

CLINICAL CASE - TEST YOURSELF Abdominal Imaging

Fat within a cystic liver lesion on cross-sectional imaging - a rare manifestation

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PART A

A 30-year-old male immigrant presented to the emergency department of our hospital with a history of abdominal pain in the right hypochondrium for the past two weeks. Complete blood count and liver function tests were normal. Imaging work up initially included

an abdominal Computed Tomography (CT) scan (Fig.1) and, due to inconclusive CT results, Magnetic Resonance Imaging (MRI) (Fig. 2, 3) was conducted. After the laboratory and radiologic work-up, the patient underwent surgery.



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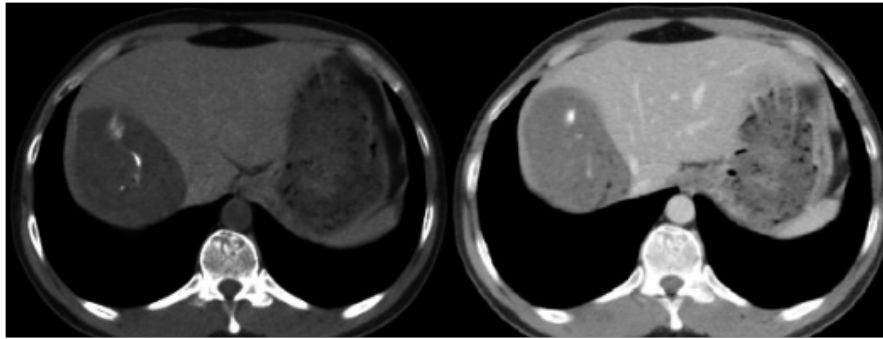


Fig. 1 Axial CT images without contrast (a) and with contrast agent (b).

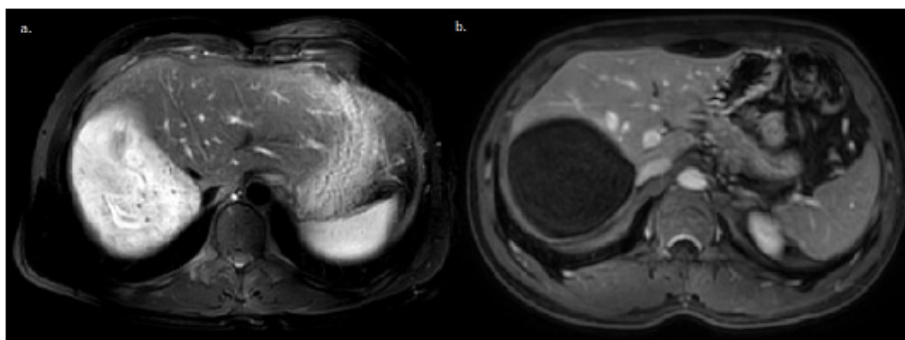


Fig. 2 Axial fat suppressed T2W MR image (a) and axial fat suppressed, contrast enhanced T1W MR image (b).

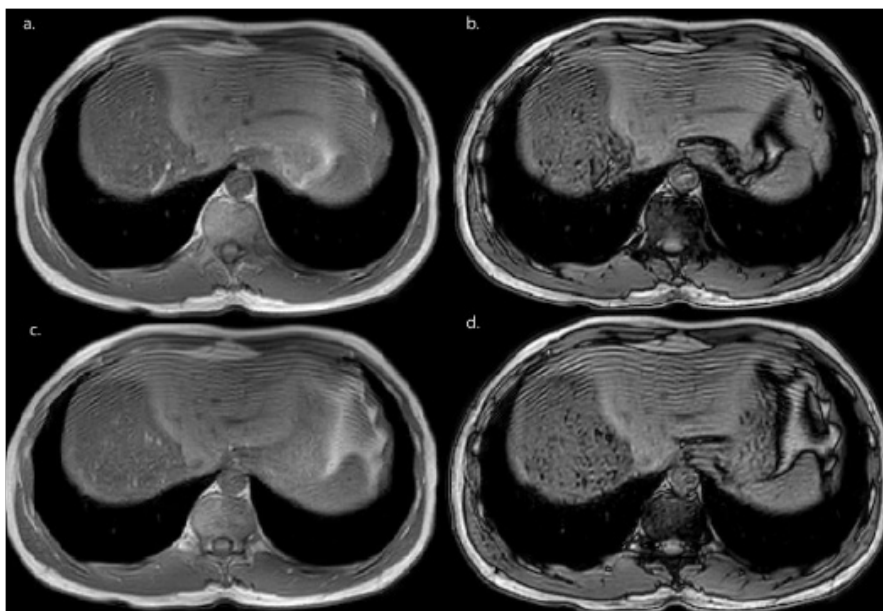


Fig. 3 Axial T1-weighted gradient-echo in-phase MR images (a, c)

PART B

Diagnosis: Hepatic hydatid cyst containing fat

Hydatid disease is a global zoonosis caused by the larva of *Echinococcus tapeworm*. *E. granulosus* is the most frequent type of hydatid disease in humans and the liver is the most commonly affected organ. Humans become infected by ingesting food or water, that is contaminated by dog stool containing parasite's eggs. The hydatid cyst is composed of an outer membrane (pericyst) and an inner membrane (endocyst) that consists of a middle laminated and a germinal layer with outpouching, in which daughter cysts may be formed [1]. The symptoms depend on the location of the hydatid cysts and the compressive effect on the surrounding tissues. Clinical signs such as abdominal pain, nausea and vomiting are commonly seen when hydatid cysts occur in the liver [1].

Ultrasound helps in the detection of the lesion, characterization of the stage as well as in the follow-up of the course of the disease in order to evaluate the efficacy of treatment [1]. CT and MRI may be reserved for cases of equivocal or impaired ultrasound findings due to obesity and location of the lesion, in disseminated and complicated disease and for cases of hydatid cysts located in sites outside the abdominal cavity (lung, central nervous system, bone, etc.) [1]. Communication of the cyst with the biliary tree may be excluded by endoscopic retrograde cholangiopancreatography (ERCP), which is also therapeutic (sphincterotomy, biliary drainage and stenting) [2].

The imaging findings range from purely cystic to a completely solid appearance, depending on the developmental phase of the cyst (growth, maturation, and degeneration) [3]. The active form of the lesion may appear as a simple unilocular cyst with or without a visible wall and or it may or may not contain hydatid sand (snow flake sign on ultrasound). Furthermore, it may be partly or completely filled with daughter cysts. On CT, the mother cyst usually shows higher attenuation than the daughter cysts because of debris and it is accompanied by higher and lower signal intensity on T1- and T2-weighted MRI, respectively. Furthermore, there are multiple rounded hyperintense lesions of cystic appearance, with a hypointense rim corresponding to the daughter cysts. T2-weighted sequences are more sensitive than CT in these

cases [4-6]. Hyperintensity on DW and hypointensity on ADC confirm the diagnosis of hydatid instead of a simple cyst, as in our case [7]. In the transition form of the cyst, detached floating membranes are seen, which are hyperdense on CT and hypointense in all MRI sequences [6]. This type of lesion may or may contain daughter cysts. On CT and MRI, contrast enhancement of the cystic component is not observed [5,6]. The inactive hydatid cyst has heterogeneous content and it is partially or completely calcified [4-6]. Calcifications, which may be better visible on CT, may occur in the cyst wall as well as internally in the matrix, as in our case, with the former being more common. Low signal on T2-weighted image is usually associated with calcification and fibrous septa [3,5,6].

Complications of hepatic hydatid cyst (HHC) are uncommon, including rupture (20-50 % of the complicated cases), secondary infection (5-8%), exophytic growth and portal vein involvement, and with the former being divided into three different types: contained, direct and communicating [2, 8]. Contained rupture occurs when there are floating membranes within the intact pericyst, due to the rupture of the endocyst [2]. Communicating rupture which is the commonest type implies leakage of the cyst contents into the biliary system, through small fissures or bile duct fistulas or through a wide perforation into a main biliary duct [2, 3]. The communication with the biliary system may be directly visible on the imaging studies. In direct rupture, there is free spillage of material into the peritoneal or pleural cavity, abdominal wall, or in hollow viscera, due to rupture of both endocyst and pericyst [2, 3].

Fat-fluid levels or fat globules may also be present within a HHC, which is rarely described in the literature. Various studies show two theories that explain this finding [8-10]. First, it is suggested that the presence of fat is an indirect sign of cysto-biliary communication due to rupture or erosion of the HHC into the biliary system [8-10]. The presence of this complicated cyst directs the treatment of these patients towards the surgical approach. On the other hand, percutaneous aspiration and instillation of scolicedal, may be performed in the cases of uncomplicated HHC [3].

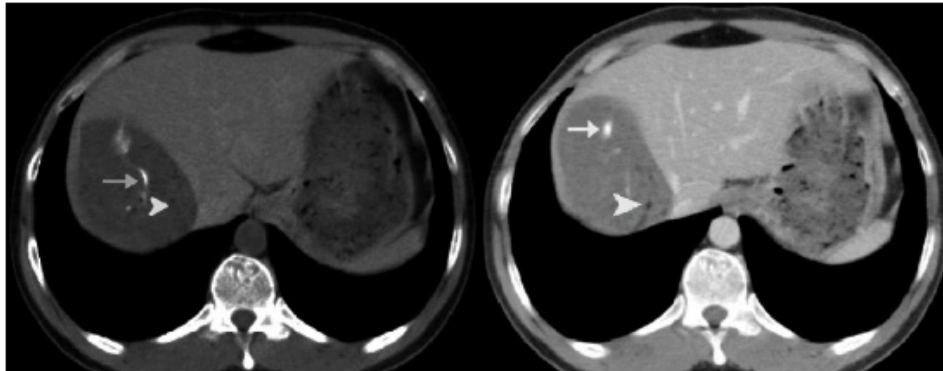


Fig. 1 Axial CT images without contrast (a) and with contrast agent (b), show a well-circumscribed cystic lesion in the right lobe of the liver, measuring approximately 10 X 8 cm, with globules of hypodense fat attenuation foci within (arrowhead) and internal calcifications (arrow). The biliary tree appeared to be regular (no dilatation seen).

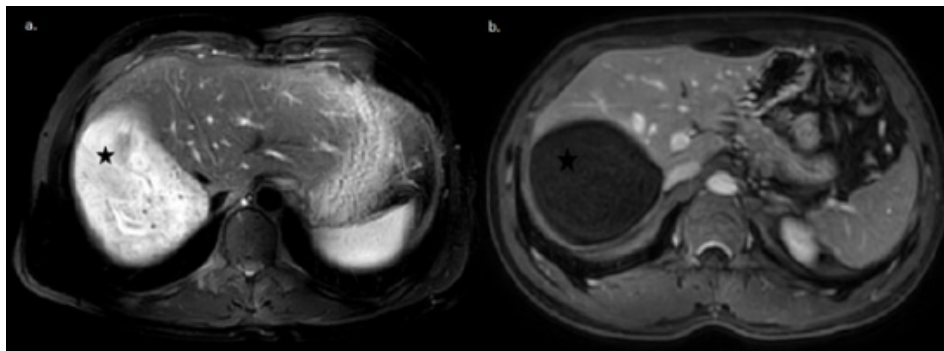


Fig. 2 Axial fat suppressed T2W MR image (a) and axial fat suppressed, contrast enhanced T1W MR image (b) show heterogeneous high intensity signal in T2 sequence (a) of the lesion (asterisk) and after intravenous paramagnetic contrast agent administration, there is not contrast enhancement (b) suggesting cystic lesion (asterisk).

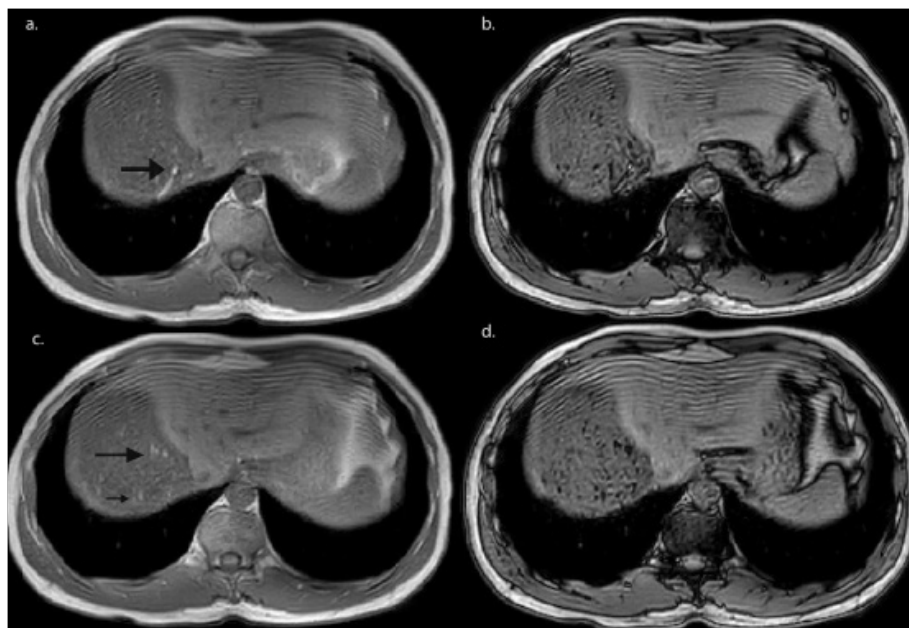


Fig. 3 Axial T1-weighted gradient-echo in-phase MR images (a, c) with motion artifacts, show high signal intensity foci (arrows) within the cyst. Axial gradient-echo opposed-phase images (b, d) with motion artifacts, show microscopic fat within the same lesions, a finding confirmed by chemical shift artifact and signal cancelation surrounding the lipid component (arrows).

The second theory suggests that the presence of fatty material within the cyst is related to maturation and degeneration of its membranes, since biochemical and histopathological evidence suggests that lipids play an essential role in metabolism of the HHC [9]. In our case, communication with the biliary tree was not confirmed, so degeneration was the most likely cause.

The secondary bacterial infection of the HHC, may occur after rupturing of the pericyst and the endocyst. The avascularity of the intact membranes and the lack of connection between the endocyst and the host vascular system, makes the secondary infection a rare complication [2].

Complications may also arise due to exophytic growth of HHC through the bare area of the liver and the gastrohepatic ligament. CT scan may reveal adherence to the diaphragm, thickening and lobulation of cysts as well as rupture into the thoracic cavity or pulmonary parenchyma through fistula [8].

Portal vein involvement is very rare. It is due to chronic compression by the cyst followed by thrombosis and cavernous transformation [8].

Nevertheless, it is essential to consider the differential diagnosis of fat-containing cystic lesions of the liver, such as a mature cystic teratoma, an epidermoid cyst and hepatocellular carcinoma with cystic degeneration. Mature cystic teratoma is a germ cell tumor, predominantly cystic and contains fat, hair, protein-rich debris and calcifications. CT and MRI are reliable imaging modalities for identification and evaluation of the cystic content

[11]. A case of hepatic epidermoid cyst of coelomic origin has been described in the literature. The MRI imaging findings show an evident fluid level in cyst, compatible with biliary content [12]. Spontaneous regression of a hepatocellular carcinoma is the predisposing factor for hemorrhage or necrosis, which is associated with cystic degeneration. The necrotic or hemorrhagic area is usually hyperdense on CT or hypointense on T2-weighted image in contrast to simple cysts [13]. Due to the different therapeutic approach with the intention of reducing complications, it is crucial to include the hepatic hydatid cyst in the differential diagnosis [3].

In our case, cystic teratoma and hepatic hydatid cyst were included in the differential diagnosis on CT, since past medical history was unclear and the presence of a hepatic cystic lesion with calcifications and fat globules resembled the radiologic findings of these pathologies. The patient underwent upper abdominal MRI which made hydatid cyst the most possible diagnosis. Echinococcus antibody test results were positive and available to us post-imaging. The patient underwent laparoscopic deroofing of the hydatid cyst. Albendazole was given prior to surgery and for one month postoperatively.

In conclusion, the presence of fat fluid level or small globules of lipid within a hydatid cyst is a rare imaging finding. Diagnostic imaging is crucial for the clinical and treatment approach. **R**

Conflict of interest

There are no conflicts of interest



KEY WORDS

Hepatic Hydatid Cyst; Fat-containing cystic lesions

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READY-MADE CITATION

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