The occurrence of mediastinal hemangiomas is reported to be less than 0.5% of all mediastinal tumors, which can be isolated or multifocal [1, 2]. The mediastinal hemangiomas usually present as non-specific masses with variable image features; together with their rarity, the pre-operative diagnosis of this tumor is usually difficult and can easily be misdiagnosed. CT guide biopsy is contraindicated as it might cause serious hemorrhage [3]. Total surgical removal is the preferred choice for treating most of these cases [4]. We report two cases of mediastinal hemangiomas, and at the same time, describe the image features that can help us in making the correct diagnosis.

**Cases Reports**

**Case 1**

A 58-year-old man suffered from progressive shortness of breath for a month and had lost almost 10 kg in the previous twelve months. Chest radiography revealed a huge, well-defined mass occupying the mediastinum (Fig. 1a). Chest computed tomography (CT) showed a 9.3 x 11.4 x 12.4 cm³ hyperdense mass with tiny punctate calcifications in the posterior mediastinum with compression of the middle mediastinum. After contrast injection, the mass revealed heterogeneous, mainly peripheral enhancement together with a well-defined enhancing capsule. The heart, bilateral main pulmonary arteries, bronchus and esophagus were compressed by this mass (Fig. 1b, 1c).

The laboratory data, including tumor marker such as CEA, SCC and AFP, were within normal range. He received right thoracotomy for tumor resection. Grossly, this mass was red-tan in outer surface coloration and had a well-defined fibrous capsule. Histologically, the mass was composed of dilated vessels lined with attenuated endothelial cells separated by collagenous stroma, and a diagnosis of cavernous hemangioma was made. (Fig. 1d). No immediate complication was found after operation. The patient was lost to follow-up after discharge.

**Case 2**

A 57-year-old female with hypertension had suffered from chest pain for a year, especially when she took a deep breath. No other symptoms such as cough, hemoptysis...
Figure 1

A 58-year-old man with mediastinal cavernous hemangioma. 

a. Chest radiography revealed a large well-defined mass occupying the mediastinum. Non-contrast-enhanced CT b. and contrast-enhanced CT c. showed a large hyperdense mass with tiny punctate calcification (arrow) in the posterior mediastinum with compression of the middle mediastinum. The mass revealed a well-defined enhancing capsule (arrowhead) and heterogeneously, mainly peripheral enhancement. The adjacent structure was compressed by this mass. 

d. Histologically, the mass was composed of dilated vessels lined with attenuated endothelial cells separated by collagenous stroma. (Hematoxyline-Eosin stain 40X)
Chest radiography showed a well-defined lesion at the left hilar region (Fig. 2a). Chest CT revealed a 3.8 x 2.9 x 2.8 cm³ mass at the middle mediastinum adjacent to left hilar great vessels. Another 1.5cm soft tissue lesion was also found at the pre-vascular region in the anterior mediastinum. No calcification was found in both lesions, which revealed heterogeneity, and had mainly peripheral enhancement in contrast studies. (Fig. 2b, 2c).

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Figure 2. A 57-year-old female with cavernous hemangiomas. a. Chest radiography shows a well-defined lesion at the left hilar region (arrow). b-c. Chest CT showed a well-defined nodule at the left hilar region (arrow). The other lesion was at the the anterior mediastinum (arrowhead). Both lesions revealed heterogeneous and mainly peripheral enhancement. d. Histologically, it showed a collection of large anastomosing ectatic vessels with congestion and thick walls with myxoid change. (Hematoxyline-Eosin stain 40X).
Mediastinal hemangiomas

including tumor marker CEA and SCC were normal. The patient received left thoracotomy for tumor removal. The tumor at the left hilar region was reddish and had severe adhesion to the adjacent aorta, pulmonary arteries and bronchus. This mass easily bled during the operation, so nearly total tumor removal was done carefully. The other tumor in the anterior mediastinum was totally resected at the same time. Histologically, both tumors showed poorly circumscribed collections of large anastomosing ectatic vessels with congestion and thick vascular walls with myxoid change, compatible with cavernous hemangioma (Fig. 2d). After operation, no obvious complications were found during three months of follow-up.

DISCUSSION

Mediastinal hemangiomas are rare benign tumors originating from the vascular endothelium. The cause of hemangioma is thought to be due to vascular developmental anomalies rather than true neoplasms [5]. Studies have found that 68% of these tumors are located in the anterior mediastinum [6]; however, they can also be found in the middle or posterior mediastinal as well [7, 8]. These lesions are mostly diagnosed before the age of 35 years and have no gender predilection [9].

One half of patients are asymptomatic at presentation, and they may be diagnosed incidentally by imaging. The other half patients may present with some nonspecific symptoms such as cough, chest pain, dyspnea, stridor, and hoarseness due to tumor compression [8].

Macroscopically, mediastinal hemangiomas usually appear as well-defined lesions, some with a true capsule, red or brown in color, and spongy in appearance on cut section. Size ranges from 2 cm to 20 cm [10]. Histologically, mediastinal hemangiomas consist of large interconnecting vascular spaces lined by flattened cuboidal epithelium together with a varying amount of interspersed stromal elements like fat, myxoid, and fibrous tissue [11]. According to the size of vascular spaces, it can be classified into cavernous, capillary, venous or mixed types [12]. More than 90% are capillary or cavernous hemangiomas [5].

The preoperative diagnosis of a mediastinal hemangioma is difficult, because their image features are usually nonspecific [11]. On the chest X-ray, a mediastinal hemangioma appears as a well-defined, circumscribed or lobulated mass, which may compress the adjacent organ.

In non-contrast CT study, mediastinal hemangioma is usually revealed as a well-defined, heterogeneous mass. CT may also demonstrate the extension or invasion of the tumor to adjacent organs. After contrast administration, four types of enhancement patterns have been reported such as minimal heterogeneous (most common), classical peripheral or central puddling of contrast agent, homogeneous enhancement, and nonenhancement [7].

Gradual increase and prolonged contrast stains are the diagnostic hints for mediastinal hemangioma under dynamic enhancing CT study [3]. An aberrant vessel entering into the tumor may be seen and is valuable for operational planning [3]. Dilated drainage veins have also been reported on delayed images in some cases [13].

Phleboliths, revealed as a ring-like calcification with central lucency [14], is usually pathognomonic to mediastinal hemangioma [5, 8, 9, 11], but only present in 10% of cases. Nonspecific punctate calcifications are found in about 20% of the cases [11].

Magnetic resonance (MR) imaging may be employed in the diagnosis of mediastinal hemangiomas. Mediastinal hemangiomas are usually hypointense on T1-weighted images and sometimes interpose with few hyperintense foci representing methemoglobin formation or fat component [14]. They are often hyperintense on T2-weighted images and demonstrate intense enhancement under enhanced T1-weighted images [14].

The common differential diagnosis of mediastinal hemangiomas is according to their locations. If the tumors are in the anterior mediastinum, it is difficult to tell hemangiomas apart from thymomas, because they share the similar image features in many aspects. However, gradually increasing and prolonged contrast enhancement is only depicted in mediastinal hemangiomas under dynamic enhancing CT study [3]. Thymomas may be isointense or less hyperintense than mediastinal hemangioma on T2-weighted images. Washout pattern may be seen in thymoma under dynamic contrast-enhanced MRI images [15]. Clinically, 30-50% of patients with thymomas have myasthenia gravis [16].

If the tumors are in the middle mediastinum, lymphoma should be taken into account. Lymphomas usually present as homogeneous enhancing masses with high prevalence of associated mediastinal lymphadenopathy. Pleural and pericardial effusions are also common features in lymphoma. Calcification of lymphoma is rare before radio- or chemotherapy [17].

When the tumors are in the posterior mediastinum, they should be differentiated from the neurogenic tumors such as schwannoma, neurofibroma or paragangliomas. Neurogenic tumors are usually present as round paravertebral masses, more commonly associated with neural foraminal extension causing foraminal widening and dumbbell-shaped tumors [18]. Presence of cystic change and identification of target sign (high signal intensity at the periphery with a hypointense region centrally on axial T2-weighted images) are also hints for neurogenic tumors, especially in schwannoma [17].

CONCLUSION

Our cases highlight the great variability of mediastinal
Mediastinal hemangiomas

Though preoperative diagnosis of mediastinal hemangiomas is difficult, there are still some valuable image features that help us to determine this tumor such as well-defined margin, peripheral enhancement, presence of phleboliths, or dilated drainage veins. Dynamic CT or MRI is also helpful to make the correct diagnosis, and prevent from catastrophic hemorrhage due to CT-guided biopsy [3].

REFERENCES