February 2005

Clinics in diagnostic imaging (102)

M Azeemuddin
Aga Khan University, muhammad.azeemuddin@aku.edu

T Ul-Haq
Aga Khan University, tanveer.haq@aku.edu

H Ahsan

W A. Memon

Follow this and additional works at: https://ecommons.aku.edu/pakistan_fhs_mc_radiol

Part of the Radiology Commons

Recommended Citation
Available at: https://ecommons.aku.edu/pakistan_fhs_mc_radiol/163
**CASE PRESENTATION**

A 19-year-old man presented with cough and haemoptysis of ten days duration. There was also history of mild pain in right hypochondrium for last two months. Patient was afebrile with no past history of tuberculosis. He was a non-smoker. On clinical examination, decreased air entry was noted on the left side of his chest. The liver was enlarged and palpable below the costal margins. Chest radiographs and ultrasonography (US) of the abdomen were performed, followed by computed tomography (CT) of the chest and abdomen. What do the chest radiograph (Fig. 1) and CT (Fig. 2) show? What is your diagnosis?
The chest radiograph (Fig. 1) showed a rounded soft tissue density opacity in the lower zone of the left lung. A small air lucency was also seen in the superior portion of this opacity (air crescent sign). Axial CT of this lesion (Fig. 2a) showed this mass to be of low density. A small amount of air was again noted within it. There was also slight adjacent pleural reaction. CT images taken through liver (Fig. 2b) showed multiple cystic lesions in the liver. The largest of these was located in the right lobe and had a daughter cyst in its lateral wall. No lymph node enlargement was identified in the abdomen or mediastinum.

**DIAGNOSIS**
Hydatid disease of the lung and liver.

**CLINICAL COURSE**
The patient was treated on Albendazole 400mg twice daily, with resolution of his chest symptoms. The liver lesions were followed-up using US. Because of the large size of the right lobe cyst and the associated pain in right hypochondrium, a PAIR (percutaneous aspiration, instillation and reaspiration) procedure was performed. US done prior to the procedure showed detachment of the cyst walls producing the “floating membrane sign”. The daughter cyst was intact (Fig. 3a). During the PAIR procedure, the daughter cyst was intentionally ruptured into the mother cyst, the contents of the cyst aspirated, and hypertonic saline instilled. This was re-aspirated and finally, a small quantity of absolute alcohol was injected (Fig. 3b).
DISCUSSION

Hydatid is a parasitic disease caused by the larvae of the dog tapeworm, *Echinococcus granulosus* and *E. alveolaris*. This disease is endemic in many parts of the world but is most commonly found in the Middle East, Australia, Iceland, and South America. Humans may become intermediate hosts through contact with a definitive host (usually a domesticated dog) or ingestion of contaminated water or vegetables\(^1\(^2\). In man, the hydatid disease usually affects the liver and lungs, and typically demonstrates characteristic imaging findings.

The right lobe is the most frequently involved portion of the liver. Imaging findings in hepatic hydatid disease depend on the stage of cyst growth i.e. whether the cyst is unilocular, contains daughter vesicles, contains daughter cysts, is partially calcified or is completely calcified (dead)\(^3\). Calcification is seen at radiography in 20%-30% of hydatid cysts, and usually manifests with a peripheral curvilinear or ring-like pattern. Complete calcification of the cysts is suggestive of death of the parasite\(^1\(^2\).

The US appearances of hydatid cysts are typical but may vary according to the stage of evolution of the disease.
the disease. Several classification schemes based on cyst appearances have been proposed\(^{(4,5)}\). They are commonly classified into four types based on their appearance, namely\(^{(6,7)}\):

Type I: Simple cysts with no internal architecture.
Type II: Cysts with daughter cyst(s) and matrix.
Type III: Calcified cyst.
Type IV: Complicated cyst. This includes rupture and super-infection (Fig. 4), and may be seen in both type I and type II cysts.

Type I hydatid cysts appear as well-defined anechoic masses with or without hydatid sand and septa. The hydatid sand produces small echogenic foci if the patient is rolled during the US examination – this is called the snowstorm sign (Fig. 5). Demonstrations of dividing septa (Fig. 6) or daughter cysts (Figs. 7-10) within a fluid-filled liver mass is consider diagnostic of hydatid disease. This gives hydatid cyst a “racemose” or “wheel spoke” appearance.
Partial detachment of the capsule from the surrounding liver parenchyma leads to a pericystic fluid collection. In complete detachment, the capsule floats freely in the cyst giving the “floating membrane” sign⁹ (Figs. 3a-b & 10). This is equivalent to the radiographical “water lily sign” of lung hydatid disease. When a liver hydatid cyst does not contain septa or daughter cysts, demonstrating a capsule can lead to a correct diagnosis. Showing the capsule minimises the difficulty in differentiating an infected hydatid cyst from tumour⁹.

Besides the liver, hydatid disease can involve almost every organ of the body. However, the basic appearances remain almost the same. In a series of 275 patients⁹, the sites of involvement (in decreasing order of frequency) included the liver (74.8%), lungs (48.3%), peritoneum, kidney (Figs. 11-13), brain (Fig. 14), mediastinum, heart, bone, soft tissues, spinal cord, spleen, pleura, adrenal glands, bladder,

Fig. 11 Renal hydatid disease. US images of the left kidney show a complex cystic mass at the upper pole. A daughter cyst is also seen, suggesting the diagnosis of hydatid disease.

Fig. 12 Renal hydatid disease. US images of the left kidney show a multilocular hydatid cyst at the upper pole. Echogenic material is also seen in the renal pelvis, suggesting spread of disease into the pelvicalyceal system.

Fig. 13 Renal hydatid disease. Enhanced axial CT image shows a hypodense mass involving the right kidney. Daughter cysts have a slightly lower density than the mother cyst.
ovary, scrotum, and thyroid gland. Patients may present with disseminated disease (Fig. 15). CT may display the same findings as US, and is best in demonstrating cyst wall calcification, cyst infection and peritoneal seeding. Magnetic resonance imaging shows the characteristic low signal intensity rim of the hydatid cyst on T2-weighted images.

In conclusion, hydatid disease most commonly involves the liver, followed by lung. However, it can arise in any part of the body and should be kept in mind when a cystic lesion is encountered anywhere in the body.
ACKNOWLEDGEMENT
We thank Dr Rashid Ahmed, DABR, Head of Advanced Radiology Clinic, Karachi, Pakistan, for providing some of the images.

ABSTRACT
A 19-year-old man presented with cough and haemoptysis of ten days duration. He also had mild right hypochondrial pain. Chest radiograph and computed tomography (CT) showed a rounded soft tissue density opacity with an air crescent sign. CT showed multiple cystic lesions in the liver with a daughter cyst in its lateral wall. Diagnosis of hydatid disease of lung and liver was made. The contents of the liver cyst were aspirated, hypertonic saline instilled, re-aspirated, and absolute alcohol injected. Hydatid disease is endemic in certain parts of the world. Although the lungs and liver are most frequently affected, the disease can arise in any part of the body and should be kept in differential diagnosis whenever a cystic lesion is encountered. Hydatid cysts typically demonstrate characteristic imaging findings, however, the appearances may become complicated due to cyst rupture or secondary infection. Ultrasonography is the imaging modality of choice particularly in hepatic disease. CT best demonstrates cyst wall calcification and cyst infection.

Keywords: echinococcosis, hepatic hydatodosis, hydatid cyst, hydatid disease, liver disease

REFERENCES
**SINGAPORE MEDICAL COUNCIL CATEGORY 3B CME PROGRAMME**  
**Multiple Choice Questions (Code SMJ 200502B)**

**Question 1.** Regarding the “PAIR” procedure for the management of hydatid cysts:

(a) It is the recommended technique for unilocular, non-calcified lung hydatid cysts.  
(b) It should not be performed if the cysts are super-infected.  
(c) It is contraindicated for the management of peritoneal hydatid disease.  
(d) Absolute alcohol is the only scolicidal agent recommended.

**Question 2.** Regarding hydatid infestation:

(a) It is caused by the larvae of the dog tapeworm *Echinococcus granulosus* and *E.alveolaris*.  
(b) Humans may become definitive host through contact with a domesticated dog.  
(c) Humans can also get infected by ingestion of contaminated water or vegetables.  
(d) The left lobe of liver is most frequently involved.

**Question 3.** Regarding the presence of calcification within hydatid cysts:

(a) Calcification is seen in > 30% cases of hydatid cysts.  
(b) Lung cysts show a similar incidence of calcification as hepatic hydatid cysts.  
(c) Demonstration of peripheral ring calcification implies inactive disease.  
(d) Completely calcified hydatid cysts in liver are easily differentiated from calcified, healed amoebic liver abscess.

**Question 4.** Considering ultrasonography of hepatic hydatid cysts:

(a) It is usually difficult to differentiate type 1 hydatid cysts from simple hepatic cysts.  
(b) The snowstorm sign is produced by detached membranes.  
(c) Hydatid cysts do not show a capsule unless calcified.  
(d) The floating membrane sign is produced when the cyst is completely ruptured.

**Question 5.** The following statements are correct regarding hydatid cysts:

(a) CT is more sensitive than ultrasonography in showing membranes and septae within the cysts.  
(b) MR imaging shows a high signal intensity rim on T2-weighted images.  
(c) The peritoneum is the third most frequent organ involved.  
(d) Hydatid cysts have been reported in parathyroid glands.

**Doctor's particulars:**

Name in full: _______________________________________________________________________________________

MCR number: ______________________________________  Specialty: ______________________________________

Email address: _______________________________________________________________________________________ 

**Submission instructions:**

**A. Using this answer form**

1. Photocopy this answer form.
2. Indicate your responses by marking the “True” or “False” box ✓
3. Fill in your professional particulars.
4. Either post the answer form to the SMJ at 2 College Road, Singapore 169850 OR fax to SMJ at (65) 6224 7827.

**B. Electronic submission**

1. Log on at the SMJ website: URL http://www.sma.org.sg/cme/smj
2. Either download the answer form and submit to smj.cme@sma.org.sg OR download and print out the answer form for this article and follow steps A. 2-4 (above) OR complete and submit the answer form online.

**Deadline for submission:** (February 2005 SMJ 3B CME programme): 12 noon, 25 March 2005

**Results:**

1. Answers will be published in the SMJ April 2005 issue.
2. The MCR numbers of successful candidates will be posted online at http://www.sma.org.sg/cme/smj by 20 April 2005.
3. Passing mark is 60%. No mark will be deducted for incorrect answers.
4. The SMJ editorial office will submit the list of successful candidates to the Singapore Medical Council.