Clinical Case Report

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Epithelioid hemangioendothelioma of right innominate vein mimics a teratoma

A case report

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Abstract

Rational: Epithelioid hemangioendothelioma (EHE) is a rare neoplasm commonly known to arise from the soft tissue, lung, and liver. EHE arising from right innominate vein (RIV) has scarcely been reported in English literature.

Patient concerns: Herein, we present a rare case of EHE of RIV in a 51-year-old woman with right-lower chest pain for 4 days. Computed tomography of the chest revealed a spherical mass with calcification and fatty foci located in the anterior mediastinum, thus a presumptive diagnosis of teratoma was made.

Diagnoses, interventions, and outcomes: Video-assisted thoracoscopic explorations and resection of mediastinal tumor were then performed. The pathological examination showed that the tumor was EHE. Postoperative radiotherapy was delivered to the patient. Pulmonary metastases were found by chest CT a year after surgery.

Lessons: A diagnosis of EHE might be considered, when a mediastinal tumor closely related to veins showing intratumoral calcification and obvious enhancement, despite the presence of a clear boundary and visible fat content.

Abbreviations: EHE = Epithelioid hemangioendothelioma, MEHE = mediastinal EHE, RIV = right innominate vein.

Keywords: computed tomography, epithelioid hemangioendothelioma, magnetic resonance imaging, mediastinum, right innominate vein

1. Introduction

Epithelioid hemangioendothelioma (EHE) is a rare angiogenic tumor originating from vascular endothelial or pre-endothelial cells. It is an aggressive neoplasm with pathological and biological characteristics that lies between benign hemangioma and malignant hemangiosarcoma.[1] EHE typically affects the lung and liver, although it may also involve several other sites, such as the head, neck, breast, spine, skin, abdomen, etc.[1] Literature search of PubMed using the search terms "epithelioid hemangioendothelioma" and "innominate vein (brachiocephalic vein)" revealed only 4 reports,[2–5] all of which occurred in left brachiocephalic vein. Mediastinal EHE (MEHE) arising from right innominate vein (RIV) has scarcely been reported in English literature. Although previous reports on MEHE described its clinicopathological features, radiographic images was lacking or scant. Radiographic images are important for an accurate preoperative diagnosis which is of great significance for the selection of therapeutic scheme or surgical plan. Here, we present an unusual case of MEHE stem from RIV in a 51-year-old woman.

2. Case description

The patient provided informed consent for the publication of her clinical and radiological data. This case report was approved by Medical Ethical Committee of The First Affiliated Hospital of Guangzhou Medical University.

A 51-year-old woman presented to our hospital with pain in the right-lower side of her chest since 4 days prior to her presentation. She reported no cough, expectoration, hemoptysis, chest tightness, or shortness of breath, and had no significant medical background or family history. On physical examination, the patient was no fever. The lungs were clear and heart rate was regular, without a murmur. Laboratory examination was unremarkable. Chest x-ray revealed a well-defined mass in the mediastinum (Fig. 1). CT revealed a spherical mass (3.3×2.9 cm) with calcification and fatty foci in the anterior mediastinum (Fig. 2), suggesting a teratoma. Ring enhancement around the tumor capsule was also observed. There were no enlarged lymph nodes in hilars and mediastinum. Magnetic resonance (MR) imaging (Fig. 3) showed a mass with isointensity on T1 weighted image (T1WI) and hypointensity on T2WI. On diffusion weighted imaging, the tumor demonstrated low signal intensity with some region showing impeded diffusion and signal loss.

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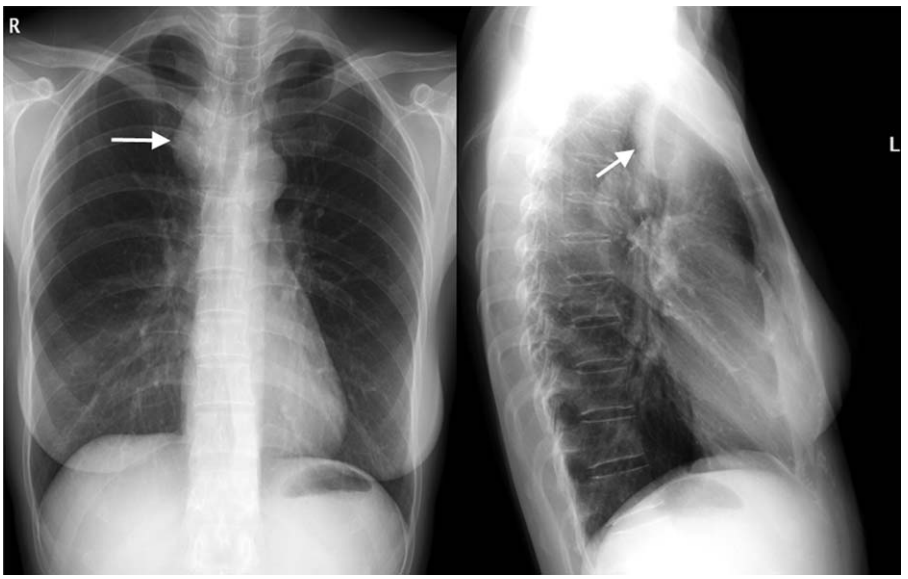

Figure 1. Chest x-ray revealed a round-like mass (arrow) in anterior mediastinum.

Video-assisted thoracoscopic explorations and resection of mediastinal tumor were then performed. RIV ruptured and bled, while attempt was made to separate the tumor and RIV. After hemostasis by compression, the tumor was found closely adhesion to RIV and cannot be safely removed off. Thus, the majority of tumor was resected. The rupture of RIV was sutured with prolene line. Histopathological examination showed no obvious cellular atypia or karyokinesis, but showed locally obvious heteromorphism of the cells (Fig. 4). Immunohistochemical analysis (Fig. 5) showed that the cells stained positively for CD31, CD34, vimentin, CD10, smooth muscle actin, and negatively for creatine kinase, EMA, Synaptophysin, chromogranin A, human melanoma black 45, CK7, thyroid transcription factor-1, and S100. The Ki67 shows proliferation rate of the tumor cells was >20%. Pathological examination confirmed a diagnosis of EHE. Postoperative radiotherapy was delivered to the patient (at 66 Gy/31 fractions, 2.12 Gy/fraction, 5 fractions/week). Pulmonary metastases were found by chest CT 1 year after surgery.

3. Discussion

MEHE is a rare intermediate malignancy and may be confused for a benign tumor. Although EHE can present at any age, the age of onset of MEHE was reported to range from newborn to 66 years.[5,6] The clinical symptoms and signs of MEHE are

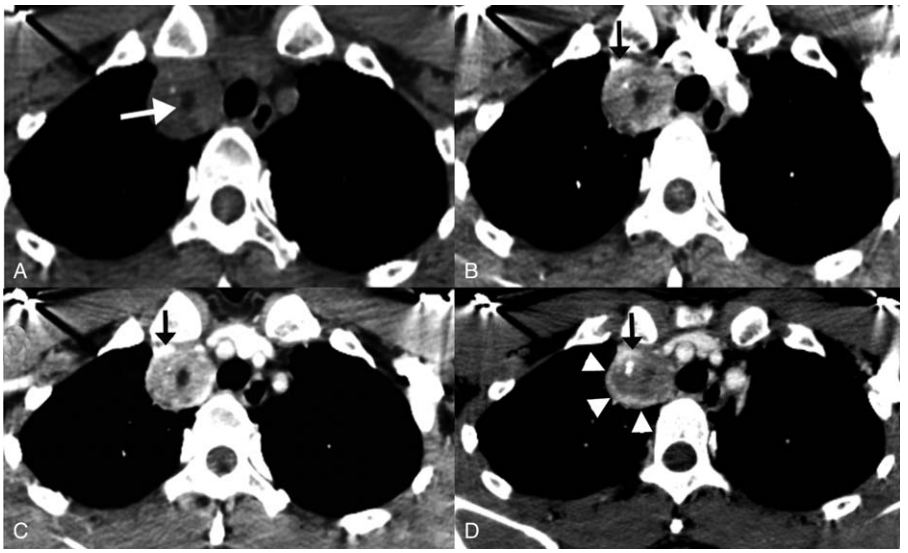

Figure 2. CT scan showed soft-tissue mass with well-defined margin. (A) Intralesional multiple punctate calcification and fatty foci (arrow) can be found on unenhanced CT images. (B, C) After contrast administration, the tumor showed progressively pronounced enhancement (39/62/98 HU in plain scan/arterial phase/parenchymal phase). Incomplete ring enhancement (arrow head) was observed, CT value reached 158 HU for the part of ring enhancement. Luminal stenosis of RIV (black arrow) and indistinct demarcation between tumor and RIV could be found. CT = computed tomography, RIV = right innominate vein.

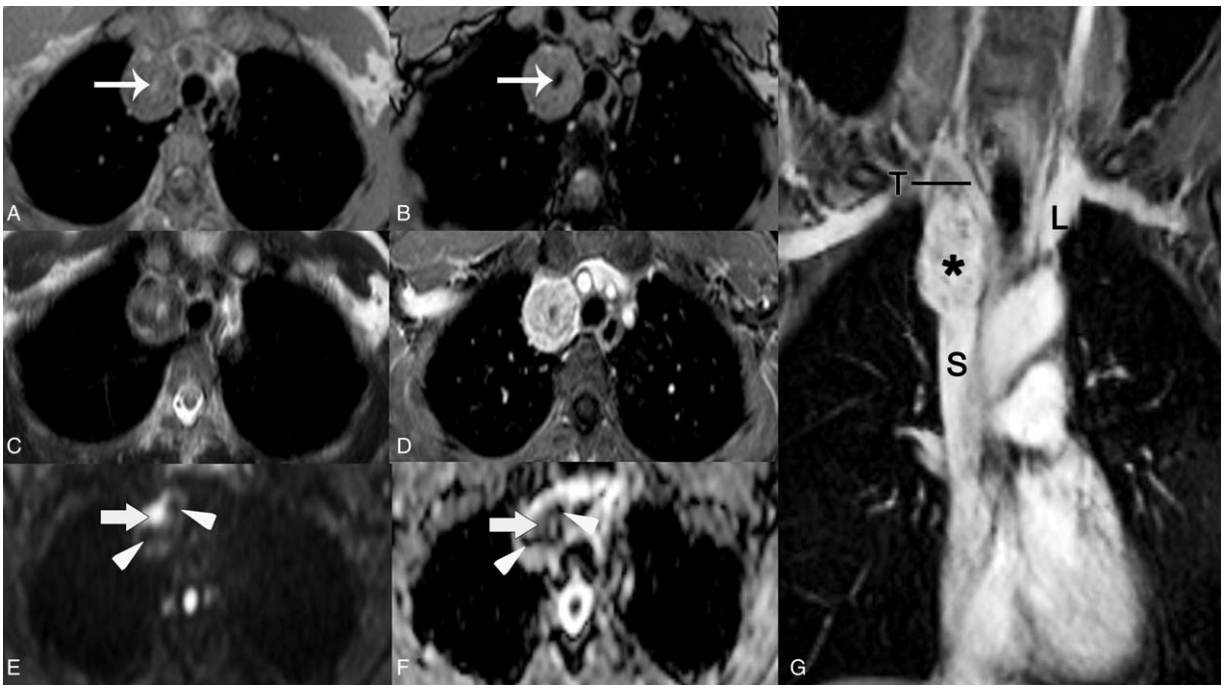

Figure 3. MR images of epithelioid hemangioendothelioma. (A, B) The mass demonstrated isointensity on T1WI (A-B) and mixed low intensity on T2WI (C). Fatty foci demonstrated high signal on in-phase T1WI (A) and signal drop on opposed-phase T1WI (fine arrow, B). The mass showed marked enhancement on axial and coronal contrast imaging (D, G). On diffusion weighted imaging (E) and apparent diffusion coefficient map (F), some area of tumor showed impeded diffusion (arrow). Signal loss caused by calcification was also presented (arrow head). *, Tumor; S, superior vena cava; T, truncus brachiocephalicus; L, left brachiocephalic vein. MR = magnetic resonance, T1WI = T1 weighted image.

nonspecific, mainly due to the local compression and stimulation of the adjacent organs, such as chest pain, cough, dyspnea, hoarseness in voice, etc. Some asymptomatic patients are accidentally discovered during physical examination.

Histologically, EHE is characterized by cords and nests of spherical to slightly spindled epithelioid cells embedded in a myxoid matrix. Immunohistochemically, endothelial differentiation is an important criterion for the diagnosis of EHE. Endothelial marker CD31 shows a good sensitivity and specificity for identifying vascular neoplasm including EHE. Some cases of EHE stained negatively for CD31 but were positive for other vascular markers such as CD34, factor VIII-related antigen,[7] or Ulex europaeus.[8] EHE cells usually stained negative for epithelial markers such as S100 and epithelial membrane antigen,[9] just as presented in this case.

In approximately 65% of patients with MEHE, the tumor was located in the anterior mediastinum; and more than half of the MEHE was observed to originate from blood vessels, especially from veins, such as brachiocephalic vein, superior vena cava, azygos vein, etc.[10] Occasionally, the tumor involved multiple blood vessels and blocked the lumen.[2] In this case, the lumen of RIV was almost blocked, which was thought to be a tumoral compression; however, the RIV turned out retrospectively to be the origin of the tumor; the relationship between tumor and RIV was closed with an indistinct demarcation.

MEHE is typically expressed as a soft-tissue mass with a well-defined margin on CT or MR images; this is consistent with the gross finding that most of the MEHEs are encapsulated.[6] This tumor is less likely to invade the surrounding tissues due to its relatively indolent clinical course compared to its counterpart in

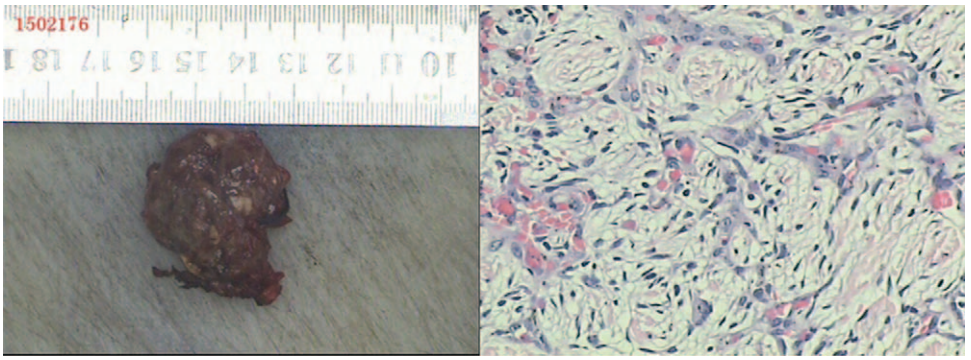

Figure 4. The gross specimen and microscopic presentation of epithelioid hemangioendothelioma (HE × 200).

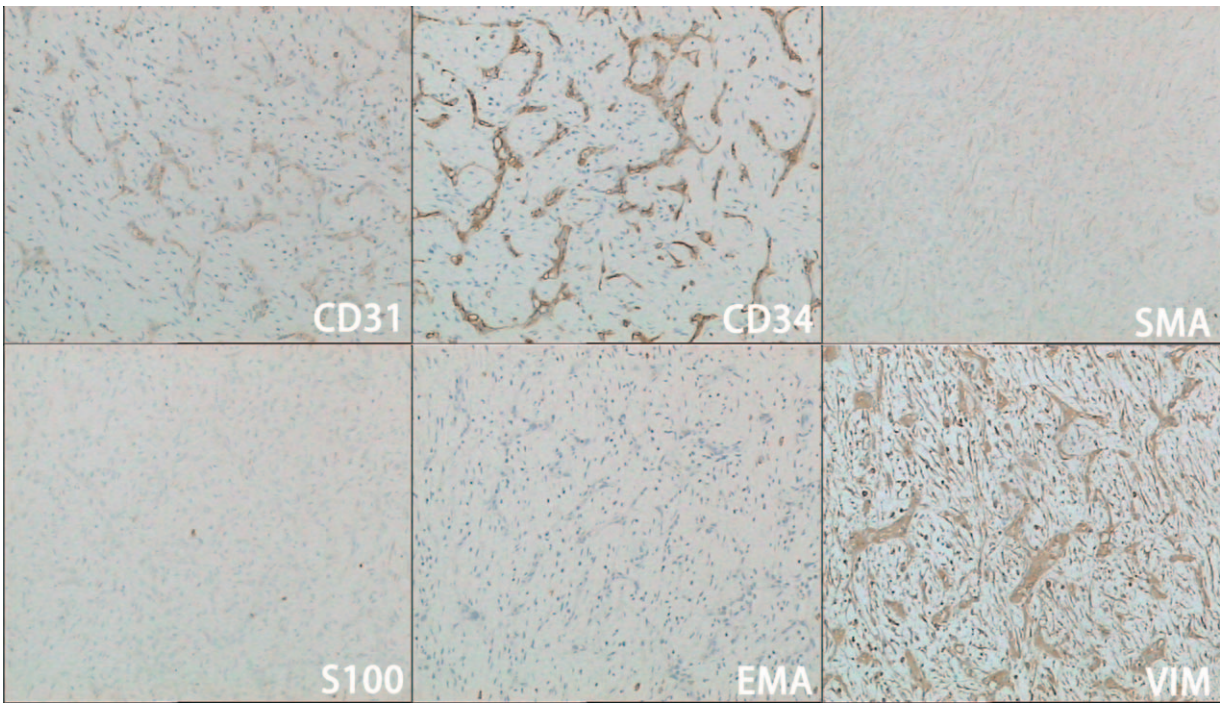

Figure 5. Immunohistochemical stain of epithelioid hemangioendothelioma (×100).

the liver, lung, and soft tissue.[11] Thus, MEHE is easily misdiagnosed as a benign tumor. Calcification is observed in approximately 40% of MEHE cases, which could be attributed to metaplastic bone formation, osteoclast-like giant cells, or phleboliths. In our patient, multiple punctate calcifications were observed. Some calcifications can be seen close to each other with a tendency to fuse together, which might explain the larger calcification observed in a previous report.[12] In the present case, fat density was detected in the center of the lesion. This is a rare but noteworthy phenomenon, since a mediastinal mass with fatty foci usually leads to a diagnosis of teratoma.[13] In MEHE, fat content could range from a small amount, as observed in the current case, to a large amount, as presented in a previous report.[3] Therefore, EHE could not be ruled out as differential diagnosis when a mass with fatty foci was observed in the mediastinum. In the present case, both calcification and fat were detected in the mass, which suggested the diagnosis of a teratoma. However, after contrast administration, the tumor demonstrated a progressively intense enhancement. This was inconsistent with teratoma, which usually demonstrates a mild enhancement. Further, incomplete ring enhancement was observed in this case, which has not been report before; this might be one of the characteristics of MEHE and needs to be confirmed in further studies.

The prognosis of EHE differs greatly among patients, and is related to the extent of tumor cell differentiation or tumor size.[14] The mean survival period of patients with EHE is 4.6 years (range, 6 months to 24 years).[1] The mortality rate associated with EHE varies according to the tumor location, and is 13% in soft tissue, 35% in liver, and 65% in lung tumor.[1] This might be due to the fact that EHE arising from the lung and liver has a tendency to be multifocal.[15] Weiss and Enzinger[15] reported that 10% and 20% of MEHE cases showed local recurrence and metastases, respectively. In our patient, pulmonary metastases were found 1 year after surgery even postoperative radiotherapy was delivered. A complete removal of the tumor followed by vein reconstruction might be a better treatment. The main reason we did not conduct a vein reconstruction was the incorrect preoperative diagnosis (teratoma) leading to inadequate preoperative preparation. During operation, severe bleed was found when attempt was made to separate the mass and RIV, in order to avoid potential uncontrollable risk (such as uncontrollable massive hemorrhage), we chose not to forcibly stripped the mass, and used postoperative radiotherapy to achieve local control. However, the data presented by this case might indicate that radiotherapy based on incomplete resection does not necessarily obtain good local control.

In conclusion, we presented a rare case of MEHE stem from RIV. When a mediastinal tumor closely related to veins showing intratumoral calcification and obvious enhancement is observed, despite the presence of a clear boundary and visible fat content, a differential diagnosis of EHE should be included.

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