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Rare epithelioid hemangioendothelioma in the brachiocephalic vein for long-term survival after surgery: A case report

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Abstract

Epithelioid hemangioendothelioma (EHE) is a rare vascular tumor. In this report, we describe the case of a 62-year-old man who presented with pain in the left clavicle and swelling of the left upper limb. Contrast-enhanced computed tomography revealed an intravascular tumor, which was completely resected surgically. Histopathological examination and immunohistochemical staining revealed that it was epithelioid hemangioendothelioma with occurrence in the left brachiocephalic vein. It has been 6 years since the surgery was performed, and no recurrence has been observed. Epithelioid hemangioendothelioma may recur or metastasize and therefore requires careful follow-up.

Keywords

Epithelioid hemangioendothelioma, vascular neoplasm, angiosarcoma

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Introduction

Epithelioid hemangioendothelioma (EHE) is a malignant vascular tumor consisting of epithelioid and histiocytoid-like vascular endothelial cells in a mucous vitreous stroma and is characterized by the *WWTR1-CAMTA1* fusion gene.[1] The prevalence of EHE is extremely rare, being less than one in a million.[2] It is more common in teens and occurs more often in men mostly in the limbs, trunk, head, and neck, and about half of EHE cases are associated with small or medium-sized veins. It is rare and originates from a vein in the mediastinal location, such as the brachiocephalic vein.[3] The symptoms of these tumors vary depending on the location. In this report, we describe the case of EHE that occurred in the left brachiocephalic vein and was treated by complete surgical resection. It is noteworthy that even after 6 years after surgery, EHE has not recurred.

Case report

A 62-year-old man presented with chief complaints of pain in the left clavicle and swelling of the left upper limb. Computed tomography (CT) showed a 1-cm-sized nodule from the left subclavian vein and internal jugular vein to the left brachiocephalic vein. Contrast-enhanced CT showed a strongly enhanced mass, suggesting an intravascular tumor (Figure 1). The patient had undergone surgery for sigmoid colon cancer (Stage I) 8 months ago and was admitted 9 months ago with an intravenous mass of almost the same size. The patient underwent surgery for the removal of an intravenous mass, which was performed by median sternotomy. An elastic hard tumor was palpated from the left brachiocephalic vein to the confluence of the subclavian vein and the internal jugular vein. Tumor resection was performed with a margin of approximately 5 mm from the tumor. The tumor was a solid white tumor with unclear boundaries. The defect was closed with a bovine pericardial patch to maintain a tubular shape (Figure 2). Histopathological examination revealed that the 12 mm × 8 mm tumor had vesicle-like and cord-like growth of round cells, and some of the cells were spindle-shaped. The individual tumor cells had medium to

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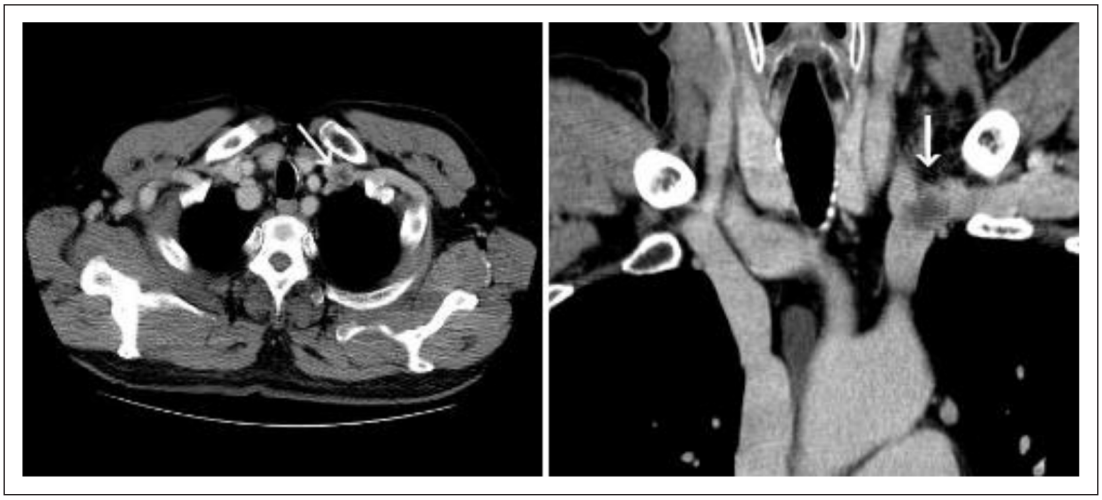

Figure 1. Computed tomography (CT) shows a mass from the left subclavian vein and the internal jugular vein to the left brachiocephalic vein.

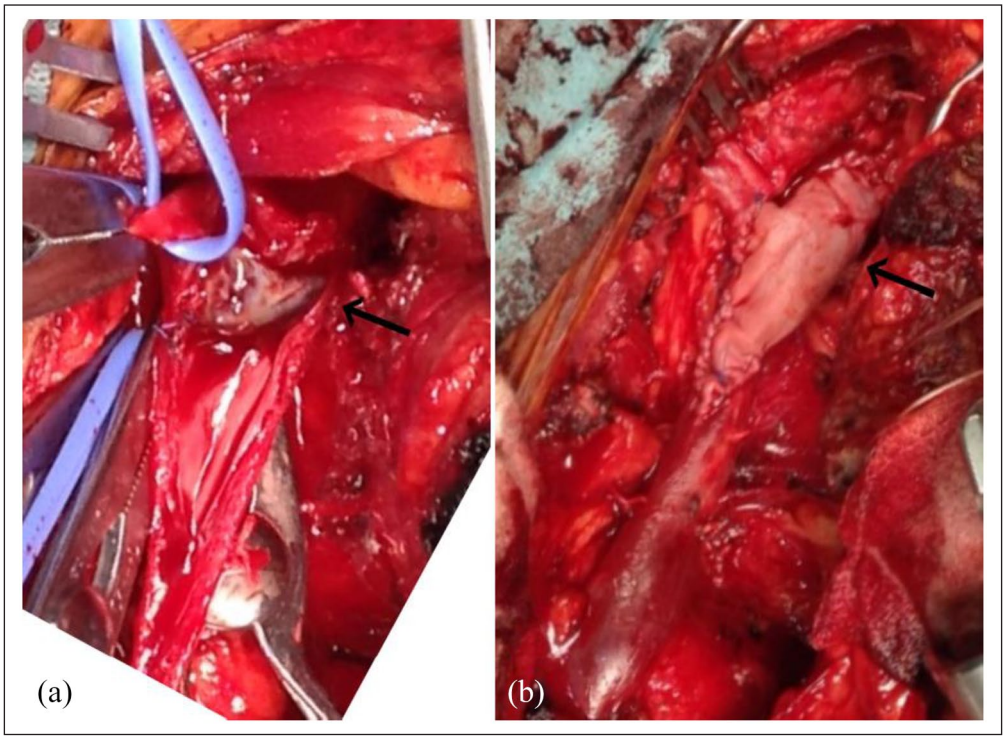

Figure 2. (a) Preoperative view of the tumor (arrow). (b) The tumor is resected and closed with a bovine pericardial patch (arrow).

large round nuclei and small nucleoli, and the cytoplasm of each cell was light to acidophilic with small vacuoles. The stroma was a fibrous hyalinized myxoid. Mitotic count was 1/10 HPF (High Power Fields). Degenerative necrosis was observed in the central part, but the interstitium of hyalinized myxoid and the degree of atypia of tumor cells were not high; hence, angiosarcoma was ruled out. There was strong continuity with some blood vessels, and infiltration into the vascular smooth muscle layer was also observed. The finding was of a malignant tumor composed of prominent polymorphic spindle-shaped cells, and it was considered that the tumor invaded the microscopic surgical margin.

Immunohistochemical staining was positive for cluster of differentiation (CD) 31, CD34, and factor VIII-related antigen and was negative for epithelial membrane antigen, alpha-smooth muscle actin, S-100, neurofilament, and human melanoma black-45, indicating the presence of EHE (Figure 3). The postoperative course was uneventful, and the

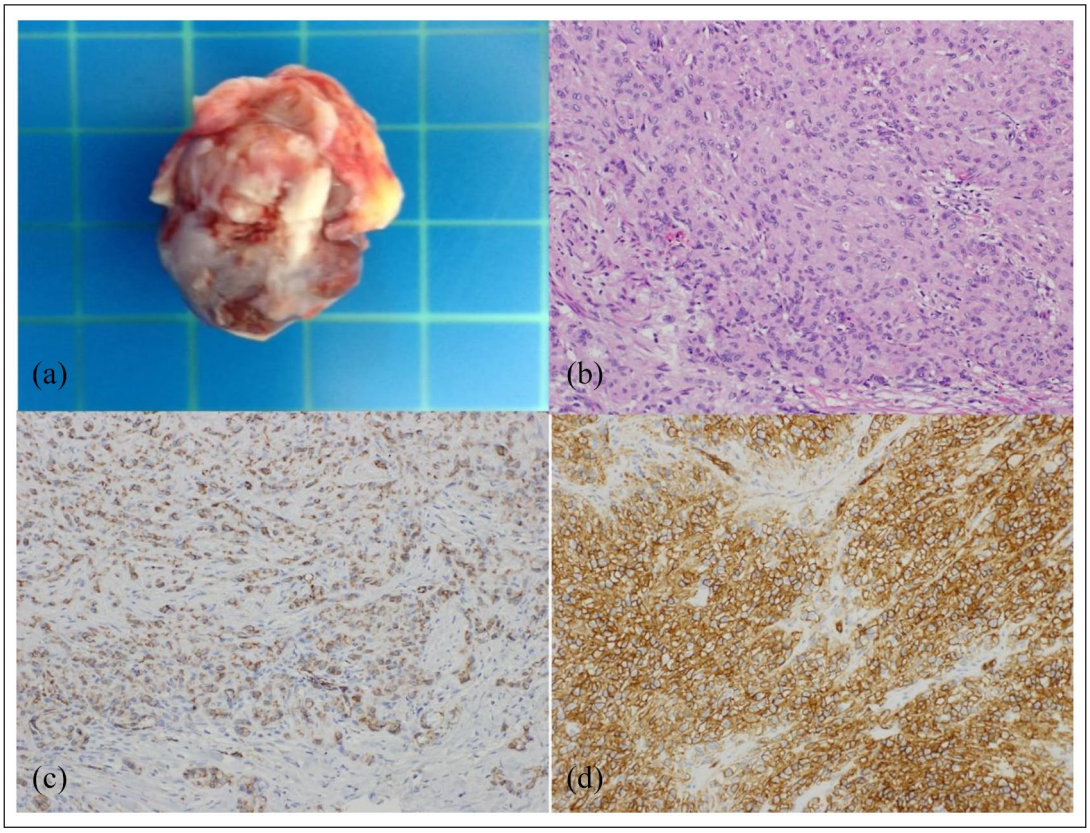

Figure 3. (a) The mass measured about 12 mm × 8 mm. (b) Epithelial-like cells are arranged in a cord-like manner against a fibromyxoma-like substrate. (c) The tumor shows positive staining for CD31. (d) The tumor shows positive staining for factor VIII-related antigen.

patient was discharged 9 days after the surgery. It has been 6 years since the operation was performed, and there has been no recurrence. Written informed consent was obtained from the patient for publication of the case report.

Discussion

EHE is a malignant vascular tumor consisting of epithelioid and histiocytoid-like vascular endothelial cells in a mucous vitreous stroma and is characterized by the *WWTR1-CAMTA1* fusion gene.[1] EHE usually originates from the cells of the blood vessels; however, EHE rarely originates in the large arteries and veins, with only a few cases reported.[4–7] Although it is asymptomatic, edema and thrombophlebitis occur depending on the site of occurrence. Diagnosis requires pathological examination of the tumor and histological findings that include nests and cords of epithelioid endothelial cells distributed in a myxohyaline stroma.[6] Histologically, it often proliferates in association with blood vessels, showing luminal stenosis and infiltrative growth around blood vessels, accompanied by fibrosis. Epithelial-like cells show mild to moderate atypia, proliferating in the form of cords and vesicles, and the stroma is myxomatous and vitreous. The nucleus of the tumor cell is round and irregular, the cytoplasm is acidophilic or clear, and it is characterized by having well-defined vacuoles in the cytoplasm. The mitoses are few. It is immunohistochemically positive for vascular endothelial markers such as CD31, CD34, Friend leukemia integration 1, and erythroblast transformation-specific-related gene.[1,8]

It has been discovered that the WW domain-containing transcription regulator 1 gene, which makes the transcriptional coactivator with PDZ-binding motif protein, binds to the calmodulin-binding transcription activator gene, and it is becoming clear that it is highly specific to EHE and is found in more than 90% of cases.[9]

In rare cases, the *YAP1-TFE3* fusion gene is found, and it is known to histologically have an acidic cytoplasm, shows more solid proliferation, and forms a clear vascular lumen.[1] Surgical resection is the only treatment option for EHE, and adjuvant chemotherapy is administered to patients with tumors that cannot be surgically resected.[10] Deyrup et al. reported 49 cases of EHE of soft tissue, with an overall 5-year disease-specific survival rate of 81% and a metastasis rate of 22%.

In their study, tumors larger than 3 cm in diameter or with a mitotic number of more than 3/50 HPF were categorized as high risk and the others as low risk. The 5-year disease-free survival rate of the high-risk group was 59%, while that of the low-risk group was 100%.[10] In our case, the patient presented with edema of the left upper limb and pain in the left

clavicle after surgery for sigmoid colon cancer. Metastatic tumors were negative because the sigmoid colon cancer was stage I, and the CT revealed intravascular tumors. It was difficult to distinguish EHE from angiosarcoma during the pathological examination. Although degenerative necrosis was observed in the central part, angiosarcoma was ruled out because the interstitium of the hyalinized myxoid and the degree of cellular atypia were not high; thus, EHE was diagnosed. In this case, a median sternotomy with a good field of view was performed. Several reports suggest that reconstruction was performed with an artificial blood vessel after tumor resection, but in our case, since it was a bifurcation lesion and there was a risk of thrombosis in the artificial blood vessel, reconstruction with a patch was performed.[7,11] The tumor invaded the microscopic surgical margin; however, complete resection was considered possible. Six years after the surgery, no recurrence has been observed. Although there are few reports of EHE occurring in blood vessels, careful follow-up is required. Moreover, since it is difficult to make a histological diagnosis prior to treatment for tumors arising within the blood vessels, it is important to plan surgery with the possibility of EHE in mind.

Conclusion

We reported a case of EHE in the left brachiocephalic vein, which presented with edema of the left upper limb and pain in the left clavicle and was completely resected surgically. It has been 6 years since the surgery, and no recurrence has been observed. EHE may recur or metastasize and therefore requires careful follow-up.

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Ethical approval

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Informed consent

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