



# The video-assisted thoracic surgery is the procedure of choice for the surgery of mediastinal bronchogenic cysts

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Mediastinal bronchogenic cyst (MBC) is congenital, and a result of an abnormal budding of the primitive foregut. MBC is the most common mediastinal cyst, usually located along the tracheobronchial tree, most often found behind the carina (1). MBC can occur among all age group, from infants to adults. Bronchogenic cysts can occur intrapulmonary or extrapulmonary. If an abnormal budding occurs during early gestation, the bronchogenic cyst will usually be located in the mediastinum. MBCs rarely communicate with the tracheobronchial tree when compared to intrapulmonary bronchogenic cysts. MBCs are lined with respiratory ciliated columnar epithelium and filled with a whitish-gray mucinous material, which can change into pus with infection.

Symptoms and signs of a compression due to MBCs were more frequent in infants and children than in adults. In infant and children, tracheobronchial compression can occur more often than in adults due to a relatively soft airway (2). MBCs can rarely cause acute respiratory distress and thus require urgent operation in infants and children due to the compression of the respiratory tract. Ribet and colleagues reported that cysts are more frequently symptomatic (70.8%) in children, because 75% are situated above the hilum and at the level of the hilum, whereas cysts are less likely to be symptomatic in adults (60%), because 53% are situated above the hilum or at the level of the hilum (3). In adults, many MBCs are found incidentally on the routine chest radiography. The incidence of symptoms varies from

9% to 67% (4,5). But more than half of the asymptomatic MBCs become symptomatic during the follow-up period due to compression of the airway, compression of the esophagus or infection. St-Georges *et al.* reported that 66.6% of the patients with MBCs were symptomatic and that 15(57.6%) developed symptoms subsequently among 26 patients who were observed (6). The most common symptoms were chest pain, cough, dyspnea and dysphagia, with substernal pain being the most common. The development of malignancy in the bronchogenic cyst has been reported, but is very rare. A variety of malignancies, such as adenocarcinoma, squamous cell carcinoma, sarcoma, have been reported (7-9). Many MBC can be detected on the standard chest radiography. However, it is difficult to differentiate an MBC from an enteric cyst, benign esophageal tumor, and solid mediastinal tumor. The combination of a computed tomography (CT) and magnetic resonance imaging (MRI) can produce a more accurate diagnosis. MRI is especially helpful in differentiating cystic MBCs from tumors with solid components, since the watery component of a cyst shows a very bright intensity on a T2-weighted MRI image. Endoscopic ultrasonography (EUS) can also help distinguish an MBC from a solid mass (10). An MBC should be differentiated from a neurogenic tumor, esophageal duplication cyst, pericardial cyst or lymphoma.

The definite treatment of MBC is surgical excision. When an abnormal mediastinal mass is found on a radiologic examination, surgical excision is generally

indicated even for asymptomatic masses for the purpose of an accurate diagnosis and prevention of future complications. In cases of MBC, at least half of the patients present symptoms at the time they are first diagnosed, and more than half of the asymptomatic patients will eventually develop symptoms. Thus, the indication for surgical excision is inevitably satisfied (4,11,12). The goal of surgery is a complete removal of MBC. A communication with the tracheobronchial tree is rare and any communications should be managed. A complete excision of an MBC is usually possible without major morbidities and mortalities. Yet, in cases of a complicated cyst with surrounding organs, a complete excision may not be so simple. MBC can tightly adhere with surrounding vital organs such as the tracheobronchial tree, esophagus and major vessels due to inflammation or infection. In these cases, any attempts to perform a complete excision can cause disastrous injury to the surrounding vital organs. It should not be forgotten that MBC is not a malignancy, but a benign cyst. Of course, the goal of surgery is a complete excision, nonetheless the safety of patient should not be ignored. When a portion of the cystic wall cannot be dissected from surrounding structures due to severe adhesion, the adhered portion may be left. But the lining mucosa of the remaining portion should be destructed to prevent the recurrence of MBC. The mucosal destruction may be performed by using an electrocautery or argon-bovie, applying a chemical agent (2% silver nitrate solution), or using a curettage (13). Ginsberg and colleagues reported a successful treatment of bronchogenic cyst by using a mediastinoscopy (14). However, the use of a mediastinoscopy remains controversial due to the fear of an incomplete resection of the cyst. Transbronchial aspiration was reported to relieve symptoms caused by cyst compression in nonsurgical candidates (15). Thoracotomy has been the procedure of choice for the removal of MBC for a long time before video-assisted thoracic surgery (VATS), with the first thoracoscopic resection of a bronchogenic cyst reported in 1991 (16). With the rapid development of VATS, the application of VATS has broadly extended. VATS has several advantages compared to routine thoracotomy, less postoperative pain, a shorter hospital stay, better cosmetic results and a quicker recovery time for daily activities after the operation. Many successful reports verified that VATS is a safe and useful method in removing MBC and that VATS will become the procedure of choice (5,11,15,17,18). Guo and colleagues compared VATS with posterolateral thoracotomy (PLT) in adult patients undergoing surgical excision of MBCs. They

reported that there was no significant difference in the rate of incomplete resection and postoperative complication between two groups. Both VATS and PLT are reliable approaches for the surgical resection of MBCs, but VATS is superior to PLT considering perioperative results. They recommended that VATS should be preferred over PLT in the removal of MBCs (11). Recently Wang and colleagues reported their experience of 119 patients with MBC. VATS was possible in 118 patients with only one exception who required a conversion to thoracotomy. There were no serious postoperative complications and mortalities in their study. They reported that a maximal diameter greater than 5 cm increased the risk of an operation time extension and bleeding (18). This report, again, confirmed the safety and effectiveness of VATS in the excision of MBC. Of course, the principle of surgery, a complete excision of a cyst should be kept in VATS. Conversion to thoracotomy should not be hesitated when VATS cannot achieve a complete excision of the cyst due to severe pericytic adhesion or high risks of injury to the surrounding vital structure. Jung *et al.* reported a 3.5% conversion rate from VATS to thoracotomy, while a French study reported a conversion rate of 35% (17,19). According to several reported studies, severe pleural adhesion is the main cause of thoracotomy conversion (4,5). This implies that early conversion to open thoracotomy can be considered in the patients who are expected to have dense pleural adhesion. The injury to surrounding vital organs is the most disastrous complications during the excision of MBC but rare. According to Pierson and Methisen, a successful repair of a large airway defect which occurred during an excision of subcarinal MBC was performed with a pedicled pericardial patch (20).

As an alternative to the removal of MBC, an aspiration of the cyst, injection of a sclerosing agent, transbronchial needle aspiration (TBNA), and aspiration by EUS and percutaneous aspiration were described (21-23). Because numerous recurrences with complications have been reported after aspiration alone, these procedures may be suggested only in patients who are not candidates for surgical removals.

In conclusion, VATS is a safe and effective method in the excision of MBC and may be the procedure of choice instead of thoracotomy.

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## Footnote

*Conflicts of Interest:* The author has no conflicts of interest to declare.

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