

## Ultrasound Findings of Hydatid Diseases in Multiple Organs: A Pictorial Guide to Radiologists

Shriya Goel<sup>1</sup>, Sujay Kumar Das<sup>1</sup>, Bishal Thakur<sup>1</sup>, Dismeeet Kaur<sup>1</sup>, Amit Saroha<sup>1</sup>, Trilochan Panthee<sup>1\*</sup>

<sup>1</sup>Department of Radiodiagnosis, AIIMS, Rishikesh, India

DOI: [10.36347/sjmcr.2022.v10i06.007](https://doi.org/10.36347/sjmcr.2022.v10i06.007)

| Received: 26.04.2022 | Accepted: 01.06.2022 | Published: 04.06.2022

\*Corresponding author: Trilochan Panthee

Department of Radiodiagnosis, AIIMS, Rishikesh, India

### Abstract

### Case Report

Hydatid disease (HD) is a parasitic infection endemic to many regions worldwide. It is commonly seen in persons practicing animal husbandry. The causative organism is *Echinococcus granulosus*, with the liver being the most common organ involved. Here we are presenting 4 cases of hydatid disease in different organs with ultrasound findings. Familiarity with the variable ultrasonographic appearances of hydatid diseases will provide essential advantages in making the diagnosis and may aid in diagnosing complex or atypical cases. Early imaging diagnosis of HD can significantly improve treatment outcomes, especially in patients living in endemic countries, like India.

**Keywords:** Case report, Hydatid disease, *Echinococcus*, Cyst, Ultrasonography.

**Copyright © 2022 The Author(s):** This is an open-access article distributed under the terms of the Creative Commons Attribution **4.0 International License (CC BY-NC 4.0)** which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

## INTRODUCTION

HD is a parasitic infection caused by the larvae of a tapeworm *Echinococcus* with humans infected as intermediate hosts [1]. This parasite is endemic to many regions around the world. It is commonly seen in persons practicing animal husbandry [1, 2]. There are two types of *Echinococcus* infections. The more common type is *E. granulosus*, whereas *E. multilocularis* is less common but more invasive, mimicking a malignancy [2]. The liver is the most common organ involved, with hepatic HD accounting for most cases. The imaging findings of extrahepatic hydatid lesions frequently simulate those of hepatic HD, as long as rupture, bleeding, and/or superimposed bacterial infection has not occurred [1-5].

## CASE REPORTS

Four patients presented with varying complaints- from pain abdomen, jaundice, and dyspepsia to flank pain, dysuria, etc. The clinical diagnosis was variable. The patients were referred to the Department of Radiodiagnosis and Imaging for the exclusion of differentials. They underwent USG. Representative USG images of all the patients are shown in Figures 1 to 4.

## RESULT

In different cases, there was the involvement of hepatic or splenic parenchyma, renal parenchyma, or peritoneum (table 1).

The imaging appearances were variable (table 2): well-defined, round to oval-shaped, variably thin to thick-walled lesions. Few showed echogenic hydatid sand. Daughter cysts were seen in the periphery of a few cases. Primarily they were being managed conservatively with albendazole at the time of presentation.

## DISCUSSION

USG is an essential imaging modality for a liver hydatid cyst. It demonstrates the wall characteristics in purely cystic lesions and floating membranes, daughter cysts, and the hydatid sand [3]. Structure of the Hydatid Cyst.

The wall of a hydatid cyst consists of 3 layers [3]:

Ø The outer layer, or pericyst, consists of modified host cells, fibroblasts, giant cells, and eosinophils; these together form a rigid protective coating that is only a few millimeters thick. The response of the host to the parasite is represented by pericyst.

Ø The middle layer is an acellular, laminated membrane. It is easily ruptured and resembles the white of a hard-boiled egg. This membrane allows the passage of nutrients but is restrictive to bacteria.

Ø The inner germinal layer is translucent and thin.

The brood capsule is an outpouching of the germinal layer from which the scolices (infectious embryonic tapeworms) develop. Hydatid sand, which settles in the dependent part of the cyst, is formed of freed scolices, together with brood capsules. The thickness of these layers depends on the tissue in which the cyst is located; the coatings tend to be thick in the liver, less developed in muscle, absent in bone, and sometimes visible in the brain [3].

### Hydatid of the liver

Hepatic hydatidosis is related to the stage of cyst growth. Hydatid sand is a characteristic finding & is seen as multiple echogenic foci [1, 2]. A solitary type I cyst can be difficult to distinguish from a simple epithelial cyst. In such cases, a double-contour thick wall due to a triple-layer, multiple unilocular cysts, and the involvement of other organs or a history of living in endemic regions are helpful [4]. Multivesicular hydatid cysts can manifest as a honeycomb pattern, i.e., well-defined fluid collections with multiple septa [5] (Fig. 1). Cyst calcification typically occurs in the pericyst layer of the wall as a curvilinear or ring-like pattern, but complete calcification develops at the end of the process [2].

### Hydatid of the spleen

The Involvement of the spleen is rare, with a prevalence of 1% to 8% [1, 6]. Splenic cysts generally form due to intraperitoneal spread from a ruptured hepatic cyst or systemic dissemination [6]. In general, imaging characteristics of splenic & hepatic hydatid cysts are not different (Fig. 2). Given the necessity of preserving splenic tissue, Spleen-saving surgery or percutaneous treatment should be tried for the treatment [6].

### Hydatid of the kidney

Involvement of kidney and adrenal gland are rare, and renal hydatid cysts are generally located in the upper or lower pole cortex [1] (Fig. 3). Complications

due to renal hydatid are infection and rupture, presenting as acute colic and hydatiduria [7]. Radiologically, in such cases, multiple round filling defects representing daughter cysts can be seen in the excretory system [1, 7]. Multilocular hydatid can be misdiagnosed with simple renal cysts, cystic nephroma, or renal cell carcinoma [1, 7].

### Hydatid of the peritoneum

Peritoneal involvement is generally secondary to hepatic involvement, and their prevalence in cases of abdominal hydatid disease is ~10% [1, 8] (Fig. 4). Cysts in the peritoneal cavity are multiple, usually due to previous surgery for hepatic hydatid cysts [8, 9]. The characteristic appearance of daughter cysts anywhere in the peritoneal cavity has made the diagnosis easier [9]. Isolated retroperitoneal hydatid cysts are generally secondary to previous surgical intervention or the involvement of other organs like the liver [10].

The medical treatment of cysts by albendazole is controversial because it is not associated with high success rates [11]. The traditional surgical treatment of liver hydatid cysts has been associated with a high mortality rate, morbidity, and postoperative recurrence (overall 10%) [12]. Percutaneous treatment of liver hydatid has become the first treatment of choice as an alternative to surgery if any treatment is indicated, as it is a safe and effective interventional radiologic procedure [13].

## CONCLUSION

USG is an essential imaging modality for diagnosing hydatid cysts, as it demonstrates the wall characteristics in purely cystic lesions, floating membranes, daughter cysts, and the hydatid sand. Familiarity with the variable ultrasonographic appearances of HD provides essential advantages in making the diagnosis and may help diagnose complex or atypical cases. Early imaging diagnosis of HD significantly improves treatment outcomes, especially in patients living in countries where this disease is endemic, like India.

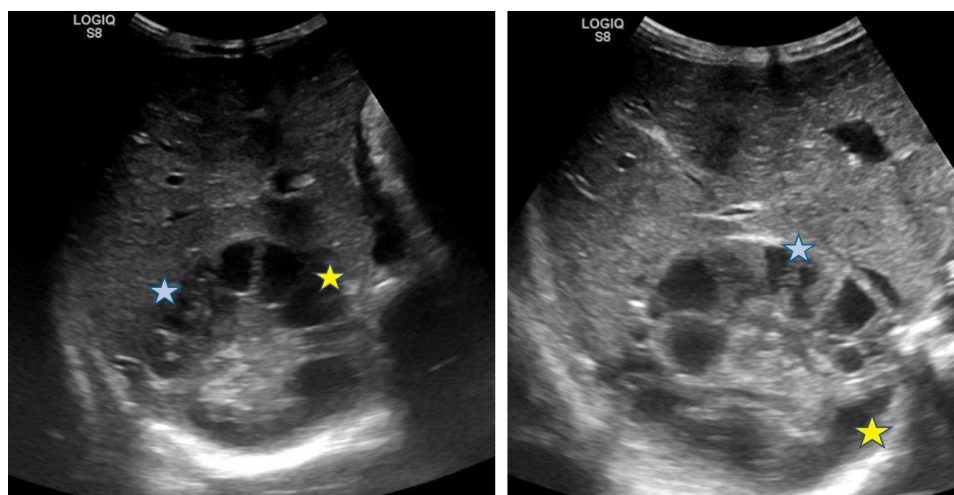
### Table and Legends

**Table-1: (Case details)**

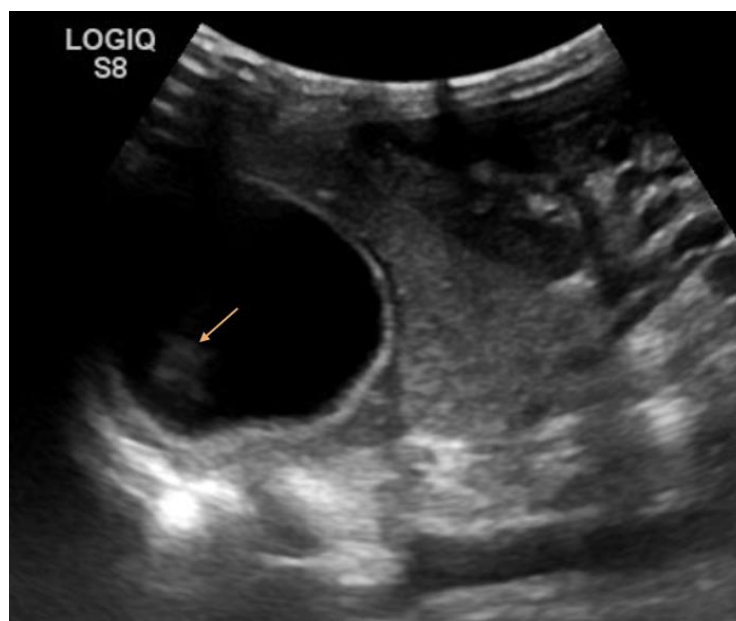
Case no.	Age (years)	Gender	Site of hydatid cyst	Clinical history
1	41	F	Liver	Vague pain in right upper abdominal quadrant
3	35	F	Spleen	Discomfort with fullness and swelling in left upper abdominal quadrant
2	20	F	Right kidney	Mild dysuria
4	32	F	Peritoneum	Diffuse mild pain abdomen

**Table-2: ( Gharbi's Type)**

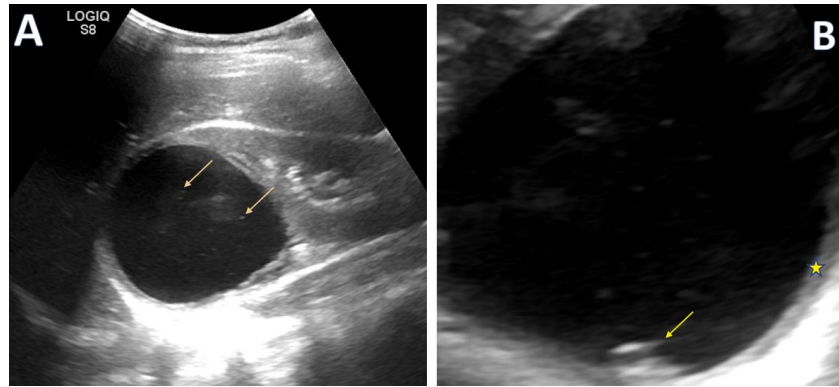
CASE	USG features	Gharbi's Type
1	The well-defined cystic lesion in the right lobe of the liver. The multiloculated appearance is due to multiple daughter cysts. Cysts septations produce wheel-like structures. There are also detached germinal membranes and brood capsules.	III
2	The unilocular cyst has anechoic content with a peripheral daughter cyst at the lower pole of the spleen.	II
3	Unilocular cyst at the upper pole of the right kidney. Hydatid sand is seen as echogenic debris within the cyst, formed by the tiny particles detached from the inner membrane. A peripheral daughter cyst is seen.	II
4	Well-defined, unilocular, purely anechoic cysts in the peritoneum.	I



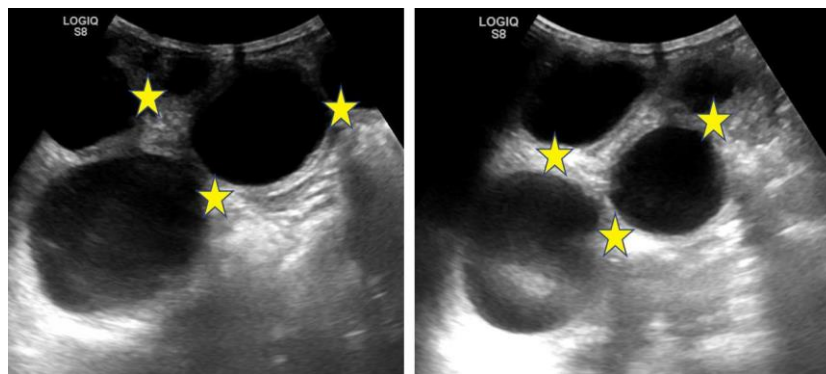
**Fig-1: Longitudinal gray-scale USG of a 41-year-old female. Images show a hypoechoic multiseptated cyst in the right lobe (marked with stars). The multiloculated appearance is due to multiple daughter cysts. Cysts septations produce wheel-like structures. There are also detached germinal membranes and brood capsules (marked with blue stars). This sonographic appearance is typical of a hydatid cyst.**



**Fig-2: Longitudinal gray-scale USG of the spleen of a 35-year-old female with pain in the left upper abdominal quadrant, showing hydatid cyst at the lower pole of the spleen with thick-walled endocyst and peripheral daughter cyst (marked with arrow).**



**Fig-3:** Longitudinal gray-scale USG of a 20-year-old female. Images of the right kidney reveal a well-defined hydatid cyst in the upper pole with hydatid sand (marked with arrows in image A). Axial USG shows thick-walled endocyst (star in B) and peripheral daughter cyst (marked with an arrow in image B)



**Fig-4:** Gray-scale USG of a 32-year-old female with vague abdominal pain shows multiple cystic lesions (marked with stars) in the peritoneum with thick-walled endocysts -characteristic of hydatid cysts.

#### Conflicts of Interest Statement

The authors have no conflicts interest to disclose.

#### REFERENCES

- Pedrosa, I., Saiz, A., Arrazola, J., Ferreiros, J., Pedrosa, C.S. (2000). HD: radiologic and pathologic features and complications. *RadioGraphics*, 20; 795–817.
- Polat, P., Kantarci, M., Alper, F., Suma, S., Koruyucu, M. B., & Okur, A. (2003). Hydatid disease from head to toe. *Radiographics*, 23(2), 475-494.
- Turgut, A. T., Akhan, O., Bhatt, S., & Dogra, V. S. (2008). Sonographic spectrum of hydatid disease. *Ultrasound Quarterly*, 24(1), 17-29.
- Dervisoglu, A., Erzurumlu, K., Taē, K., Arslan, A., Gürsel, M., & Hökelek, M. (2002). Should intraoperative ultrasonography be used routinely in hepatic hydatidosis?. *Hepato-gastroenterology*, 49(47), 1326-1328.
- Ozturk, A., Ozturk, E., Zeyrek, F., & Sirmatel, O. (2005). Late ultrasonographic findings in cases operated for hydatid cyst of the liver. *European journal of radiology*, 56(1), 91-96.
- Dahniya, M.H., Hanna, R.M., Ashebu, S. (2001). The imaging appearance of HD at some unusual sites. *Br J Radiol*, 74; 283–289.
- Hertz, M., Zissin, R., Dresnik, Z., Morag, B., Itzchak, Y., & Jonas, P. (1984). Echinococcus of the urinary tract: radiologic findings. *Urologic radiology*, 6(1), 175-181.
- Karavias, D. D., Vagianos, C. E., Kakkos, S. K., Panagopoulos, C. M., & Androulakis, J. A. (1996). Peritoneal echinococcosis. *World journal of surgery*, 20(3), 337-340.
- Englin, G. (2000). A cunas B, Rozanes I, Acunas G. *HD with unusual localization. Eur Radiol*, 10, 1904-1912.
- Turgut, A. T., Altın, L., Topçu, S., Kılıçoğlu, B., Altınok, T., Kaptanoğlu, E., ... & Koşar, U. (2007). Unusual imaging characteristics of complicated hydatid disease. *European journal of radiology*, 63(1), 84-93.
- Davis, A., Dixon, H., & Pawlowski, Z. (1989). Multicentre clinical trials of benzimidazole-carbamates in human cystic echinococcosis (phase 2). *Bulletin of the World Health Organization*, 67(5), 503.
- Sielaff, T. D., Taylor, B., & Langer, B. (2001). Recurrence of hydatid disease. *World journal of surgery*, 25(1), 83.
- Akhan, O., Ozmen, M. N., Dincer, A., Sayek, I., & Göçmen, A. (1996). Liver hydatid disease: long-term results of percutaneous treatment. *Radiology*, 198(1), 259-264.