



Thoracoscopic Resection of Mediastinal Bronchogenic Cysts in Adults

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OBJECTIVE: The aim of this study was to discuss the diagnosis and determine the optimal thoracoscopic surgical treatment of mediastinal bronchogenic cysts.

METHODS: From May 1996 to April 2008, 13 consecutive patients with mediastinal bronchogenic cysts underwent thoracoscopic surgery at our institution. There were eight men and five women aged 16–74 years (mean age, 41.5 years).

RESULTS: In the majority of patients (69.2%), there were no clinical symptoms and the lesions were found incidentally by chest radiography that was performed as part of physical screening. Lesions were found in the posterior mediastinum in five patients (38.5%) and in the upper mediastinum in four (30.8%). In the histopathological examinations, ciliary epithelium was observed in 13 patients (100.0%), bronchial cartilage in 7 patients (53.8%), bronchial glands in 6 patients (46.2%), and smooth muscle in 5 patients (38.5%). No serious postoperative complications were observed. In 3 patients (23.1%), conversion to open thoracotomy was necessary due to major pleural adhesions and intraoperative vascular injury.

CONCLUSION: Thoracoscopic resection of mediastinal bronchogenic cyst is minimally invasive and has no serious postoperative complications, and should therefore be considered as the primary therapeutic option. [*Asian J Surg* 2011;34(1):11–14]

Key Words: magnetic resonance imaging, mediastinal bronchogenic cyst, thoracoscopic surgery

Introduction

Mediastinal bronchogenic cysts are thought to originate from anomalous buddings of the tracheobronchial tree,^{1,2} and the site of occurrence is near the bronchi in most cases. This is a benign disorder; therefore, in recent years thoracoscopic surgery has been a widely accepted treatment.^{3–6} However, because some patients present with major adhesions,^{5,6} it might be difficult to evaluate the suitability of thoracoscopic resection and make the decision to convert the operation to conventional thoracotomy. Against this background, in this study we investigated

13 cases of mediastinal bronchogenic cysts treated in our hospital, with a focus on diagnosis and thoracoscopic surgical treatment.

Materials and methods

Patients

Between May 1996 and April 2008, 13 consecutive patients with mediastinal bronchogenic cysts underwent surgery (8 men and 5 women, with a median age of 41.5 years and age range of 16–74 years) at Nihon University Itabashi Hospital (Tokyo, Japan). All of the specimens were collected

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through surgical resection for histopathological diagnosis. The postoperative status of each patient was checked using data in their medical records and telephone interviews.

Surgical procedure

After double-lumen intubation, the patient was placed in the lateral decubitus position on the operating table, with the affected side facing upward. Three trocars were used; their position depending on the location of the cyst. Usually, the thoracoscope was introduced at the fifth intercostal space along the mid-axillary or anterior axillary line. Two additional access sites were positioned at the fifth intercostal space along the posterior axillary line and the mid-clavicular line. At completion of surgery, one chest tube was inserted. Postoperative pain control was assured by intravenous patient-controlled or epidural analgesia systems.

Results

Clinical findings

In the majority of patients, there were no clinical symptoms and the lesions were identified by chance in nine patients (69.2%) by chest radiography, which was done as part of a physical screening examination. However, as subjective symptoms, chest pain was reported in some patients and coughing in one (Table 1).

Radiological findings

Chest radiography was performed in all patients, whereas computed tomography (CT) and magnetic resonance imaging (MRI) were performed in 13 and 10 patients, respectively. Round abnormal shadows were detected by chest radiography in all patients. All of the cysts appeared on chest CT with smooth edges ($n = 13$), whereas the thickness of the cyst wall and density inside the cyst varied (Figure 1). Most cysts showed low or moderate signal intensity on T1-weighted images and high signal intensity on T2-weighted images (Figure 2). The cysts in the other two patients who underwent MRI showed high signal intensity in T1-weighted images and low signal intensity in T2-weighted images.

Location of lesions

Lesions were found in the posterior mediastinum in five patients (38.5%), upper mediastinum in four patients (30.8%), middle mediastinum in three patients (23.1%), and anterior mediastinum in one patient (7.7%) (Table 1). According to the Maier classification,¹ four patients (30.8%) were type I (paratracheal), three (23.1%) were type II (tracheal carina), two (15.4%) were type III (hilar), four (30.8%) were type IV (para-oesophageal), and none were type V (others) (Table 2).

Treatment

All 13 patients were treated by thoracoscopic surgery. In 10 patients, the surgery was completed by video-assisted thoracoscopic surgery, whereas in 3 patients (23.1%) conversion to open thoracotomy was necessary, because of major pleural adhesions and intraoperative vascular injury. All of the cysts were completely resected. No serious postoperative complications were observed.

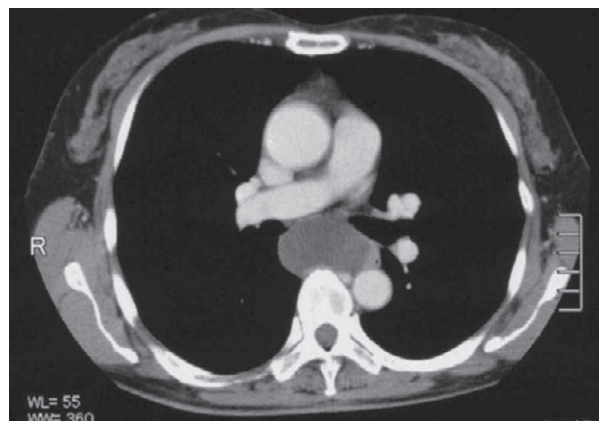


Figure 1. Chest computed tomography scan showed a rounded cyst in front of the vertebra.

Table 1. Presentation and location of mediastinal bronchogenic cyst

Presentation		Location	
Asymptomatic	9 (69.2%)	Posterior mediastinum	5 (38.5%)
Symptomatic	4 (30.8%)	Upper mediastinum	4 (30.8%)
Chest pain	3	Middle mediastinum	3 (23.1%)
Cough	1	Anterior mediastinum	1 (7.7%)

Pathological findings

The smallest tumour was 2 cm × 2 cm × 2 cm in diameter and 5 g in weight, and the largest tumour was 7 cm × 4 cm × 2 cm in diameter and 33 g in weight. The cyst contents varied in colour and texture; they were white, yellow, pale yellow, or brown in colour, and liquid, sticky and creamy, or mucinoid in texture.

Histological findings

In all 13 patients, the interior of the cysts was covered with ciliary epithelium. Bronchial cartilage in 7 out of 13 cases (53.8%), bronchial glands in 6 out of 13 cases (46.2%), and smooth muscle in 5 out of 13 cases (38.5%) were observed. All of these components were observed in three patients (23.1%).

Discussion

Bronchogenic cysts are one of the most common bronchopulmonary malformations. These cysts are congenital lesions that are thought to originate from the primitive ventral foregut, and occur between gestational day 26 and day 40.⁷ It is believed that abnormal budding of the primitive tracheobronchial tree occurs in the early stages and

develops into a mediastinal bronchogenic cyst, whereas budding that occurs in the later stages becomes an intrapulmonary bronchogenic cyst.² Although no particular location has been identified for intrapulmonary bronchogenic cysts, it is believed that mediastinal bronchogenic cysts often occur near the bronchi and in the hilar area.

Modern imaging techniques such as CT and MRI are useful for precise preoperative diagnosis. CT images can clearly reveal the relationships between mediastinal bronchogenic cysts and other mediastinal vital structures, and MRI produces T2-weighted images of cyst contents with very high signal intensities.⁸⁻¹¹ However, despite advances in diagnostic imaging, a definite diagnosis of a mediastinal bronchogenic cyst is ultimately made based exclusively on the results of a biopsy of the surgically resected tissue specimens.

Although there are generally no clinical symptoms in the majority of patients with mediastinal bronchogenic cysts, severe complications and malignant changes have been reported in some, and this is one of the reasons why surgical resection is the recommended treatment of choice. In addition, recurrence from incomplete excision has been reported, even after 25 years,^{12,13} and it seems that complete excision of the cyst wall is desirable as far as is possible.

Mediastinal bronchogenic cyst is a benign disorder, and considering recent improvements in thoracoscopic instruments and surgical techniques, thoracoscopic surgery is recommended as the first choice of treatment. It should be noted, however, that the amylase level is usually elevated in a bronchogenic cyst,¹⁴ and that pleural adhesions are extensive in some cases.

Table 2. Location of mediastinal bronchogenic cyst according to the Maier Classification

Type I (paratracheal)	4 (30.8%)
Type II (carina)	3 (23.1%)
Type III (hilar)	2 (15.4%)
Type IV (paraesophageal)	4 (30.8%)
Type V (others)	0 (0%)

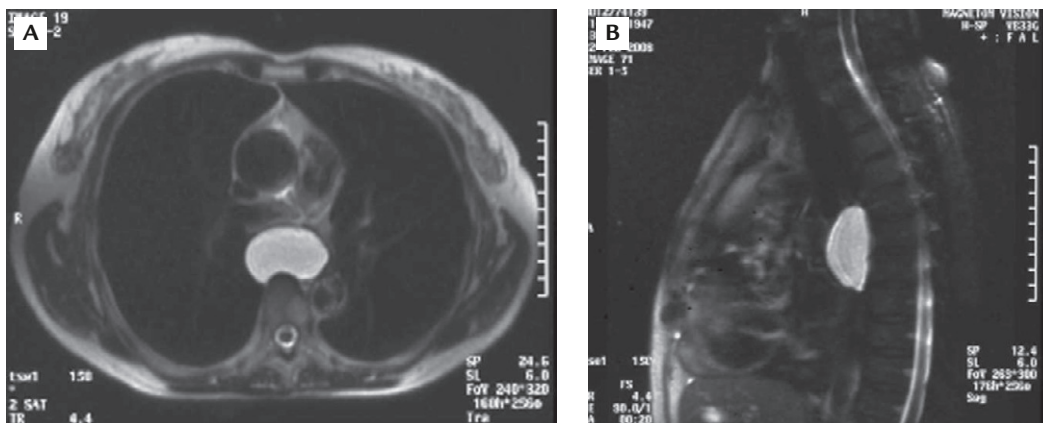


Figure 2. Transversal magnetic resonance imaging sections of a mediastinal bronchogenic cyst with high signal intensity located in front of the vertebra.

In more than a few cases, thoracoscopic surgery for cyst excision is converted to the conventional thoracotomy approach because of extensive adhesions, bronchial damage, or haemorrhage.^{5,6}

The conversion rate from thoracoscopic surgery to open thoracotomy is 8–35% by some reports,^{3,4,6} and our conversion rate is 23.1%, not a low numerical value. However, none of the 13 patients included in this study of thoracoscopic treatment of bronchogenic cysts were selected on the basis of location, size, and complications. In our opinion, conversion into thoracotomy is strongly advised in cases where excision is difficult because of adhesions and vascular complications.

Preoperative evaluation including CT and MRI are important in predicting potential complications and proximity to vital structures, which might in some instances be approached better with standard thoracotomy. However, as the thoracoscopic method is minimally invasive, it is more beneficial if the surgery is completed thoracoscopically, and the length of postoperative hospital stay might also be reduced. Therefore, it is important to complete the surgery in a safe manner, and in this respect, it is important always to be ready to convert to open thoracotomy when necessary.

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