Yonago Acta medica 2010;53:77–81

Thoracoscopic Resections of Bronchogenic Cysts Arising in the Posterior Mediastinum: A Report on 3 Patients

Yasuaki Kubouchi, Hiroshige Nakamura*, Shinji Fujioka*, Ken Miwa*, Yuzo Takagi*, Yohei Yurugi*, Tomohiro Haruki* and Yuji Taniguchi*

*Post-Graduate Clinical Research Center and *Division of General Thoracic Surgery, Tottori University Hospital, Yonago 683-8504 Japan*

We report 3 cases of patients with bronchogenic cyst arising in the posterior mediastinum. The patients were a 19-year-old male, a 36-year-old female and a 33-year-old female, whose cysts were detected as abnormal shadows in the chest. In 2 of them, neurogenic tumors were suspected preoperatively. We performed thoracoscopic resection for the 3 tumors. Bronchogenic cysts may occur ectopically, and the posterior mediastinum must be sufficiently recognized as a rare but possible ectopic site.

Key words: bronchogenic cyst; posterior mediastinum; thoracoscopic surgery

Bronchogenic cysts are benign tumors that frequently occur in the middle mediastinum, but occasionally arise ectopically due to the abnormal presence of the tracheal primordium (Di Lorenzo et al., 1989). We encountered 3 patients with relatively rare bronchogenic cysts of the posterior mediastinum, and treated them successfully by thoracoscopic resection.

Patient Reports

Case 1 was a 19-year-old male patient with an abnormal chest shadow, which was detected on mass screening. He was asymptomatic, and blood tests were normal. On chest X-ray examination, a massive shadow was visible in the left inferior lung field. Computed tomography (CT) of the chest presented a clearly circumscribed massive shadow of 35 × 20 mm on the left margin of the descending aorta (Fig. 1a). By magnetic resonance imaging (MRI) of the chest, a cystic lesion of 35 × 15 mm was seen adhering to the left side of the 10th thoracic vertebra, exhibiting iso-intensity on T1-weighted imaging and high intensity on T2-weighted imaging (Fig. 1b). Since these findings suggested a cystically degenerated neurogenic tumor as the most likely diagnosis, we performed thoracoscopic surgery. A lobulated yellowish cystic mass was present on the left side of the vertebral body, which was completely resected (Fig. 1c). Histopathologically, the cystic lesion was covered by the pseudostratified ciliated columnar epithelium and stratified squamous epithelium with the mucus glands in the cyst wall. We diagnosed the lesion as a bronchogenic cyst originating from the posterior mediastinum (Fig. 1d). The postoperative course was uneventful.

Case 2 was a 36-year-old female patient also with an abnormal chest shadow, which was noted during outpatient management for bronchial asthma. She was asymptomatic and the sound of her respiration was normal. Blood tests presented no abnormal findings. Chest X-ray examination showed a massive shadow in the right hilar region. By chest CT, a massive shadow of 40 mm in di-

Abbreviations: CT, computed tomography; MRI, magnetic resonance imaging

ameter with a smooth margin and clear border was visible on the right side of the posterior mediastinum (Fig. 2a). Chest MRI revealed a high-intensity cystic lesion of 34 × 34 mm on the right side of the 8th thoracic vertebra on both T1- and T2-weighted imaging (Fig. 2b). Since these findings suggested ectopic bronchogenic cyst, thoracoscopic surgery was performed. Under thoracoscopy, the mass had a smooth and transparent surface through which its interior could be observed, and was completely resected (Fig. 2c). Histopathologically, the lesion was a cyst covered by the pseudostratified ciliated columnar epithelium with the cartilage and mucus glands in the cyst wall. We made the diagnosis of bronchogenic cyst (Fig. 2d). The postoperative course was uneventful.

Case 3 was a 33-year-old female patient with an abnormal chest shadow, which was detected during outpatient treatment for bronchial asthma. The patient was asymptomatic, and blood tests were normal. On chest X-ray examination, an abnormal shadow was present on the mediastinal side of the left upper lung field. Chest CT showed a low-density mass with a smooth margin and homogeneous interior of 15 × 7 mm on the left side of the 4th thoracic vertebra (Fig. 3a). Chest MRI revealed a cystic lesion of 29 × 14 mm, which showed iso-intensity on T1-weighted imaging and high intensity on T2-weighted imaging, on the left side of the 4th thoracic vertebral body (Fig. 3b). Since these findings suggested a cystically degenerated neurogenic tumor, thoracoscopic surgery was

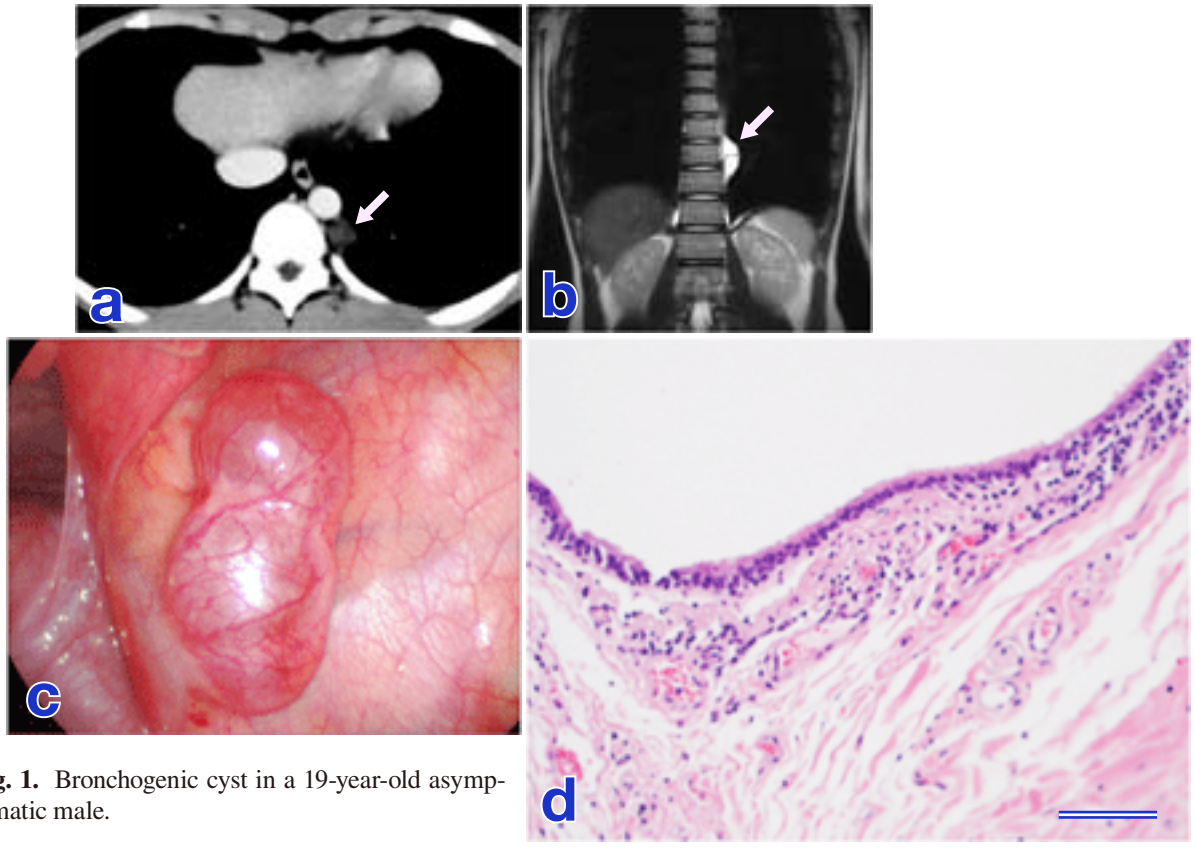

Fig. 1. Bronchogenic cyst in a 19-year-old asymptomatic male.

a: Chest contrast CT shows a clearly circumscribed tumor mass (arrow) in the left margin of the descending aorta.
b: On T2-weighted image, a high-intensity tumor (arrow) adheres on the left side of the 10th thoracic vertebra.
c: Intraoperatively, we observed a lobulated yellowish cystic mass attach to the vertebral body.
d: Pathologically, the resected tumor presents bronchogenic cyst lined by the pseudostratified ciliated columnar epithelium and stratified squamous epithelium with the mucus glands (hematoxylin and eosin staining). Bar = 100 μm.
CT, computed tomography.

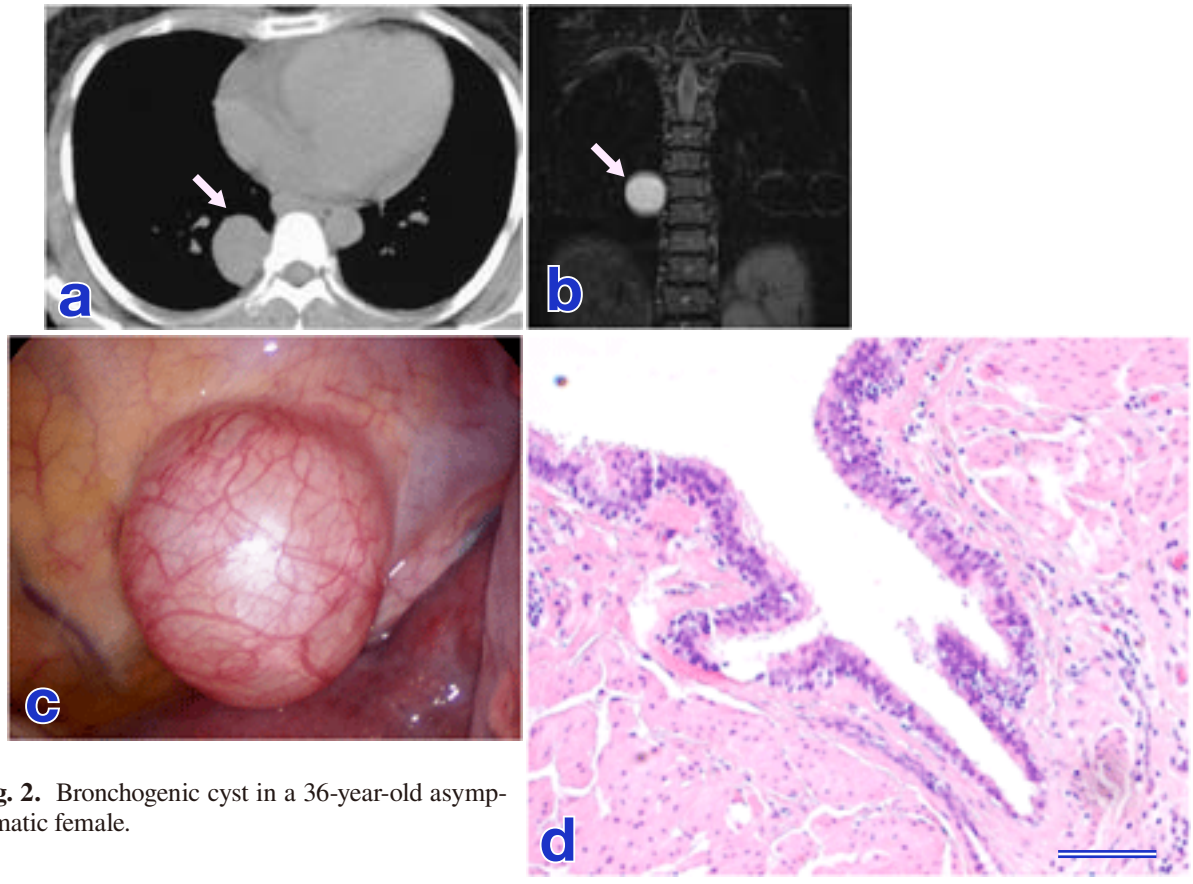

Fig. 2. Bronchogenic cyst in a 36-year-old asymptomatic female.

a: By chest contrast CT, a clearly circumscribed tumor mass (arrow) is seen on the right side of the posterior mediastinum.
b: T2-weighted image shows a high-intensity tumor (arrow) on the right side of the 8th thoracic vertebra.
c: Intraoperatively, we observed a bronchogenic cyst with a transparent surface through which its interior was visible.
d: Pathologically, the resected tumor shows cyst lining of the pseudostratified columnar respiratory epithelium, with the cartilage and mucus glands in the cyst wall (hematoxylin and eosin staining). Bar = 100 μm.
CT, computed tomography.

performed. On thoracoscopy, the mass was egg-shaped, smooth-surfaced and pale yellowish, with a transparent surface through which the interior could be observed. The mass was completely resected (Fig. 3c). Histopathologically, the it was a cystic lesion covered by the pseudostratified ciliated columnar epithelium. Although no cartilage, smooth muscle or mucus gland was recognized in the cyst wall, we judged the findings not to be contradictory to the diagnosis of bronchogenic cyst arising from the posterior mediastinum (Fig. 3d). The postoperative course was uneventful.

Discussion

Bronchogenic cysts occur congenitally due to abnormal budding or the ectopic presence of the tracheal primordium originating from the ventral outgrowth of the foregut (Di Lorenzo et al., 1989). They frequently appear outside the mediastinum or pleura if there is growth due to abnormal budding in an early stage of embryonic development, but in the lung if it occurs in a late stage (Maier et al., 1948). Bronchogenic cysts are classified primarily into intrapulmonary and mediastinal types (Ko

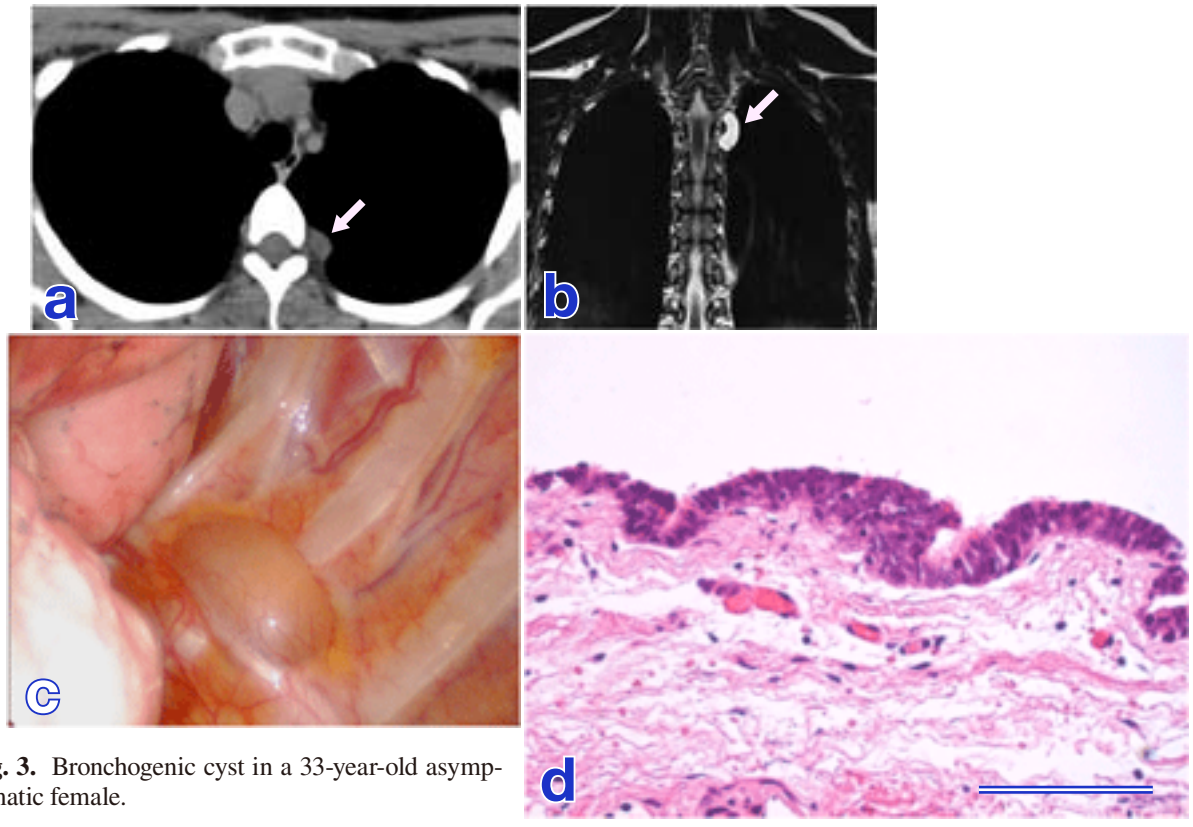

Fig. 3. Bronchogenic cyst in a 33-year-old asymptomatic female.

- **a:** By chest contrast CT, a clearly circumscribed and a low-density mass (arrow) is on the left side of the 4th thoracic vertebra.
- **b:** T2-weighted image shows a high-intensity tumor (arrow) on the left side of the 4th thoracic vertebral body.
- **c:** Intraoperatively, we observed an egg-shaped and pale yellowish bronchogenic cyst with a transparent surface through which its interior was visible.
- **d:** Pathologically, the resected tumor is bronchogenic cyst lined by the pseudostratified ciliated columnar epithelium although no cartilage, smooth muscle or mucus gland is recognized in the cyst wall (hematoxylin and eosin staining). Bar = 100 μm.

CT, computed tomography.

et al., 2006), and the latter is further classified by Maier into types I (paratracheal), II (bronchial bifurcational), III (hilar), IV (paraesophageal) and V (others) (Maier et al., 1948). Types I, II and III arise in the middle mediastinum, types IV and V arise in the posterior mediastinum, and type V also arises in the anterior mediastinum. Lesions occurring in the middle mediastinum are the most frequent, with those occurring in the posterior mediastinum accounting for about 17% (McAdams et al., 2000). Also, 84% of the patients with this disease showed onset at the age of 40 years or below (McAdams et al., 2000), and all 3 patients presented here were under 40.

Bronchogenic cysts are usually asymptomatic if they are of the intrapulmonary type. If they are of the mediastinal type, symptoms such as wheezing, coughing, dyspnea, atelectasis and dysphagia appear due to bronchial compression. Also, severe symptoms including bloody expectoration, bloody sputum, hemoptysis, fever and pyothorax occur in some patients if the condition is complicated by infection. Of the present 3 patients, 2 had a history of asthma, but it was not related to the tumor, and both were asymptomatic. This was probably because the cyst arose in the posterior mediastinum, was small and had no accompanying infection.

Differential diagnoses include neurogenic tumors, Castleman lymphoma and pulmonary sequestration. Generally, high-signal intensity on T2-weighted MRI indicates cystic disease, but differentiating it from neurologic tumors, which may also be cystic, is difficult. In fact, in previous reports bronchogenic cysts of the posterior mediastinum were preoperatively diagnosed in only 10 to 40% of the patients (Patel et al., 1994; Suen et al., 1993), and neurogenic tumors were also suspected in 2 of our 3 patients initially.

Large size, rapid growth and being symptomatic have been considered surgical indications of mediastinal bronchogenic cysts. However, there have been reports of malignant transformation of the cyst wall during the course of bronchogenic cysts (Ashizawa et al., 2001), developing into superior vena cava syndrome (Rammohan et al., 1975) or pulmonary artery embolism (Worsnop et al., 1995). Therefore, surgical treatment, particularly thoracoscopic surgery, is recommended for this disease. It is also very significant for our presented cases of tumors arising in the posterior mediastinum to be differentiated from neurogenic tumors with cystic degeneration by performing thoracoscopic resection. Thoracoscopic surgery is not only less invasive than open chest surgery, but also less frequently causes complications such as hemorrhage, cyst perforation and nerve injury, and is esthetically more satisfactory. Other less-invasive methods, for example, simple fine needle aspiration or ethanol injection are inferior to surgical resection in radicality. Thoracoscopic surgery of the posterior mediastinum requires caution to avoid damaging structures such as the sympathetic trunk, aorta, esophagus and thoracic duct, but provides a better view, and is easier in many respects, than that of the middle or anterior mediastinum. Bronchogenic cysts may occur ectopically, and the possibility of their occurrence, although rare, in the posterior mediastinum must be sufficiently recognized, in which case, particular attention toward differentiation from neurogenic tumors is necessary.

References

1 Ashizawa K, Okimoto T, Shirafuji T, Kusano H, Ayabe H, Hayashi K. demonstration of complicating malignancy by CT and MRI. Br J Radiol 2001;74:959–961.

2 Di Lorenzo M, Collin PP, Vaillancourt R, Duranceau A. Bronchogenic cysts. J Pediatr Surg 1989;24:988–991.

3 Ko SF, Hsieh MJ, Linc JW, Huang CC, Li CC, Cheungd YC, et al. Bronchogenic cyst of the esophagus. Clin Imaging 2006;30:309–314.

4 Maier HC. Bronchiogenic cyst of the mediastinum. Ann Surg 1948;127:476–502.

5 McAdams HP, Kirejczyk WM, Rosado-de-Christenson ML, Matsumoto S. Imaging features with clinical and histopathologic correlation. Radiology 2000;217:441–446.

6 Patel S, Meeker D, Biscotti C, Kirby T, Rice T. Presentation and management of bronchogenic cysts in the adult. Chest 1994;106:79–85.

7 Rammohan G, Berger HW, Lajam F, Buhain WJ. Superior vena cava syndrome caused by bronchogenic cyst. Chest 1975;68:599–601.

8 Suen HC, Mathisen DJ, Grillo HC, LeBlanc J, McLoud TC, Moncure AC, et al. Surgical management and radiological characteristics of bronchogenic cysts. Ann Thorac Surg 1993;55:476–481.

9 Worsnop CJ, Teichtahl H, Clark CP. Bronchogenic cyst a cause of pulmonary artery obstruction and breathlessness. Ann Thorac Surg 1993;55:1254–1255.

Received October 4, 2010; accepted October 28, 2010

Corresponding author: Hiroshige Nakamura, MD