Imaging Features of Uterine Leiomyomatosis with the Inferior Vena Cava and the Right Atrium Involvement

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To the Editor: A 48-year-old Chinese woman complained of chest tightness, shortness of breath, and palpitations for 8 months. These symptoms were gradually increasing and the edema on both lower limbs appeared 1 month ago. She had a history of uterine fibroids. Sound of tumor fluttering was heard at the 3/4th intercostal space of the left libs; at the same time, systolic murmur was heard at the apical area. Cardiac ultrasound of another hospital indicated a mass of right atrium which was diagnosed as myxoma. Cardiac ultrasound imaging showed that inferior vena cava and right heart cavity were occupied by a mass [Figure 1a]. Computed tomography angiography (CTA) of the abdomen and heart demonstrated that there were multiple irregular soft-tissue masses in uterus, which entered the inferior vena cava through the right ovarian vein and finally reached the right atrium [Figure 1b, 1c]. Radiologists considered the disease as uterine leiomyomatosis (UL) and proposed to check through magnetic resonance imaging (MRI). According to MRI of the abdomen [Figure 1d, 1e] and heart [Figure 1f], as well as diffusion-weighted imaging (DWI) [Figure 1g], the disease was diagnosed as UL. Such diagnosis was confirmed by surgery and pathology [Figure 1h]. The above symptoms were significantly alleviated after operation, and edema of both lower limbs disappeared 10 days after operation.

UL is a rare, histologically benign but biologically and clinically aggressive, clinical disease.[1,2] It adheres to but does not invade the vessel wall. The recurrence rate of UL is 30%.[2] Preoperative diagnosis of UL is difficult because of low morbidity and atypical symptoms of patients.[3] Complete resection of lesion is particularly important to treat and prevent recurrence. Therefore, surgical treatment is the optimal option.[1] Imaging examination provides an irreplaceable value for the choice of surgical approaches and plays an important role in the assessment of recurrence. Common diagnostic imaging methods of UL include ultrasonography, CT, and MRI.

Ultrasonography shows multiple medium-low echo nodules in the uterine muscle wall and the blood flow signal of the tumor. Its features are always similar to uterine fibroids, resulting in misdiagnosis. While suspected of UL, color Doppler flow imaging of pelvic and inferior vena cava should be performed, and intracardiac situation can be observed through echocardiography or transesophageal ultrasound, which can help clinicians in adequate preoperative preparation to some extent. Ultrasonography is treated as one of the primary screening and follow-up methods because of its cost-effectiveness.

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CT can accurately provide the detection and localization of mass and show the relationship between lesions and surrounding tissue. The lesion may present as unevenly enhanced, significantly enhanced, or slightly homogeneously enhanced on dynamic contrast-enhanced-CT (DCE-CT). The different pattern of enhancement may be related to different nourishing vessels of the tumor. Compared with ultrasonography and MRI, a notable advantage of CTA is that it can directly present the full-scale path of tumor extension.[4] CT is faster and cheaper than MRI, but it has radiation damage.

MRI, including T1-weighted image (T1WI), T2WI, DWI, and DCE-MRI, can observe lesion of heart, abdomen, pelvic organs, and blood vessels. Most UL's signals are similar to or slightly higher than that of muscle on T1WI and higher on T2WI. DWI showed that the most signals of UL are decreasing as b value increasing. DCE-MRI shows that the lesion may appear as unevenly enhanced, or markedly enhanced. At the same time, the delayed enhancement can further evaluate the characteristics of myocardial tissue. The unique cine sequence can clearly observe whether there is adhesion between tumor and vascular wall, or heart chamber. It can additionally assess cardiac function and observe the activity of lesion. MRI enjoys better contrast among soft tissues, to ensure that the relationship between tumor and vascular tissue showed more clearly, and MRI boasts advantages such as nonionizing radiation, multi-sequence, multi-angle, and multi-parameter imaging. Thus, it can accurately show details of the tumor, which is important for preoperative diagnosis, guidance of surgery, and prognostic evaluation of patients.

In summary, imaging examination is difficult to give an accurate diagnosis before operation, but it is of great importance for early detection, surgical planning, and follow-up of UL.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for

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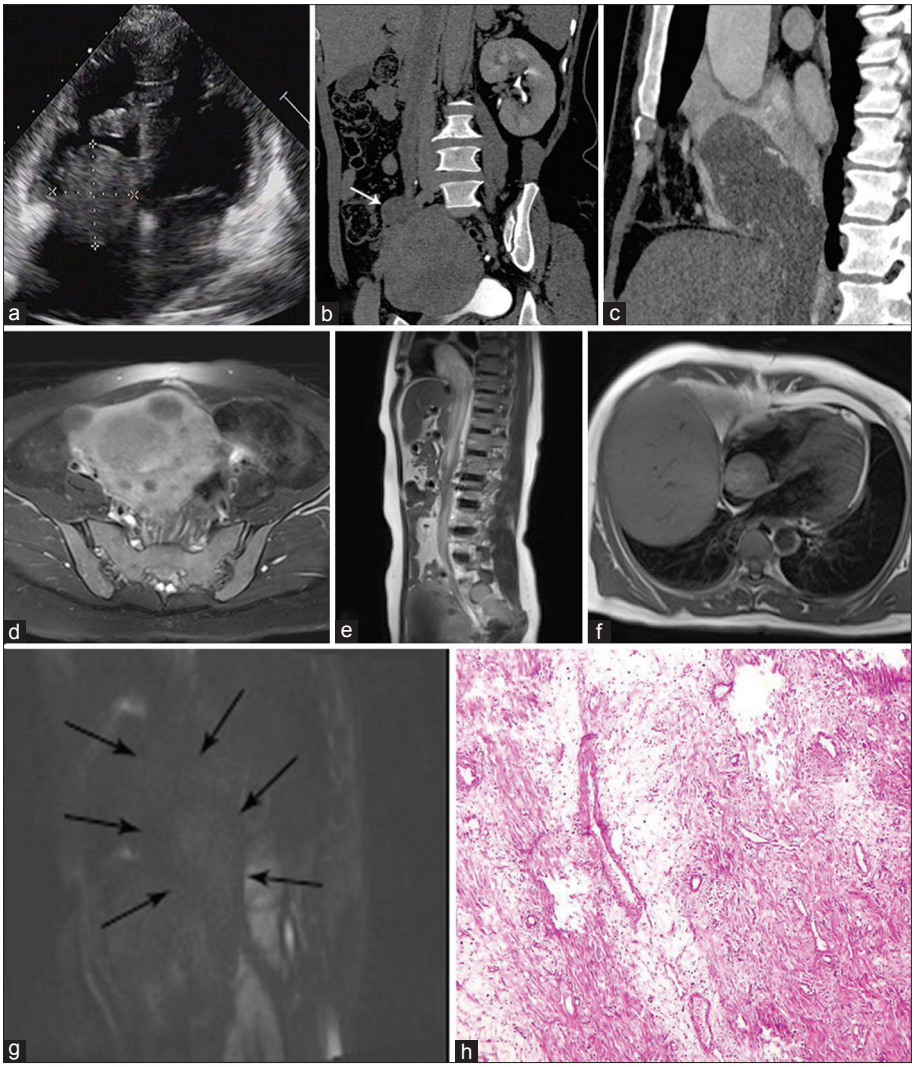

Figure 1: (a) Ultrasonography: The length/transverse diameter of right atrium is 75/59 mm; the size of the hypoechoic mass is about 60 mm × 36 mm × 40 mm, which has good mobility, and tricuspid valve leaflets were thickened. Tricuspid valve regurgitation, and the velocity of Tricuspid valve regurgitation is 220cm/s. The inferior vena cava's velocity of flow was increased to about 150 cm/s. (b and c) CTA: Coronal reconstruction images of abdomen presented that the volume of uterus was significantly enlarged, where multiple masses are seen extending to the right ovarian vein (b, arrow), and finally drilled into the inferior vena cava and right atrium (c). The enhanced vascular shadow can be seen in lesion. (d and e) MRI: Axial T2-weighted image of pelvic, inhomogeneous signal of masses in the uterus (d) and sagittal T2-weighted image shows a crutch-shaped high-signal intensity lesion in the inferior vena cava and right atrium (e). (f) Axial T1-weighted image showing that the tumor's signal in the right atrium is similar to that of muscle. (g) b = 800 s/mm^2, DWI presented a low signal lesion (arrow). (h) Pathology of spindle cells. The cells formed a beam or braid (H and E, ×100). CTA: Computed tomography angiography; MRI: Magnetic resonance imaging; DWI: Diffusion-weighted imaging.

her images and other clinical information to be reported in the journal. The patient understands that her name and initial will not be published and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

References

1. Zeng H, Xu Z, Zhang L, Luo YI, Chen H, Zhu H, *et al.* Intravenous leiomyomatosis with intracardiac extension depicted on computed tomography and magnetic resonance imaging scans: A report of two cases and a review of the literature. Oncol Lett 2016;11:4255-63. doi: 10.3892/ol.2016.4499.
2. Low G, Rouget AC, Crawley C. Case 188: Intravenous leiomyomatosis with intracaval and intracardiac involvement. Radiology 2012;265:971-5. doi: 10.1148/radiol.12111246.
3. Fang H, You Y, Cai F, Yang Y, Yang C, Lv P, *et al.* Intravenous leiomyomatosis of the subclavian vein. J Vasc Surg Venous Lymphat Disord 2017;5:254-6. doi: 10.1016/j.jvsv.2016.03.008.
4. Gui T, Qian Q, Cao D, Yang J, Peng P, Shen K, *et al.* Computerized tomography angiography in preoperative assessment of intravenous leiomyomatosis extending to inferior vena cava and heart. BMC Cancer 2016;16:73. doi: 10.1186/s12885-016-2112-9.