Diagnosis and management of cystic lesions of the liver

AUTHORS: Arie Regev, MD, K Rajender Reddy, MD
SECTION EDITOR: Sanjiv Chopra, MD, MACP
DEPUTY EDITOR: Kristen M Robson, MD, MBA, FACG

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INTRODUCTION

Cystic lesions of the liver represent a heterogeneous group of disorders, which differ in etiology, prevalence, and clinical manifestations (table 1). Most liver cysts represent true cysts that are found incidentally on imaging studies and tend to have a benign course. A minority of liver cysts can cause symptoms and rarely may be associated with serious morbidity and mortality [1-3]. Larger cysts are more likely to be symptomatic and cause complications such as spontaneous hemorrhage [4], rupture into the peritoneal cavity [3,5] or bile duct [6], infection [7], and compression of the biliary tree [2,8]. Some cystic lesions of the liver may have unique complications such as malignant transformation in the case of a mucinous cystic neoplasm (cystadenoma) or a ciliated hepatic foregut cyst, or anaphylactic shock due to a hydatid cyst. Some of these complications may occasionally mandate surgical intervention [9-12].

In some cases, predominantly cystic liver lesions may have solid areas, particularly in the setting of malignancy. Conversely, predominantly solid liver lesions may have cystic components, as may be seen with hemangiomas or tumors that have areas that are necrotic.

Considerable controversy still exists regarding the definition and classification of cystic lesions of the liver (table 1). Furthermore, consensus has not been achieved on the optimal treatment of patients with symptomatic cysts, although a number of therapeutic approaches have been described [13,14]. This topic review will provide an overview of the diagnosis and management of cystic lesions in the liver. Detailed discussions on some of the individual causes of cysts are provided in the corresponding topic reviews:

- (See "Pathology of malignant liver tumors".)
- (See "Echinococcosis: Clinical manifestations and diagnosis".)
- (See "Echinococcosis: Treatment".)
- (See "Biliary cysts".)

SIMPLE CYST

Simple cysts of the liver are cystic formations containing clear fluid that do not communicate with the intrahepatic biliary tree. Although simple cysts are found in approximately 1 percent of autopsy series, very few become large, and even fewer cause symptoms. Their size ranges from a few millimeters to massive lesions occupying large volumes of the upper abdomen; the largest reported cyst contained 17 liters of fluid [15].

Simple cysts tend to occur more commonly in the right lobe and are more prevalent in females. The female-to-male ratio is approximately 1.5:1 among those with asymptomatic simple cysts, while it is 9:1 in those with symptomatic or complicated simple cysts [1]. Large cysts are found almost exclusively in female patients over 50 years of age [16].

Symptomatic patients may present with abdominal discomfort, pain, or nausea. As a general rule, cysts in symptomatic patients are larger than those in asymptomatic ones [14]. Large cysts can produce atrophy of the adjacent hepatic tissue, while some large cysts can cause complete atrophy of a hepatic lobe with compensatory hypertrophy of the other lobe. Complications (such as spontaneous hemorrhage, bacterial infection, torsion of pedunculated cyst, rupture, or biliary obstruction) are more common in large cysts and are rare [2-4,6,7,17].

Diagnosis — The distinction between a simple liver cyst, a mucinous cystic neoplasm (with or without invasive carcinoma), an echinococcal cyst, and other rare primary or metastatic tumors can be difficult. However, the distinction is extremely important since these lesions have different clinical significance.

Imaging studies — Ultrasonography is probably the most helpful initial test, since it can usually differentiate a simple cyst from other cystic lesions. It may also be used for follow-up studies. Simple cysts appear as an anechoic unilocular fluid-filled space with imperceptible walls and with posterior acoustic enhancement [18,19]. Clinical features combined with the sonographic findings are usually sufficient to distinguish simple cysts from other lesions that can appear cystic, such as a liver abscess, necrotic malignant tumor, hemangioma, and hamartoma.

On a computed tomography scan, a simple cyst is defined as a well-demarcated water-attenuation lesion that does not enhance following the administration of intravenous contrast (image 1). Uncomplicated simple cysts are virtually never septated. However, hemorrhage into a simple cyst can lead to confusion in the sonographic differentiation between a simple cyst and a mucinous cystic neoplasm (with or without invasive carcinoma) [4,20]. In one report, hemorrhage was associated with the appearance of septa in 2 of 57 patients (3.5 percent) with large simple cysts (≥4 cm) [21]. Hemorrhage is much less frequent in smaller cysts.

Magnetic resonance imaging demonstrates a well-defined water-attenuation lesion that does not enhance following the administration of intravenous gadolinium. On T1-weighted images the cyst shows a low signal, whereas a very high intensity signal is shown on T2-weighted images (image 1).

Differential diagnosis — The differential diagnosis of a simple cyst includes a variety of hepatic lesions that can have a cystic appearance, such as a mucinous cystic neoplasm (with or without invasive carcinoma), a hepatic abscess, a necrotic malignant tumor, a hemangioma, and a hamartoma (table 2). As mentioned above, the distinction can usually be made based upon the clinical setting (eg, presence of symptoms) and radiographic findings. The presence of symptoms related to the cyst or increasing size should raise concern that the lesion could be a mucinous cystic neoplasm (with or without invasive carcinoma) or another rare cystic neoplasm, since most simple cysts generally remain stable in size [16].

Histology and needle aspiration — Aspiration is usually not required for diagnosing simple cysts that have a typical imaging appearance. When cyst aspiration is performed, the aspirated fluid is always sterile and cytologically negative.

Management

Asymptomatic patients — For asymptomatic patients with simple liver cysts, no intervention or follow-up imaging for cyst surveillance is needed. Limited published data and clinical experience suggest that asymptomatic simple cysts do not have malignant potential (algorithm 1) [16,22]. If the patient develops symptoms that are attributed to the liver cyst, intervention may be indicated. (See 'Symptomatic patients' below.)

Symptomatic patients — Patients with large, symptomatic simple liver cysts may require intervention (algorithm 1). The causal relationship between abdominal pain and a simple cyst must be admitted with caution and accepted only if the cyst is large (eg, ≥4 cm) and other causes of symptoms have been excluded [23]. These include cholelithiasis, gastroesophageal reflux disease, gastric dysmotility, peptic ulcer disease, and other causes of abdominal pain.

Evaluation of the adult patient with abdominal pain is discussed separately. (See "Evaluation of the adult with abdominal pain".)

Several therapeutic approaches have been described for symptomatic, large simple cysts, including needle aspiration with injection of a sclerosing agent [24-27], laparoscopic cyst deroofing [28-33], internal cyst drainage with cystojejunostomy [34], open surgical cyst deroofing [28,35-37], and liver resection [38]. There are no randomized trials comparing interventions. As a result, the choice of intervention is individualized and informed by the liver cyst location and size, patient comorbidities, history of abdominal surgery, local expertise, and patient preferences.

Laparoscopic cyst deroofing has been shown to be safe, achieving a wide deroofing without the need for open surgery [21,28-31,37,39-43]. Several centers have reported cyst recurrence rates ranging from 0 to 14 percent, and morbidity rates of 0 to 15 percent following laparoscopic deroofing of solitary simple cysts [28-33]. In a systematic review of 34 studies including 348 patients who underwent laparoscopic cyst deroofing with a mean follow-up of 38 months, the pooled rates of persistent symptoms and of cyst recurrence were 2 and 6 percent, respectively [33]. Major complications were reported in six patients (2 percent) and included bleeding, infection (eg, liver abscess), bile leak, and incisional hernia. Laparoscopic deroofing may not be an option for patients with a liver cyst in a superior or posterior location. Open surgical deroofing or cyst resection are other surgical options that have been associated with a relatively low incidence of cyst recurrence or complications [21,28,35,36,39,44].

Observational data suggest that percutaneous needle aspiration of the cyst followed by sclerotherapy (PAS, often with ethanol) is a reasonable, less invasive alternative to surgery for symptomatic patients who require intervention [45-49]. In a systematic review of 34 studies including 265 patients with liver cysts who had percutaneous cyst aspiration with sclerotherapy using ethanol in most cases, the pooled rate of persistent symptoms was 3.5 percent during mean follow-up of 26 months [33]. Major complications (peritonitis, liver abscess) were reported in two patients (0.8 percent), and symptomatic cyst recurrence was reported in one patient (0.4 percent). Rates of ethanol toxicity following PAS with ethanol have varied among studies, but rates up to 93 percent have been reported [49-51]. Risk factors for ethanol toxicity included high ethanol volumes (>134 mL) or long duration of sclerotherapy (>120 minutes) [49].

Percutaneous cyst aspiration without sclerotherapy is not typically used for managing symptomatic simple cysts because the fluid usually reaccumulates inside the cyst cavity [40].

NONINVASIVE MUCINOUS CYSTIC NEOPLASM (CYSTADENOMA)

Hepatic mucinous cystic neoplasms (MCNs; previously referred to as cystadenomas) are rare cystic tumors that occur within the liver parenchyma, or less frequently, in the extrahepatic bile ducts. The published experience with these lesions is limited to single case reports and small series [21,52-54]. These reports suggest that MCNs occur in adults and more often in women. The tumors occurred more often in the right lobe than in the left in one report [52], while two other series reported frequent involvement of the left lobe [21,53]. The tumors grew to a large size and required surgical intervention in most reports.

Clinical manifestations — The most common presenting symptoms were a sensation of an upper abdominal mass, abdominal discomfort or pain, and anorexia. These symptoms had been present for several years prior to diagnosis in several patients. However, many patients were asymptomatic, and the lesions were found incidentally on abdominal imaging studies.

Diagnosis — Histologic examination is required for definitive diagnosis, although the lesion may be suspected on imaging studies. The differential diagnosis includes MCN with an associated invasive carcinoma (cystadenocarcinoma), echinococcal cyst, and a simple cyst. Simple cysts can usually be distinguished on imaging studies because of the absence of septations and papillary projections and the presence of serous cystic fluid. Echinococcal cysts are frequently associated with calcifications, septations and thickening of the cyst wall, and patients will have positive serology. (See "Echinococcosis: Clinical manifestations and diagnosis".)

Imaging studies — The appearance of an MCN on ultrasonography can usually differentiate it from a simple cyst (picture 1). On ultrasonography, an MCN typically appears as a hypoechoic lesion with thickened, irregular walls and occasional internal echoes representing debris and wall nodularity. These findings are generally indicative of a complicated cyst, which may represent a simple cyst with previous bleeding, a neoplastic cyst such as an MCN (with or without invasive carcinoma), or rarely, a metastasis. On a computed tomography scan, an MCN appears as a low attenuation mass, which may be uni- or multilocular or may have septations (picture 1). The cyst wall is usually thickened and/or irregular. This is in contrast to a simple cyst, which is typically devoid of septations and has imperceptible walls.

Histopathology — An MCN is usually a multilocular cystic lesion with a smooth external surface and a thin wall with smooth internal lining [52,53]. The cyst frequently contains blood or chocolate-colored material. Histology is essential for the diagnosis and is usually obtained during or after resection of a suspicious cyst. Microscopically, MCNs are lined by biliary-type mucus-secreting cuboidal or columnar epithelium, supported by dense cellular (mesenchymal) fibrous stroma resembling ovarian tissue (picture 1). The lining is surrounded by a loose and less cellular layer of collagen. It has been suggested that MCNs may be composed of two

distinct groups that differ in the presence or absence of a mesenchymal stroma surrounding the epithelial lining of the cyst [53]. (See "Pathology of malignant liver tumors", section on 'Mucinous cystic neoplasms (biliary cystadenoma and cystadenocarcinoma)'.)

Treatment — The preferred treatment for noninvasive MCNs is resection, which should be performed whenever possible, since malignant transformation of the cyst lining has been described in as many as 15 percent of patients [55]. Resection of the cyst can be accomplished by enucleating it from the surrounding liver. Partial excision is invariably associated with recurrence and with worse prognosis compared with complete resection [28,40,44]. Aspiration is also associated with rapid recurrence of fluid and symptoms [21]. A hepatic resection should be considered whenever a cystic lesion is suspected of containing invasive carcinoma, since reliable differentiation between noninvasive MCNs and MCNs with associated invasive carcinoma is not always possible [56].

MUCINOUS CYSTIC NEOPLASM WITH ASSOCIATED INVASIVE CARCINOMA (CYSTADENOCARCINOMA)

Mucinous cystic neoplasms (MCNs) with associated invasive carcinoma (previously referred to as cystadenocarcinomas) are usually found in older adults, although they have been reported in patients in their thirties [52]. While the tumors can invade adjacent tissues and metastasize, their prognosis has generally been better than that associated with cholangiocarcinoma [52]. (See "Treatment of localized cholangiocarcinoma: Adjuvant and neoadjuvant therapy and prognosis".)

Diagnosis — Determining whether a MCN has developed invasive carcinoma can be difficult based upon clinical, radiologic, and histological evidence (picture 2) [56-58]. MCNs with associated invasive carcinoma are usually multilocular. Malignant changes are typically found in the inner epithelial lining (picture 2). (See "Pathology of malignant liver tumors", section on 'Mucinous cystic neoplasms (biliary cystadenoma and cystadenocarcinoma)'.)

Macroscopically, noninvasive MCNs have a smooth external surface. However, internally, they have varying degrees of thickness in the wall. Infrequently, they may have a thin wall with a smooth lining. MCNs with associated invasive carcinoma generally have a thick wall that may show large tissue masses protruding from the internal cyst lining [52,53]. MCNs with associated invasive carcinoma have occasionally been identified preoperatively by aspiration and examination of the contents of the cyst, but this procedure carries a risk of bleeding and peritoneal seeding of the tumor [59]. Needle biopsy is not typically performed due to its low diagnostic accuracy and risk of tumor seeding [58]. As noted above, elevated levels of

carcinoembryonic antigen have been reported in cystic fluid aspirated from MCNs with associated invasive carcinoma, but the diagnostic accuracy of this finding is not clear [60]. Thus, when imaging findings are nondiagnostic but invasive carcinoma is suspected, surgical resection is required to confirm the diagnosis [58]. (See 'Treatment' below.)

Treatment — In contrast to noninvasive MCNs, if invasive carcinoma is suspected, treatment should consist of a formal liver resection [56,61]. Enucleation is not performed, since it may be associated with an increased risk of recurrence [56]. The lesion is potentially curable by complete excision. The effect of nonsurgical therapy (eg, radiation or chemotherapy) is unknown.

ECHINOCOCCAL CYST

Echinococcal (hydatid) cysts of the liver are caused by the larval form of *Echinococcus granulosus*, which is usually acquired from infected dogs. These are fluid-filled structures limited by a parasite-derived membrane that contains germinal epithelium (figure 1). Hydatid cysts of the liver are uncommonly encountered in the United States. (See "Echinococcosis: Clinical manifestations and diagnosis".)

Patients are often asymptomatic. When symptoms do occur, they are usually due to the mass effect of an enlarging cyst or complications such as intraperitoneal leakage, infection, or biliary obstruction. *E. granulosus* cysts can rupture into the biliary tree and produce biliary colic, obstructive jaundice, cholangitis, or pancreatitis . Pressure or mass effects on the bile ducts, portal and hepatic veins, or on the inferior vena cava can result in cholestasis, portal hypertension, venous obstruction, or the Budd-Chiari syndrome (see "Etiology of the Budd-Chiari syndrome"). Hydatid cysts can also rupture into the peritoneum, causing peritonitis, or transdiaphragmatically into the bronchial tree, causing pulmonary hydatidosis or a bronchial fistula. Secondary bacterial infection of the cysts can result in liver abscesses. (See "Pyogenic liver abscess".)

Detailed discussion on the clinical manifestations, diagnosis, and treatment of echinococcus are presented separately. (See "Echinococcosis: Clinical manifestations and diagnosis" and "Echinococcosis: Treatment".)

OTHER CYSTIC LESIONS OF THE LIVER

Ciliated hepatic foregut cyst — A ciliated foregut cyst is a rare, benign solitary cyst consisting of ciliated pseudostratified columnar epithelium, subepithelial connective tissue, a smooth

muscle layer, and an outer fibrous capsule. Unlike simple solitary cysts, they occur more frequently in men and are found most commonly in the left lobe [62]. There are over 100 reported cases of ciliated foregut cyst, ranging in size from 0.4 to 9.0 cm, and most of these were detected on imaging or intraoperatively [9,12]. There are rare reports of malignant transformation into squamous cell carcinoma [10,11]. The clinical importance of its diagnosis lies in the distinction from other potentially malignant hepatic lesions.

Primary squamous cell carcinoma — There are several reports of primary squamous cell carcinoma arising in hepatic cysts lined predominantly by stratified squamous epithelium. These lesions appear to have a poor prognosis, although the information in the literature is sparse [63-65].

Liver metastases — Rarely, certain liver metastases may have features of cystic-appearing lesions, usually due to the occurrence of central necrosis. These include metastases from ovarian carcinoma, pancreas, colon, kidney, and neuroendocrine tumors. These metastatic lesions can be distinguished from other cystic lesions on MR imaging.

Polycystic liver disease — Polycystic liver disease most often occurs in patients with polycystic kidney disease. The incidence of hepatic cysts in polycystic kidney disease increases with age from approximately 10 percent below the age of 30 to greater than 50 percent over the age of 60. The cysts, which appear to be derived from biliary epithelium, are more commonly observed in patients with advanced renal disease. (See "Autosomal dominant polycystic kidney disease (ADPKD): Extrarenal manifestations", section on 'Hepatic cysts'.)

A less common disorder, autosomal dominant polycystic liver disease (PCLD), is distinct from polycystic kidney disease, since it is not associated with kidney involvement or cerebral aneurysms. Two mutations have been found to cause most cases of this disorder: a mutation in the *PRKCSH* gene that encodes a protein called hepatocystin [66], and a mutation in the *SEC63* gene that encodes for a component of the protein translocation machinery in the endoplasmic reticulum [67]. Additionally, in a study of 102 patients with PCLD who did not have common gene mutations, heterozygous loss-of-function mutations in three genes (*ALG8*, *GANAB*, and *SEC61B*) were identified. All three genes demonstrated distinct effects on polycystin-1 biogenesis [68].

Biliary cysts — Biliary cysts are cystic dilatations that may occur singly or in multiples throughout the bile ducts. They were originally termed choledochal cysts (involving the extrahepatic bile duct), but the clinical classification was revised in 1977 to include intrahepatic cysts. Infants with biliary cysts commonly present with conjugated hyperbilirubinemia (80 percent), failure to thrive, or an abdominal mass (30 to 60 percent). The triad of pain, jaundice,

and abdominal mass is found in 11 to 63 percent. In contrast, chronic and intermittent abdominal pain appears to be the most common presenting symptom (50 to 96 percent) in patients older than two. (See "Biliary cysts".)

Extrahepatic cysts presenting as hepatic cystic lesions — In rare cases, extrahepatic cysts, which are adjacent to the liver (eg, adrenal, renal or mesenteric cystic lesions) may closely mimic hepatic cysts and may be difficult to differentiate from the latter without a surgical intervention [69].

SOCIETY GUIDELINE LINKS

Links to society and government-sponsored guidelines from selected countries and regions around the world are provided separately. (See "Society guideline links: Hepatic and biliary cysts".)

SUMMARY AND RECOMMENDATIONS

- **Simple liver cysts** – Cystic lesions of the liver may pose a diagnostic and therapeutic dilemma. Simple cysts are the most common lesions encountered:

  - **Diagnosis** – Clinical features combined with typical ultrasound findings are usually sufficient to distinguish simple cysts from other cystic lesions but further characterization with magnetic resonance imaging (MRI) can confirm the diagnosis if ultrasound is equivocal (table 1). Needle aspiration is usually not required for diagnosis. On the other hand, certain clinical and radiologic features should raise suspicion for an alternative diagnosis such as mucinous cystic neoplasm (with or without invasive carcinoma) or hydatid cyst (table 2). (See 'Simple cyst' above.)

  - **Management** – Most patients with simple liver cysts are asymptomatic and require no treatment or follow up because simple liver cysts lack malignant potential (algorithm 1). (See 'Asymptomatic patients' above.)

    For patients with symptomatic, large simple cysts, the choice of intervention is individualized and informed by cyst location and size, patient history and comorbidities, local expertise, and patient preferences. For patients who are candidates for surgery, cyst deroofing with a laparoscopic or open surgical approach is usually curative. For patients who cannot or do not wish to have surgical intervention, percutaneous aspiration with sclerotherapy is a reasonable alternative.

During surgical deroofing for symptomatic liver cysts, close inspection of the interior for neoplastic components is extremely important. Any suspicion regarding underlying malignancy (eg, solid or thickened cyst wall, nodules, etc.) mandates a biopsy for frozen section histopathology. (See 'Symptomatic patients' above.)

- **Mucinous cystic neoplasms** – Enucleation may be sufficient for noninvasive mucinous cystic neoplasms, whereas formal hepatic resection is indicated for mucinous cystic neoplasms with associated invasive carcinoma. (See 'Noninvasive mucinous cystic neoplasm (cystadenoma)' above and 'Mucinous cystic neoplasm with associated invasive carcinoma (cystadenocarcinoma)' above.)

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Topic 3588 Version 25.0

GRAPHICS

Classification of hepatic cysts

Simple (solitary) cyst*
Polycystic disease*
Parasitic
Hydatid (echinococcal)¶
Neoplastic
Primary
Cystadenoma¶, cystadenocarcinomaΔ, squamous cell carcinomaΔ
Secondary
Carcinoma of ovaryΔ, pancreasΔ, colonΔ, kidneyΔ, neuroendocrineΔ
Duct related
Caroli's disease¶
Bile duct duplication¶
False cysts
Traumatic intrahepatic hemorrhageΔ
Intrahepatic infarctionΔ
Intrahepatic bilomaΔ
Ciliated foregut cystΔ

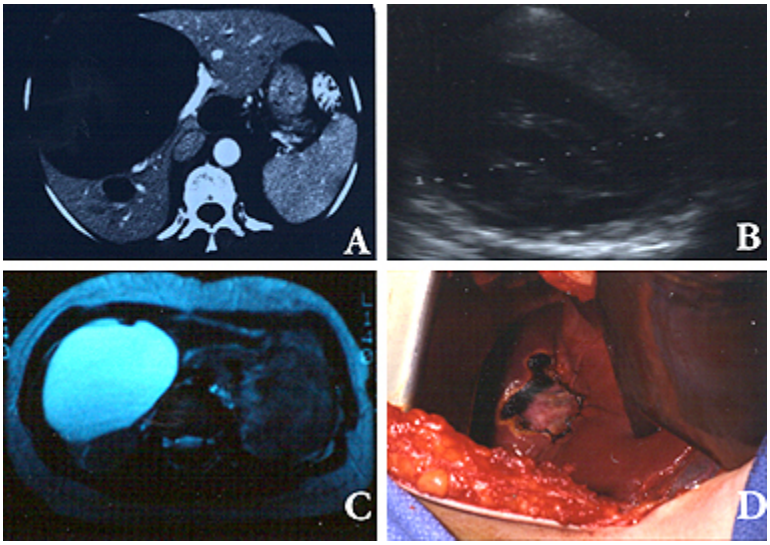
* Common.

¶ Uncommon.

Δ Rare.

Graphic 58989 Version 2.0

Images of hepatic cysts



(A) Abdominal CT scan shows a well-defined, low-attenuation lesion in the left hepatic lobe.

(B) Abdominal ultrasound demonstrates an unilocular space with internal echoes consistent with bleeding into the cyst cavity.

(C) T2-weighted magnetic resonance imaging, demonstrating a typical high-intensity signal.

(D) Surgical view showing wide unroofing of the cyst.

CT: computed tomography.

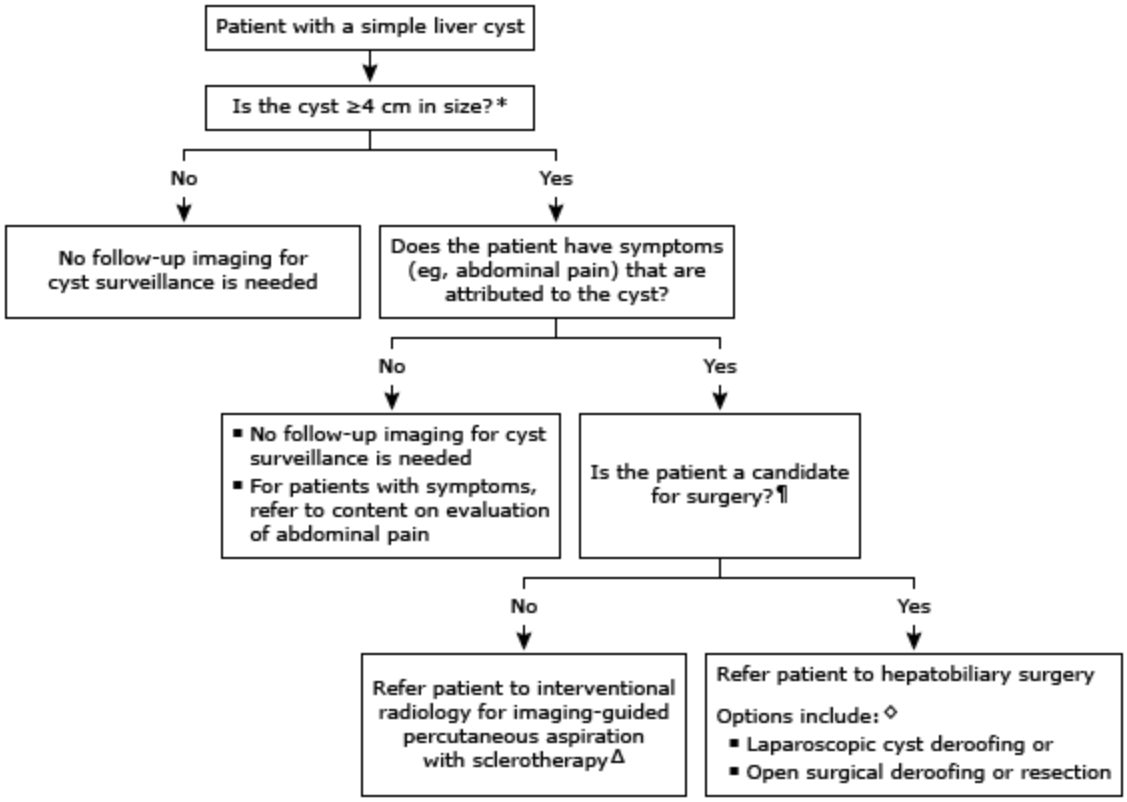
Graphic 68739 Version 5.0

Clinical manifestations and imaging findings suggesting a hepatic cystic lesion is more than a simple cyst

Manifestation/imaging finding	Differential diagnosis
Progressive symptoms	Cystadenoma, cystadenocarcinoma, metastasis
Abnormal hepatic biochemical tests	Cystadenocarcinoma, metastasis
Rapid growth on periodic follow-up	Cystadenoma, cystadenocarcinoma, metastasis
Calcifications or daughter cysts	Echinococcal cyst
Thick or irregular cyst wall	Cystadenoma, cystadenocarcinoma, metastasis, echinococcal cyst
Nonhomogeneous cyst content	Cystadenoma, cystadenocarcinoma, echinococcal cyst, bleeding into a simple cyst
Sepations or multilocular cyst space	Cystadenoma, cystadenocarcinoma, echinococcal cyst, bleeding into a simple cyst

Graphic 72463 Version 2.0

An approach to managing the adult patient with a simple liver cyst



Refer to UpToDate content on the management of liver cysts for additional details.

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* Small liver cysts (<4 cm in size) have not been associated with the development of symptoms.

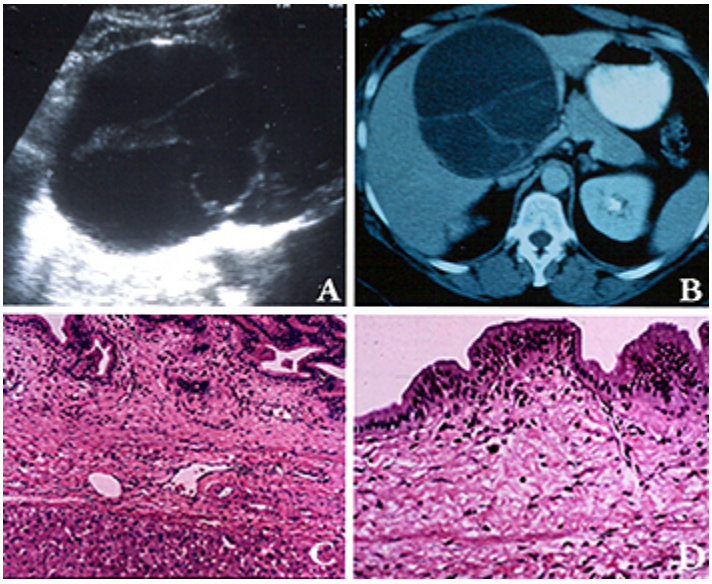
¶ For symptomatic patients, the choice of intervention is individualized and informed by the liver cyst location and size, patient comorbidities, prior abdominal surgery, local expertise, and patient preferences. Data from randomized trials comparing interventions are lacking.

Δ Percutaneous aspiration with sclerotherapy is a minimally invasive procedure in which ultrasound-guided drainage is followed by injection of a sclerosing agent, often ethanol.

◇ The choice of surgical procedure is informed by several factors including cyst location, prior abdominal surgery, and local expertise.

Graphic 134606 Version 1.0

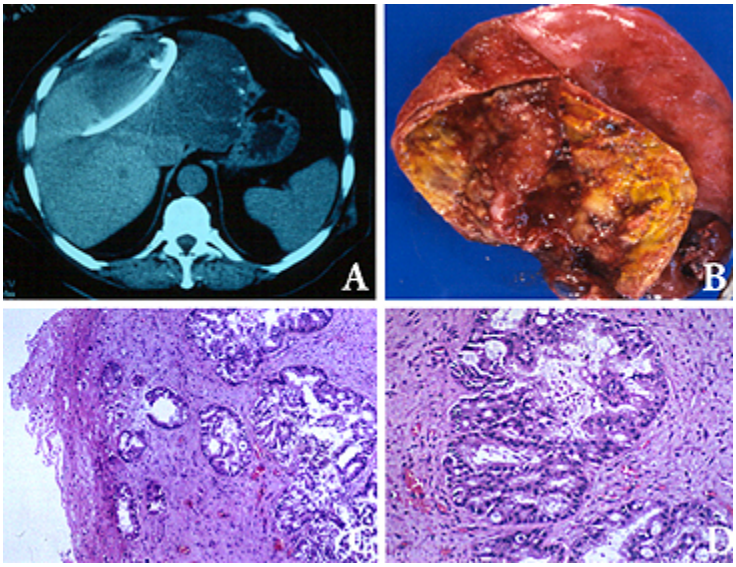
Hepatobiliary cystadenoma



Panel A: Ultrasound shows a large cystic lesion with septations and slightly irregular wall. Panel B: CT scan demonstrates the same cyst occupying most of the left hepatic lobe. Panel C: Histologic appearance: Low power magnification showing the wall of the cyst composed of a layer of loose vascular, spindle cell stroma lined by tall columnar epithelium. Note polypoid projections (hematoxylin and eosin, original magnification: x 400). Panel D: Closer view demonstrates the layer of simple columnar epithelium with focal areas of pseudostratification. No cellular atypia or pleomorphism is noted (hematoxylin and eosin, original magnification: x 2000).

Graphic 66639 Version 3.0

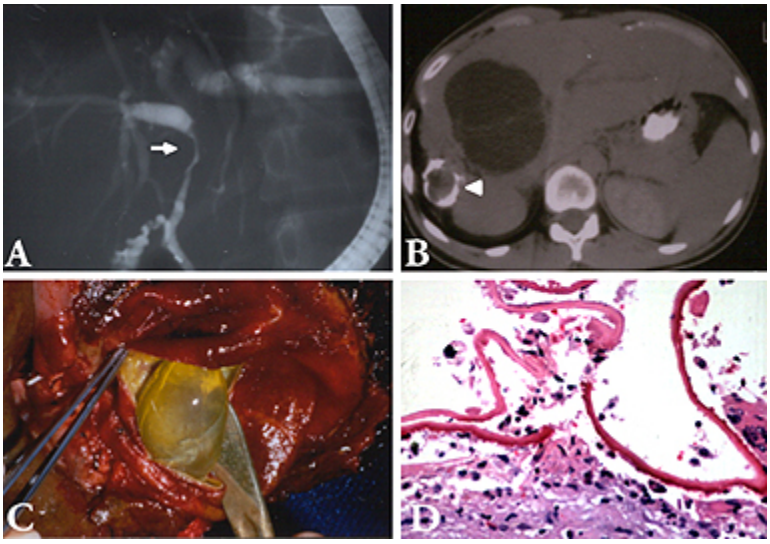
Hepatic cystadenocarcinoma



Panel A: CT scan, during a percutaneous aspiration. Note irregular thick cyst wall with nonhomogenous content. Panel B: Gross pathological examination, revealing a thick wall with multiple papillary projections. Panel C: Histologic examination: Scanning magnification showing complex glandular structures embedded in the stroma of the wall (hematoxylin and eosin, original magnification: x 400). Panel D: Higher power demonstrates glands with a cribriform growth pattern and nuclei displaying mild atypia (hematoxylin and eosin, original magnification: x 2000).

Graphic 69402 Version 4.0

Hepatic echinococcal cyst



Panel A: ERCP demonstrating external compression of the hepatic duct by the cyst. Panel B: CT scan shows a complex septated cyst and a heavily calcified daughter-cyst in the right hepatic lobe (arrowhead), in a 38-year old man. Panel C: Post resection. Panel D: Histologic appearance of a degenerated cyst containing fragments of the germinal membrane (hematoxylin and eosin, original magnification: x 2000).

Graphic 60149 Version 2.0

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Conflict of interest policy

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