# Clinical and Surgical Profile and Follow Up of Patients With Liver Hydatid Cyst from an Endemic Region

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## Abstract

**Aim:** The aim of this study is to present the changes in the treatment of liver hydatid cyst during the last 20 years in our clinic according to literature data. **Material and methods:** Clinical, laboratory and operational findings and pre- and postoperative complications of 650 from 700 patients with liver hydatid cysts, examined and treated at Selcuk University Meram Medicine Faculty, General Surgery Department, between 1985-2005, were evaluated in two groups: 1st period (1985-1995) and 2nd period (1995-2005). **Results:** 436 of the cases were females (67.1%) and 214 (32.9%) males. The mean age of the females was 35 years (ranges 10-73) and of the males 46 years (ranges 12-76). Surgical treatment comprised radical and obliterative conservative techniques in the first period, while non-obliterative conservative techniques and percutaneous puncture and aspiration of the cyst, injection of scolex eliminating substance and reaspiration (PAIR) were preferred in the second period. During the follow-up (498 cases were followed for a mean period of 32 [12-72] months), recurrence occurred in 12 in the first period and in 9 in the second period, a total of 21 patients (4.21%). **Conclusion:** We consider that regardless of the surgical treatment used in liver hydatid cyst cases, combination with chemotherapy is the safest and most effective approach.

## Keywords

Echinococcus granulosus – liver hydatid cyst – surgical treatment.

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## Introduction

Liver hydatid cyst is an infestation caused by the larvae of Echinococcus granulosus tenia. Man is an accidental intermediate host in the evolution of this parasite [1]. It is still an important health problem in our country, which is an endemic area for the infection. It has a variety of courses, sometimes even remaining asymptomatic for years, and diagnosed only incidentally using screening methods [2]. Most commonly, it causes pain and sensation of fullness. Less commonly, it may present after rupturing into the biliary tract causing obstructive jaundice and cholangitis, or rupturing into the abdominal cavity causing acute abdomen [3, 4]. Until recently, the treatment of hydatid cyst was only surgical. However, percutaneous puncture and aspiration of the cyst, injection of scolex eliminating substance and reaspiration (PAIR) combined with chemotherapy has emerged as an alternative treatment [5-7]. Mebendazole and albendazole are used as medical treatment [8, 9]. There are recent studies mentioning successful results with albendazole injected into the cyst [10]. As medical treatment alone is not an ideal solution, it is used in combinations such as before/after PAIR or before/after surgery [11]. Nevertheless, especially in late stage cysts, surgery remains the gold standard. There are many studies in the literature both in support of and against radical and conservative approaches used in the surgical treatment of liver cyst hydatids [12-14]. Each technique has advantages and disadvantages. It seems that debates on this topic will continue until safe, controlled randomized studies are performed. We thus planned this study to evaluate the clinical characteristics of patients with liver hydatid cyst surgically treated at Selcuk University Meram Medicine Faculty, General Surgery Department during the last 20 years.

## Material and method

The records of 700 liver cyst hydatid patients who were examined and treated at Selcuk University Meram

Medicine Faculty, General Surgery Department, between 1985-2005 were examined retrospectively

Clinical, laboratory, operative findings and pre- and postoperative complications were evaluated in 650 documented cases of 700 patients with liver hydatid cysts admitted in our Department. Patients were divided in two groups: treated in the 1st period (1985-1995) – 339 patients and treated in the 2nd period (1995-2005) – 311 patients. Of the serological diagnostic tests, indirect hemagglutination and Weinberg test were used in the 1st period and enzyme linked immunosorbent assay (ELISA) in the 2nd period. Surgical techniques applied to the patients in the 1st and 2nd periods were evaluated with respect to cyst number, recurrence rate, morbidity and mortality. Four hundred and ninety-eight cases were followed-up periodically in the postoperative period, with a mean follow-up of 32 (ranges 12-72) months. In the postoperative period, patients were followed for cavity resolution with ultrasonography (US) before the application of computed tomography (CT) in practice, and thereafter with CT. Cases were followed with CT at the end of the 1st postoperative month, and with US at 3 and 6 months. CTs were repeated at the end of the 1st year. CT was repeated every year for cases with unresolved cavities.

In the 1st period, mebendazole (50 mg/kg) was administered for 1 year. For the last 10 years, albendazole 10 mg/kg/day was applied in all cases one week before the operation and for 3 months with 14-day intervals after the operation.

Excluded from the evaluation were the patients who did not present for their routine examinations.

**Statistical analysis**

Statistical analysis was peformed by using the chi-square text. A p value of less than 0.05 was regarded as significant.

## Results

Of the cases operated between 1985-2005 for liver hydatid cyst, 436 were females (67.1%) and 214 (32.9%) were males. The mean age of females was 35 (ranges 10-73) and of males 46 (ranges 12-76) years. Of the 650 cases, 410 (63.07%) had right lobe, 182 (28%) left lobe and 58 (8.93%) bilobar cyst localization (Table I). The total number of cysts was 947. During follow-up, US had been usually performed during the first years of the 1st period. By the end of the first period, abdominal CT was used as the imaging modality for the diagnosis. Twenty-eight percent of the patients were asymptomatic and hydatid cysts were diagnosed during examinations for other reasons. The most common symptom in the remainder patients was abdominal pain. Less commonly, patients presented a mass in the right upper quadrant, fullness in the upper abdomen and dyspeptic symptoms. The most frequent physical findings were hepatomegaly, a palpable mass in the upper abdomen, jaundice, or acute abdomen (Table II).

**Table I.** Characteristics of cysts and patients

| | Patients (650) |
|---|---|
| Sex | |
| Male | 214 (32.93%) |
| Female | 436 (67.07%) |
| Age (years) | |
| 10-30 | 143 (22.0%) |
| 31-50 | 377 (58.0%) |
| 50-70 | 85 (13.07%) |
| >70 | 45 (6.93%) |
| Location of cysts in the liver | |
| Right lobe | 410 (63.07%) |
| Left lobe | 182 (28.0%) |
| Both lobes | 58 (8.93%) |

**Table II.** Clinical characteristics of the 650 cases

| | |
|---|---|
| Abdominal pain | 435 (66.92%) |
| Mass in the right upper quadrant | 39 (6.0%) |
| Fullness in the upper abdomen and dyspepsia | 234 (36.0%) |
| Hepatomegaly | 201(30.92%) |
| Jaundice | 104 (16.0%) |
| Acute abdomen | 13 (2.0%) |
| Asymptomatic | 182 (28.0%) |

All cases were prophylactically treated with antibiotics. Right or left subcostal or double subcostal, or for bilateral cysts bucket handle incisions were used. Pre- and perioperative complications are presented in Table III.

**Table III.** Preoperative and perioperative complications

| Complication | 1st period | 2nd period |
|---|---|---|
| Rupture in the biliary tract | 25 | 37 |
| Abscess | 4 | 4 |
| Intraperitoneal rupture | 6 | 8 |
| Bronchobiliary fistula | 2 | 3 |

After the neighborhood of the cyst was isolated with tampons with scolex eliminating agent, cyst evacuation was performed. After evacuation of the cysts, povidone iodine was used in 190 (56.04%), AgNO3 in 125 (36.85%) and 20% hypertonic saline solution in 24 (7.07%) cases in the 1st period. In the 2nd period, cavity sterilization was performed with the same substances, but significantly more frequently with 20% hypertonic saline (Table IV). In our series, there was no case of sclerosing cholangitis caused by povidone iodine. However, we followed two cases of sclerosing cholangitis probably caused by formaldehyde, who were operated in other centers.

**Table IV.** Agents used for cavity sterilization

| Scolex eliminating agent | 1st period | 2nd period |
|---|---|---|
| AgNO3 | 125 (36.87%) | 25 (8.04%) |
| Povidone iodide | 190 (56.04%) | 115 (36.98%) |
| Hypertonic saline solution | 24 (7.07%) | 171 (54.98%) |

After sterilization was completed, cavity-minimizing surgical treatment was performed. Documentation of the

surgical techniques used in both periods is presented in Table V.

Besides the treatment to minimize the cyst cavity, additional surgical techniques used for cysts found to be ruptured into the bile pathways are presented in Table VI. Classical cavity sterilization was not applied in these cases.

**Table V.** Surgical techniques applied to the cases

| Surgical procedure | No. patients | 1st period - No (%) | 2nd period - No (%) |
|---|---|---|---|
| **Radical** | 101 | 67 (66.33%) | 34 (33.67%) |
| **Conservative approach (obliterative)** | | | |
| Omentoplasty | 75 | 46 (61.33%) | 29 (38.66%) |
| Capitonnage | 84 | 58 (69.04%) | 26 (30.96%) |
| Introflexion | 46 | 30 (65.21%) | 16 (34.79%) |
| Overlapping | 32 | 24 (75.0%) | 8 (25.0%) |
| Combination | 12 | 8 (66.66%) | 4 (33.33%) |
| **Conservative approach (nonobliterative)** | | | |
| External drainage | 94 | 50 (53.2%) | 44 (46.8%) |
| Unroofing | 189 | 46 (24.33%) | 143 (75.67%)* |
| Marsupialization | 12 | 10 (77.77%) | 2 (22.23%) |
| Laparoscopic | 5 | 0 (0%) | 5 (100%)** |

* $p< 0.005$; ** $p< 0.02$

**Table VI.** Techniques applied to the hydatid cysts ruptured into the biliary tract

| Technique | 1st period | 2nd period |
|---|---|---|
| T-tube drainage | 15 | 20 |
| Choledochoduodenostomy | 6 | 3 |
| Hepaticojejunostomy | 1 | - |
| Transcystic biliary decompression + suture to the bile duct orifice | - | 2 |
| Suture to the bile duct orifice | 5 | 5 |
| ERCP + sphincterotomy | - | 5 |

In cases where bile leakage in the cavity or jaundice was detected, we examined the communication of the cyst cavity and bile pathways using per-operative cholangiography. Patients were treated by suturing in cases of bile duct orifices up to 5 mm size and by choledochoenterostomy if the orifice was larger than 5 mm and the common bile duct was enlarged. In patients where choledochoenterostomy was applied, the orifice of the bile duct was not sutured, since flow of bile to the bowel would be easily facilitated by lowering pressure. In order to drain any possible bile leakage in the cavity, the drain was not placed inside the cavity but at the closest and most appropriate location. In most cases with bile leakage, it resolved spontaneously, but in some cases, when cholangiography failed to detect bile leakage during the operation, it resulted in fistula. In these cases, the connection of the cyst cavity and biliary tract was examined by fistulography. Treatment included application of temporary stents or papillotomy during endoscopic retrograde cholangiopancreatography (ERCP).

For cysts ruptured into the peritoneal cavity, the peritoneal cavity was flushed with povidone iodine or 3% NaCl solution after the mechanical cleaning procedures. For thorax- associated cysts, if the complication was noticed while working on the abdomen, thoracotomy was added and segmentectomy or lobectomy was applied.

Table VII summarizes the postoperative complications observed.

**Table VII.** Postoperative complications (number of patients)

| Complication | 1st period | 2nd period |
|---|---|---|
| Biliary fistula | 6 | 8 |
| Residual cavity infection | 3 | 4 |
| Wound infection | 8 | 10 |
| Pulmonary atelectasia | 9 | 11 |
| Recurrence | 12 | 9 |
| Mortality | 1 | 1 |

During the follow-up (498 cases were followed for a mean period of 32 [12-72] months), recurrence was noted in 21 patients (4.21%): 12 patients in the 1st period and 9 patients in the 2nd period ($p> 0.05$).

## Discussion

Echinococcosis is accepted as a serious health problem throughout the world. It is observed more often in Mediterranean countries, Australia and South America, where stock-breeding, especially sheep–breeding, is common. It is remarkable that in the United States it is observed more often in immigrants with origin from Mediterranean countries. Our country ranks second according to incidence [15, 16]. Echinococcus mostly infects humans in childhood and symptoms occur during the active labor period [17]. The liver is the most frequently involved organ. Symptoms depend on the involved organ, location, effects on the adjacent organs and complications caused by the rupture [16].

Abdominal US is one of the oldest methods used for the diagnosis of liver cyst hydatid [18], but recently CT and magnetic resonance imaging are used especially in postoperative follow-up [19]. In our clinic, US was the primary diagnostic tool in the first period but was replaced in the second period by CT for postoperative follow-up.

There is a wide spectrum of treatment possibilities, ranging from conservative treatment to radical surgical treatment. Recently, there have been important changes in the treatment of liver hydatid cyst, which previously was treated only surgically. Routine use of antihelminthic treatment before and after surgery, PAIR and laparoscopic surgical approaches in early-stage hydatid cysts may be considered as important developments [20, 21]. The main aim of the treatment of liver hydatid cyst is to keep the recurrence, morbidity and mortality rates as low as possible. The most important causes of local recurrence during liver hydatid cyst surgery are ineffective drainage of cyst fluid inside the cyst cavity during the operation and contamination of adjacent tissues with infected cyst fluid during the evacuation of the cyst. For the treatment of cyst fluid, povidone iodine and Ag nitrate were

previously used as scolicidal agents, though hypertonic solutions are presently preferred [22, 23]. In accordance with the literature, povidone iodine was used in more than half of the patients in the first period in our clinic, while hypertonic saline solutions were generally preferred in the second period. While there are studies mentioning the use of cetrimide and hydrogen peroxide, these agents have not been used by us.

After appropriate and effective treatment of the cyst cavity with scolex eliminating agent, one of the most important steps in the surgical treatment of liver hydatid cyst is the surgical treatment of the cyst cavity. The characteristics of the cysts (type, number, level of complication, connection with bile pathways), age of the patient, conditions and experience of the surgeon help to choose the technique. Independent of the technique, recurrence should be low, and mortality and morbidity should be acceptable [24]. It is remarkable that in the past, radical and obliterative conservative techniques were preferred [13, 25, 26], while nowadays non-obliterative conservative techniques are prevalent [13, 27, 28]. In conservative approaches, the cavity is minimized and closed (obliterative methods) or its entrance is opened wide and left to collapse and fill over time after its adventitia is excised. In radical treatments, the cyst is evacuated and may be taken out with an open or closed pericystectomy or with hepatectomy. Each technique has advantages and disadvantages. No single technique can be applied uniformly to all cysts; the selection must be made according to characteristics of each cyst [26].

In our experience, capitonnage and omentoplasty were the most preferred techniques in the first period, while partial cystectomy and leaving open to peritoneum were preferred in the second period. Radical surgical procedures with high mortality and morbidity were used previously, whereas in the second period, conservative methods were used more often. In some recent series, partial cystectomy is preferred especially in laparoscopic approaches [29]. Superiority of partial cystectomy includes its easy application, no requirement of extensive surgical experience, little possibility for collection in the cavity since a wide entrance is left, applicability to most of the cysts, and the cavities mostly collabate and fill over time. However, laparoscopic treatment is applied to grade 1 and 2 and, rarely, grade 3 cysts.

In our department, all cyst cases are discussed with the radiologists in the preoperative period regarding the possibility of PAIR treatment. Since treating early-stage cysts with PAIR is preferred in our clinic, the number of cases treated with laparoscopy was not as high as expected. We apply PAIR in type I and II cysts, which may be diagnosed by US, according to Gharbi classification. In cases where the cyst is larger than 6 cm, we place a pigtail catheter inside the cyst cavity after aspiration and remove it when the daily drainage is less than 10 cc [30].

Recent studies report that ERCP and sphincterotomy are useful in the diagnosis of biliary tract ruptures and for therapy of postoperative complications (bile leakage, biliary fistula, sclerosing cholangitis) [31]. There are also studies reporting that endoscopic sphincterotomy alone may be an alternative to surgery in selected cases [31, 32]. In our series, 5 cases which evidenced intrabiliary rupture in the preoperative period were treated with sphincterotomy alone. It is reported in the literature that different treatments such as T-tube drainage, suture to the bile pathway orifices or bilioenteric diversion may be applied to cases with rupture into the bile ducts [33, 34]. When we detected rupture into the bile ducts, we used the techniques mentioned in the literature, alone or in combinations, depending on the conditions. It has been noted in the literature that the most important disadvantage in case of rupture into the biliary tract is extended hospitalization [35]. In our series, mean hospital stay of cases without rupture was 7 (ranges 5-13) days compared with 15 (ranges 9-21) days for those with rupture.

One of the applications changing over time in hydatid cyst treatment is the medical treatment. There are many studies showing that pre- and postoperative use of mebendazole from the beginning of the ‘80s and albendazole in the following years decreased recurrence rates from 80% to 10% [8, 36, 37]. In accordance with the literature, chemotherapy with mebendazole was applied pre- and postoperatively in the first and albendazole in the second periods.

**In conclusion,** a variety of techniques, both radical and conservative, are used in the treatment of liver hydatid cyst. None of the techniques is applicable alone in the treatment of all cysts. Technique should be chosen based on the characteristics of each cyst. Cyst characteristics, experience of the surgeon and conditions of the medical center will be factors in the choice of the approach. A recent tendency is to prefer treatment of early stage cysts by methods with less morbidity such as PAIR or laparoscopy. For later stage cases, where these methods are not appropriate, non-obliterative surgical techniques should be preferred. But regardless of the surgical treatment used in liver hydatid cyst, combination with chemotherapy is the safest and most effective approach.

## Conflicts of interest

None to declare

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