Clinical Case Reports

WILEY

Clinical Case Reports Open Access

CASE REPORT OPEN ACCESS

Giant Cysticercosis of the Right Kidney: A Case Report

Yumeng Zhang | Huaqing Tan | Xukun Gao | Yuxuan Wang | Yuntai Cao

Department of Radiology, Affiliated Hospital of Qinghai University, Xining, China

Correspondence: Yuntai Cao (caoyt18@lzu.edu.cn)

Received: 18 March 2024 | **Revised:** 31 August 2024 | **Accepted:** 5 November 2024

Funding: This work was supported by Qinghai Provincial Department of Science and Technology of China, (Grant: 2023-ZJ-918M), Qinghai Province "Kunlun Talents High-end Innovation and Entrepreneurial Talents" Top Talent Cultivation Project, (Grant: 13,2021), National Natural Science Foundation of China, (Grant: 82260346).

Keywords: cysticercosis | imaging features | kidney worm disease | magnetic resonance imaging

ABSTRACT

Cysticercosis, although reported in several parts of the body, especially the liver, lesions occurring in the kidney are particularly rare. We report a 58-year-old female patient with intermittent epigastric pain, who was found to have a huge occupancy of the right kidney on computed tomography (CT) and magnetic resonance imaging (MRI), which was confirmed to have a predominantly cystic component, with no clear enhancement on CT images after injection of contrast medium, and significant enhancement of the peritoneum and septum visible on MRI. This case reports a case and its rarity of cysticercosis occurring in the kidney.

Taxonomy Classification: Radiology & Imaging.

1 | Introduction

Echinococcosis is a global zoonotic infectious disease mainly caused by the larvae of Echinococcus granulosus, which poses a serious threat to human health and animal husbandry [1, 2]. Most hydatid cysts are located in the liver, less frequently in the lungs, rarely affecting other internal organs, and even more rarely in the kidneys, with an incidence rate of only 1%–2% [3]. This article reports a case of echinococcosis in the right kidney, which is rarely described in the literature and successfully treated by resection.

2 | Case History/Examination

A 58-year-old woman suffered from intermittent upper epigastric pain for 2 months, mainly in the right upper abdomen, with intermittent distending pain, accompanied by radiating pain in the shoulders, waist, and back, dizziness, headache, nausea, vomiting, no chest tightness, palpitations, diarrhea, constipation, frequent urination, urgency, or painful urination.

A large lump can be palpated in the upper right abdomen on physical examination, with mild pressure pain. There were no pertinent positive findings on the remaining systems.

She underwent blood tests, urine tests, and some imaging examinations: computed tomography (CT) and magnetic resonance imaging (MRI). Serology showed positive IgG hydatid antibody, and other routine blood and urine tests were normal. CT scan showed an irregular mixed-density mass with a maximum range of 16.30 × 13.23 cm in the retroperitoneal region of the right kidney, with "ribbon sign" and "honeycomb-like" slightly high-density shadows, and irregular calcified foci. The lower boundary of the lesion reached the right iliac fossa; no obvious enhancement of the lesion were seen on the CT enhancement scan (Figure 1). MRI showed a huge abnormal signal shadow in the right kidney. T1-weighted imaging (TIWI) showed a low signal in the same phase, while the T2-weighted imaging (T2WI) fat sequence showed a high signal. Multiple cystic and linear slightly low signal shadows were seen inside; diffusion weighted imaging (DWI) showed uneven high signal intensity (Figure 2), with enhanced MRI capsule and septum. The lesion extended from the lower

Summary

- Cystic hydatid disease, although reported in multiple parts of the body, is particularly rare in lesions that occur in the kidneys.
- This case reports an extremely rare case of cystic echinococcosis that occurs in the kidneys.
- This is a 58-year-old female patient with intermittent upper abdominal pain for 2 months.
- Through computed tomography and magnetic resonance imaging, a huge mass was found in the right kidney, confirming that it is mainly cystic.

boundary of the pelvic cavity to the right iliac fossa, and the right lobe of the liver was compressed and the boundary with the lesion was unclear; enhanced scanning showed enhanced capsule and septal enhancement, with a small amount of remaining normal tissue located in the right anterior abdominal cavity (Figure 3). Ultrasound showed that the liver capsule is smooth, and a mixed echo area of about 20.80 × 13.40 cm was detected in the right lobe of the liver. The boundary was distinguishable, and the wall thickness was double layered. There were many strip-shaped echoes curled up in the shape of an onion inside. The above imaging diagnosis opinion considers right renal cystic echinococcosis.

3 | Methods (Treatment and Differential Diagnosis)

She underwent liver hydatid resection and right nephrectomy under general anesthesia. During the surgery, a huge cystic lesion was found in the right kidney and adrenal region, protruding outside the kidney. The lesion was a gray-pink cystic mass with a volume of 25.00 × 20.00 × 7.00 cm, connected to a segment of the ureter, 4.00 cm long and 0.50 cm in diameter. Inside, there was a caseous necrotic mass with varying sizes of cystic density shadows. Postoperative pathological examination revealed a cystic mass with a 0.30–1.50 cm wall thickness, containing grayish-yellow powder and a paste-like substance. Histopathological examination of hematoxylin and eosin (H&E) stained sections showed the cystic walls and powdery skin-like structures of the encapsulated worms, with a few calcifications seen within and scattered inflammatory cells around (Figure 4).

Renal cysticercosis also needs to be differentiated from multilocular cystic renal carcinoma and renal polycystic cysts in terms of imaging manifestations [1]. Multi-compartmental cystic renal carcinoma: its clinical symptoms are not unique. The imaging features are that the renal area can be seen inside or partially protruding outside the kidney. Multiple cystic clusters of different sizes can be observed on one side of the kidney, presenting a grid-like change, and there is no communication between the cystic cavities; if a cyst herniates into the renal pelvis, it can cause renal pelvis obstruction and hydronephrosis; the precise

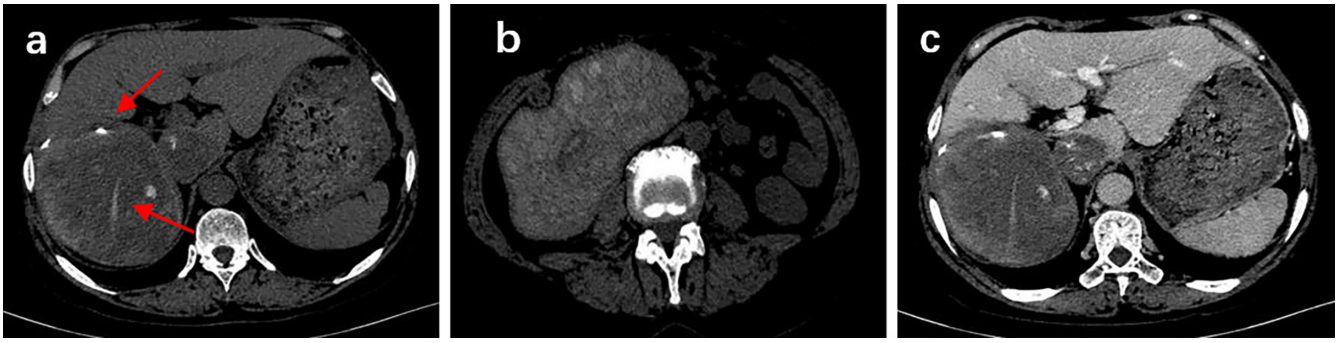

FIGURE 1 | (a and b): Transverse axial CT scan shows an irregular mixed-density mass in the right kidney region with a "ribbon sign", "honeycomb-like" hyperdensity, and calcified foci (arrows); c: transverse axial CT enhancement image shows insignificant enhancement of the lesion.

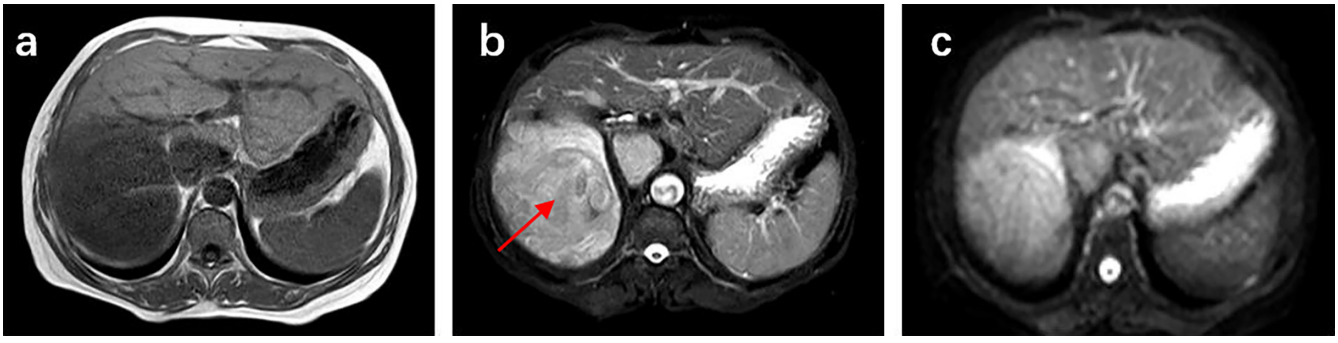

FIGURE 2 | (a): Transverse-axial isophotogram image shows the lesion is low signal; (b): transverse-axial T2WI compression fat sequence lesion shows mixed high signal, and multiple cystic and striated slightly low signal can be seen in it (arrow); (c): transverse-axial DWI image shows the lesion is inhomogeneous high signal.

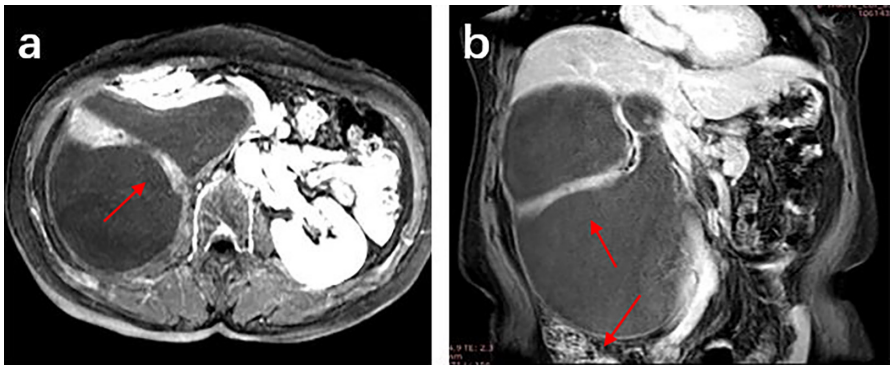

FIGURE 3 | (a and b): Transverse axial and coronal enhancement scans of the lesion did not show clear enhancement, with enhancement of the periphery and septum (arrows), with the inferior border reaching the right iliac fossa.

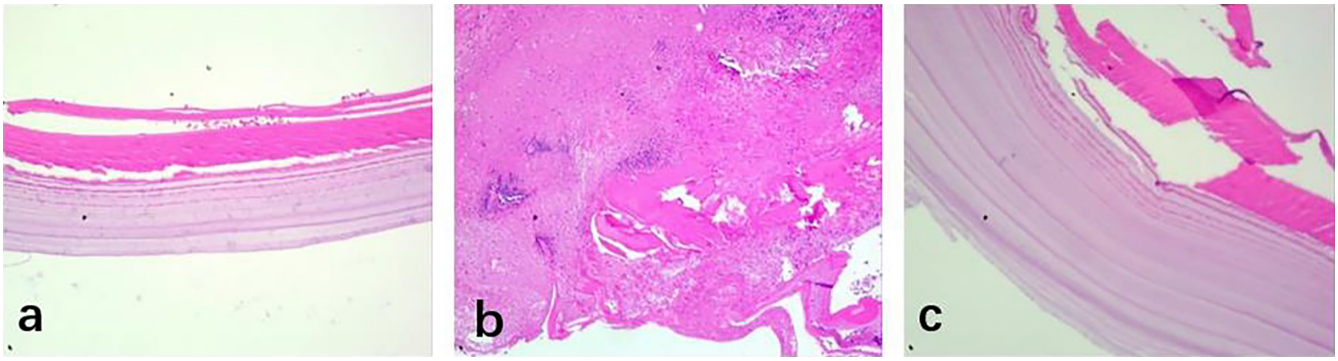

FIGURE 4 | (a–c): Hematoxylin–eosin (H&E) staining shows the cystic wall of the encapsulated worm and a powdery skin-like structure with a little calcification seen within and scattered inflammatory cells around.

boundary between renal parenchyma and the cyst is a characteristic of this disease. The surface of the mass is smooth and non-invasive, with occasional arc-shaped calcification on the cyst wall. The surrounding renal parenchyma is pushed or shrunk, and the ureter does not expand. Due to the different composition of the contents of the cyst's contents, there will also be significant differences in CT values. When the cyst is filled with mucus, the CT value is similar to that of a solid soft tissue mass. During enhanced scanning, there will be no enhancement in the cyst cavity. Compared with normal bone parenchyma, the density of the cystic septum is lower and completely segmented. During enhanced scanning, mild to moderate enhancement may occur, while the compressed renal parenchyma is significantly improved [2]. Renal polycystic cysts: the most important distinguishing point between renal polycystic cysts and renal cysticercosis is that these cysts are not contained within a large lesion, in contrast, the mother cyst, daughter cyst, and grandchild cyst of renal cystic echinococcus are both included in a large lesion.

4 | Conclusion and Results

4.1 | Pathological Diagnosis

Renal cystic echinococcosis.

After 1 year of follow-up after surgery, the patient's condition was well controlled.

5 | Discussion

There are two types of echinococcosis, fine-grained echinococcosis and vesicular echinococcosis, where fine-grained echinococcosis is a cystic lesion caused by echinococcal infection and is most common in pastoralist areas, and can occur at any age, it is endemic in Mediterranean countries, the Middle East, South America, South Africa, New Zealand, Iceland, Australia, and India [4, 5].

Dogs are the ultimate host of *Echinococcus granulosus*, sheep are the usual intermediate host, and humans are just the occasional intermediate host. Human infection occurs through close contact with the final host or by ingesting food and water contaminated with echinococcus tapeworm eggs. The ingestion of such contaminated food by humans can cause the eggs to hatch in the gastrointestinal tract, be released in the duodenum, and be transported to the liver through portal vein circulation. The liver is the first affected area, followed by the lungs, with minimal involvement of other organs [3, 6].

Cysticercosis can generally be classified into five types: type 1, multiple small vesicles without a solid component; type 2, with solid components and multiple small vesicles; type 3, solid mass surrounded by many small vesicles combined with large or irregular cysts; type 4, solid mass without cystic components; and type 5, large cyst without solid components [7]. This patient belongs to the parenchymal type 4. The classification

of cysticercosis is of great help for clinical treatment, and the World Health Organization recommends that when type 1 hydatid cysts are less than 5 cm, albendazole medication should be given for treatment. For cysts greater than 5 cm, puncture and drainage can be used, supplemented by albendazole treatment; type 2 is usually treated with minimally invasive surgery or surgery combined with albendazole treatment; type 3 belongs to the transitional stage, which is classified as drug or surgical treatment based on whether it contains or does not contain a cyst; for cystic hydatid cysts of type 4 and 5, only observation and follow-up are necessary [8].

Renal cystic hydatid disease may not have obvious clinical symptoms in the early stage, and most patients are discovered during physical examinations and surgeries. In the advanced stage, the compression of the cysts will lead to low back and abdominal pain and impairment of renal function. When the cyst breaks into the collecting system, the white powdery skin-like cyst wall and subcapsules are discharged from the body with urine, which leads to renal colic and changes in urine [9–11].

On imaging, CT has a high diagnostic value for all types of encapsulated worms, and typical imaging manifestations can be observed. Renal cysticercosis can be divided into two types, polycystic and monocystic. Polycystic renal cysts are more typical in imaging, and CT scans show polycompartmental cystic masses in the kidneys, which are characterized by calcification of the capsule wall, subcapsules, and detachment of the capsule membrane, and the kidneys are characterized by multiple cystic changes, with a thick capsule wall, clear borders, and the "capsule within a capsule" sign, and sometimes the characteristic carapace or honeycomb segmentation images [12, 13]. But some are easily misdiagnosed as multilocular cystic renal carcinoma, renal clear cell carcinoma cystic transformation, or multiple renal cysts, often requiring pathological diagnosis for diagnosis. MRI is an important supplement to CT, which can provide the basis for the imaging classification of cysticercosis by its multiparameter advantage [14].

Author Contributions

Yumeng Zhang: writing – original draft, writing – review and editing. **Huaqing Tan:** writing – review and editing. **Xukun Gao:** writing – review and editing. **Yuxuan Wang:** writing – review and editing. **Yuntai Cao:** data curation, funding acquisition, resources, writing – review and editing.

Acknowledgments

The authors thank National Natural Science Foundation of China Regional Fund Project (No. 82260346), Qinghai Province Science and Technology Program (No. 2023-ZJ-918M), Qinghai Province "Kunlun Talents High-end Innovation and Entrepreneurial Talents" Top Talent Cultivation Project (No. 13,2021) for financial support.

Ethics Statement

This retrospective study, adhering to the Declaration of Helsinki, was approved by the Medical Ethics Committee of the Affiliated Hospital of Qinghai University, exempting subjects from informed consent, with approval number: P-SL-202219.

Consent

Written informed consent was obtained from the patient for the publication of her condition and accompanting images.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The datasets used and/or analysed during the current study available from the corresponding author on reasonable request.

References

1. Q. Wang, L. Yang, Y. Wang, et al., "Disease Burden of Echinococcosis in Tibetan Communities—A Significant Public Health Issue in an Underdeveloped Region of Western China," *Acta Tropica* 203 (2020): 105283.

2. G. Singla, A. Sharma, and Y. Nevtia, "A Peculiar Case of Hydatid Disease," *Cureus* 13 (2021): e20729.

3. S. Gupta and C. J. Das, "Imaging of Hydatid Cyst of Kidney, Ureter and Urinary Bladder," *British Journal of Radiology* 95 (2022): 20211373.

4. S. Şimşek and Ö. C. Akgül, "Unusual Imaging Characteristics of Thoracic Hydatid Disease," *Radiologia Brasileira* 55 (2022): 128–133.

5. M. Ghanem, M. Z. Al Kazzaz, and A. Soliman, "Hydatid Cyst in the Neck, an Unusual Localization of the Disease: A Case Report," *International Journal of Surgery Case Reports* 85 (2021): 106274.

6. S. Sarngal, S. Gandhi, S. Arora, and S. Sharma, "Unusual Presentation of Hydatid Cyst," *Euroasian Journal of Hepatogastroenterology* 12 (2022): 31–34.

7. WHO Informal Working Group, "International Classification of Ultrasound Images in Cystic Echinococcosis for Application in Clinical and Field Epidemiological Settings," *Acta Tropica* 85 (2003): 253–261.

8. M. Mihmanli, U. O. Idiz, C. Kaya, et al., "Current Status of Diagnosis and Treatment of Hepatic Echinococcosis," *World Journal of Hepatology* 8 (2016): 1169–1181.

9. S. A. Kumar, A. Shetty, C. Vijaya, et al., "Isolated Primary Renal Echinococcosis: A Rare Entity," *International Urology and Nephrology* 45 (2013): 613–616.

10. M. Hammade, S. Alhoulaiby, and A. Ahmed, "Isolated Giant Renal Hydatid Cyst With a Simple Renal Cyst Appearance: A Case Report," *Journal of Medical Case Reports* 16 (2022): 386.

11. M. Demir and İ. Yağmur, "Isolated Renal Hydatid Cyst in a 6-Year-Old Boy: A Case Report," *Iranian Journal of Parasitology* 16 (2021): 692–696.

12. C. Ceylan, Ö. Odabaş, T. A. Serel, Ö. Baytok, and T. Temuçin, "Giant Renal Cystic Echinococcosis: Case Report," *Türkiye Parazitolojii Dergisi* 37 (2013): 61–63.

13. A. Kalovidouris, C. Pissiotis, G. Pontifex, A. Gouliamos, S. Pentea, and C. Papavassiliou, "CT Characterization of Multivesicular Hydatid Cysts," *Journal of Computer Assisted Tomography* 10 (1986): 428–431.

14. J. Zheng, J. Wang, J. Zhao, and X. Meng, "Diffusion-Weighted MRI for the Initial Viability Evaluation of Parasites in Hepatic Alveolar Echinococcosis: Comparison With Positron Emission Tomography," *Korean Journal of Radiology* 19 (2018): 40–46.