



# Solid epithelioid hemangioma of the heart: Report of a case with unusual threadlike bridging strands

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## ABSTRACT

We present a rare case of solid epithelioid hemangioma (EH) which was found in the left atrium of the heart in a 77-year-old man. The tumor measured 20 mm. Histologically, it was composed of a solid proliferation of epithelioid endothelial cells. Some cells contained intracytoplasmic lumina with the appearance of vacuoles. Focally, several of such cells, closely adjacent to one another, created small vascular space with thin transverse bridge of cytoplasm, resembling strongly so-called threadlike bridging strands which are typical of adenomatoid tumor. Therefore, the adenomatoid tumor was considered in differential diagnosis of this lesion. However, immunohistochemical expressions of CD31 and ERG protein, and negative results with mesothelial markers confirmed endothelial nature of the tumor. Cardiac EH with solid pattern and with threadlike bridging strands is extremely rare lesion which should not be confused with the adenomatoid tumor.

**KEY WORDS:** Adenomatoid tumor, epithelioid hemangioma, heart, immunohistochemistry

## INTRODUCTION

Among vascular tumors of the heart, a majority of cases represent "classic" hemangiomas of cavernous, capillary or arteriovenous type [1]. Epithelioid hemangioma (EH) [2] in the cardiac location appears to be extremely rare [3-6]. Recently, we had the possibility to examine such a case. The tumor was removed from the left atrium of the heart. Histologically, it showed typical features of solid variant of EH [7-10]. In addition, it contained unusual threadlike bridging strands of the cell cytoplasm, a feature that is otherwise typical of adenomatoid tumors of mesothelial origin [11]. We present histological and immunohistochemical findings of this case.

## CASE REPORT

A 77-year-old and otherwise healthy man presented with mass of the left atrium of the heart. About 20 mm tumor was diagnosed by ultrasonography and computer tomography. In October 2013, a total extirpation of the tumor was performed in Central Slovak Institute of Cardiovascular Disease in Banská Bystrica. The tumor involved the free wall of the left atrium. The patient is well and without recurrence 2 years after the surgery.

## MATERIALS AND METHODS

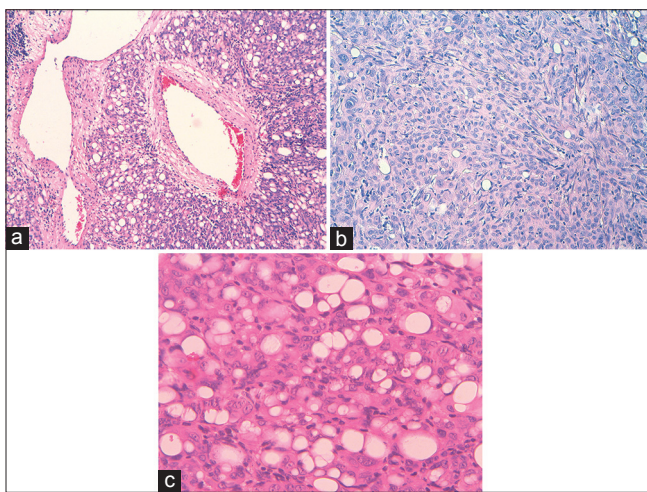
The tissue was fixed in 4% formalin and processed routinely. All of the tumor tissue was paraffin-embedded. The sections were stained with hematoxylin and eosin. Immunohistochemical studies were performed on formalin-fixed, paraffin-embedded sections using the following antibodies: Vimentin (VIM 3B4, 1:50, Dako), CD31 (JC 70 A, 1:40, Dako), ERG protein (EPR 3864, 1:100, Ventana), calretinin (DAKCalret1, 1:80, Dako), CD34 (Qbend 10, 1:40, Dako), CK AE1/3 (AE1/AE3, prediluted, Dako), CK5/6 (D5/16 B4, 1:100, Dako), CK7 (OV-T1 12/30, 1:100, Dako), CK19 (E 16-L, 1:100, DB Biotech), EMA (E29, 1:100, Dako), S-100 protein (polyclonal, 1:650, Dako), HMB-45 (hmb 45, 1:50, Dako), melan A (A 103, 1:50, Dako), alpha-actin (1A4, 1:50, Dako), desmin (D33, 1:100, Dako), WT-1 (GF-H2, 1:50, Dako), and Ki-67 (MIB-1, 1:80, Dako). Immunostaining was performed according to standard protocols using streptavidin-biotin complex labeled with peroxidase (Dako). The positive and negative controls were applied.

## RESULTS

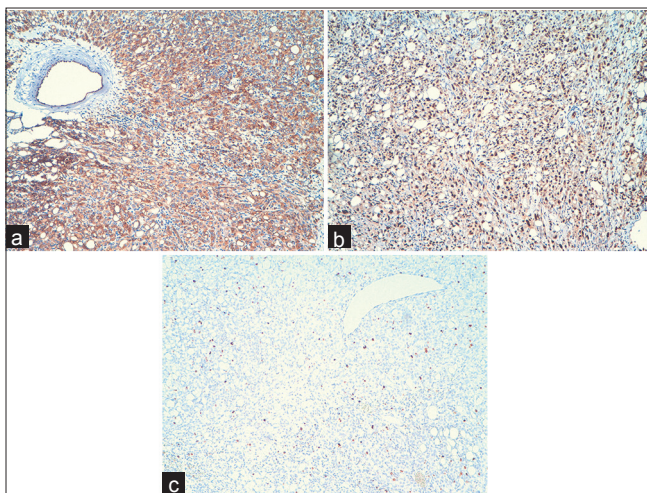
Macroscopically, the tumor measured 2 cm in diameter, was firm in consistency, and its cut surface was solid, gray and hemorrhagic.

Histologic examinations revealed well-circumscribed tumor with fibrous pseudocapsule. The tumor cells were epithelioid, and they were arranged in the solid pattern [Figure 1a-c]. They had large round nuclei, often with prominent nucleoli. The nuclei did not show significant nuclear atypia, and mitotic figures were extremely rare. Many cells contained intracytoplasmic lumens, often with the appearance of vacuoles. Focally, the cells with large vacuoles were lying adjacent to one another, and their cytoplasm created threadlike bridging strands [Figure 1c] resembling strongly those of adenomatoid tumor [11]. The epithelioid cells created rare tubular gland-like vascular channels. In addition, several small arteries, some of them dilated, were found in the lesion. Scattered lymphocytes and some eosinophils were seen focally.

Immunohistochemically [Figure 2], tumor cells were diffusely positive for vimentin, CD31, and ERG protein, and they were



**Figure 1:** Histological features. (a) Solid and gland-like growth pattern, with two dilated arterioles. (b) Epithelioid cells in the solid area, with rare vacuolization. (c) An area with vacuoles shows thread-like bridging strands, a morphology resembling that of adenomatoid tumor. (HE, original magnifications  $\times 100$ ,  $\times 200$ , and  $\times 400$ , respectively)



**Figure 2:** Immunohistochemical findings. (a) CD31 positivity. (b) Expression of ERG protein. (c) Ki-67 shows low proliferative activity (original magnification,  $\times 100$ )

negative for calretinin, CD34, CK AE1/3, 5/6 CK, CK7, CK19, EMA-, S-100 protein, HMB-45, melan A, alpha-smooth muscle actin, desmin and WT-1. Expression of Ki-67 was seen in 5% of the tumor cells.

## DISCUSSION

EH is a rare vascular tumor. It is benign, but it can recur in 30% of cases [8]. Rosai *et al.* considered originally this tumor as a non-neoplastic reactive lesion [3]. In its etiology, a role of arterial trauma was suspected, because the lesion often contains small artery with damaged wall [12]. It occurs most frequently in the skin of the head and fingers of middle-aged women [8,9]. In addition, EH can occur in the bone, soft tissue, lung or penis [7,8]. Some cases were multifocal [8]. A finding of EH in the heart appears to be extremely rare [3-6]. In the past, EH was regarded to be identical with Kimura disease [1]. However, EH and Kimura disease are nowadays considered unrelated [8,13].

Histologically, EH is composed of proliferating blood vessels with epithelioid endothelial cells and with inflammatory cells such as lymphocytes, plasma cells, and eosinophils [1,8]. In rare cases, EH shows solid-appearing endothelial cell population, and such cases were designated as solid, exuberant or atypical EHs [7-10]. In the skin, solid EH represents probably the same lesion as so-called cutaneous epithelioid angiomatous nodule [14-16]. In our case, features of solid variant of EH were present. In addition, some groups of epithelioid and vacuolated cells created small empty-appearing spaces containing transverse thin strands of cytoplasm [Figure 1c]. These strands resembled strongly so-called threadlike bridging strands of adenomatoid tumor [11], and therefore we were obliged to consider cardiac adenomatoid tumor in differential diagnosis [17]. For this differential diagnosis, immunohistochemistry was very helpful, because adenomatoid tumor is, in contrast with EH, positive for mesothelial markers and negative for endothelial markers CD31 and ERG. Additional differential diagnosis included other vascular tumors composed of epithelioid cells, such as epithelioid hemangioendothelioma [18] and epithelioid angiosarcoma [19,20]. Epithelioid hemangioendothelioma [18] shows epithelioid endothelial cells arranged in cords and nests, with focal solid growth pattern that could mimic EH. However, epithelioid hemangioendothelioma has, at least focally, a distinctive myxohyaline and sclerotic stroma which is not present in EH. In addition, epithelioid hemangioendothelioma shows more nuclear atypia than is seen in EH, and it has infiltrative/destructive growth, often with vascular invasion [18]. Epithelioid angiosarcoma differs from EH by its severe nuclear atypia, high mitotic count and frequent necrosis [19,20].

The formation of abovementioned thin bridging strands is probably a result of crowding of vacuolated cells. In adenomatoid tumor, the strands are formed by apposition of the attenuated cytoplasm of two adjacent mesothelial cells, as it was proven by the ultrastructural study [11]. We think that in our case the strands developed in a similar fashion, i.e., they represent extremely thinned parts of two adjacent endothelial cells. Between such two cells, there is not enough of stromal collagen and external lamina material that would be visible

at light microscopic level, and therefore the cytoplasm of two adjacent cells has the appearance of a single thin strand.

## CONCLUSION

In conclusion, we described a rare case of solid EH of the heart. The lesion contained, in addition to typical histological features, unusual threadlike bridging strands resembling those of adenomatoid tumor. Pathologists should be aware of this morphology which can cause confusion with the adenomatoid tumor. Immunohistochemistry is very helpful for differential diagnosis of this lesion.

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