

# Imaging findings of succinate dehydrogenase-deficient renal cell carcinoma

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## **Imaging findings of succinate dehydrogenase-deficient renal cell carcinoma**

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### **AUTHOR CONTRIBUTIONS**

Wenqin Liu wrote the original draft of this letter, and Guiwu Chen made subsequent revisions. Jiaxin Meng participated in the image analysis and interpretation. Xiaomin Liao participated in the pathology image analysis and interpretation. Yuhuan Xie assisted in the revision and supervised the overall production of this report.

### **ACKNOWLEDGMENT**

Not applicable.

### **FUNDING STATEMENT**

No funding was received for this study.

### **CONFLICT OF INTEREST STATEMENT**

The authors declare no conflicts of interest.

### **DATA AVAILABILITY STATEMENT**

The data used to support the findings of this study are available from the corresponding author upon request.

### **TRANSPARENCY STATEMENT**

We can confirm that this manuscript is an honest, accurate, and transparent account of the case being reported and that no important aspects of the case have been omitted.

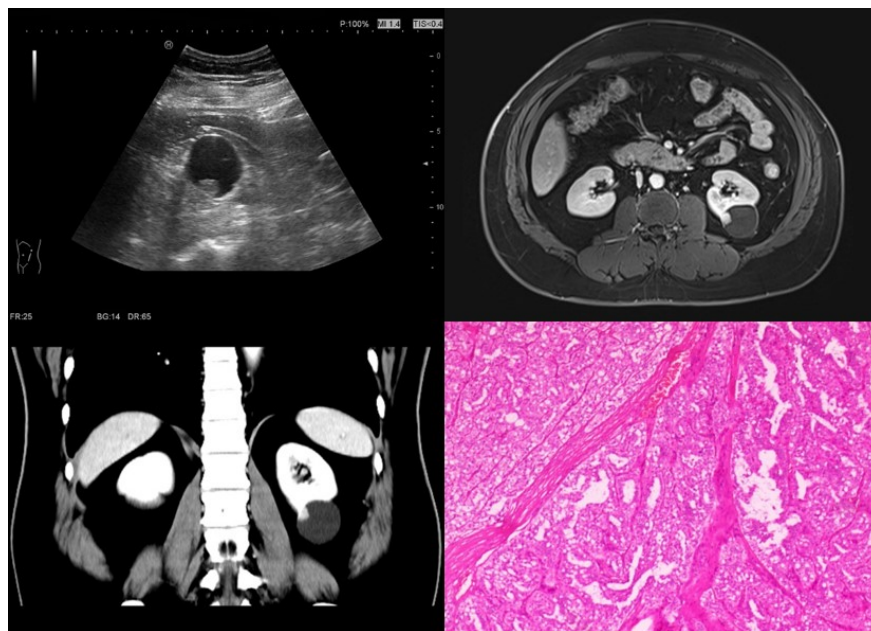
## CONSENT FOR PUBLICATION

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

## Key Clinical Message

A 50-year-old man with a mass located in the left kidney was described by multimodal images, including ultrasonography, computed tomography, and magnetic resonance imaging. After surgical resection of the mass, pathological examination confirmed succinate dehydrogenase-deficient renal cell carcinoma.

## Graphical Abstract Image



## Graphical Abstract Text

Succinate dehydrogenase-deficient renal cell carcinoma (SDH-deficient RCC) is a malignant epithelial tumor that tends to occur in young males. Here, we present a case of SDH-deficient RCC characterized by multimodal images and confirmed by pathological examination.

## Abstract

Succinate dehydrogenase-deficient renal cell carcinoma (SDH-deficient RCC) is a malignant tumor associated with the loss of a mitochondrial enzyme. Owing to its rarity and limited imaging, SDH-deficient RCC is always misdiagnosed or escapes diagnosis. Here, we report a case of SDH-deficient RCC in a 50-year-old male characterized by multimodal images and confirmed by pathological examination.

## KEYWORDS

Renal cell carcinoma, Succinate dehydrogenase, Ultrasonography, Computed tomography, Magnetic resonance imaging, Pathology

Succinate dehydrogenase (SDH)-deficient renal cell carcinoma (RCC) is a malignant epithelial tumor defined by the absence of immunohistochemical expression of mitochondrial complex II. Due to its incidence

accounting for only 0.05% to 0.2% of all renal carcinomas, SDH-deficient RCCs are always misdiagnosed or escape diagnosis.<sup>1</sup> Here, we report a case of SDH-deficient RCC characterized by ultrasonography, computed tomography, and magnetic resonance imaging as well as confirmed by pathological examination.

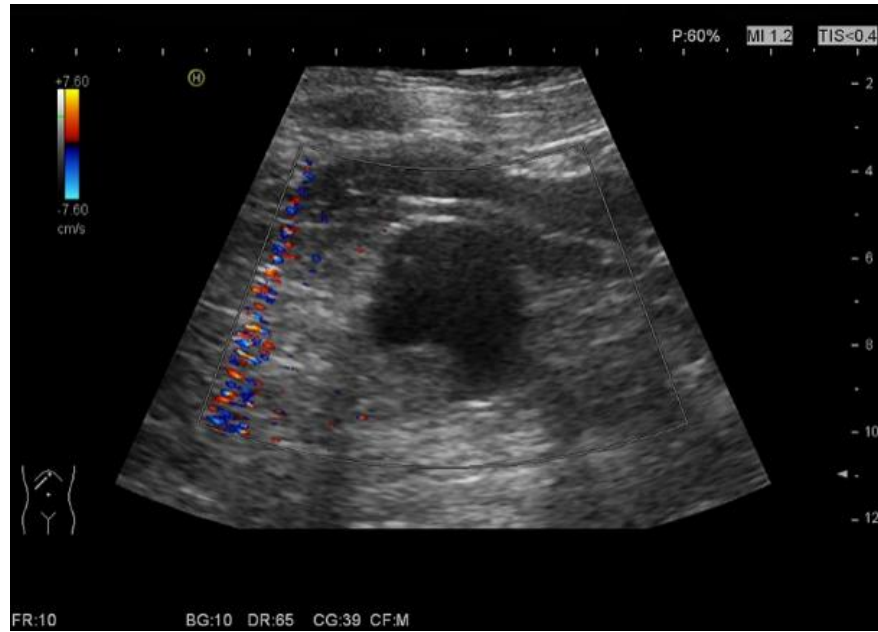
A 50-year-old man was admitted to our hospital with polypnea for 1 month and smoking for 30 years. He had a history of hypertension and hepatitis B confirmed recently. After admission, abdominal ultrasonography revealed a cystic-solid mass located in the left kidney (Figure 1). Then, computed tomography of the abdomen was performed to describe the mass (Figure 2). Furthermore, magnetic resonance imaging provided more characteristics of this mass (Figure 3). Eventually, the patient underwent surgical resection, and a pathological diagnosis of SDH-deficient RCC was confirmed (Figure 4). Immunohistochemical staining showed that CK, CK8/18, Vim, PAX-8, GATA3, HNF1 Beta were positive and AMACR, TFE-3, E-Cad were partly positive as well as CK7, CK20, RCC, CA, IX, CD10, CD117, 34BetaE12, SDHB were negative. Ki-67 was approximately 30%.

SDH-deficient RCCs tend to occur in relatively young adults with a mean age of 38 years and the male-to-female ratio is 1.8. Most of them were unilateral or bilateral, while others could be combined with paragangliomas, gastrointestinal stromal tumors, or pituitary adenomas.<sup>2</sup> Regarding the imaging of SDH-deficient RCCs, abdominal ultrasound shows that the masses are oval, well-defined, and mix-echoic with or without blood flow signals. Computed tomography and magnetic resonance imaging revealed that the masses could be cystic, cystic-solid, or solid with obvious enhancement.<sup>1</sup> Fortunately, most SDH-deficient RCCs have a favorable prognosis for low metastatic risk with low nuclear grade after nephron-sparing surgery. However, others have more aggressive progression for a higher metastatic rate with coagulative necrosis, high nuclear grade, or sarcomatoid dedifferentiation, and radical nephrectomy should be performed.<sup>3</sup>

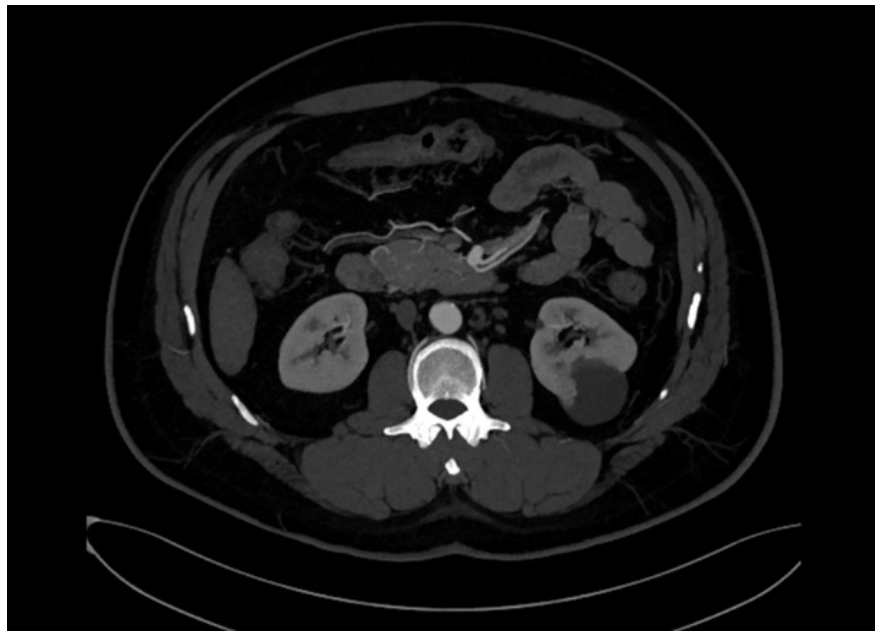
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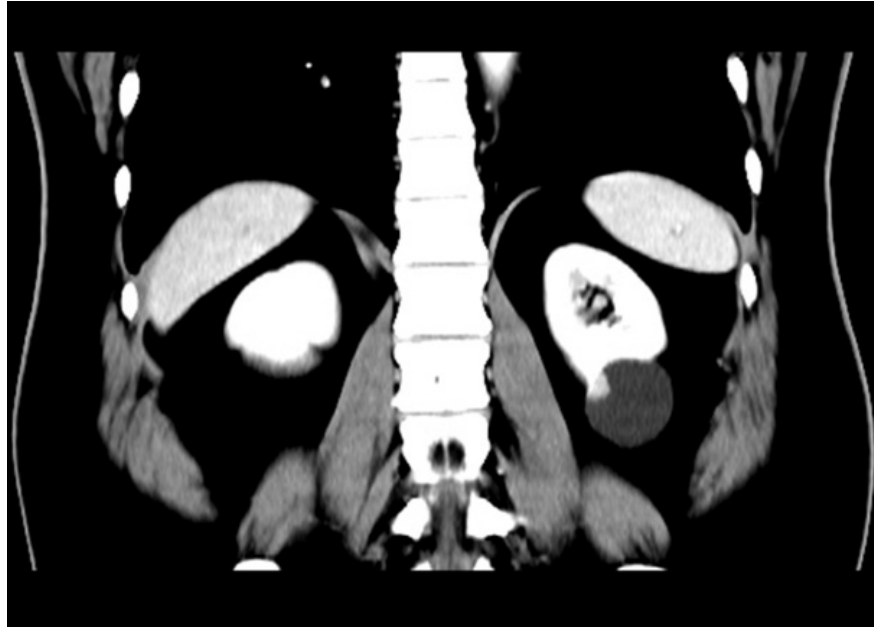
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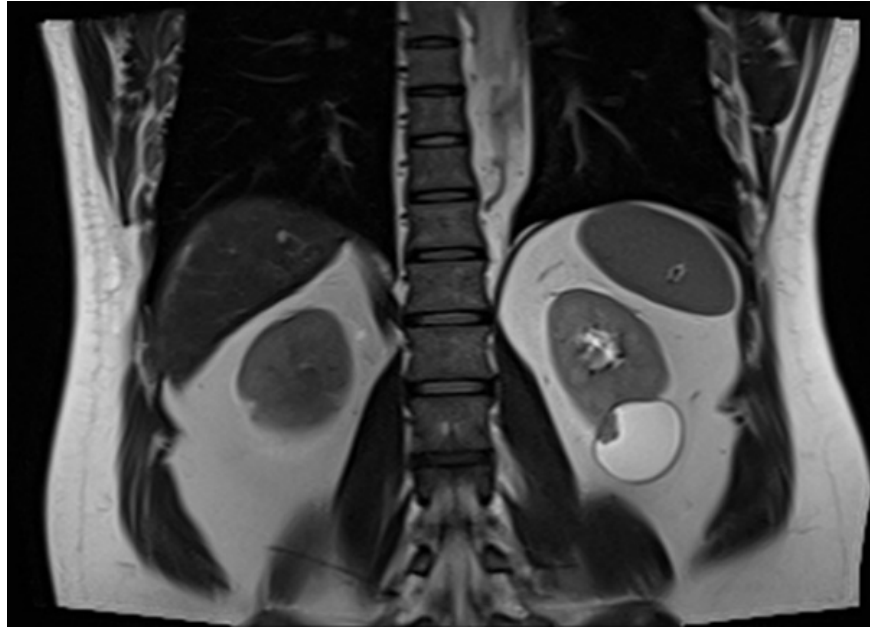
**FIGURE 1** Ultrasonography of succinate dehydrogenase-deficient renal cell carcinoma. (A) Grayscale ultrasound showed that the cystic-solid mass was oval, well-defined, and approximately 41 mm×40 mm in size. (B) Color Doppler flow imaging showed that the solid component of the mass was isoechoic and approximately 16 mm×9 mm in size without any blood flow signals.





**FIGURE 2** Computed tomography of succinate dehydrogenase-deficient renal cell carcinoma. (A) Plain computed tomography showed that the cystic-solid mass was low-density and the solid component of the mass was approximately 37 HU. (B) Enhanced computed tomography showed that the solid component of the mass was obviously enhanced with 99 HU.

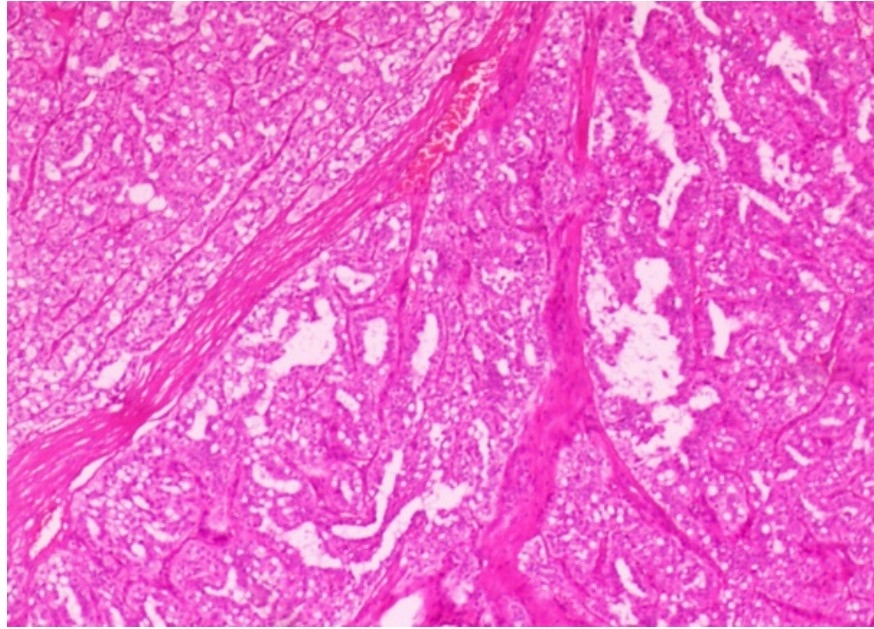




**FIGURE 3** Magnetic resonance imaging of succinate dehydrogenase-deficient renal cell carcinoma. (A) T1-weighted imaging showed that the cystic-solid mass had short signals and the solid component of the mass had long signals. (B) T2-weighted imaging showed that the mass had long signals and the solid component of the mass had short signals.







**FIGURE 4** Pathology of succinate dehydrogenase-deficient renal cell carcinoma. (A) The gross specimen showed that the cystic-solid mass was grayish white and the solid component of the mass was papillary. (B) Hematoxylin-eosin staining showed the cells of the mass with abundant vessels presented in a nest or duct shape, the nucleus was enlarged and oval as well as the cytoplasm was eosinophilic and transparent.

