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Benign Liver Cysts: generalities and radiological characteristics

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Summary

Benign liver cysts are liquid or semi-liquid growths with their own capsule that clearly separates them from the hepatic parenchyma. These cysts can be single or multiple and they can be simple or complex. They are almost always asymptomatic, have no clinical relevance, and are almost always randomly diagnosed by abdominal ultrasound or CT. We will talk about benign liver cysts, simple cysts, parasitic cysts and also polycystic liver disease. Simple hepatic cysts have no clinical significance and, only if these cysts suffer complications or are particularly voluminous, it is appropriate to intervene or follow-up them over time. Instead, parasitic cysts need to be treated both locally and surgically due to frequent complications. Differential diagnosis will be made with more severe or malignant diseases such as cystadenoma, cystadenocarcinoma, hepatic pseudocysts and primary or secondary malignant lesions of the liver containing areas of necrotic colliquation. The most sensitive diagnostic and radiological investigations are Ultrasonography, Computed Tomography (CT), and Magnetic Resonance Imaging (MRI). Of these categories of benign hepatic cysts, the main clinical features and radiological pictures will be provided.

Key Words

Hepatic cysts, Simple liver cysts, Parasitic cysts, Hepatic imaging, Ultrasonography, CT, RMI.

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INTRODUCTION

Cystic hepatic lesions are a group of heterogeneous lesions frequently encountered in daily clinical practice. These lesions have several pathogenesis, clinical and radiological aspects, and include both benign cystic and malignant lesions (Sanfelippo et al., 1974; Borhani et al., 2014; Pitchaimuthu & Duxbury, 2017; Rawla et al., 2019).

Benign liver cysts are liquid or semi-liquid neoformations with their own capsule that clearly separates them from the hepatic parenchyma. These cysts can be single or multiple and can be simple or complex. They are almost always asymptomatic and are almost always diagnosed by chance on abdominal ultrasound or CT (Marrero et al., 2014). Simple liver cysts have no clinical significance and, only in the event that these cysts undergo complications or are particularly bulky, it will be appropriate to intervene or follow-up them over time. Instead, parasitic cysts need to be treated both locally and surgically. Differential diagnosis includes cystadenoma, cystadenocarcinoma, hepatic pseudocysts, and primary or secondary malignant lesions of the liver containing areas of necrotic colliquation.

Other cystic lesions of the liver are the cystic liver metastases (from colon, kidney, prostate, ovary/testis, squamous cell lung cancer, GIST, sarcomas and neuroendocrine tumors), liver abscess, undifferentiated embryonal sarcoma (UES) (highly malignant hepatic neoplasm that is rarely seen in late childhood and early adulthood), biliary hamartomas, Caroli disease (a benign condition that manifests with saccular dilatation of large intrahepatic bile ducts), peribiliary cysts, intrahepatic pseudocysts, biloma (intra- or extra-hepatic bile collection outside the biliary tree with a well-demarcated capsule) and intraductal papillary neoplasms of the bile duct (IPNBs).

Cystic formations can also be found in some congenital pathological conditions such as Polycystic

Liver Disease (PCLD), which will also be treated in this work.

The most sensitive diagnostic and radiological investigations for all these benign and malignant pathologies are Ultrasonography, Computed Tomography (CT), and Magnetic Resonance Imaging (MRI) (Spiegel et al., 1978; Marrero et al., 2014).

Therefore, of the benign liver cysts of which we will speak, the main clinical and radiological characteristics will be here provided.

BENIGN LIVER CYSTS

Simple liver cysts

Simple liver cysts are cavities with thin, smooth walls, lined with cuboidal epithelium, which secrete bile-like fluid. They are congenital biliary lesions caused by the progressive dilatation of biliary microhamartomas that do not communicate with the biliary system. Peak incidence is greater after 50 years, is slightly higher in females (1.5:1 female:male ratio) (Rawla et al., 2019), and the population-wide prevalence of these lesions ranges from 1.6% to 18% (Caremani et al., 1993; Chiche & Adam, 2013; Bakoyiannis et al., 2013; Vachha et al., 2011; Lantiga et al., 2013; Strauss et al., 2015; Mavilia et al., 2018).

The size of these cysts varies from a few millimeters to several centimeters but, generally (90%), the size does not exceed 5 cm. The diagnosis of liver cysts is generally occasional during an ultrasound examination (Ultrasound has 90% sensitivity and specificity for diagnosis of these lesions: Taylor & Richman, 1983) or a CT scan performed for another pathology. In fact, liver function does not appear altered even in patients with large cysts, which are almost always asymptomatic. Pain related to glissian distension and compression on surrounding structures may rarely occur, even with the appearance of cholestatic jaundice. Even more rarely, an abscess or intraperitoneal rupture of the cyst or an intracystic hemorrhage may occur. Treatment is the laparoscopic resection if symptomatic.

Following Marrero et al. (2014), we list the main features of instrumental diagnostics:

Ultrasonography: anechoic, fluid filled, round lesion with Smooth margins and dorsal acoustic enhancement; may contain up to 2 septa, unlike complex cysts, which are typically multiseptate (Figs. 1, 2).

Computed Tomography (CT): well-delimited lesion, water-attenuated, smooth lesion without an internal structure; shows no contrast enhancement (Fig. 3).

Magnetic Resonance Imaging (MRI): well-defined, homogeneous lesion. No enhancement with contrast. T1: hypointense signal intensity T2: hyperintense signal intensity (Fig. 4).

Parasitic cysts

Parasitic liver cysts are almost always echinococcal cysts. These cysts are caused by the infestation of *Echinococcus* larvae, a small cestode that lives, as adult, in the small intestine of the dog (definitive host) and is parasitic, in its larval stage, to numerous intermediate hosts, including humans (Sayek et al., 2004; Smego & Sebanego, 2005; Czermak et al., 2008). Human infestation is characterized by the presence of cysts containing larval forms, located more frequently in the liver and more rarely in the lung, brain and kidney. The most common form is given by *Echinococcus granulosus*, although sometimes the infectious agent is *Echinococcus multilocularis*. The first parasite is responsible for echinococcal cysts, while the second for alveolar echinococcosis (Pakala et al., 2016). Approximately 80% of hydatid cysts are initially single, located in the right lobe and are asymptomatic. Symptoms appear, especially, when the cysts reach diameters greater than 5 cm.

The most common symptoms are abdominal pain, a sense of weight with palpable mass in the right hypochondrium, jaundice due to compression of the biliary tract, a continuous low-grade fever or high fever, sometimes also due to over-infection, dyspeptic disorders, toxic-allergic phenomena (itching, urticarial reaction, low-grade fever, asthma attacks, up to anaphylactic shock) secondary to the passage of some components of the hydatid fluid into the circulation. In the absence of complications, the diagnosis is often random, when performing a liver ultrasound for other reasons. Scintigraphy, ultrasound, CT and MRI with contrast medium have, to diagnose this pathology, a sensitivity of almost 100%. Following Marrero et al. (2014), we list the main features of instrumental diagnostics:

Ultrasonography: Parasitic cysts may appear similar to simple hepatic cysts. Progress to develop thick, calcified walls, hyperechoic/hypoechoic contents. Daughter cysts in periphery.

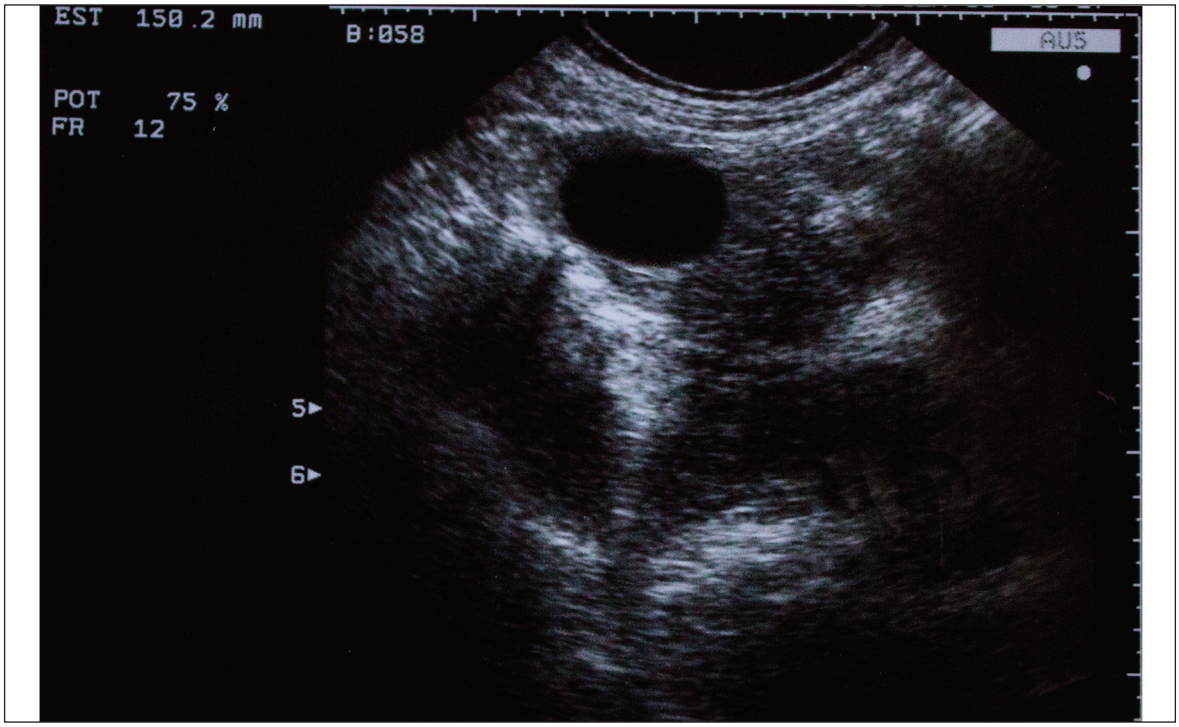

Figure 1. Ultrasonography image: simple liver cysts.

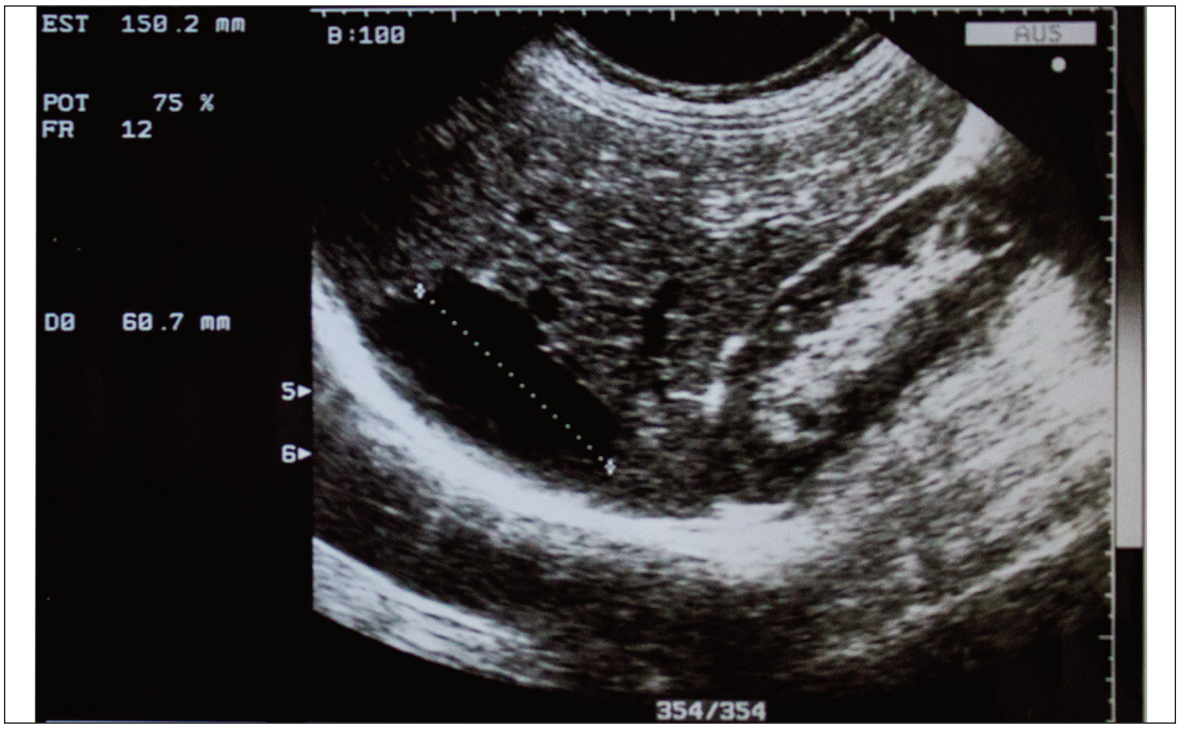

Figure 2. Ultrasonography image: other simple liver cysts.

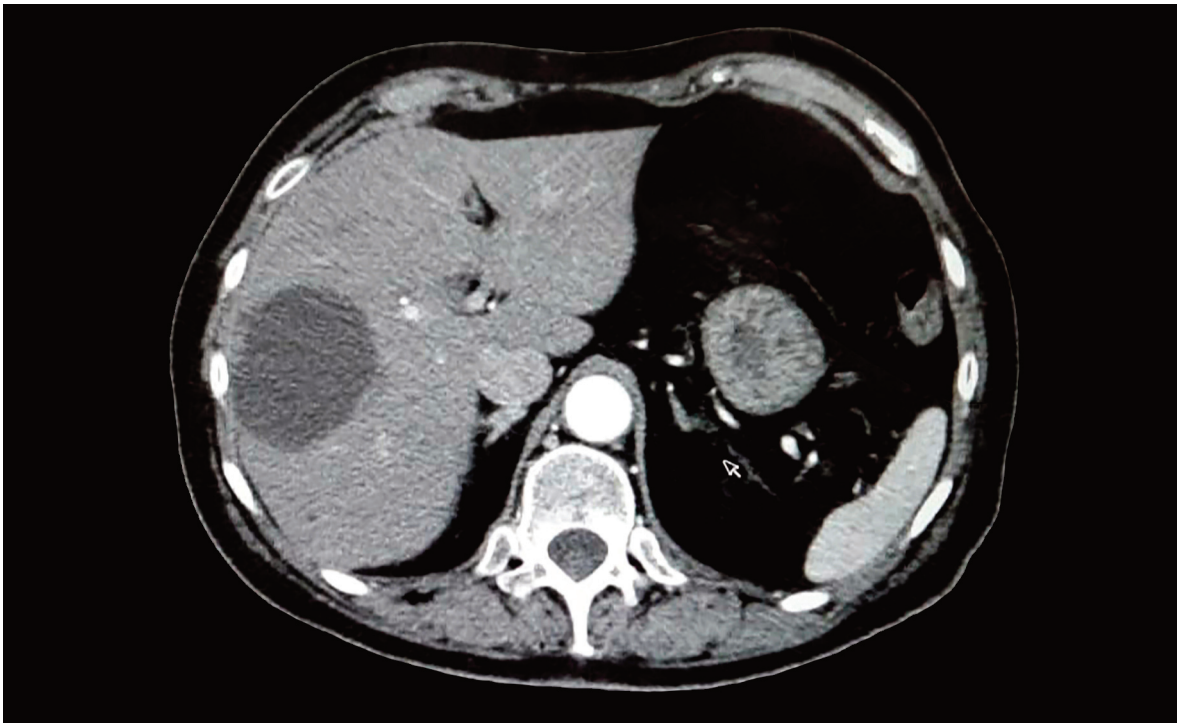

Figure 3. Computed Tomography (CT) image: simple liver cysts.

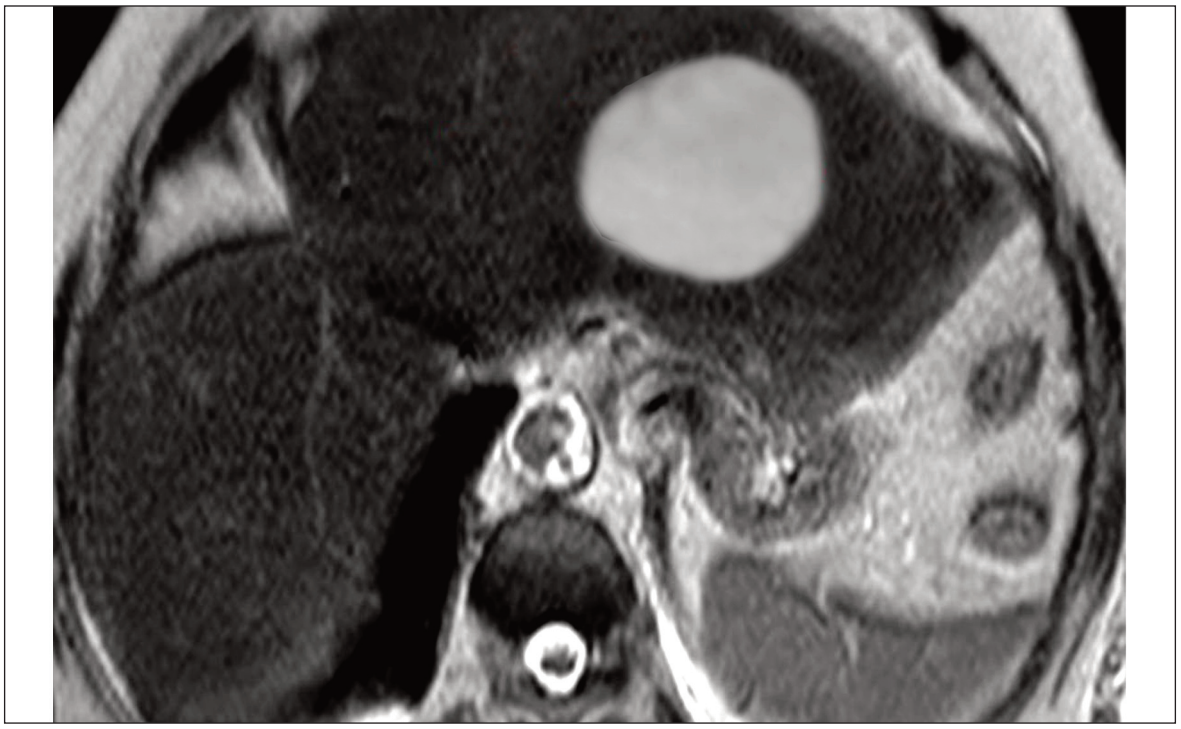

Figure 4. Axial T2-weighted Magnetic Resonance Imaging (MRI) image: simple liver cysts.

Computed Tomography (CT): hypodense lesion with hypervascular pericyst wall, distinct endocyst wall. Calcified walls and septa easily detected. Daughter cysts seen peripherally within mother cyst.

Magnetic Resonance Imaging (MRI): hypointense signal intensity of cyst contents. T2: Hyperintense signal intensity of cyst contents. Hypointense rim on T2. Daughter cysts seen peripherally within mother cyst. Collapse parasitic membranes seen as floating linear structures within cyst.

Polycystic liver disease (PCLD)

PCLD is thought to be a part of a clinical spectrum of ciliopathies including Caroli' s disease that are associated with mutations that impair cholangiocyte ciliary function (Fakhouri & Grunfeld, 2000; Torres & Harris, 2009; Sallee et al., 2009; Qian, 2010; Chandok, 2012; Drenth et al., 2010). PCLD is characterized by the presence of numerous hepatic cysts that are similar to simple hepatic cysts but more numerous (usually > 20) and larger (182). The most common PCLD is autosomal dominant polycystic kidney disease with PCLD, while the rarest is autosomal recessive polycystic kidney disease.

PCLD is asymptomatic until the size and number of cysts increase to a critical level. Patients may also present with complications such as traumatic rupture, infection, bleeding, extrinsic compression of the biliary tree or gastrointestinal tract, compression of the inferior vena cava, and, in severe cases, may develop portal hypertension.

Following Marrero et al. (2014), we list the main features of instrumental diagnostics:

Ultrasonography: multiple hepatic cysts, similar in characteristics to simple hepatic cysts US findings.

Computed Tomography (CT): multiple hepatic cysts, similar in characteristics to simple hepatic cysts CT findings.

Magnetic Resonance Imaging (MRI): multiple hepatic cysts, similar in characteristics to simple hepatic cysts MRI findings.

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