

# Surgical Treatment of Hydatid Disease of the Liver

## Review of 304 Cases

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**Hypothesis:** To review the results of different modalities of treatment of hydatid disease of the liver.

**Design:** Retrospective study of 304 patients.

**Setting:** A university hospital in Turkey.

**Patients:** Three hundred four patients with hepatic hydatid disease who underwent operation between 1981 and 1996.

**Main Outcome Measures:** Mortality and morbidity.

**Results:** Two hundred thirty-eight patients had a cyst on the right lobe, 41 patients had a cyst on the left lobe, and 25 patients had a cyst on both lobes. Forty-five patients had multiple hepatic cysts and 18 patients had co-existing cysts in other intra-abdominal organs. Surgical procedures were tube drainage, capitonnage, omentoplasty, cystectomy, segmentectomy, and cystoenteros-

tomy. Of the patients with tube drainage, 36 developed an infection of the remaining cavity, 10 developed long-lasting biliary fistula, 8 developed cholangitis, and 6 developed septicemia. Four patients died of unrelated complications. Of the patients with capitonnage, 7 developed cholangitis and 3 developed an infection of the remaining cavity. Of the patients with omentoplasty, 1 developed an infection of the remaining cavity and 1 developed cholangitis. One patient who underwent segmentectomy developed pulmonary complications. Of the patients with cystoenterostomy, 1 developed cholangitis, 1 developed septicemia, and 1 developed pulmonary complications.

**Conclusion:** For management of hydatid disease of the liver, capitonnage, omentoplasty, cyst excision, segmentectomy, or cystoenterostomy are all superior to tube drainage.

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**H**UMAN HYDATID disease or echinococcosis, caused by the larval form of *Echinococcus granulosus*, has a worldwide distribution and is endemic in many countries in the Mediterranean region, the Middle and Far East, and South America.<sup>1</sup>

### See Invited Critique at end of article

The adult *E granulosus* is a worm that resides in the jejunum of dogs and other canines and produces eggs that are passed in the stool. Eggs ingested by intermediate hosts (cows, sheep, mice, caribou, and humans) liberate an embryo in the duodenum, which passes through the intestinal mucosa to enter portal circulation. Most of these embryos are trapped in the liver; the rest pass through the liver and are scattered to other organs and develop

into hydatid cysts. The hydatid cyst of the liver has 2 layers; the ectocyst, a dense fibrous host reaction to the parasite, and the parasite-derived endocyst, which has an outer laminated and an inner germinal layer. The single-celled germinal membrane gives rise to brood capsules, which contain the scoleces, and daughter cysts, which float freely in the clear cyst fluid.<sup>2-7</sup>

Uncomplicated hydatid cysts are usually asymptomatic. Symptoms are produced by 2 mechanisms: a generalized toxic reaction due to the presence of the parasite itself and local or mechanical symptoms depending on the location of the cyst.<sup>4</sup> The mechanical symptoms also depend on the size and number of the cysts. In more than 40% of cases, the complications precede the diagnosis of the disease. Rupture, secondary infection, and suppuration are the most common complications.<sup>3</sup>

Plain abdominal x-ray films may show a calcification in the right upper quadrant

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## PATIENTS AND METHODS

Three hundred four patients with hepatic hydatidosis were treated surgically between 1981 and 1996. One hundred ninety-nine were women and 105 were men. The mean age was 40.4 years (range, 4-82 years). The most common complaints were pain in the right upper quadrant and epigastrium and abdominal mass, which were present in 74% and 55% of the cases, respectively. Symptoms at clinical presentation are summarized in **Table 1**. Fifteen patients had previous surgery for hydatid disease before being referred to our center.

The Casoni test was positive in 187 of 204 patients and the Weinberg test was positive in 149 of 197 patients.

Plain abdominal x-ray films, ultrasonography, and computed tomography were used as imaging techniques (**Table 2**). Plain x-ray films of the abdomen showed calcification in 48 (19.4%) of 247 patients, which is a suggestive finding of hydatid disease of the liver. Ultrasonography and computed tomography demonstrated cystic lesions in both intrahepatic and extrahepatic locations in many cases.

Cysts were found in the right lobe in 238 patients (78.3%), in the left lobe in 41 patients (13.5%), and bilaterally in 25 patients (8.2%). Forty-five patients (14.8%) had multiple cysts in the liver, and 18 patients (5.9%) had coexisting cysts in the spleen (3 patients), pancreas (2 patients), adrenal gland (2 patients), mesocolon (4 patients), ovaries (1 patient), retroperitoneum (4 patients), and abdominal wall (2 patients). The diameter of the cysts was smaller than 5 cm in 13 patients (4.3%), 5 to 10 cm in 106 patients (34.9%), and larger than 10 cm in 185 patients (60.8%). Thirty-five patients (11.5%) had infected cysts.

Forty-six patients received mebendazole (50 mg/kg of body weight) and 56 patients received albendazole (10 mg/kg of body weight) perioperatively for 1 month in cases of abdominal hydatidosis or suspicion of intraoperative spillage.

For the tube drainage procedure, after the abdominal

cavity had been isolated with compresses soaked in 20% hypertonic saline solution, the cyst was punctured and hydatid fluid aspirated to reduce the tension within the cyst. Cysts were then widely deeroofed by excising the projecting part of the pericyst and evacuating its contents. The remaining cavity was irrigated with a scolocidal agent. Sterile hypertonic saline, 95% ethanol, or povidone-iodine were used as scolocidal agents. External drainage of the residual cavity was done using a wide-gauge rubber tube brought out through a stab wound and connected with a bag for gravity drainage; suprahepatic and subhepatic spaces are also drained in some cases. Tubes were removed within a few days in the absence of bile leakage or any discharge. To obliterate the remaining cavity, a portion of omentum with a good blood supply was sutured into the cavity (omentoplasty), or remaining walls of the cavity were brought together with a series of purse-string or mattress sutures starting from the bottom and working outward (*capitonnage*). If obliteration of the remaining cavity was not possible, Roux-en-Y cystojejunostomy was performed by a wide anastomosis between pericystic opening and jejunum. In the instance of cystobiliary communication, treatment included closure of the communications with fine absorbable sutures. In our series, tube drainage was performed in 122 patients (40.1%), capitonnage in 100 patients (32.9%), omentoplasty in 40 patients (13.2%), cystectomy in 22 patients (7.2%), segmentectomy in 10 patients (3.3%), and cystoenterostomy in 10 patients (3.3%). Because of intrabiliary rupture, in 18 patients migrated hydatid material was cleared from the common bile duct through a choledochotomy and choledochostomy was performed in those patients. After the common bile duct had been cleared, T tube drainage was performed in 13 patients and choledochoduodenostomy was performed in 5 patients. Coexistent cysts were treated by splenectomy, oophorectomy, and cyst excision.

Statistical analyses were performed using the Student *t* test for postoperative hospital stay and  $\chi^2$  test for morbidity.  $P \leq .05$  was considered significant.

that is a suggestive finding of hydatid disease of the liver. Ultrasonography and computed tomography are highly sensitive in the diagnosis of hepatic hydatid cysts. The positivity of Casoni and Weinberg tests in hydatid disease is 87% and 69%, respectively.<sup>3,8</sup> Of the serological tests, the indirect hemagglutination test is more sensitive than the complement fixation test.<sup>9</sup>

Although medical treatment with mebendazole<sup>10</sup> or albendazole<sup>11</sup> has been reported to be effective in some cases, little objective evidence is available to support these claims. Treatment of hydatid disease consists either of surgery or percutaneous drainage. A variety of surgical procedures have been described,<sup>4,8</sup> but there are basically 2 surgical alternatives—resection or conservative procedures.<sup>2</sup> Resection of small or pedunculated cysts may be simple and safe, but in most cases cystectomy involves a major resection, with its attendant increase in operative risk. Conservative procedures are easier to perform, but the rate of postoperative complications and the duration of hospital stay are not always satisfactory.<sup>1-3</sup> In this article, we have retrospectively reviewed results of different surgical procedures in 304 patients with hepatic hydatid disease in a 15-year period.

## RESULTS

The most common complication was postoperative infection in the remaining cavity. Of the patients with tube drainage, 36 (29.5%) developed infection of the remaining cavity, 8 (6.6%) developed cholangitis, 6 (4.9%) developed septicemia, and 10 (8.2%) developed long-lasting biliary fistula (2-4 months). All those fistulas were closed spontaneously. Four patients received octreotide because of high-volume fistula (1000 mL/d). Of the patients with capitonnage, 7 (7%) developed cholangitis, 3 (3%) developed infection of the remaining cavity, and 2 (2%) developed septicemia. Of the patients with omentoplasty, 1 (4.5%) developed infection of the remaining cavity and 1 (4.5%) developed cholangitis. One patient (10%) in the segmentectomy group developed pulmonary complications. In the cystoenterostomy group, 1 patient developed cholangitis, 1 patient developed septicemia, and 1 patient developed pulmonary complications. Infection of the remaining cavity and biliary fistula were significantly more frequent ( $P < .05$ ) in the tube drainage group as compared with the other groups, and there

**Table 1. Clinical Presentation**

Presenting Sign or Symptom	No. (%) of Patients
Abdominal pain	225 (74)
Abdominal mass	167 (55)
History of fever	69 (22.7)
History of jaundice	18 (5.9)
Acute abdomen	3 (1)
Asymptomatic	29 (9.5)

**Table 2. Imaging Techniques**

	No. of Patients	No. Positive	Sensitivity, %
Plain abdominal x-ray film	243	28	11.5
Ultrasonography	304	297	97.7
Computed tomography	154	154	100.0

were no significant differences between groups other than tube drainage ( $P > .05$ ).

Postoperative hospital stay is summarized in **Table 3**. The average hospital stay was longer in the tube drainage group as compared with the other groups ( $P < .01$ ), and there were no significant differences between groups other than tube drainage ( $P > .05$ ).

Four patients (1.3%) died of cardiopulmonary complications. No recurrence was seen in follow-up lasting from 3 months to 6 years.

### COMMENT

Hydatid disease is still a problem in developing countries. Although the disease is often asymptomatic for many years owing to slow growth of the cyst, complications including infection, obstructive jaundice, and rupture could cause serious problems. In our series there were 35 patients (11.5%) with infected cysts, 18 patients (5.9%) with obstructive jaundice, and 3 patients (0.98%) with cyst rupture.

The diagnosis of hydatid disease of the liver had previously been based on history and clinical findings that are compatible with the disease. The clinical findings are too nonspecific to be diagnostic. Skin tests and serological tests are helpful in diagnosis. In our series, the Casoni test was positive in 187 (91.7%) of 204 patients and the Weinberg test was positive in 149 (75.6%) of 197 patients. Although it has been reported that the Casoni test can cause anaphylaxis, in our series this was not seen. In all patients Casoni and Weinberg tests were performed after the cyst had been diagnosed by imaging techniques, so we are not able to discuss the false-positivity of those tests.

Ultrasonography and computed tomography are highly sensitive in the diagnosis of hepatic hydatid disease. In our series, sensitivities were 97.7% and 100% for ultrasonography and computed tomography, respectively.

Percutaneous drainage is helpful in diagnosis and is a good alternative to surgery in treatment of hepatic hydatidosis.<sup>12,13</sup>

The first step in hydatid surgery is evacuation and irrigation of the cyst cavity. To prevent peritoneal con-

**Table 3. Postoperative Hospital Stay**

Type of Treatment	Mean $\pm$ SD Hospital Stay, d
Tube drainage (infected)	27.9 $\pm$ 7.9
Tube drainage (uncomplicated)	16.1 $\pm$ 3.0
Capitonnage	11.2 $\pm$ 2.8
Omentoplasty	11.2 $\pm$ 2.6
Cystectomy	9.5 $\pm$ 1.9
Lobectomy	11.1 $\pm$ 2.6
Cystoenterostomy	12.8 $\pm$ 1.7

tamination, the peritoneal cavity must be carefully protected during cyst evacuation. After evacuation, the remaining cavity must be irrigated with scolocidal agents. There are many scolocidal agents available. Years ago, formalin was used for inactivation, but it has been abandoned because of sclerosing cholangitis<sup>14,15</sup> and systemic reactions.<sup>16</sup> Many agents, such as chlorheximide, 80% ethanol, hypertonic saline, and 0.5% cetrimide are effective scolocidals.<sup>8</sup> We used 20% saline, 95% ethanol, and povidone-iodine as scolocidal agents. Although it was reported that hypertonic saline solution could cause sclerosing cholangitis,<sup>14</sup> in our series this complication was not present.

The second step is management of the cyst cavity. If possible the cyst cavity should be obliterated by capitonnage<sup>4</sup> or omentoplasty,<sup>17</sup> but if it is not, drainage procedures such as tube drainage or marsupialization could be performed. If the cyst is peripheral or pedunculated, cystectomy or lobectomy could be performed. We do not recommend hepatic resection if the cyst location is central. In our series segmentectomy was performed for cysts located on the left lobe.

In cases of suppuration, marsupialization or tube drainage is unavoidable.<sup>3</sup> In these cases the duration of hospitalization is long because of complications, especially infection and biliary drainage. In our series, tube drainage was performed in 87 patients with uncomplicated cysts. The average hospital stay was shorter in patients with uncomplicated cysts as compared with patients with complicated cysts ( $P < .05$ ).

In our series, surgical strategy varied over the 15 years. Tube drainage had previously been preferred, especially in patients who had concomitant medical illness. However, since 1986, radical procedures have been performed in most cases. Since 1991, percutaneous drainage has been performed in 101 selected cases. Percutaneous drainage was performed in patients who had type 1 or type 2 hydatid cysts according to the description of Gharbi et al.<sup>18</sup> In this procedure, after percutaneous aspiration of the cyst fluid, the cyst cavity is irrigated with a scolocidal agent and the catheter is removed. Thus, complications such as infection of the remaining cavity or biliary fistula are not seen in patients treated with percutaneous drainage.

We concluded that omentoplasty, cystectomy, capitonnage, lobectomy, and cystoenterostomy are superior to external drainage. In uncomplicated cysts these procedures had a shorter duration of hospitalization as compared with tube drainage. In this respect, marsupi-

alization or tube drainage should be avoided as much as possible.

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## Invited Critique

This article represents a retrospective study on the results of different modalities of treatment of hydatid disease of the liver, concluding that capitonnage, omentoplasty, cystectomy, lobectomy, and cystoenterostomy are superior to tube drainage and that marsupialization or tube drainage should be avoided as much as possible. Human hydatid disease, an endemic disease in many countries, is caused by a parasite that is identified as *Echinococcus granulosus* or *Echinococcus multilocularis*. Most of the embryos are trapped in the liver and the rest pass through the liver and are scattered to other organs such as the lung, brain, or spleen, where they develop into hydatid cysts. Although the proliferation and differentiation of germinal cells of *E multilocularis* are presumed to be deeply involved in the incidence of this disease, the clinicopathologic features of the disease are not well established. Chemotherapy is reportedly not effective in most cases.

This article emphasizes that the first step in hydatid surgery of the liver is evacuation and irrigation of the cystic cavity, followed by management of the cyst cavity. Rupture of the cyst, secondary infection, and suppuration are the most common complications. The rate of postoperative complications and the duration of hospital stay are not always satisfactory when conservative procedures are chosen; nevertheless, the mortality rate is low.

On the other hand, hydatid disease of the liver in Hokkaido (northern Japan) behaves like a malignant neoplasm and is often fatal. Hydatid disease in this area in Japan can be controlled only by complete resection of the lesions. Conservative therapies are not effective in patients with nonresectable lesions. Causes of death are liver failure, disseminated intravascular coagulation, and multiple organ failure due to biliary sepsis. The clinicopathologic features of this disease in the northern hemisphere seem to be somewhat different from what is observed in southern or southeastern areas.

Establishment of an in vitro primary culture of germinal cells of *E multilocularis* is considered to be indispensable for elucidation of the clinicopathologic features and improvement of the prognosis of this disease.

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