infections varies from 5 to 45%, but is assumed to occur early in the course of many, and possibly all, *Salmonella* infections and is quickly cleared in most patients infected with *Salmonella enteritidis* serotypes [8]. Localized infection usually follows intestinal infection [8].

Infected mediastinal bronchogenic cysts usually adhere densely to adjacent structures. These adhesions could produce major operative difficulties and does not usually preclude complete removal of the cyst without injury of the tracheobronchial tree or the esophagus [4]. However, complete removal must be the goal, because recurrence of bronchogenic cyst is possible after incomplete surgical removal [7]. In our case, complete excision of the cyst was laborious including local esophageal myotomy.

Conclusively, we might suppose that bronchogenic cyst could be the target tissue for any bacteremia otherwise transient. Taking into account that cyst infection could lead to hazardous complications, secondary to intrinsic pathological changes within the cyst itself, such as impostume, rupture or hemorrhage [3,7] and operative difficulties or/and intraoperative complications, we support the recommendation made by large series [4,7] of surgical excision of any suspected or diagnosed bronchogenic cyst even if it is asymptomatic.

**References**


