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

Singapore Med J 2005; 46(2) : 93

CME Article

Clinics in diagnostic imaging (102)

M Azeemuddin, T UI-Haq, H Ahsan, W A Memon

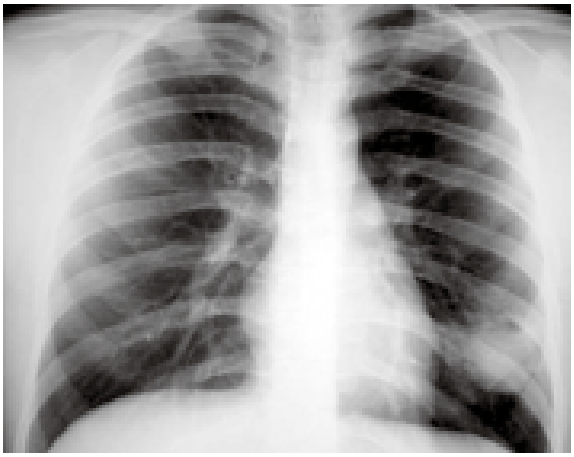


Fig. 1 Chest radiograph (posteroanterior projection).

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?

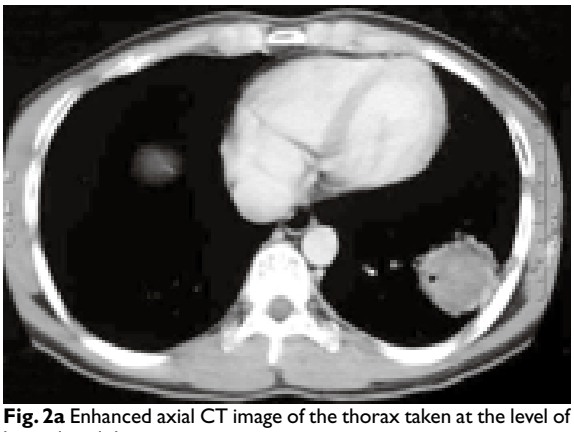


Fig. 2a Enhanced axial CT image of the thorax taken at the level of lower lung lobes.

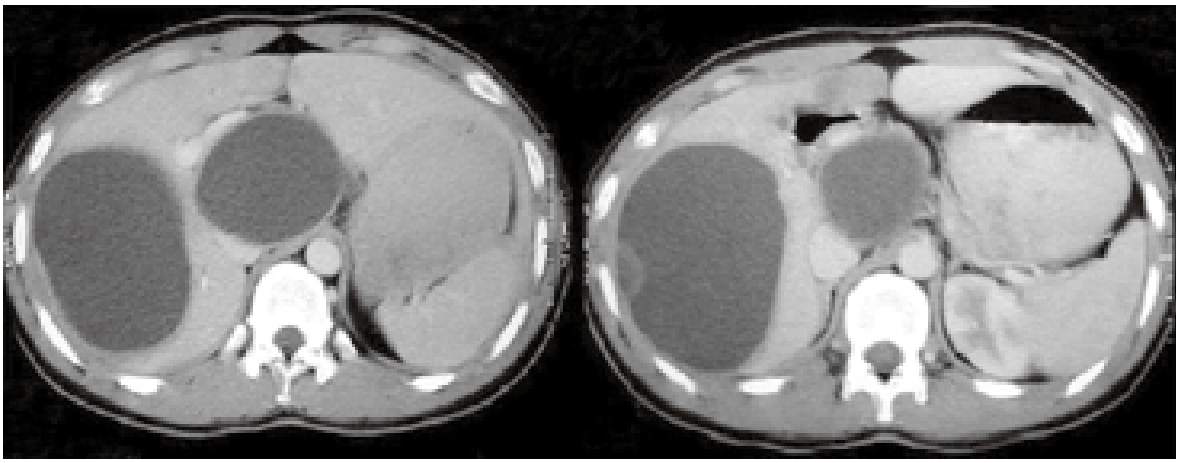


Fig. 2b Enhanced axial CT images of the upper abdomen.

Department of Radiology
Aga Khan University Hospital
PO Box 3500
Karachi 74800
Pakistan

M Azeemuddin, MCPS, FCPS
Assistant Professor

T UI-Haq, MCPS, FCPS, FRCR
Associate Professor

H Ahsan, MCPS, FCPS
Associate Professor

W A Memom, MCPS, FCPS
Senior Instructor

Correspondence to:
Dr Muhammad Azeemuddin
Tel: (92) 21 4859 2020
Fax: (92) 21 493 4294
Email: drazeem2000@yahoo.com

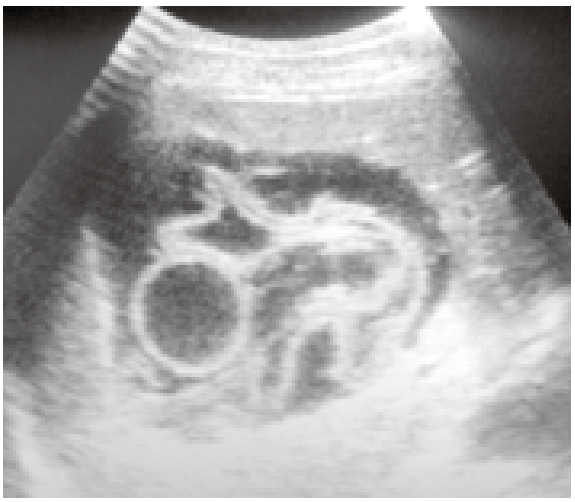


Fig. 3a US image obtained prior to PAIR procedure shows detachment of cyst membranes producing the "floating membrane sign" in the larger hepatic hydatid cyst. The daughter cyst is intact.

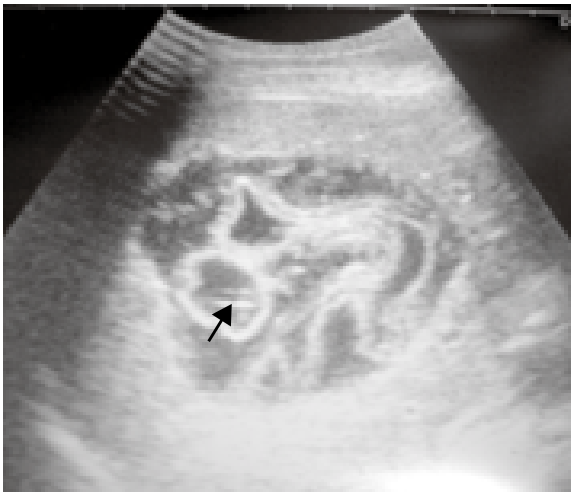


Fig. 3b US image obtained during PAIR procedure. The daughter cyst is punctured by a needle, seen as parallel echogenic lines (arrow). The cyst is now partially collapsed.

IMAGE INTERPRETATION

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).

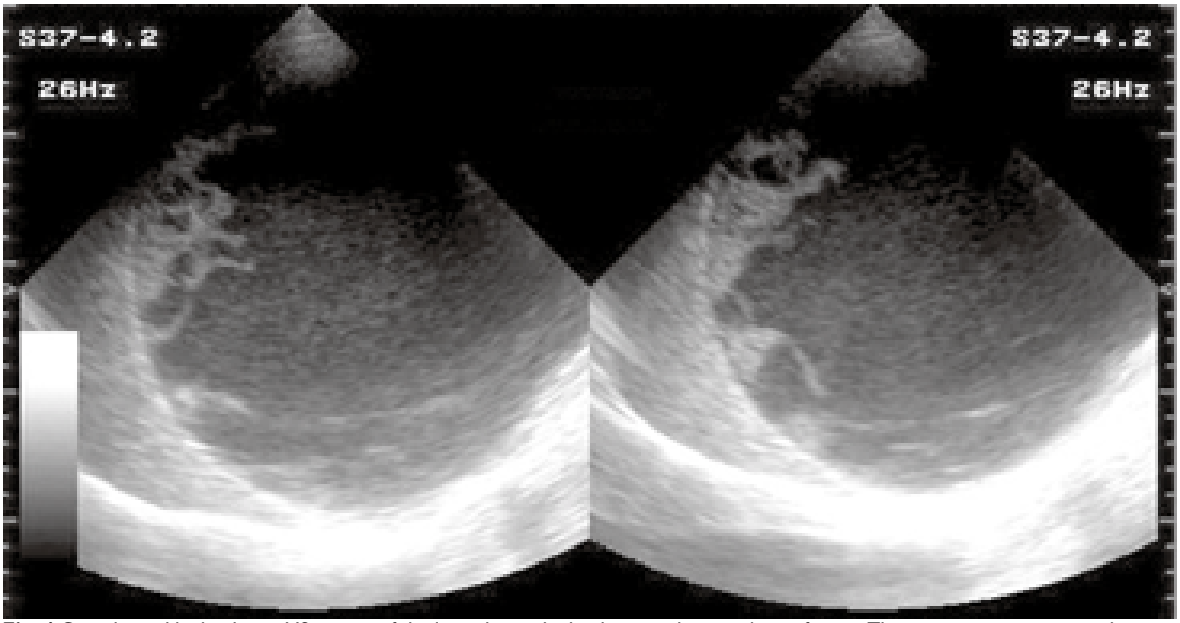


Fig. 4 Complicated hydatid cyst. US images of the liver show a hydatid cyst with secondary infection. The cyst contents appear echogenic rather than hypoechoic.

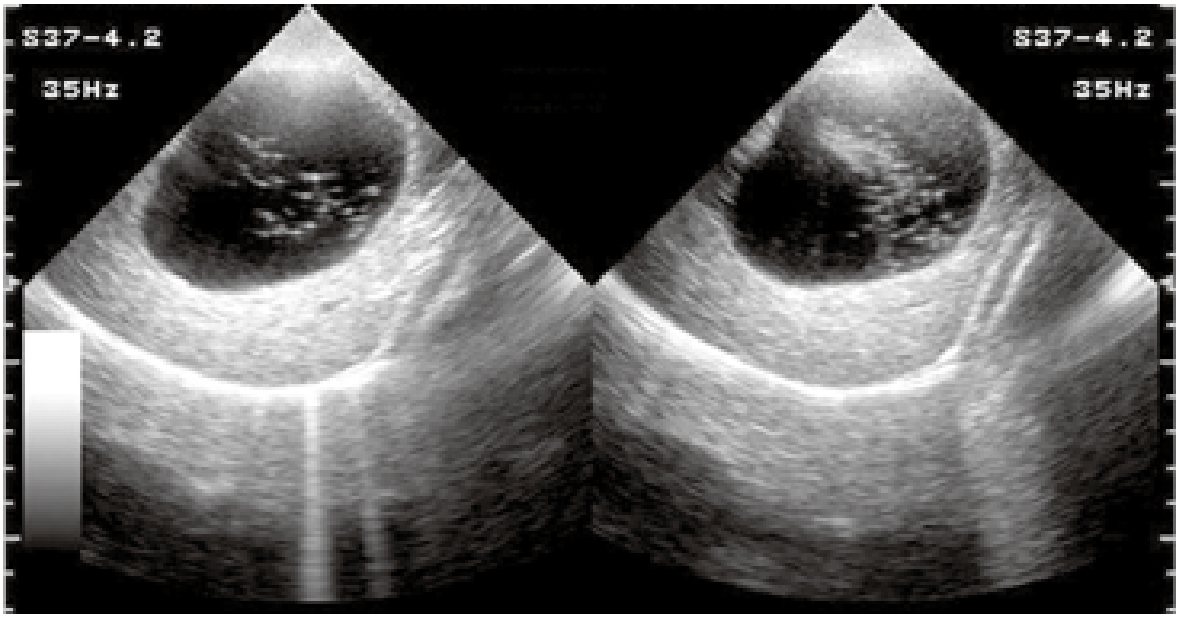


Fig. 5 Snowstorm sign. US images of the liver show hydatid sand producing the snowstorm sign. Mobile echogenic foci are demonstrated when the patient is rolled during the examination.

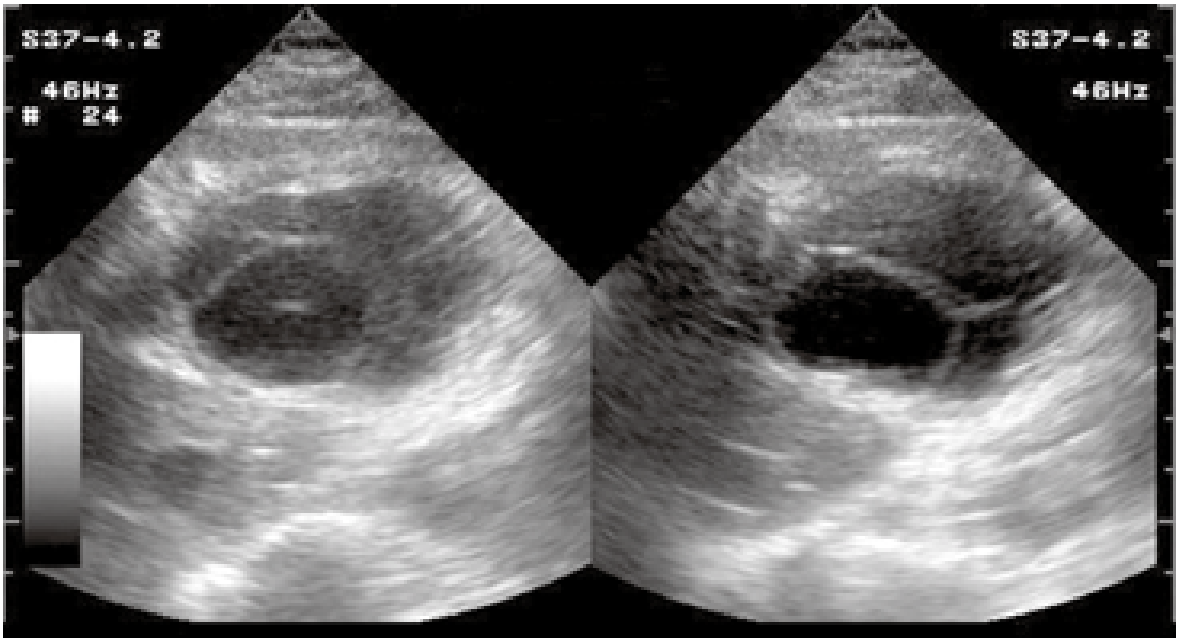


Fig. 6 Septations in hydatid cyst. US images of the liver show septations producing linear echogenic bands within the hydatid cyst.

DISCUSSION

Hydatid is a parasitic disease cause by the larvae of the dog tapeworm, *Echinococcus granulosis* 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

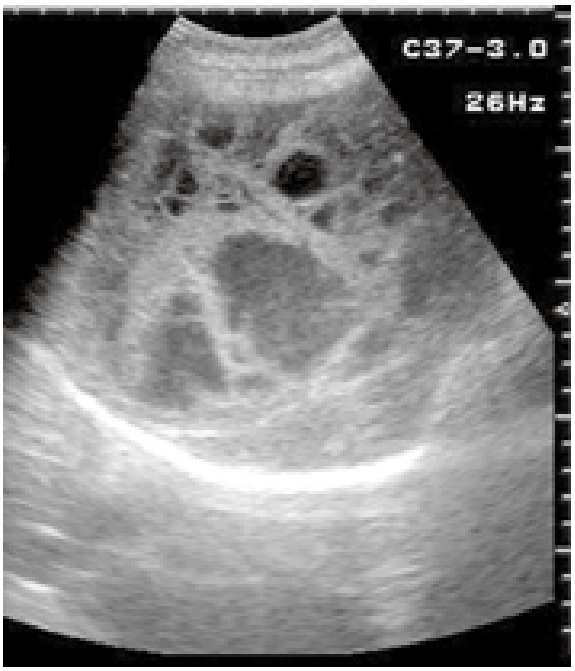


Fig. 7 Complex mass with daughter cysts. US image of the liver shows a hydatid cyst presenting as a complex mass. The presence of multiple septae and daughter cysts are characteristic signs.

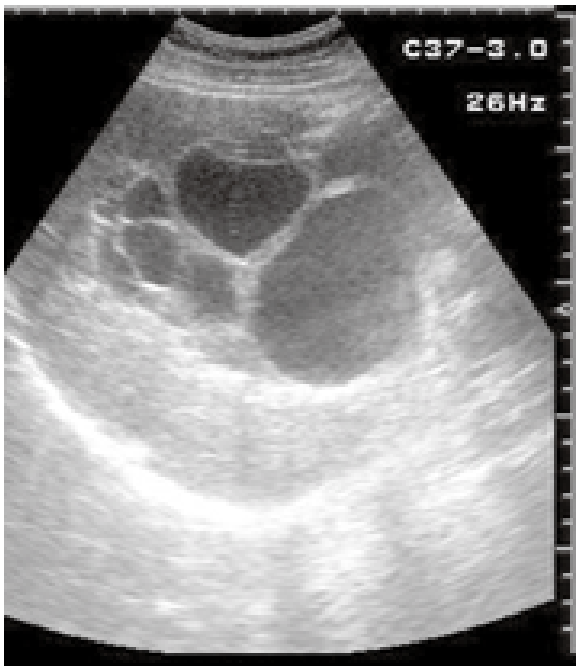


Fig. 8 US image of the liver shows the typical multilocular cystic appearance.

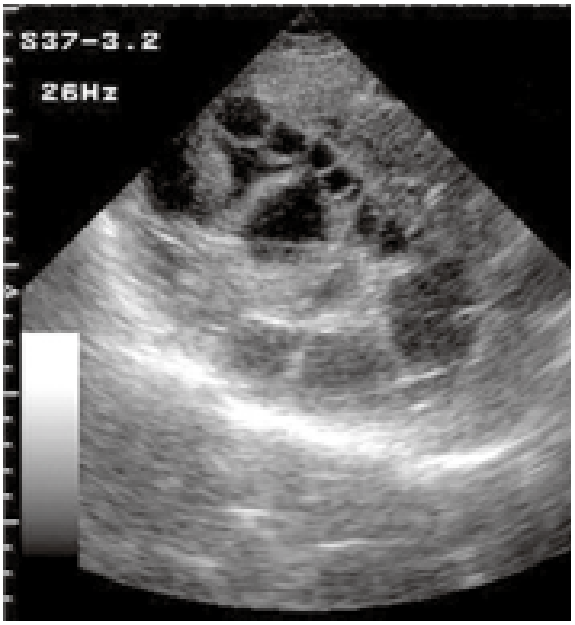


Fig. 9 US image of the liver shows arrangement of daughter cysts at the periphery of the mother cyst.

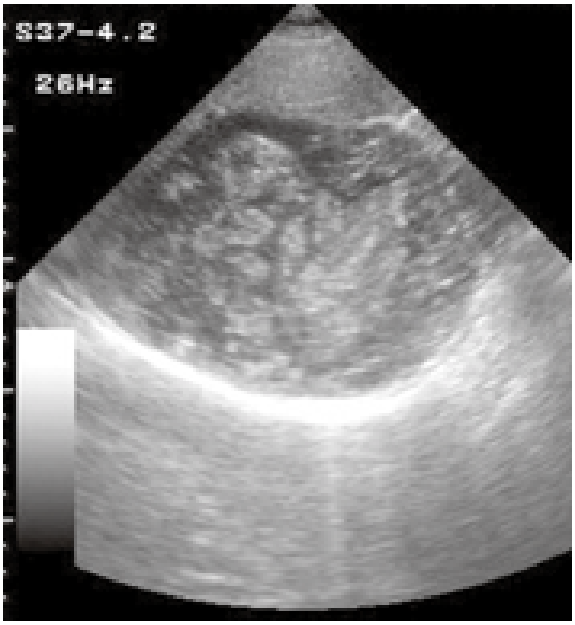


Fig. 10 Partial detachment of cyst walls. US image of the liver shows echogenic material with some hypoechoic curvilinear areas in the hepatic cyst. This is due to partial detachment of the cyst walls.

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.

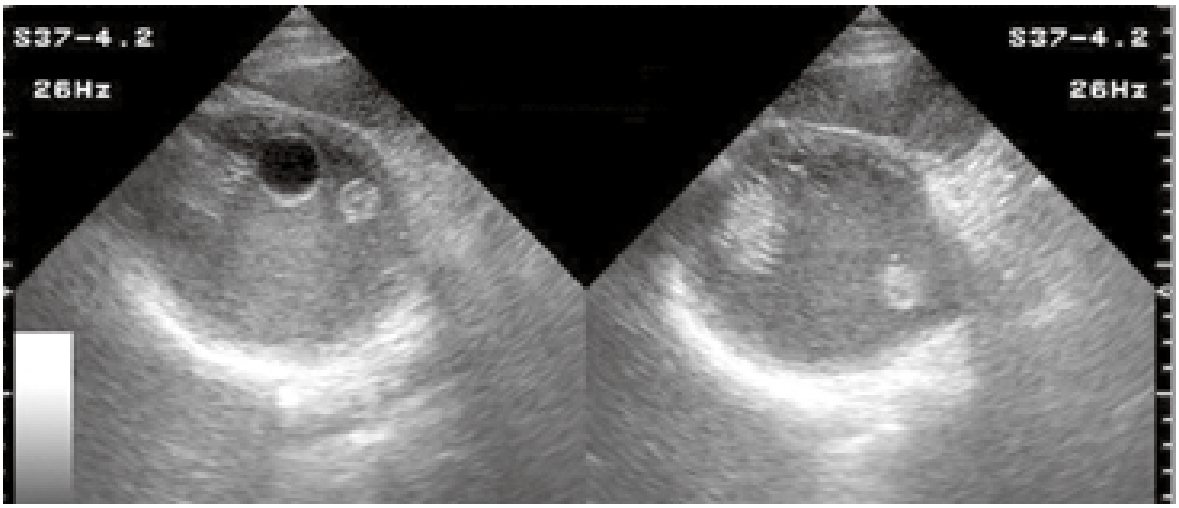


Fig. 11 Renal hydatid disease. US images of the left kidney show a complex cystic mass at the upper pole. A daughter cyst is also seen, suggesting the diagnosis of hydatid disease.

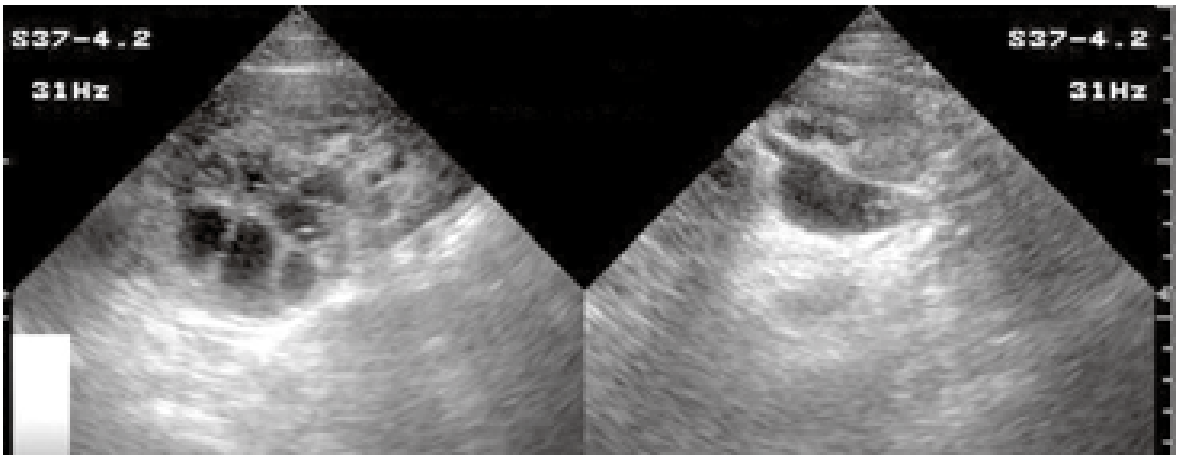


Fig. 12 Renal hydatid disease. US images of the left kidney show a multilocular hydatid cyst at the upper pole. Echogenic material is also seen in the renal pelvis, suggesting spread of disease into the pelvicalyceal system.

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" sign[8] (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 tumour[9].

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 patients[6], 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,

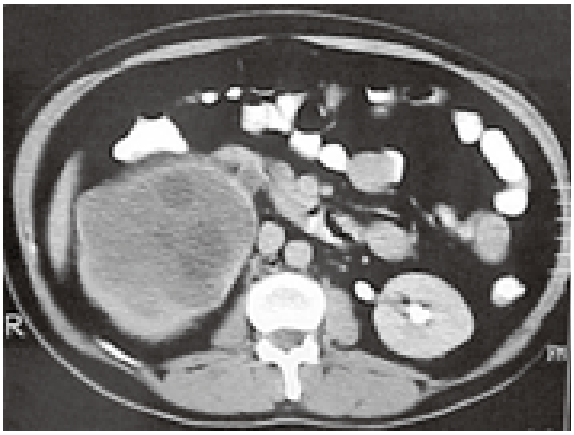
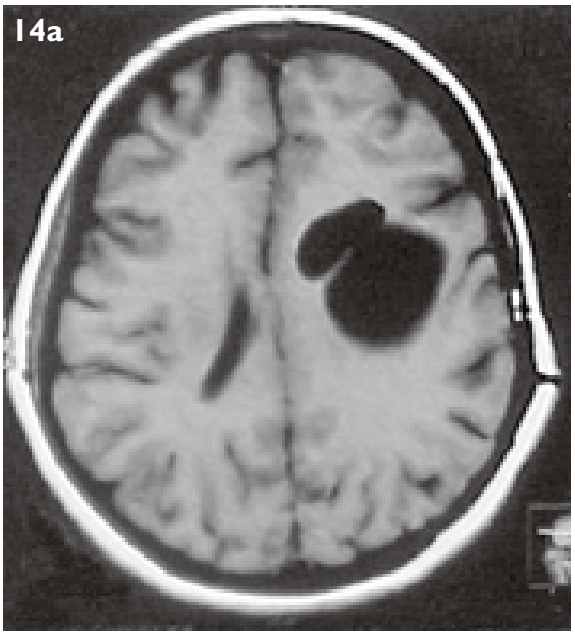


Fig. 13 Renal hydatid disease. Enhanced axial CT image shows a hypodense mass involving the right kidney. Daughter cysts have a slightly lower density than the mother cyst.



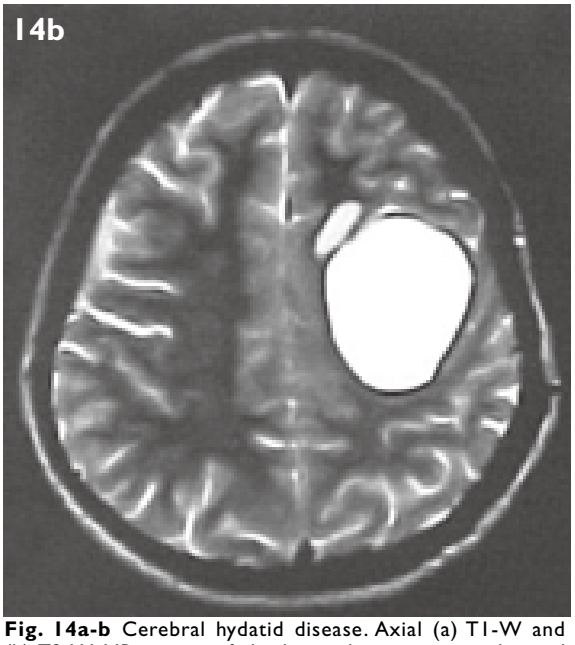
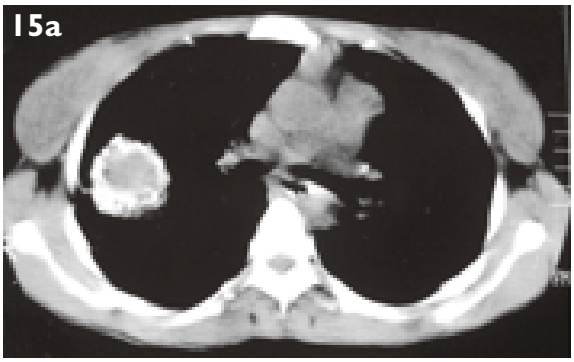
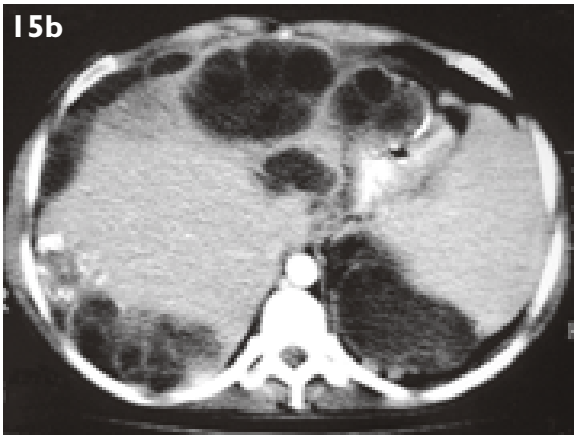


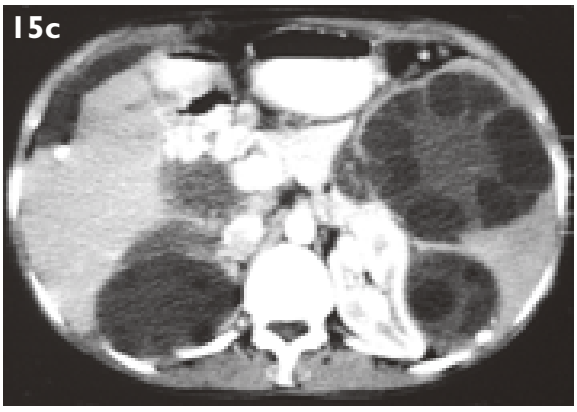
Fig. 14a-b Cerebral hydatid disease. Axial (a) T1-W and (b) T2-W MR images of the brain show two cysts located adjacent to each other in the left parietal region. These show T1-hypointensity and T2-hyperintensity. The T2-W image shows a typical hypointense rim, characteristic of hydatid disease.

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[10].

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.







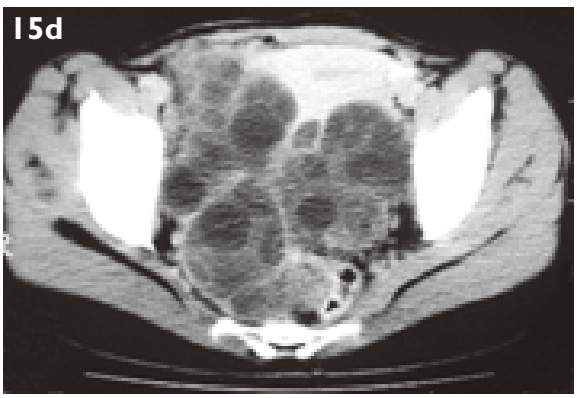


Fig. 15a-d Disseminated hydatid disease. Enhanced axial CT images of the (a) thorax, (b,c) abdomen and (d) pelvis in a patient show involvement of liver, spleen, right kidney, pelvis, both ovaries and pouch of Doughlas. Calcification is seen in some of the hepatic hydatid cysts, especially in the subdiaphragmatic location.

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

Singapore Med J 2005; 46(2):93-100

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SINGAPORE MEDICAL COUNCIL CATEGORY 3B CME PROGRAMME

Multiple Choice Questions (Code SMJ 200502B)

	True	False
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 granulosis* 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.	❑	❑

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Submission instructions:

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