Mature teratomas are rarely located in the posterior mediastinum, and most mature teratomas are asymptomatic. Teratoma rupture into the adjacent lung and esophagus is possible but considering the rare entity of posterior mediastinal teratomas and the perforation rate, it is extremely unusual. We report a case of ruptured mature cystic teratoma located in the posterior mediastinum, showing fistula formation to the adjacent lung and esophagus, which presented with hemoptysis.

**Index terms**
- Teratoma
- Neoplasm
- Mediastinum
- Chest Imaging

**INTRODUCTION**

Mature teratomas are the most common mediastinal germ cell tumors. Most mature teratomas are located in the anterior mediastinum, and only 3–8% of mature teratomas occur in the posterior mediastinum (1). Mature teratomas may rarely rupture into adjacent structures (2). Based on a review of the literature, ruptured mature teratomas in the posterior mediastinum have not been reported previously. Ruptured teratomas with invasion of adjacent structures, such as the pleural space, pericardium, or lung parenchyma, have rarely been reported, but all reported mediastinal mature teratomas have been located in the anterior mediastinum (2).

In this case report, we noted an unusual tumor location and imaging findings of ruptured mature teratomas in the mediastinum. We present a case of ruptured mature cystic teratoma located in the posterior mediastinum with fistula formation of the adjacent lung and esophagus.

**CASE REPORT**

A 43-year-old-man presented to our outpatient clinic to evaluate hemoptysis of 1-week duration. He also complained of dysphagia and vigorous cough during meals. He had a history of bronchiectasis diagnosed at 15-years-of-age. The physical examination revealed coarse and diminished breath sounds over the right lower chest. The results of laboratory tests, including complete blood count, chemistry panel, and serum tumor markers were normal.

Chest posteroanterior radiograph showed consolidation in the right lower lung field and curvilinear opacities along the lower thoracic spine superimposed on the right atrium and left heart border, findings suggestive of a posterior mediastinal mass (Fig. 1). Chest computed tomography (CT) revealed a large het-
Ruptured Mature Cystic Teratoma in the Posterior Mediastinum

A homogeneous mass in the right paraesophageal region below the carina. The mass contained fat, soft tissue, calcifications, fluid, and air bubbles (Fig. 2A, B). Consolidation with an air bronchogram and multi-focal low density areas were seen at the anterior aspect of the right lower lobe. The mediastinal mass and the consolidation were in direct contact and an air-containing fistulous tract visible between the mediastinal mass and the consolidation (Fig. 2B). The distal esophagus was displaced to the left side by the mass. Another fistulous tract was noted between the esophagus and the mediastinal mass on the coronal image (Fig. 2C). No pleural or pericardial effusion was present. Esophagography and bronchoscopy were performed to confirm the fistulous tracts.

Esophagography revealed contrast leakage into the tumor and an irregular surface of the involved distal esophagus (Fig. 3). The bronchoscopy showed a profuse purulent-like secretion at the distal portion of the anterior basal segment of the right lower lobe bronchus. There was no definite fistulous tract on bronchoscopic examination. Polymerase chain reaction analysis of the bronchial wash fluid was negative for *Mycobacterium tuberculosis*.

A thoracotomy was performed to obtain an adequate tissue sample for a definite diagnosis of the mass and treat the fistula. Intraoperative inspection showed a mass tightly adherent to the right lower lobe and infiltrating into the esophagus. The surgeon confirmed two fistulous tracts connected to the distal esophagus and right lower lung. An excision of the posterior mediastinal tumor and a partial esophagectomy with gastroesophageal reconstruction were performed.

The tumor consisted of multiple cystic structures lined by columnar and squamous epithelium, skin appendages with sweat glands and hair follicles, and neural tissue. The mass was pathologically confirmed as a mature cystic teratoma (Fig. 4).

The patient recovered well and has had no evidence of recurrence or complications to date. A repeat chest CT obtained 3 months later showed regression of necrotizing pneumonia in the right lower lobe of the lung.

**DISCUSSION**

Teratomas are germ cell tumors composed of several types of...
mature or immature somatic tissues derived from two or three germinal layers. They are classified as mature, cystic (dermoid cyst), immature, and malignant (3).

Patients with mature teratomas are usually asymptomatic and the masses are found incidentally on a chest radiograph. Patients may have symptoms such as cough, chest pain, dyspnea or hemoptysis resulting from local compression, associated infection, or rupture (2). Mature teratomas may rarely rupture into adjacent structures such as the pleural space, pericardium, lung parenchyma, or tracheobronchial tree (2). The mechanism of rupture of a mature teratoma is still controversial, although autolysis, chemical inflammation, ischemia, pressure necrosis, and infection have been proposed (2). Pericardial effusion, pleural effusion, lipoid pneumonia, or expectoration of hair or sebaceous materials may occur in patients with a ruptured teratoma (1).

Imaging features of unruptured mature teratomas in the posterior mediastinum are identical to typical anterior mediastinal teratomas, except for the location (2, 4). The most frequent CT manifestation of an unruptured mature teratoma in the mediastinum is a heterogeneous mediastinal mass, containing soft tissue, fluid, fat, and calcifications (1). Calcification is observed in about 50% of cases, being focal or rimlike or rarely teeth or bone.

The most significant imaging findings of ruptured masses are inhomogeneity of the internal components. The heterogeneous densities of the ruptured tumors might be caused by the mixing of internal components in different compartments with a secondary inflammatory reaction to extravasated contents (2). Some ancillary findings such as a fat-containing mass, consolidation, or atelectasis in the adjacent lungs are helpful for detecting ruptured teratomas. Other findings to detect rupture of the tumor are pleural and pericardial effusions (2). In our case, image findings such as heterogeneous densities of the mass, consolidation in the adjacent lung, and fistula formation of the adjacent esophagus raise the possibility of ruptured mature cystic teratoma into the adjacent lung and esophagus.

The differential diagnosis of posterior mediastinal tumors includes neurogenic tumor, bronchogenic cyst, enteric cyst, xanthogranuloma, diaphragmatic hernia, esophageal tumor, lymphadenopathy from granulomatous disease, and paravertebral abscess (5). When fat-containing lesions with calcification are detected in the posterior mediastinum, the differential diagnosis includes germ cell tumors, extramedullary hematopoiesis, lipoma, and liposarcoma (6). In the present case, although imaging findings strongly suggested mature cystic teratoma, our differential diagnoses also included liposarcoma. Liposarcomas rarely occur in the mediastinum (7). Liposarcomas appear on CT scans in homogeneous attenuation with significant amounts of soft tissue within the fatty mass (3). Liposarcomas can show calcification and ossification (7). CT findings suggesting liposarcomas are poor definition of adjacent mediastinal structures or evidence of infiltration or invasion of mediastinal structures (3). In our case, there was no definite evidence of tumor infiltration or invasion into adjacent mediastinal structures.

Open thoracotomy and video-assisted thoracoscopic resection are surgical techniques for resecting a mediastinal mature teratoma (7). When mature teratomas rupture, the internal compo-
nents of the teratoma such as proteolytic or digestive enzymes leak into the adjacent organs, causing inflammation and adhe-
sions. Therefore, surgical treatment of ruptured tumors is more
complicated than unruptured tumors (2). In our patient, severe
adhesions and inflammation were present between the tumor
and adjacent esophagus, so the surgeon performed a mediasti-
nal tumor resection and partial esophagectomy with gastro-
esophageal reconstruction.

In conclusion, early diagnosis of ruptured mature teratomas is
important for proper management. Understanding the radio-
logic findings of ruptured teratomas and the unusual tumor lo-
cation can improve the correct diagnosis rate for ruptured pos-
terior mediastinal mature teratomas.

REFERENCES

1. Rosado-de-Christenson ML, Templeton PA, Moran CA.
   From the archives of the AFIP. Mediastinal germ cell tu-
mors: radiologic and pathologic correlation. Radiographics
   1992;12:1013-1030
2. Choi SJ, Lee JS, Song KS, Lim TH. Mediastinal teratoma: CT
differentiation of ruptured and unruptured tumors. AJR
3. Muller NL, Silva CIS. Imaging of the chest. Philadelphia,
4. Sinclair DS, Bolen MA, King MA. Mature teratoma within the
5. Duwe BV, Sterman DH, Musani AI. Tumors of the mediasti-
6. Moran CA, Suster S, Fishback N, Koss MN. Extramedullary
   hematopoiesis presenting as posterior mediastinal mass: a
   study of four cases. Mod Pathol 1995;8:249-251
7. Shintani Y, Funaki S, Nakagiri T, Inoue M, Sawabata N, Min-
ami M, et al. Experience with thoracoscopic resection for
   mediastinal mature teratoma: a retrospective analysis of 15