

## Case Report

# Cavernous hemangioma in the mediastinum : A case report focusing on multimodal image findings.

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## Abstract

A 50-year-old female was admitted to Jichi Medical University Saitama Medical Center with a mediastinal tumor suspected on thoracic computed tomography (CT). The CT showed a well-demarcated, nodular lesion in the left anterior mediastinum, which was adjacent to the aortic arch. A contrast-enhanced dynamic CT study revealed spotty enhancement in the peripheral part of the tumor in the arterial phase; subsequently, the contrast effect progressively spread throughout the tumor in the delayed phase. On magnetic resonance imaging (MRI), the tumor had a homogeneously hyperintense signal on T2-weighted image. Diffusion-weighted image demonstrated high intensity in the tumor with a high apparent diffusion coefficient. A neurogenic tumor was suspected, and surgery was performed without a definitive preoperative diagnosis. The tumor was removed and was histologically diagnosed as a cavernous hemangioma.

Here, we report the multimodality imaging findings of a patient with a cavernous hemangioma in the mediastinum. When a cavernous hemangioma is on the differential diagnosis of a mediastinal tumor, dynamic CT or MRI studies should be considered to facilitate making a preoperative diagnosis.

(Key words : cavernous hemangioma, mediastinal tumor, contrast-enhanced dynamic CT, contrast-enhanced dynamic MRI.)

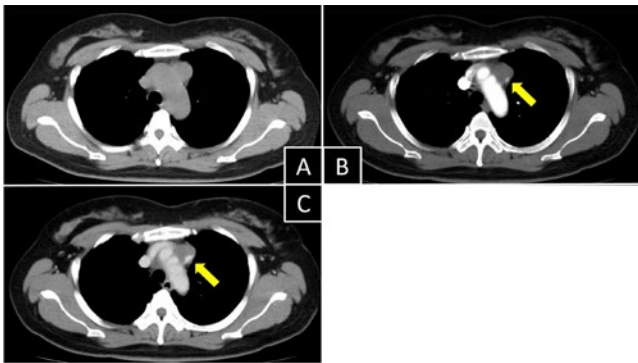
## Introduction

A hemangioma in the mediastinum is relatively rare, and it accounts for approximately 0.5% of all mediastinal tumors<sup>1</sup>. A mediastinal cavernous hemangioma is an asymptomatic, benign, vascular lesion<sup>2</sup>, and its diagnosis is often confirmed by surgical resection. Because these lesions have no specific imaging findings, making a preoperative diagnosis is difficult. However, heavy bleeding may occur during surgery or biopsy : therefore, preoperative diagnosis is important. Although cases of mediastinal hemangiomas have been reported in the literature<sup>3</sup>, information regarding imaging findings is limited.

We present the case of a patient with a cavernous hemangioma in the anterior mediastinum and discuss its multimodal imaging findings.

## Case

A 50-year-old female with nonspecific complaints was suspected of having a mediastinal tumor on plain computed tomography (CT) of the thorax at an outside hospital. The patient was referred to our center to undergo detailed examination and treatment. She had a history of malignant tumor resection in her right thigh 5 years ago. However, there had been no recurrence or metastasis. Her family history and blood biochemistry test results were unremarkable.

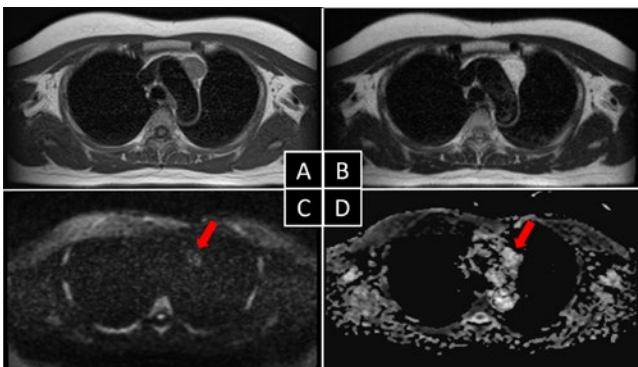


**Fig. 1. Dynamic computed tomography (CT) of the thorax**

A : Plain CT. A well-defined spherical nodular lesion is noted in the left anterior mediastinum adjacent to the aortic arch. The lesion shows a relatively homogeneous density.

B : Early phase of dynamic CT. Spotty contrast enhancement is seen in the posterior part of the lesion, showing the same degree of contrast as in the aortic arch.

C : Late phase of dynamic CT. The contrast effect progressively spreads throughout the lesion.



**Fig. 2. Magnetic resonance imaging (MRI) of the thorax**

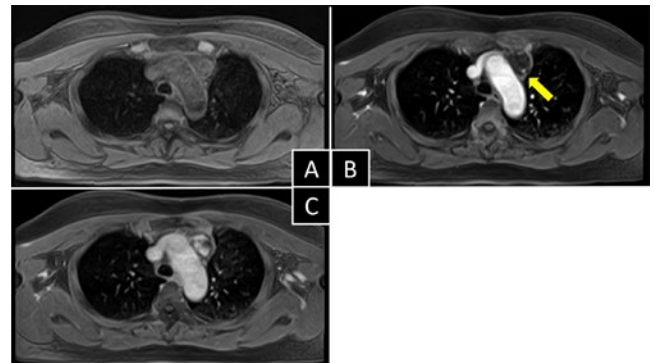
A : T1-weighted image. A well-demarcated nodule is demonstrated showing relatively low signal intensity but a slightly more hyperintense signal than that of the muscles.

B : T2-weighted image. The nodular lesion shows a homogeneous hyperintense signal.

C : Diffusion-weighted image (DWI). DWI reveals a hyperintense signal due to T2 shine-through effect.

D : Apparent diffusion coefficient (ADC) map. The ADC map shows an almost uniform high value within the lesion.

There were no abnormalities on her chest radiograph. The CT scan revealed a well-demarcated, spherical, nodular lesion in her left anterior mediastinum, adjacent to the aortic arch (Fig. 1A). The lesion was relatively homogeneously dense and was 28 × 26 × 26 mm in size. Dynamic contrast-enhanced CT revealed peripheral nodular enhancement within the lesion in the arterial phase, showing the same degree of contrast as in the aortic arch (Fig. 1B). The



**Fig. 3. Thoracic dynamic magnetic resonance imaging (MRI)**

A : Pre-contrast MRI. The lesion shows uniform signal intensity, similar to that of the muscles.

B, C : Dynamic contrast MRI. The dynamic study shows spotty contrast enhancement in the posterior peripheral part of the lesion in the early phase (B) and fill-in contrast effect in the delayed phase (C).

contrast effect progressively spread throughout the tumor in the delayed phase (Fig. 1C). On magnetic resonance imaging (MRI), the tumor showed relatively low signal intensity but was slightly hyperintense on T1-weighted image (Fig. 2A) and had a homogeneous hyperintense signal on T2-weighted image (Fig. 2B). Diffusion-weighted image (DWI) demonstrated high intensity in the lesion with a high apparent diffusion coefficient (ADC ; Figs. 2 C, D). Furthermore, there was spotty contrast enhancement in the peripheral part of the nodule in the early phase on dynamic MRI, which subsequently spread toward the center in the late phase ; this was similar to the finding observed on CT (Fig. 3).

A neurogenic tumor, such as a neurinoma, was suspected, and the lesion was removed via thoracoscopic surgery without a definitive preoperative diagnosis. The tumor was a well-demarcated, elastic, soft lesion adjacent to the aortic arch with no invasion into neighboring structures. Histopathological examination revealed that the lesion was composed of dilated blood vessels lined by endothelial cells with intraluminal red blood cells. There was no evidence of malignancy. The tumor was histologically diagnosed as a cavernous hemangioma. Postoperatively, the patient remained recurrence-free.

### Discussion

Hemangiomas are a heterogeneous group of benign vascular lesions containing differentiated blood vessels<sup>2</sup>. They are commonly found in the liver or head and neck, but they rarely develop in the mediastinum. Shennan et al.<sup>4</sup> reported on hemangiomas for the first time in 1914. Hemangiomas account for 0.5% of all mediastinal tumors<sup>1</sup>. There are no differences in the incidence between male

and female patients<sup>3</sup>. Patient ages range from 3 months to 76 years (average age, 35 years), and tumor size ranges from 2 to 17 cm (average, 6.6 cm)<sup>3</sup>. The most common site of occurrence is the anterior mediastinum, followed by the posterior mediastinum<sup>3,5</sup>. Histologically, a cavernous hemangioma (70% – 77%) and capillary hemangioma (15%) account for most hemangiomas, and mixed types have also been reported<sup>2,3,6</sup>. More than 60% of patients with mediastinal hemangioma are asymptomatic; the remainder present with various symptoms such as hemoptysis, superior vena cava syndrome, hoarseness, and pneumothorax<sup>7</sup>.

Surgical resection is the first choice for treatment, and thoracoscopic resection has been reported in recent years<sup>3,8-10</sup>. However, heavy bleeding may occur during surgery or biopsy<sup>10-12</sup>, and a preoperative diagnosis is important but difficult to make<sup>3</sup>.

The presence of ring-shaped phleboliths within the mass are a characteristic finding on chest x-rays and are seen in approximately 10% of patients. Masses with venous stones were found in 16% of patients on CT<sup>5</sup>. Contrast-enhanced CT shows different degrees of enhancement, and peripheral spotty enhancement has been reported on dynamic CT<sup>13</sup>. MRI exhibits a mass with iso-intensity relative to muscle on T1-weighted image and hyperintensity on T2-weighted image. Progressive fill-in contrast effect has been reported on gadolinium-enhanced T1-weighted image<sup>5</sup>.

Characteristic findings on CT and MRI have been well described for cavernous hemangiomas of the liver. Histological features are the same between hepatic and mediastinal hemangiomas<sup>2</sup>; therefore, it is likely that the imaging findings of both lesions are similar. Dynamic CT/MRI of hepatic hemangiomas typically shows peripheral nodular enhancement in the arterial phase and fill-in contrast in the late phase as well as homogeneous hyperintensity on T2-weighted image similar to cerebrospinal fluid<sup>15</sup>. DWI with a high ADC is useful for distinguishing hepatic hemangiomas from neurogenic tumors<sup>16,17</sup>.

In the present case, the same imaging characteristics for hepatic hemangiomas were observed on CT and MRI. T2-weighted image and DWI/ADC findings were also similar to those of hepatic hemangiomas. Notably, early peripheral nodular enhancement in the arterial phase and progressive centripetal enhancement to uniform filling in the delayed phase are characteristic findings on dynamic CT and MRI studies. These imaging features are different from those of other mediastinal tumors, such as thymoma or neurogenic tumors. Furthermore, homogeneous, hyperintense signals on T2-weighted image and DWI with high ADCs may be useful imaging findings for making a diagnosis.

If mediastinal hemangiomas are preoperatively diagnosed, carefully planned surgeries can be performed while avoiding biopsy in symptomatic patients. In asymptomatic patients, follow-up observations should be considered. Thus, when a

mediastinal tumor is encountered, a cavernous hemangioma should be included in the differential diagnosis and multimodality imaging is necessary.

## Conclusion

We presented the case of a patient with a cavernous hemangioma in the anterior mediastinum and described its multimodal imaging findings. Early peripheral nodular enhancement in the arterial phase and progressive centripetal enhancement to uniform filling in the delayed phase are characteristic dynamic CT and MRI findings. When a cavernous hemangioma is considered in the differential diagnosis of a mediastinal tumor, dynamic CT or MRI studies are recommended for making a preoperative diagnosis.

## Declaration of interest

Conflict of interest disclosure : None

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## 縦隔内海綿状血管腫の1例：画像所見を中心に

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### 要 約

症例は50歳の女性で、CTにて前縦隔左側に大動脈弓と接する結節が認められた。ダイナミック造影CTでは、早期相において辺縁部に結節状の強い造影効果を示し、後期相では病変全体が濃染した。MRIでは、T2強調画像で内部均一で著明な高信号を呈し、ダイナミック造影MRIでは、CTと同様の特徴的な造影パターンが認められた。拡散強調像では高信号を呈し、みかけの拡散係数(ADC map)も高値を示した。神経原性腫瘍が疑われ、胸腔鏡下での腫瘍摘出術が施行され、組織学的に海綿状血管腫と診断された。縦隔内発生の海綿状血管腫はまれで、画像診断に関する報告は少ない。肝の海綿状血管腫と同様の画像所見が認められ、鑑別診断においてダイナミックCTおよびMRI所見が特徴的であると考えられた。

(キーワード：海綿状血管腫，縦隔腫瘍，ダイナミックCT，ダイナミックMRI)