Nonparasitic Cysts of the Liver: Analysis of 36 cases and review of modern diagnostic techniques

Victor Lawoyin
Robert J. Priest

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Nonparasitic Cysts of the Liver

Analysis of 36 cases and review of modern diagnostic techniques

Victor Lawoyin, MD and Robert J. Priest, MD*

A review is presented of 36 cases of nonparasitic cysts of the liver. These are uncommon and difficult to diagnose clinically. Diagnosis has usually been made by post-mortem examination and by surgery. Attention is focused on the merits of modern diagnostic methods to differentiate cystic from solid tumors of the liver. These methods include radioisotope scanning, ultrasonography, and abdominal arteriography.

Nonparasitic cysts of the liver, solitary or multiple, are uncommon and difficult to diagnose clinically. The first reported case in 1856 by Bristowe was diagnosed at post-mortem examination.1 By 1968, there were 500 reports of cystic disease of the liver in the literature.2 Diagnosis of nonparasitic hepatic cysts has usually been made by post-mortem examination3 and by surgery,4 sometimes by peritoneoscopy.5 New diagnostic methods introduced in recent years have been hepatic radioisotope scanning,6 ultrasonography7 and hepatic arteriography.8 We have reviewed 36 case histories of hepatic cysts and have evaluated the usefulness of newer techniques in making this diagnosis. Between the years 1937 and 1969, there were 36 patients with nonparasitic cysts of the liver including solitary and multiple types. Thirteen cases were diagnosed at post-mortem examination in a total of 15,090 necropsies performed in this period of time (1 per 1,160 post-mortem examinations). Of the remaining 23 patients 19 were diagnosed at the time of surgery and only four were diagnosed preoperatively. In this period of 33 years, there were approximately 41,367 intra-abdominal operations in our hospital.

The youngest patient was in the third decade of life and the oldest in the eighth decade with a mean age of 56 years. Sixteen females and three males had solitary hepatic cysts, while seven females and ten males had multiple cysts. Seven patients had symptoms arising from the liver including a constant upper abdominal distention with dull pain and dragging sensation, anorexia and post-prandial fullness with nausea and vomiting; also, rarely, episodes of sharp abdominal pain in the upper right quadrant. The remaining patients had no symptoms referable to the hepatic area.

Fifteen patients were found to have hepatomegaly from 3 cm to 13 cm below the costal margin. The hepatic edge was smooth, occasionally nodular, and rarely interpreted as cystic. Splenomegaly was not found in association with hepatic cystic disease and no patient was found to

*Division of Gastroenterology Henry Ford Hospital, Detroit, Michigan

Address reprint requests to Dr. Priest at Henry Ford Hospital, Detroit, Mich. 48202.
be jaundiced clinically.

Cyst size varied from a few millimeters to 20 cm in diameter containing 3,500 ml of fluid (Figure 1). The character of the cystic fluid was serous straw colored except in two cases which were creamy dark and brownish. In one of these patients hemolytic streptococcal organisms were grown from the cystic fluid.

Serum bilirubin determinations were obtained in 17 patients and only one had a total bilirubin above 2 mg%. Serum glutamic transaminase was elevated in two patients with huge solitary cysts and associated metastatic carcinoma to the liver. Serum alkaline phosphatase and bromsulphthalein retention were abnormal in three patients with associated metastatic disease to the liver and in two patients with chronic cholecystitis.

Ten patients with polycystic livers and one patient with a solitary cyst were associated with polycystic disease of the kidneys. Another patient had an infarcted cystic lesion in the cerebellum diagnosed at necropsy. Ovarian cysts were found in one patient with a solitary cyst and in another with polycystic liver disease.

Diagnostic Techniques

Liver cysts were diagnosed by peritoneoscopy in two cases. A plain x-ray film of the abdomen was taken in a patient after the cystic lesion had been injected with a radiopaque material (Figure 2). This method outlines clearly the contour of the cyst and localizes its position and extent. The radioisotopic liver scan was interpreted as a large filling defect in six patients (Figure 3). An upper gastrointestinal barium study was done in
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There was an extensive pressure defect on the lesser curvature of the stomach (Figure 4). In hepatic arteriography, there is a completely avascular area with peripheral vascular displacement occurring around the cyst (Figure 5). Finally, with the use of ultrasonography, a cyst in the left lobe of the liver was diagnosed correctly in this patient (Figure 6a, 6b). A large nonparasitic cyst was confirmed by operation and excised in this patient.

Discussion

The rarity of nonparasitic cysts of the liver has been established.9,10 We have reviewed cases diagnosed in a 33-year span.

Figure 2

The position of a nonparasitic cyst involving the right lobe of the liver is localized by a dense radio-opaque mass in the right upper quadrant. The cyst had been injected with a radio-opaque material (Cholografin).

Figure 3

Radioisotope anterior scan of the liver. There is a large defect involving the left lobe of the liver.
period. The incidence was only 1 per 1,160 postmortem examinations and 1 per 1,969 intra-abdominal operations. The incidence of hepatic cysts among females is reportedly higher than among males. In the present study females outnumbered males in the total instance but there were more males with polycystic disease. There was no patient below the age of 30 years even though cystic disease of the liver has been described in all age groups including children. Also, cysts result from trauma, but none was diagnosed in our experience.

The etiology and pathogenesis of nonparasitic hepatic cysts was discussed by Moschowitz, who proposed that the cysts arise from aberrant bile ducts. Norris and Tyson enunciated another theory that cysts result from unresorbed normally distorted and distended bile ducts during embryonic development. The present theory is that the cysts are congenital malformations of the bile ducts which fail to connect with the biliary tree, resulting in the formation of retention cysts. Peltokallio and Peltokallio described two cases in sisters and emphasized an inheritance pattern of the disease. Dalgaard studied the inheritance of both polycystic livers and polycystic kidneys in Scandinavian families.

Concurrent cystic changes in other organs seem to substantiate the congenital nature of the condition. Cystic kidneys associated with nonparasitic hepatic cysts have been noted to occur in 30-50% of the reported cases. Approximately 30% of our patients had associated polycystic kidney disease and polycystic livers.

Nonparasitic cysts are benign lesions and are compatible with long life. However, fatal complications can occur such as carcinomatous degeneration, liver abscess, and portal hypertension.
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Figure 6a

The liver (L) and enlarged left lobe (LL) are outlined by transverse ultrasonogram 14 cm above umbilicus at low gain.

with bleeding esophageal varices. Obstructive jaundice resulting from compression of extrahepatic bile ducts by the cyst, spontaneous rupture of a cyst and hepatocystic-fistula are less serious complications. The most serious complication in our experience was hemorrhage into the cyst and subsequent pyogenic infection. This patient survived after treatment by drainage, excision of the cyst wall and use of antibiotics.

Biochemical liver function tests are of little value in the diagnosis of nonparasitic cysts even when the cysts attain enormous sizes. We found no elevation of bilirubin, alkaline phosphatase, or bromsulfalein except in association with metastatic carcinoma of the liver. New diagnostic methods, when utilized, can be helpful to establish a precise diagnosis.

The use of radioisotope scanning as a diagnostic method was introduced by Stirrett et al. and later used by Friedell and associates to demonstrate neoplasms and cystic defects of the liver. The methods and materials for the technique are discussed by Crespo et al. and by Shingleton and his co-workers. Iodine 131 labeled rose bengal, colloidal gold, aggregated human serum albumin labeled with 131 and technetium labeled sulfur colloid are materials most commonly used for the technique. Rose bengal is concentrated by the polygonal cells of the liver and released through the biliary tract to the intestine.

The colloidal preparations — gold, technetium sulfide and serum albumin — are concentrated by the reticuloendothelial cells of the liver. Retention of radioactive
Multiple echoes are demonstrated in the normal liver at high gain while the fluid-filled cyst (C) in the left lobe remains transonic.

gold permits rescanning within 24 hours without re-injection. Technetium sulfur colloid provides better resolution than rose bengal or colloidal gold and therefore is preferred to differentiate focal lesions such as cysts from diffuse liver disease.

Indications for radioisotope scanning have been described by McAfee and his associates.24 Space-occupying lesions, including cysts, are revealed by areas of diminished or absent uptake of radioactivity. Lesions as small as 2.5 cm in diameter can be detected by this diagnostic tool.25 In an extensive review of 1,600 liver scans by Rossi and Gould, 81% of 26 cases of space-occupying masses were diagnosed correctly.26 However, tumors, dilated hepatic ducts and abscesses had to be considered in the differential diagnosis. Another group of investigators, reviewing 1,034 hepatic scans, found 83% of space-occupying masses correctly diagnosed with 17% false positives.27 False positive and misinterpretation of the hepatic scan can be caused by marked hepatic insufficiency, fatty infiltration of the liver and an accentuated hepatic notch.28 The same is true of an enlarged gallbladder, dilated hepatic ducts, renal and adrenal tumors.29

Ultrasonography, unlike radioisotope scanning, can differentiate between solid and cystic masses.30 Both the A-mode and B-mode techniques can accomplish this purpose, but the A-mode is said to be a technically simpler procedure.31 The A-mode echoes are represented by a trace recording on the oscilloscope. The intensities of the echoes are represented by...
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by the height of the echo "spikes". The B-mode technique displays the echoes as dots on the oscilloscope. The brightness and size of the dots represent the intensity of the echoes.

In ultrasonography, an ultrasound beam is transmitted through the body and echoes received from tissue interfaces are recorded. With B-scanning, a cross-sectional portion of the subject is displayed in two dimensions. Homogeneous fluid-filled structures contain no acoustical interfaces and are therefore transonic. In contradistinction, solid tissues contain multiple acoustical interfaces which will reflect a portion of the ultrasonic beam depending on the magnitude of the interface.

In scanning the liver at low gain settings, the outline of the liver is displayed, but no echoes are returned from the internal architecture. By rescanning at increased sensitivity, it is then possible to display the internal architecture as multiple echoes are received from smaller intrahepatic structures such as the biliary radicles. With this technique, it is possible to demonstrate a fluid-filled intrahepatic cyst (which is transonic) within the liver. A solid intrahepatic tumor, on the other hand, is not transonic and will reflect more echoes than the surrounding normal liver.

Detailed background information about the mechanics of ultrasonography is provided by Howry and the basic principles and concepts of its application by Lehman. Ultrasonic scanning may detect masses too small to be detected by radioisotope scanning; moreover, it avoids ionizing irradiation of the patient, and can thus be used in infants and in pregnant patients for whom irradiation is undesirable. A significant pitfall of this technique may be the difficulty to differentiate between nonparasitic cysts and inflammatory cysts.

Vascular displacement with an avascular central area may be seen by arteriography. However, arteriography may be normal if the cyst is on the surface of the liver. Similar vascular displacement may be seen in hydatid cysts, avascular tumors of abscesses. To distinguish these from nonparasitic cysts, other features may be helpful. Only rarely are metastatic tumors in the liver calcified. If the space-occupying lesion is avascular, only occasionally is a "blush" seen at the margin of the tumor in the late phase of the arteriogram which persists beyond the phase of portal venous branch filling. Chronic abscesses on occasion may have an increase in vascularity with abnormal vessels surrounding the radiolucent center, but the more acute abscesses are difficult to differentiate. Polycystic disease of the kidney and of the liver, when identified in the same patient by abdominal arteriography, indicates a congenital etiology.

Clinical judgment remains the best method for making a differential diagnosis between solid tumors of the liver and inflammatory or nonparasitic cysts. Such judgment is required when a tumor is palpated in the abdomen and is identified as an hepatic mass. Liver cysts are clinically silent until they have attained sufficient size to affect the liver, to compress adjacent viscera or to have developed complications.

Such clinical judgment is now strengthened by the merits of diagnostic methods to differentiate cystic from solid tumors of the liver. Arteriography, ultrasonography and radioisotope scanning are complementary to one another. The radioisotope scan is an excellent method for initial screening and ultrasonography can differentiate cystic from solid masses. Prior to the use of these modern diagnostic techniques, the diagnosis of hepatic cysts has been made almost exclusively by abdominal surgery or by necropsy. Using these techniques when indicated can provide a more precise diagnosis of liver cysts.
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