Endoscopic management of a relapsing hepatic hydatid cyst with intrabiliary rupture: A case report and review of the literature

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Hydatid disease, although endemic mostly in sheep-farming countries, remains a public health issue worldwide, involving mainly the liver. Intrabiliary rupture is the most frequent complication of the hepatic hydatid cyst. Endoscopy is advocated, preoperatively, to alleviate obstructive jaundice caused by intracystic materials after a frank rupture and is also a useful and well-established adjunct in locating postoperative biliary fistulas.

Endoscopic retrograde cholangiography with sphincterotomy has been successful as the sole and definitive means of treatment of intrabiliary ruptured hydatid cysts. A case of an elderly woman with frank rupture is presented, where the rupture was definitively managed endoscopically in conjunction with sphincterotomy to remove the intrabiliary obstructive daughter cysts and to achieve decontamination of the biliary tree.

Endoscopic retrograde cholangiography provided an excellent diagnostic and therapeutic modality in the present case and, thus, it should be considered as definitive treatment in similar cases especially if surgical risk is anticipated to be high.

Key Words: *Endoscopic treatment; Hydatid disease; Intrabiliary rupture*

Echinococcal disease is a parasitic zoonosis with humans being the intermediate host. *Echinococcus granulosus*, causing cystic hydatid disease, and *Echinococcus multilocularis*, causing alveolar hydatid disease, are of the most medical importance, infecting humans by entering the gastrointestinal tract. Although it can be encountered in any organ, echinococcosis most commonly affects the liver (50% to 70%) and the lungs (10% to 15%) (1).

Hepatic hydatid disease usually runs asymptotically, while clinical features, if present, are usually due to complications that supervene (1). The most commonly encountered complication, occurring in almost 50% of cases on admission, is rupture into the biliary tree with secondary biliary obstruction by intracystic material or cholangitis (2,3). Intracystic or subphrenic abscess formation after intraperitoneal rupture, as well as rupture into the bronchial tree, is less frequent (1,4-6).

In the case of intrabiliary rupture, endoscopic retrograde cholangiography (ERC) in conjunction with endoscopic sphincterotomy (ES) achieves decompression of the biliary tree

La prise en charge endoscopique d'une récurrence de kyste hydatide hépatique avec rupture intrabiliaire : Un rapport de cas et une analyse bibliographique

Bien que principalement endémique dans les pays où se pratique l'élevage du mouton, la maladie hydatique, qui s'attaque surtout au foie, reste un problème de santé publique partout dans le monde. La rupture intrabiliaire est la principale complication du kyste hydatide hépatique. L'endoscopie est préconisée avant l'opération pour éviter une jaunisse obstructive causée par des matières intrakystiques après une rupture franche et elle constitue une mesure auxiliaire utile et bien établie pour repérer des fistules biliaires après l'opération.

La cholangiographie rétrograde endoscopique accompagnée d'une sphinctérotomie est le seul mode de traitement des ruptures de kystes hydatides biliaires. Le cas d'une femme âgée ayant une rupture franche est présenté, où la rupture a été résolue par voie endoscopique conjointement avec une sphinctérotomie pour supprimer les kystes fils obstructifs intrabiliaires et pour obtenir une décontamination de l'arbre biliaire.

La cholangiographie rétrograde endoscopique a constitué un diagnostic et une modalité thérapeutique de premier ordre dans le cas présent. Par conséquent, il faut l'envisager comme traitement définitif dans des cas similaires, surtout si le risque chirurgical anticipé est élevé.

from intracystic debris and prevents recurrence of the obstructive jaundice by ES (4-8). The endoscopic method was applied as the sole means for the treatment of a female patient with frank intrabiliary rupture of a hydatid hepatic cyst, and produced impressive curative results.

CASE PRESENTATION

An 81-year-old woman was admitted to Hippocrateion Hospital in Athens, Greece, suffering from high fever, rigors and jaundice. Her past medical history was insignificant except for an echinococcal cyst of the left hepatic lobe that was diagnosed and surgically treated during World War II. Physical examination revealed tachycardia and mild, right, upper quadrant abdominal tenderness. Her initial workup showed white blood cell counts of $41 \times 10^9/L$ (where 96% of the cells were polymorphonuclear), hemoglobin levels of 106 g/L, platelet counts of $231 \times 10^9/L$, creatinine levels of 185.6 $\mu\text{mol/L}$, urea nitrogen levels of 7.14 mmol/L, aspartate aminotransferase levels of 137 U/L, alanine aminotransferase levels of 90 U/L, gamma-glutamyl transpeptidase levels of 414 U/L, alkaline

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Figure 1) Abdominal computed tomography scan revealing an irregular mass (arrow) with partial calcification of the wall in segment IV of the common bile duct

phosphatase levels of 310 U/L, total bilirubin levels of 130 $\mu\text{mol/L}$ and direct bilirubin levels of 80.4 $\mu\text{mol/L}$. The indirect hemagglutination test for *Echinococcus* species was negative. Upper abdominal ultrasound showed a multiloculated cyst in the left liver lobe, and dilation of the extrahepatic biliary ducts with hyperechoic material in the common bile duct (CBD). An abdominal computed tomography (CT) scan revealed an irregular cystic mass, 6 cm in diameter, in segment IV (Figure 1), and marked dilation of the CBD. Thus, acute cholangitis was diagnosed and intrabiliary rupture of a relapsing hydatid cyst was highly suspected to be the cause. Proper antibiotic treatment was intravenously administered. The patient's general condition, as well as physical signs and laboratory values, rapidly improved within 24 h.

ERC revealed a dilated choledochal duct with angular configuration and a free-floating cystic mass. Biliary tree communication with the cystic remnant was not demonstrated (Figure 2). ES was performed and the daughter cyst was extracted with a Fogarty catheter. Hypertonic saline was administered through a nasobiliary catheter for 5 min to decontaminate the biliary tree. The patient had an uncomplicated recovery and was discharged on the second day post-ERC. The patient denied any further treatment with anthelmintic medication, and remains asymptomatic 36 months after the admission.

DISCUSSION

Hepatic hydatid disease after a long asymptomatic course becomes symptomatic in an unknown percentage of patients. Hydatid cysts grow at a variable rate and stabilize, and may become calcified, while others may collapse and completely resolve (9). The clinical course is long and even after surgical treatment, decontamination is difficult to achieve.

Becoming symptomatic may be due to pressure exertion of the cyst on the liver parenchyma, or rupture into surrounding tissues (10). Intrabiliary rupture is the most frequent complication, representing approximately 50% of cases on admission. However, the percentage increases up to 80% to 90%, if the cases of small subclinical cystobiliary communications are included. These cases, which are frequently overlooked pre- and

Figure 2) Endoscopic retrograde cholangiography revealing a markedly dilated choledochal duct with angular configuration and a free-floating cystic mass (arrowheads). Communication of the biliary tree with the cystic remnant was not demonstrated

intraoperatively, may cause external cystobiliary fistulas postoperatively (5). The mechanism of intrabiliary rupture seems to be that of entrapment of small bile duct radicles in the pericyst, which due to increased intracystic pressure undergo atrophy resulting in rupture (5,11). Following cyst enlargement, communication with larger ducts is established (12). Most liver hydatid cysts that remain symptom free for long periods of time are mistakenly considered to be at low risk for rupture (13).

Intrabiliary rupture mainly occurs in centrally localized cysts, while an intracystic H_2O pressure of up to 80 cm is also a predisposing factor (10). Intrabiliary rupture occurs either as an occult rupture, in which only cystic fluid is drained to the biliary tree, or as a frank rupture with overt passage of intracystic material to the biliary tract (14). The reported frequency for occult rupture is 10% to 37%, and 3% to 17% for frank rupture (4-6,15,16). In frank rupture, cystic material, even daughter

cysts, are allowed to pass into the biliary tree causing septic contamination of the mother cyst, obstructive jaundice (in two-thirds of cases) or cholangitis (6). On the other hand, occult rupture has rather minor consequences because obstruction occurs in only 5% to 10% of cases because only fluid, scolices, hooks, small brood capsules and cystic wall fragments can pass the small-sized bile radicles reaching the biliary tree (17). Intrabiliary rupture occurs in 55% to 60% of cases into the right hepatic duct, 25% to 30% into the left hepatic duct, 8% to 11% into the hepatic duct junction, CBD or cystic duct, and 5% to 6% perforate into the gallbladder (4,18,19). Spontaneous recovery rate after rupture is reported to be approximately 25%; in the remaining cases, persistent obstructive jaundice, cholangitis or septicemia may develop with mortality ranging from 30% to 50% (4,10,18). Obstructive jaundice, caused by the impact of intracystic material within the biliary tract, and cholangitis constitute the most frequent clinical consequences of frank intrabiliary rupture (10). Acute or chronic pancreatitis (20,21), acute cholecystitis or even biliary cirrhosis (6) has also been reported. Symptoms are mostly nonspecific, while in 5% of patients intrabiliary ruptures are asymptomatic (4,6,9,22-25). Upper abdominal pain, jaundice and fever were the presenting symptoms in our patient, and mild, right, upper quadrant tenderness was found despite her advanced age.

Although suspicion is high in endemic areas, diagnosis of intrabiliary rupture of a hydatid cyst in nonendemic areas is usually not straightforward. Trying to establish early diagnosis of certain clinical predictors has been proposed. A history of nausea and vomiting, a serum alkaline phosphatase level greater than 144 U/L, a total bilirubin level greater than 13.6 $\mu\text{mol/L}$ and a cyst diameter greater than 14.5 cm seem to all be independent risk factors for occult rupture. On the other hand, a type IV cyst after secondary bacterial infection, suggestive ultrasonographic findings (irregular linear echogenic structures without acoustic shadowing in the bile duct and/or the dilated biliary system), a cyst diameter larger than 10.5 cm, jaundice found on physical examination and a history of jaundice seem to all be independent clinical factors for frank rupture (25). Preoperative diagnosis of a frank rupture is important because by performing ERC and ES, an unnecessary CBD exploration can be avoided; complete drainage of the cyst may even postpone surgery (25). Otherwise, the CBD should be examined with intraoperative cholangiography.

The diagnosis of intrabiliary ruptured hydatid cysts has been assisted by imaging and laboratory tests. Although these tests were proven to be ineffective in detecting occult rupture, certain findings in the United States raise an essential clue to the diagnosis of frank rupture with obstruction. Echogenic material, without posterior acoustic shadowing in the extrabiliary ducts, is a finding implying the presence of intracystic material (26). The cyst may also be depicted as smaller after rupture (10,17), with the extrahepatic biliary tract dilated (70%) (22,24,27) and sludge-like hydatid material possibly apparent in the biliary tract (53% to 80%), while in 20% to 47% of cases the communication is visualized with dilated biliary radicle(s) with a conical appearance near the main cyst (17,22,24,28-30). An abdominal CT scan may reveal a dilated CBD with low attenuation intraluminal material, suggesting the presence of hydatid sand and cysts (1,31). Cyst wall discontinuity followed by bile duct dilation with intraluminal hydatid debris, the highly suggestive direct sign of rupture, is identified in approximately 75% of cases (10,29). CT may demonstrate

high attenuation material passing through the defect of the cystic wall and filling up of the intrahepatic biliary radicles or CBD, or the presence of intracystic gas that is thought to be due to biliary reflux of gas into the cyst (10,32). The combination of the abdominal CT scan and the American findings helps to improve diagnostic accuracy (10,29). Recently, magnetic resonance imaging has proven to be a useful noninvasive diagnostic adjunct in cases of intrabiliary rupture, whereas CT scan and ultrasound results are not conclusive (33). A breach in the rim of the wall with extrusion of cystic contents constitutes a direct diagnostic sign, while fluid levels, presence of air and changes in signal intensity comprise indirect signs (26,34). In cases of intrabiliary rupture, direct hyperbilirubinemia, hyperamylasemia and increased white blood cell counts are usually present but are nonspecific, while eosinophilia is found in 30% to 40% of cases (6,22,24). Elevated antibody titres against echinococcal antigens are reported in approximately 80% of cases (22).

If a cystobiliary connection could not be suspected preoperatively, certain intra- and postoperative findings raise suspicion, leading to CBD exploration: bile-stained cystic fluid, visualized bile leak orifice and CBD enlargement, as well as substantial bile drainage from the cavity drains (13). When an intrabiliary rupture is diagnosed pre- or intraoperatively, suturing the orifice (if seen) should be incorporated with the conventional techniques of cystic evacuation, removal of the germinative layer and disinfection of the cystic cavity (35). If cystic material is suspected to be contained in a normal calibre choledochus, then choledochotomy, evacuation of cystic debris, irrigation using hypertonic saline and T-tube drainage have proven to be sufficient. If CBD enlargement has been already established, choledochoduodenostomy is preferable (36). Roux-en-Y hepaticojejunostomy is reserved if bile duct stricture has developed. Recently, open ES has also been used. Even cystojejunostomy has been applied, albeit with the risk of jaundice and cholangitis caused by cystic content drainage into the biliary tract (13).

If preoperative diagnosis of intrabiliary ruptured hydatid cyst has been established or highly suspected, ERC with ES is performed to extract retained daughter cysts from the biliary tract. In conjunction with or without nasobiliary stent application, the obstructed CBD is evacuated by using a Dormia basket or a biliary occlusion balloon (7,37,38), thereby avoiding its exploration during surgery. In addition, postoperative biliary fistula formation can be prevented by draining the cyst cavity (35). Moreover, scattered cases of definitive treatment of obstructive jaundice after intrabiliary rupture using endoscopy have been reported. Thus, by achieving a detection rate of 86.6% to 100%, ERC has been rendered the 'gold standard' in the assessment of intrabiliary rupture (16,17,22,24). Certain findings, such as edematous hyperemic Vater's papilla with hydatid material protruding (17,22,24,39-41), may lead to the diagnosis. Cystobiliary fistulas, biliary dilation, and daughter vesicles and hydatid material in biliary ducts as filling defects may also be shown. Extrinsic compression of the bile duct is less frequent, while distal stenosis, pancreatic channel dilation or cysts in the channel are rare findings (17,24,39-41). Hydatid membranes or daughter cysts in the biliary tract may resemble gallstones in cholangiography. However, the leaf-like irregular aspect of the membrane and the weak regular contrast of daughter cysts assist in the diagnosis (17). Depiction of a cut intrahepatic duct, occluded by a daughter cyst, is the most

definite finding (22,24,39,40,42). In 'silent' rupture, visualization of the ruptured cyst is practically impossible because the radio-contrast agent cannot pass through the multiple but small openings. In frank rupture, a possible failure to determine the communication is attributed to the impaction of hydatid material at the site of perforation (22). Through ERC, even evacuation of the mother cyst can be performed if a nasobiliary tube is placed followed by irrigation with hypertonic saline (40). After initial management of the intrabiliary rupture with ERC, 75% of cases had to undergo elective surgery, while in 25% of cases no further intervention was required (16,17,21,37,41,43-48). Anthelmintic therapy was shown to be effective as an adjunct to endoscopic treatment (16,49).

If an intrabiliary rupture is not preoperatively suspected and/or intraoperatively overlooked, postoperative biliary fistulas are unavoidable, constituting the most frequent complication after surgery for hepatic hydatid disease. Infection and/or abscess formation may occur after colonization of the ruptured cavity through the external cystobiliary fistula by common intra-abdominal pathogens (10). Moreover, in occult rupture, lack of symptoms and dilation of the CBD lead to a difficult preoperative diagnosis. Thus, if not frequently diagnosed intraoperatively, occult rupture may cause postoperative biliary leakage resulting in external cystobiliary fistulas (38,49,50). On the contrary, frank rupture, causing intermittent or complete obstruction, can usually be preoperatively diagnosed. Although external biliary fistulas often close spontaneously, they can persist in (3,8-27) 5% of patients, 11% of whom will develop ascending cholangitis (37). Replacement of daily electrolyte and fluid losses has proven to be sufficient in low-output fistulas (less than 300 mL daily output) (35). On the other hand, an early, high-output fistula postoperatively, predicts a nonspontaneously resolving fistula, possibly due to the impact of hydatid material into the CBD, or to frank-type communication. In these cases, early ERC with ES postoperatively is proposed because delay may cause fistula persistence and infectious complications (51). Moreover, in the case of overlooked persistent cystobiliary fistulas, ES should be of great benefit because it facilitates continuous biliary flow by decreasing the duodenobiliary pressure gradient (40,45,52-55). If a nasobiliary catheter is placed, it constantly drains the biliary tract while allowing monitoring of the fistula by cholangiography. As an alternative to ES, an endoprosthesis may be placed and later withdrawn when external drainage ceases (38,56-60). ERC which is a

minimally invasive procedure may obviate reoperation. The success rate is reported to be 70% to 100%, with an overall rate of fistula closure of 81% in 10 to 20 days (61). Controversy exists whether fistulae daily output or concomitant hydatid material in the biliary tract influences the time required for complete closure (51).

Thus, endoscopy is a modality serving both diagnostic and therapeutic aims. Preoperative ERC permits evaluation in the case of cholangitis or obstruction, possibly resulting in a cure in cases of frank intrabiliary rupture, or in the present case, and if combined with ES decreases the incidence of postoperative external fistulas. On the other hand, ERC postoperatively may clarify causes of ongoing or recurrent symptoms, or laboratory abnormalities and may resolve obstruction or cholangitis due to residual material in biliary ducts, while providing management of postoperative external biliary fistulae (17). Using an endoscopic approach in our patient, complete evacuation of the biliary tree from the obstructing daughter cysts, as well as irrigation with hypertonic saline, were achieved. Regarding the patient's rapid clinical improvement, as well as high surgical risk, no further intervention was considered necessary. Thus, endoscopy, although sparsely used as monotherapy, proved to be therapeutic (9). We advocate for ERC with ES to be used in intrabiliary ruptured hydatid liver cysts based on the sparse published evidence regarding safety, and short- and long-term efficacy (16,21,37,40,41,44-46). Alleviating obstruction and irrigating the biliary tree as well as the mother cyst, endoscopy may minimize the need for surgery.

Recently the treatment of hydatid liver disease was reviewed extensively, it was concluded that the level of evidence available on the treatment of complicated hydatid liver disease was low (62). Thus, it was evident that endoscopic procedures should at least be a therapy arm in future trials evaluating the available modalities for the treatment of ruptured hydatid liver disease. ERC should be a procedure of choice for acute complications such as cholangitis and obstruction, pre- and postoperatively, allowing surgery, if necessary, to be performed on an elective basis.

CONCLUSION

ERC with ES proved to be a choice offering excellent immediate and short-term postprocedure results. Thus, it may be proposed alternatively, especially if surgical risk is high and clinical benefit adequate.

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