

Single Case

Perigastric Hyaline-Vascular Variant Castleman's Disease

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Keywords

Castleman's disease · Hyaline-vascular variant · Contrast-enhanced ultrasound · Case report

Abstract

Castleman disease (CD) is a rare chronic lymphoproliferative disease with unknown etiology and pathogenesis disease. When the lesion is located in the mediastinum, the diagnosis of CD is easy. However, if the lesion presents as a perigastric mass mimicking other subserosal gastric mesenchymal tumors, the diagnosis can be challenging. As few sonographic manifestations of hyaline-vascular variant CD, especially contrast-enhanced ultrasound (CEUS) imaging, as well as computed tomography (CT) and histopathological imaging, have been reported in literature, this case may provide a vivid example of a comprehensive CEUS and CT usage in the diagnosis and surgery with regard to CD. This report presents a case of a 50-year-old female diagnosed with hyaline-vascular variant CD in a random physical examination, the ultrasound examination first revealed a 24.3 mm × 15.4 mm hypoechogenic lesion abutting the stomach, esophagus, and liver, which was under the suspicion of gastrointestinal stromal tumor. Following a series of medical examinations, including CEUS, CT, postoperative histopathological examination, and immunohistochemical analysis, the patient was diagnosed with hyaline-vascular variant unicentric CD. After the mass was completely excised through laparoscopic surgery, the woman recovered very well without recurrence during a follow-up period of 15 months. Thus, mastering ultrasound and CT-imaging characteristics of CD and applying ultrasound and CT examination together would do help to preoperative diagnosis.

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Introduction

Castleman disease (CD) is a rare chronic lymphoproliferative disease with unknown etiology and pathogenesis characterized by angiofollicular lymph node hyperplasia, which was named by Keller in 1972. CD is divided into 2 types clinically: unicentric type and

multicentric type, according to single or multiple hyperplastic lymph nodes. Due to the fact that this disease is relatively low in frequency and its clinical manifestations are diverse and nonspecific, currently, there are no targeted exam methods for it. What's more, the preoperative misdiagnosis rate is high, and mostly, it is diagnosed by postoperative pathology. Histologically, it is divided into 3 variants: hyaline-vascular type (which is commonly found in young women and accounts for about 90% of all CD cases with no obvious clinical symptoms), plasma cell type (about half of the patients are accompanied by a variety of clinical signs, such as mild anemia, fever, night sweats, abdominal pain, diarrhea, etc.), and mixed type [1, 2]. CD develops in all lymph nodes, especially in the mediastinum. The localized CD abutting the stomach can be erroneously interpreted as gastrointestinal stromal tumor, and as the following case, we reported in a middle-aged female. The most common diagnostic means is computed tomography (CT); ultrasound examination is rarely used, so literature about CD on ultrasonography is hard to find.

Case Report/Case Presentation

A 50-year-old female came to our hospital for a regular examination, presented with distention in the epigastrium 1 week ago, the feeling lasted a few minutes and then spontaneously resolved. The patient had no gastrointestinal history before, and no special medical, family, genetic, and psychosocial history either. As there was no tenderness in the upper abdominal, no mass found in the examination by physician, plus chest radiography showed no abnormalities yet, she was suggested to take an ultrasound examination. Sonography on an empty stomach showed an indistinct hypoechogenic nodule in the area between liver, esophagus, and fundus of stomach. In order to show the nodule clearly, we asked her to take the exam again after drinking 700 mL water. The clearer image showed that the size of the nodule was 24.3 mm × 15.4 mm, with a clear boundary and even internal echo. Rich blood flow signal and arterial flow spectrum were also detected in it, in addition, contrast-enhanced ultrasound (CEUS) showed intense enhancement on the arterial phase and slightly reduced enhancement on the delayed phase. Since the nodule was very tight to the wall of the stomach, we supposed it as a gastrointestinal stromal tumor. The ultrasound images are shown in Figure 1a–f.

In order to further clarify the relationship between the mass and stomach wall, the patient was taken a CT scan. The plain CT images showed a homogeneous nodule, whose density was slightly lower than that of liver nearby. In addition, intense enhancement on the arterial phase and equal enhancement on the venous and delayed phase were observed. Since a narrow gap between the nodule and the fundus was seen on enhanced CT image in venous phase, we inferred that the nodule was likely out of the stomach, perhaps a lymph node or a subserosal gastric stromal tumor. The CT images are shown in Figure 2a–f.

Although ultrasound-guided puncture biopsy would be more appropriate next, the patient wanted to have a laparoscopic surgery immediately. During the operation, the nodule was discovered closely adhered to the diaphragm; dilated and tortuous vessels were seen around and on the surface (shown in Fig. 3a). The tumor was thoroughly removed without a hitch (shown in Fig. 3b), and the subsequent frozen pathology suggested that it was a lymphoid tissue hyperplasia. The final paraffin pathology result was a hyaline-vascular type of CD, hematoxylin-eosin staining showed marked vascular proliferation and hyalinization of the abnormal germinal center, with a tight concentric layering of lymphocytes around the follicle, resulting in an “onion-skin” appearance (shown in Fig. 3c), along with the accumulation of CD34⁺ (vessel), CD21⁺ (FDC) consistent with hyaline-vascular type of CD (shown in Fig. 3d, e). During the follow-up at 15 months after laparoscopy, the

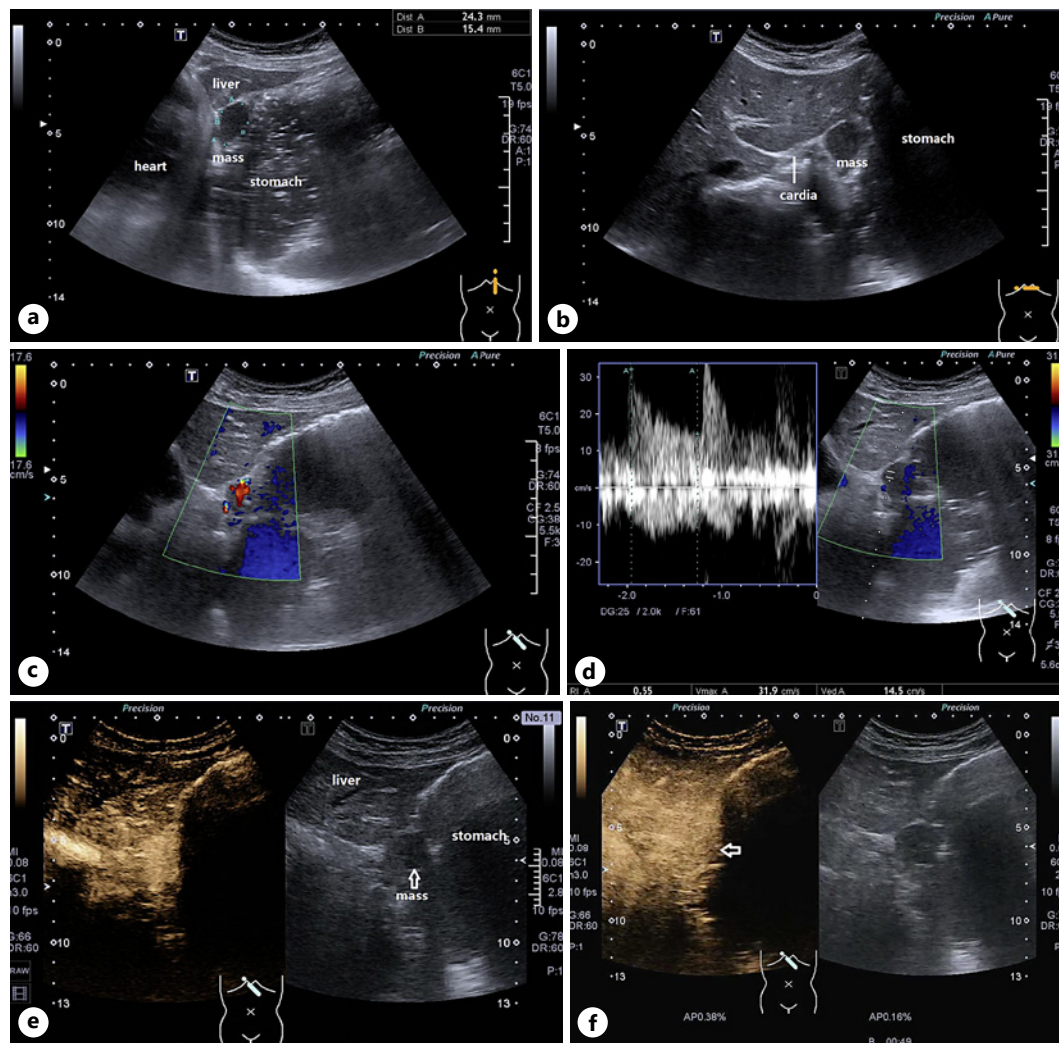


Fig. 1. Ultrasound images of hyaline-vascular variant CD. **a** Longitudinal image of the oval solid nodule nearby the gastric wall. **b** Transverse image of the nodule around liver, cardia, and stomach. **c** Color Doppler flow imaging shows plentiful blood flow. **d** Spectral Doppler shows peak flow velocity (PSV) is 31.9 cm/s, and the RI is 0.55. **e** After injection of 2.4 mL sulfur hexafluoride microbubbles into the right median cubital vein for 18 s (in the arterial stage), the tumor was rapidly, evenly, and highly enhanced. **f** After 49 s, the tumor was still equally enhanced relative to the adjacent liver tissue in the venous stage. CD, Castleman's disease; RI, resistance index.

patient recovered very well with no signs of recurrence, she was very satisfied with the process of diagnosis and operation.

Discussion/Conclusion

CD, also known as vascular follicular lymph node hyperplasia, is a rare disease first reported by pathologist Castleman et al. [3] in 1956. Its pathogenesis is not yet clear, and it may be related to chronic inflammatory stimulation, viral infection, and abnormal cytokine regulation [4]. CD is characterized by painless lymphadenopathy. Histologically, it can be divided into hyaline-vascular variant, plasma cell variant, and mixed variant, among which hyaline-vascular variant

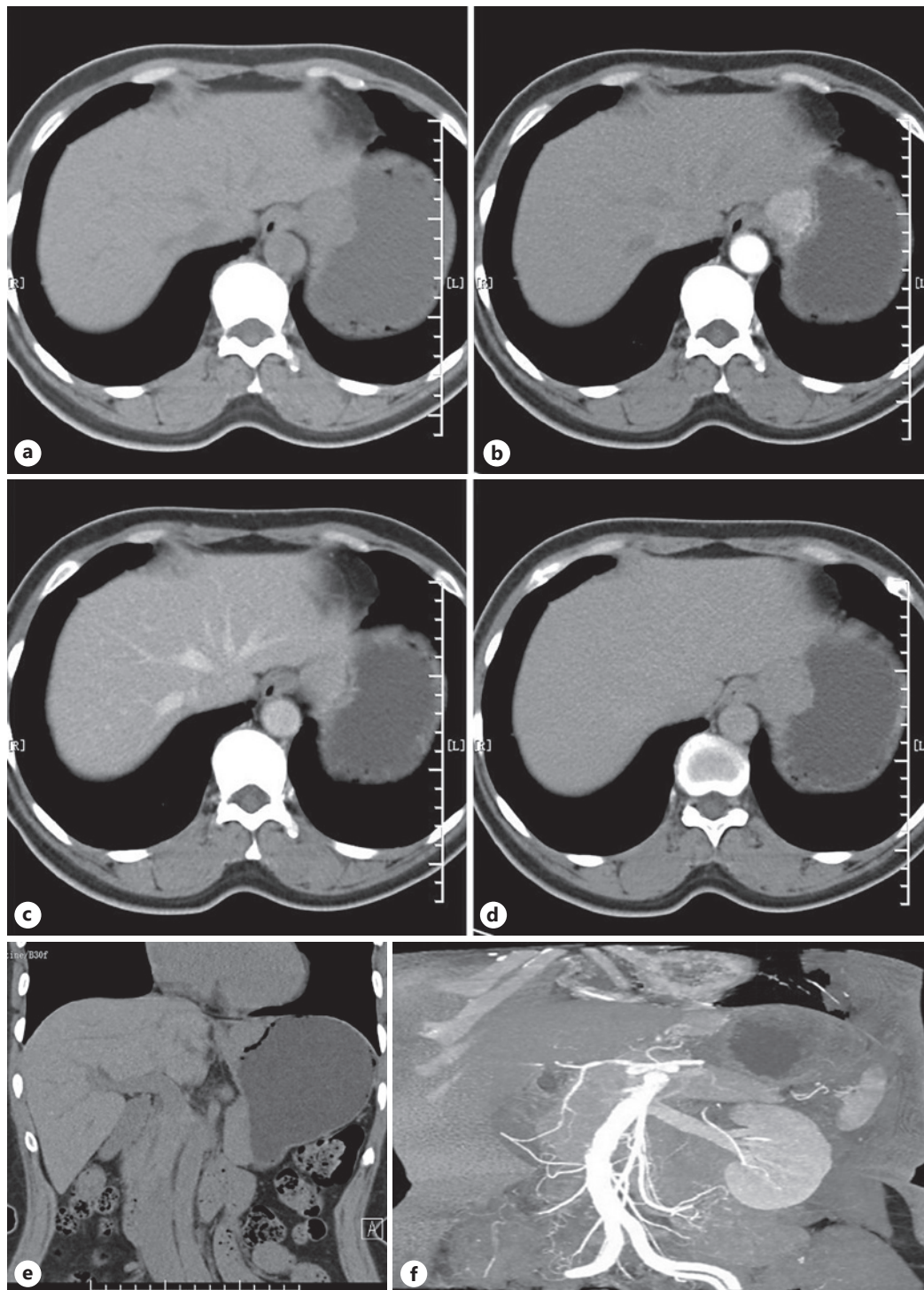


Fig. 2. CT images of hyaline-vascular variant CD. **a** Axial nonenhanced CT image depicts a well-circumscribed homogeneous nodule between liver, cardia, and stomach, CT value of the nodule is about 41.89 and that of adjacent liver tissue is about 57.39. **b** Arterial phase CT image shows the nodule with increased enhancement. **c** CT image in the venous phase showing a narrow gap between the nodule and the fundus. **d** CT image shows the delayed washout pattern. **e** The coronal image of the nodule. **f** CT-angiography image of the nodule shows dilated and tortuous feeding artery around the nodule. CD, Castleman's disease; CT, computed tomography.

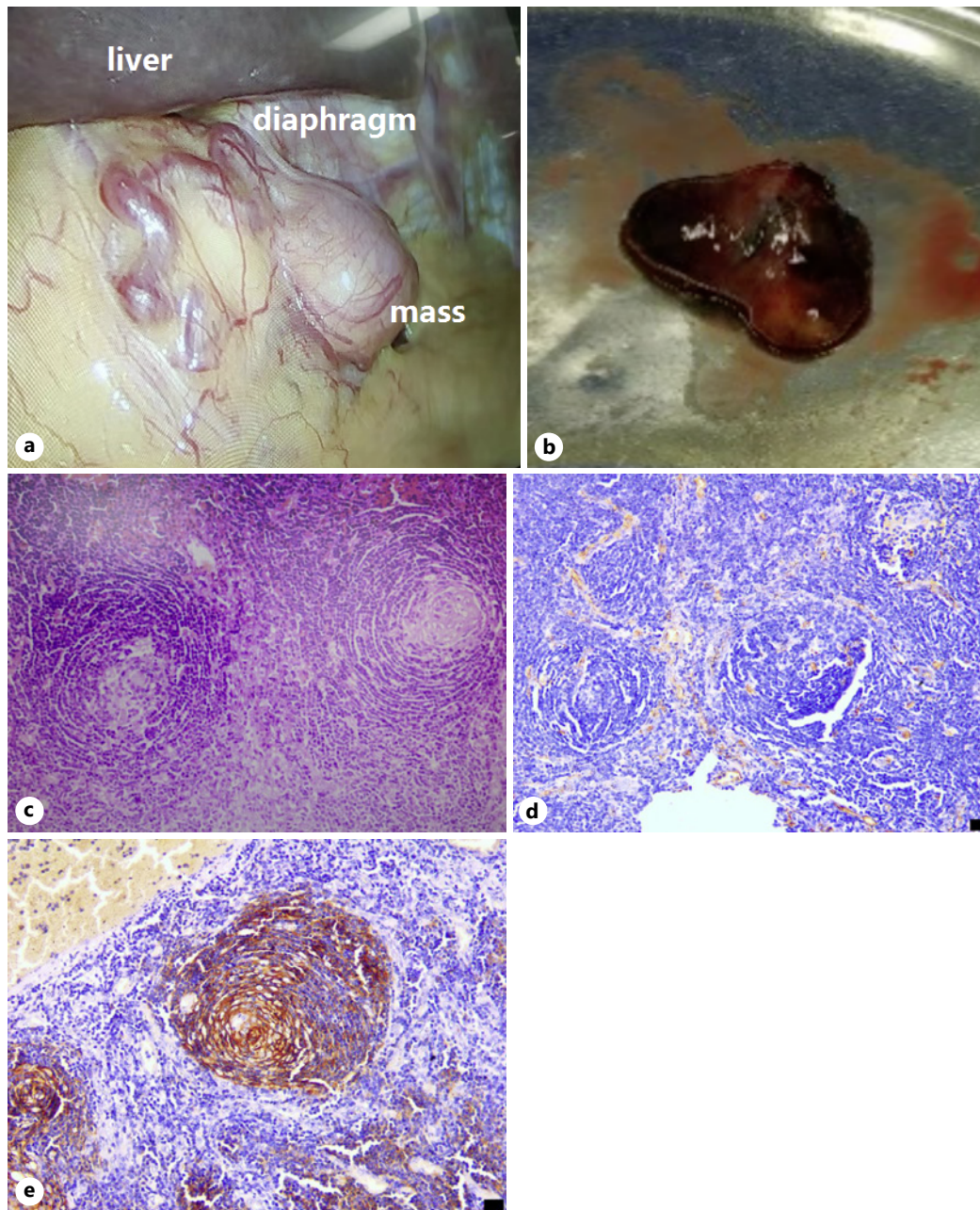


Fig. 3. Operative and pathological pictures of hyaline-vascular variant CD. **a** The surface morphology of the nodule showed by laparoscopy, with rich feeding vessels. **b** Gross specimen of the excised nodule: it is 2.8 cm × 1.8 cm × 1.2 cm in size with a smooth surface, tan appearance, complete envelope, and moderate hardness. **c** Photomicrograph of hyaline-vascular variant unicentric CD (hematoxylin-eosin staining, ×200) shows marked vascular proliferation and hyalinization of the abnormal germinal center, with a tight concentric layering of lymphocytes around the follicle, resulting in an “onion-skin” appearance. **d** Immunohistochemical stains show CD34⁺, indicating positive for vascular endothelium (Elivision, ×200). **e** Immunohistochemical stains show CD21⁺, indicating positive for follicular dendrite net cells (Elivision, ×200). CD, Castleman's disease.

accounts for the highest proportion. Pathology of hyaline-vascular variant is mainly manifested as the proliferation of lymphoid tissue scattered in the distribution of larger lymphatic follicles, follicular structure without germinal center, capillary proliferation, and small transparent

vascular follicles as the characteristics. There is not specific indicator in immunohistochemistry for CD patients, but it has certain value in differentiation: positive for CD34 (marking vascular hyperplasia and penetration into germinal centers) and CD21 (marking follicular dendrite net) indicates hyaline-vascular variant, while positive for CD3 (marking T cell) and CD138 (marking plasma cell) is more commonly seen in plasma cell variant.

In this paper, we describe the feature of a hyaline-vascular variant CD's image. The sonographic manifestations of hyaline-vascular variant CD, especially CEUS imaging, have been less reported in the literature. It's generally presented as an isolated, well-circumscribed, hypoechoic mass with no internal cystic necrosis. Internal echoes are homogeneous or not, and may be accompanied by fine strong echo separation or calcification. Most of the posterior echo is enhanced, with abundant feeding vessels in color doppler [5, 6]. Generally speaking, the case we reported is similar to existing record in the literature. Combined with gray-scale sonography, abundant blood supply within the mass may be characteristic of CD. Its internal echo is even, possibly related to its small size or short growth time. The CEUS profile is characterized by early, increased, homogeneous enhancement and a delayed washout of the contrast agent, which is consistent with its pathological characteristics, but the behavior at CEUS is difficult to distinguish from gastric stromal tumors.

Hyaline-vascular variant CD could be represented on contrast CT as an enhanced tumor with a smooth surface and in most cases, uniform density. Features of CD can be explained as follows: first, calcification is infrequent, including punctate, coarse, peripheral, and arborizing patterns [7]; second, CT-imaging findings are closely related to the pathological features, and the most important feature is the intensive enhancement of the mass, which is similar to the enhancement degree of the near large arteries.

It is necessary to differentiate CD from gastrointestinal stromal tumors. Gastrointestinal stromal tumor usually originates from the muscularis propria of the stomach and can grow toward the subserous membrane, which is presented as a single, regularly shaped, circular mass, usually found at the fundus of the stomach. When the tumor is small, internal echo is even, and the CEUS profile is also characterized by an early, intense, homogeneous enhancement followed by a delayed washout of the contrast agent [8], it is very difficult to differentiate them from each other by ultrasound. Furthermore, CD should be distinguished from gastric schwannoma, gastric leiomyoma, desmoid, inflammatory, or metastatic lymph node.

In this case, the mass is close to the fundus of stomach, which makes it difficult for ultrasound to distinguish whether the mass originates from the stomach or not. However, the CT scan can show the feeding artery around the mass and the gap between mass and gastric wall, making the diagnosis of CD easier. In summary, the imaging of CD has certain characteristics, multimodality approach to it is conducive to a correct diagnosis, but the ultimate diagnosis still depends on histopathological tests.

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Statement of Ethics

The case report was approved by the hospital ethics committee of Kongjiang Hospital of Yangpu District, Shanghai, China, and written informed consent was obtained. Written informed consent was obtained from the patient for publication of this case report and any

accompanying images. A copy of the written consent is available for review by the Editor of this journal.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Yu Ming Jin wrote most of the manuscript, while Gui Ying Jing finished the part of pathology and rephotographed a clear version of immunohistochemical images.

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