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Surgical treatment of liver hydatid cysts

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Abstract

Background. The surgical treatment technique for liver hydatic cyst (LHC) cannot be standardized, and the surgical technique should be tailored according to the extent of the cyst and any adjunct complications of hydatid disease. *Patients and methods.* All patients were treated with albendazole (10 mg/kg/day) for 15 days preoperatively. Total pericystectomy was performed in three patients (7%). Partial cystectomy and its modifications were performed in the remaining 41 patients (93%). *Results.* A total of 44 patients were operated on for LHC between December 1998 and October 2004 in our center. Patients were evaluated with ultrasonography and computed tomography scan to determine the extent of the disease and preoperative staging. Twenty-four (53%) of these patients were women and 20 were men (median age, 52.5 years; range, 19–81 years). The majority of patients ($n=27$) had 1 cyst, and the remaining 17 patients had multiple cysts. In four patients (9.1%), daughter cysts were found in the biliary system, and abscesses were present in three patients (7%). Biliary fistula was the most frequent complication ($n=5$). Three patients had wound infections. Follow-up was complete for 33 patients (75%). The mean postoperative follow-up was 11.9 ± 10.8 months; there were four recurrences during this time. *Discussion.* The aim should be to provide complete drainage and obliteration of the cavity. Bile leak and biliary obstruction may complicate the postoperative course if bile leakage into the peritoneal cavity and obstruction in the biliary system are missed.

Key Words: *Liver, hydatid cyst, surgical treatment*

Introduction

Hydatid disease has been known since the time of Hippocrates and is described as a 'liver full of water'. The disease is endemic in the Mediterranean region, South America, the Far East, the Middle East, and Eastern Europe. However, it is being observed more frequently in nonendemic countries owing to increasing global travel [1].

Hydatid disease is a zoonosis caused mainly by *Echinococcus granulosus*, or less frequently by *Echinococcus multilocularis* and *Echinococcus oligarthrus*. The primary carriers are dogs and wolves. The intermediate hosts are sheep, cattle, and deer. Humans are alternative/accidental secondary hosts and are infected by ingestion of ova from the feces of dogs [2]. Early diagnosis is important, as if the diagnosis is late, cysts are complicated and the treatment is difficult and long-lasting [3]. The most effective treatment of noncomplicated hydatid disease is evacuation of the cyst fluid and decreasing the dead space of the cystic cavity. However, if the cysts are complicated, there is no standard management of treatment [4]. In this latter scenario, treatment is determined according to the stage of the cyst and the relation of the cyst to the biliary ducts or surrounding organs.

In this study, we present the treatment of hydatid disease patients at our clinic and discuss the indications and efficacy of surgical treatment.

Patients and methods

In our hospital, 84 patients with hydatid disease were treated between December 1998 and October 2004; 44 of the patients were treated surgically, and the rest were treated with radiologic intervention. Each patient's medical record was reviewed retrospectively for results of the physical examination, serum biochemistry, abdominal ultrasound (US), and spiral abdominal computed tomography (CT) or magnetic resonance imaging (MRI) scans. The Gharbi classification system was used to stage the hydatid disease [5].

Surgical treatment was used for all cysts that were larger than 15 cm, those that were complicated, and those that were not suitable for interventional

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radiology (type III or IV). All patients were treated with albendazole (10 mg/kg) 15 days before surgery, and this medication was continued for 2 months postoperatively. Magnetic resonance cholangio-pancreatography (MRCP) or endoscopic retrograde cholangio-pancreatography (ERCP) also were used preoperatively for patients with jaundice, history of cholangitis, dilatation of the biliary ducts, existence of debris in the bile ducts, or elevation of serum liver transaminases.

Surgical treatment

A 20% hypertonic saline solution was used to deactivate the cyst content. Prior to injection of this solution into the cystic cavity, the contents of the cyst were completely aspirated to prevent dilution of the agent. The solution was left inside the cyst about 10 min to kill the scolices. To prevent accidental spillage of the cystic contents, the puncture site was covered with hypertonic saline solution-soaked gauzes. If the cyst was localized to the liver periphery, the entire cyst could be excised; however, if the cysts were centrally located, they were drained through a hepatotomy. After evacuating the cystic contents, the cavity was explored for any possible communication with the bile duct. The offending bile duct was then sutured. The remaining cystic cavity was then drained or obliterated. Obliteration was achieved with omentoplasty or capitonnage. A drain was then placed into the subhepatic or subdiaphragmatic space. Exploration of the main bile duct was performed in four patients in whom preoperative ERCP drainage had been unsuccessful.

Results

There were 20 (47%) male and 24 (53%) female patients with a mean age of 52.5 years (range 19–81 years). There was 1 cyst in 27 patients (61%), and there were 2 cysts in 7 patients (17%), 3 cysts in 5 patients (11%), 4 cysts in 1 patient (2%), and more than 4 cysts in 4 patients (9%). The number of preoperative diagnostic tools is shown in Table I. Distribution of patients according to Gharbi classification is shown in Table II.

Table I. Number of preoperative diagnostic tools.

Diagnostic tools	Number (%)
US	16 (36%)
US+CT	24 (55%)
CT	3 (7%)
US+CT+MRI	1 (2%)
Total	44 (100%)

US, ultrasound; CT, computed tomography; MRI, magnetic resonance imaging.

Table II. Type of cyst according to Gharbi classification.

Type of cyst	Gharbi classification	Number (%)
Type I	Pure fluid collection	5 (12%)
Type II	Fluid collection with a split wall (water lily sign)	3 (7%)
Type III	Fluid collection with septa (honeycomb sign)	23 (53%)
Type IV	Heterogeneous echographic patterns	10 (22%)
Type V	Reflecting thick walls	0 (0%)
Type II-III		2 (4%)
Type I-II-III-IV		1 (2%)
Total		44 (100%)

Surgical treatment was performed in six patients who had been treated percutaneously and then experienced recurrence. An anaphylactic reaction was reported to occur in one patient while undergoing percutaneous drainage in another center. The treatment for that anaphylaxis was unclear from the previous medical history. However, the patient was in good health when she was admitted to our center. She had an uneventful postoperative course. Two patients had urgent operations. Both of them had high fever, leucocytosis, jaundice and clinical examination findings suggesting free perforation. Upon exploration free perforation of the infected type IV cyst was confirmed for both patients. Drainage of the cyst cavity and main bile duct exploration with T-tube drainage was performed. Although wound infection developed in one patient both of them were discharged uneventfully. Splenectomy was performed in two patients because of concomitant splenic hydatid disease. A closed thorax drainage tube was placed in one patient who had an injury to the diaphragm and pleura due to a close relationship between the cyst and the diaphragm. Three patients had disseminated abdominal hydatidosis. Midline laparotomy incisions were used for these patients. The cysts were situated in every location of the abdominal cavitiy. Cystectomy was done for the cysts that did not endanger the nearby organs. Partial cystectomy and drainage were performed for the rest of the cysts. Cholecystectomy was performed in seven patients because three of them had biliary stones and in four patients there was a close relationship between the cyst and the gall bladder.

Thirteen patients had communication between the cysts and biliary tract. This communication was detected in 10 of the 13 patients (77%) during surgery and during preoperative evaluation in the other 3. These communications were repaired primarily. Complications were observed in 12 patients (Table III). There was no operative mortality in this series. Wound infections were treated by meticulous wound care. A patient who had pelvic hydatidosis developed deep venous thrombosis and was treated conventionally with heparin infusion. Hypernatremia

Table III. Postoperative complications.

Complications	Number (%)
Hypernatremia	1 (2.2%)
Deep venous thrombosis	1 (2.2%)
Cavity abscesses	3 (6.8%)
Urinary infection	1 (2.2%)
Wound infection	4 (9%)
Biliary leakage*	8 (18.2%)
Fistula	3 (6.8%)
Empyema	1 (2.2%)
Diaphragmatic injury	1 (2.2%)
Total	12 (27.3%)†

*Leakage included all patients who had biliary drainage in the postoperative period. The three patients who were classified as having fistulas had leakages that continued for >10 days.
†Multiple complications occurred in some patients.

developed in one patient after excessive use of 20% hypertonic saline solution for giant cysts. He was treated by judicious rehydration. Eight patients developed biliary leakage and their management is detailed in the discussion section. Postoperative abscesses and empyema did not require surgery and were treated percutaneously.

Discussion

The symptoms of hydatid cysts of the liver depend on the localization, size, and stage of the cyst. Complicated cysts (free rupture into the intraperitoneal cavity or biliary tract, or concomitant bacterial infection) are also symptomatic. Although liver hydatid cysts are usually asymptomatic, the most common symptoms are pain and hepatomegaly. Fever and jaundice may accompany complicated cysts.

Ultrasonography is the primary diagnostic tool owing to its low cost, and high specificity and sensitivity. CT, MRI, and MRCP may be used for better documentation and definition of the vascular/biliary anatomy. Simple cysts and type 1 hydatid cysts of the liver are difficult to differentiate using radiologic modalities. Serologic methods may be useful for the differential diagnoses in difficult cases [2].

Pressure inside the cyst is an important indicator of its viability and it is usually around 35 cm H_2O, which is generally higher than the intraluminal pressure of the bile duct. However, this value is much lower in nonviable cysts. This high pressure is the cause of communication between cysts and the biliary system [6]. Jaundice, episodic cholangitis, and elevated liver function tests are the expected results of biliary contamination. ERCP and MRCP are not effective in predicting communication of hydatid cysts with bile ducts due to intracystic high pressure. However, these modalities are very sensitive in showing dilated bile ducts and daughter vesicles or germinative membranes of hydatic cysts in bile ducts [7].

Treatment depends on stage, localization, size, and complications of the cysts. Chemotherapy should be the first choice for disseminated disease and for patients who have a prohibitively high risk for surgery. Albendazole, an antiparasitic drug, is recommended as the chemotherapeutic agent of choice. The usual dosage is 10–15 mg/kg/day [8]. Chemotherapy is contraindicated in pregnancy due to embryotoxicity [9]. Franchi and colleagues used 10 mg/kg/day albendazole on 448 patients with uncomplicated hydatid cyst for 6 months. They found that 74% of the patients had degeneration in their cysts, and the persistence rate was 25% at the end of 6 months [10]. Type I and type II cysts can be treated successfully and effectively by percutaneous methods. Although some authors reported a high risk for peritoneal contamination or anaphylaxis during the percutaneous procedure, our interventional radiology team did not experience any such complications during the same time period in adult patients [11]. Although the technique requires experience, the key point is to drain the cyst through the hepatic parenchyme. Surgery is still the first choice for type III cysts, type IV cysts, and cysts opening into the bile ducts or peritoneal cavity. There is often no need for therapy for type V hydatid cysts [12].

Appropriate surgical treatment of hydatid cysts of the liver depends on communication of the cyst and the bile duct. If the cyst is localized peripherally, total cystectomy or hepatic resection is recommended because of the low rate of recurrence. In accord with this, in our study, total cystectomy was performed in three patients at our center with no recurrence. However, partial cystectomy and omentoplasty are the most frequently used operations for intraparenchymal hydatid cysts. Omentoplasty has been advocated for its absorptive capacity of residual fluid in the cystic cavity. It has also been hypothesized to stimulate macrophage migration into the operated area [13]. Fluid accumulation and recurrence also can be prevented by using a capitonnage technique, but it is important to remember that capitonnage carries with it the risk of injuring major ducts or vessels passing just outside the pericystic layer. Ariogul and co-workers have shown that the introflexion method – suturing the outer surface layers of the cyst to each other or to the bottom of the cavity to keep the cyst walls folded [4] – is a simple, safe, and effective means of closing the cystic cavity. Although pericystectomy and hepatectomy have low recurrence rates, these operations are very radical and are preferred in superficial and exophytic hydatid cysts and in cysts originating from *Echinococcus alveolaris*.

Patients who have jaundice or a history of cholangitis, elevated liver enzymes, and dilatation or debris in major bile ducts should be assessed for main bile duct contamination [14,15]. If the bile ducts are evaluated with ERCP before surgery, it is not necessary to perform main duct exploration. Kayaalp and co-workers have shown that hydatid cysts lying around the hilus of the liver had a higher biliary

communication rate (48%) than did peripherally located cysts (27%) [16]. It is still controversial whether a T-tube or biliary enteric anastomosis is advantageous after a duct exploration. Alper and colleagues have shown that choledocoduodenostomy reduces mortality and morbidity rates compared with the use of a T-tube for drainage [17]. However, Erbir and co-workers compared T-tube drainage with choledochoduodenostomy for mortality and morbidity rates, hospitalization time, and infection rate and showed superiority of the T-tube [7].

Partial or total cystectomy can be performed laparoscopically using an umbrella trocar. This method enables the surgeon evaluating the cystic cavity to clip and suture the sites of bile duct leakage [18].

A drain is usually placed to prevent abscess, biloma, or biliary peritonitis. If bile drainage lasts >10 days, it should be considered as a biliary fistula. ERCP may be used successfully to manage these patients with a low output, that is, <100 ml/day [16,17,19]. We had eight patients with bile leakages (18.3%). Leakage stopped spontaneously in five patients within 7 days; therefore these were not considered as biliary fistulas (Table III) [16]. For the remaining three patients, biliary fistulas were treated by nonsurgical methods. A nasobiliary catheter was used for the first patient. This catheter was removed on the 31st postoperative day, and the fistula closed on the 68th postoperative day. A biliary stent was placed by ERCP for the second patient, and the fistula closed on the 16th postoperative day, and after 20 days the stent was removed. The fistula of the third patient closed spontaneously in 10 days. Kayaalp and co-workers described 14 (26%) biliary leakages in 54 patients that they have treated. The leakage in nine of the patients ceased in 7 days, whereas biliary fistulas occurred in the other five patients. A nasobiliary catheter was used by ERCP for only two patients, and these fistulas closed in 2 weeks [20].

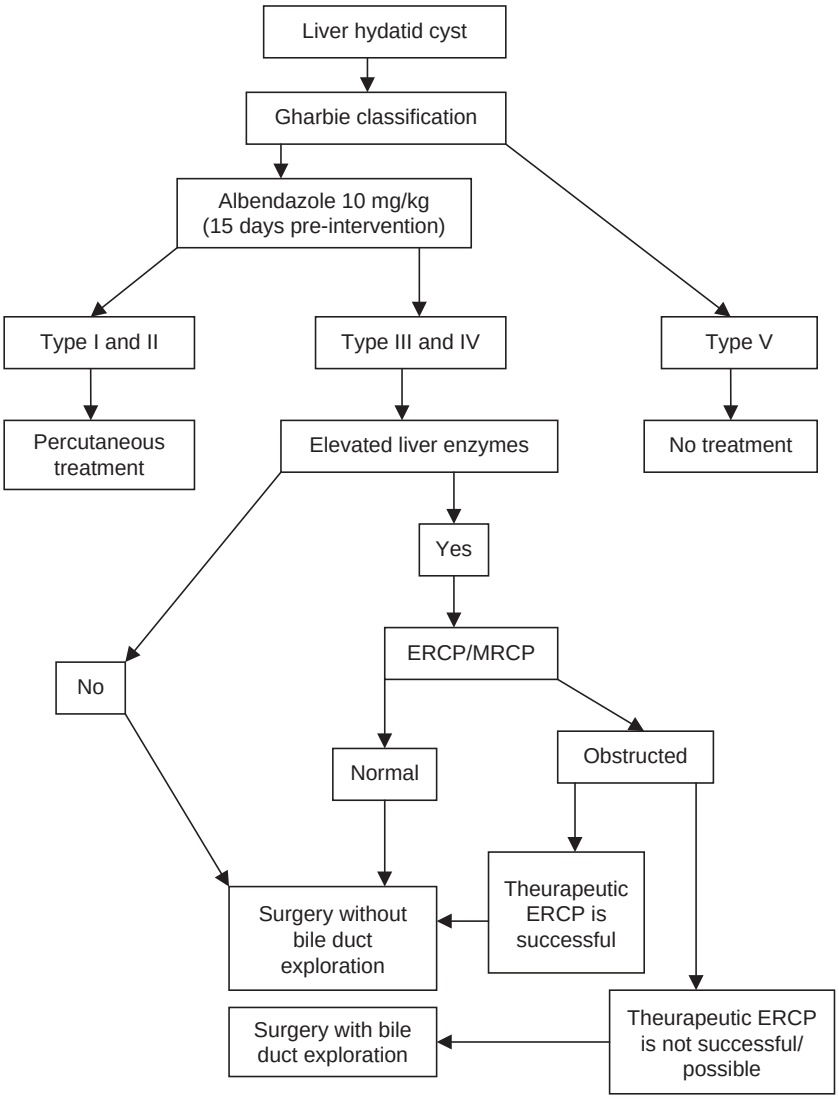

Figure 1. The suggested algorithm for management of the liver hydatid disease. ERCP, endoscopic retrograde cholangio-pancreatography; MRCP, magnetic resonance cholangio- pancreatography.

Relapse is a major problem in hydatid disease surgery. Ultrasonography alone is not enough to detect relapses following surgical treatment of liver hydatid cyst. Results of an indirect hemagglutination (IHA) test and an IgE radioallergosorbent test (RAST) will remain positive long after operation, and only demonstration of the scolices in the remaining cavity ensures definitive diagnosis [21]. The recurrence rates of the surgical techniques range between 0% and 25%, but as yet no prospective randomized study has shown superiority of one operative technique over the other [22]. In our center, the recurrence rate was 9% with a mean follow-up of 11.9 ± 10.8 months.

Conclusion

Cyst size, stage, localization, and relation to the bile ducts are important in the treatment of liver hydatid cysts. The aim of surgical intervention is evacuation and obliteration of the cystic cavity. It is helpful to use ERCP or MRCP for the appropriate surgical method in patients with suspected communication with the biliary system. We use the general algorithm depicted in Figure 1. Follow-up is usually by US, although aspiration and cytologic assessment are necessary for conclusive proof of recurrence.

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