

## Original Article

# Comparison of surgical procedures and percutaneous drainage in the treatment of liver hydatid cysts: a retrospective study in an endemic area

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**Abstract:** Introduction: Surgical procedures are still the golden standard option in the treatment of liver cystic echinococcosis. However, minimal invasive technics like percutaneous drainage are rising trends. We aimed to compare the efficacy of surgical and percutaneous options in the treatment of liver hydatidosis in an endemic area. Methods: Patients who underwent surgical or percutaneous procedures for hydatid disease between January 2007 and December 2012 were retrospectively evaluated. Recurrence rates, hospital stay time, and related factors were analyzed. Results: There were 44 (35.5%) male and 80 (64.5%) female patients in this study. Eighty two patients (Group I) had undergone surgery (66.1%) and 42 patients (Group II) had undergone percutaneous drainage (33.9%). The mean cyst size was  $7.28 \pm 2.51$  cm in Group I and  $8.76 \pm 3.30$  cm in Group II. Nine recurrences (7.3%) were detected during study. Five of the recurrences were in Group II (11.9%) and four (4.9%) of them were in Group I. The mean length of hospital stay of all patients was  $5.42 \pm 3.16$  days. Discussion: Percutaneous drainage techniques can be a good alternative to surgery in selected patients. In complicated cases like cystobiliary fistula, surgery is superior to percutaneous approaches. The hospital stay time, recurrence rate and postoperative complications were not enhanced when compared to percutaneous treatment in our study. Despite all controversy about the low morbidity after percutaneous treatment, surgical approach is still a preferable option in patients with liver hydatidosis when it is performed by experienced surgeons.

**Keywords:** Liver hydatid cyst, surgical treatment, percutaneous aspiration irrigation and reaspiration, recurrence

## Introduction

Cystic echinococcosis or hydatid disease, also known as hydatidosis, remains a significant public health problem in endemic areas such as Mediterranean countries, the Middle East, Australia and South America. Worldwide travelling and ongoing immigration lead the disease to spread through rarely seen regions like United States and Europe [1, 2]. Although liver (50-70%) is the most frequently infected organ, hydatid cysts (HC) can be developed in many other organs [3]. Hydatid cysts are generally asymptomatic. However, they can be infected or ruptured or can exert pressure to adjacent organs after reaching remarkable sizes [4, 5]. The rupture can cause anaphylaxis or dissemination [6].

Although symptomatic cysts should be treated, also the asymptomatic ones have to be consid-

ered for treatment because of the high risk of probable complications. Medical treatment, surgery and percutaneous approaches are the treatment choices [6].

In this study, we aimed to review all the patients with liver HC who underwent surgical treatment or percutaneous approaches respectively in order to determine the appropriate management.

## Methods

A hundred and twenty four patients diagnosed and underwent surgical or percutaneous treatment for HC in liver between January 2007 and December 2012 in Research and Teaching Hospital of Medicine School of Mustafa Kemal University were analyzed to determine the results of these procedures. Nine patients were excluded from the study because of the lack of

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**Table 1.** Patient and cyst characteristics

		Surgery	Percutan Drainage	Total	P
Sex	Male	27	17	44	> 0.05
	Female	55	25	80	
Mean Age (years)		44.62	51.83		> 0.05
Mean Cyst Size (cm)		7.28	8.76		> 0.05
Recurrence		4	5	9	> 0.05
Side	Right	Right	28	86	> 0.05
	Left		22	9	
	Bilobar		2	5	
Mean Hospital stay (day)		7.04	5.9		> 0.05

their data. Because the study was retrospective, we had no chance for randomization.

Before the treatment, all the diagnoses were confirmed by radiological examinations (ultrasonography and/or computed tomography) and casoni skin test. If there was a suspicion for cystobiliary fistula (CBF), magnetic resonance cholangiopancreatography (MRCP) was performed to investigate the biliary tree obstruction. All of the patients were treated with albendazol before (10-15 mg/kg/day in for 3 weeks) and after (10-15 mg/kg/day in courses of 3 months, separated by intervals of 1 week) the invasive approaches.

Patients were divided into two groups according to the type of therapeutic approach. Group I included patients with hepatic HC who had undergone surgery, radical or conservative, and Group II included patients who had undergone percutaneous drainage for HC.

### *Surgical technique*

Standard aseptic procedures were performed during laparotomy. Total/partial pericystectomy, unroofing and/or omentoplasty were the preferred procedures, and the appropriate technique was performed according to the characteristics of patient's cyst.

### *Percutaneous technique (PAIR)*

After the classifications of cysts with USG according to Gharbi, type I, II cysts and type III cysts with drainable matrices were thought to be candidates to percutaneous drainage. The first puncture was performed with 18-20-gauge needle under local anesthesia. Nearly entire fluid in cyst was aspirated and then 95% sterile

alcohol injection to cyst cavity was applied for 20 minutes to obtain scolecidal effect. The catheter was removed when the drainage was less than 30 cc per day.

### *Statistical analysis*

Statistical analyses were performed using the SPSS software version 15. The variables were investigated using visual (histograms, probability plots) and analytic (Kolmogorov-Simirnov/Shapiro-Wilk's test) tests to determine whether or not they were normally distributed. Descriptive analyses were presented using medians and interquartile range (IQR) for the non-normally distributed and ordinal variables. Since the hospital stay times were not normally distributed; nonparametric tests were conducted to compare these parameters, as well as to compare ordinal variables. The Mann-Whitney U test was used to compare hospital stay time and procedures between the groups. Recurrence rates according to procedure type were analyzed using Mc Nemar test. Cyst types and treatment options were compared using the Chi-square test. A P-value less than 0.05 was considered to show a statistically significant result.

### **Results**

There were 44 (35.5%) male and 80 (64.5%) female patients in this study and there were no statistically significant differences between surgery and percutaneous drainage groups according to sex ( $P > 0.05$ ). The mean age of patients was  $47.06 \pm 18.32$  years. The mean age of patients according to sex was nearly same and there were no statistically significant differences ( $P > 0.05$ ). Eighty two patients (Group I) had undergone surgery (66.1%) and 42 patients (Group II) had undergone percutaneous drainage (33.9%). The patients in Group II were older than the patients in Group I but there were no statistically significant differences between groups according to age ( $51.83 \pm 20.88$  years vs.  $44.62 \pm 16.47$  years,  $P > 0.05$ ). Most of the cysts were located in the right hepatic lobe (69.4%) and 7 of the patients had multiple cysts with bilobar location (**Table 1**).

The mean cyst size of all patients was  $7.88 \pm 2.88$  cm. The mean cyst size was  $7.28 \pm 2.51$  cm in Group I and  $8.76 \pm 3.30$  cm in Group II.

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**Table 2.** Gharbi Classification of cysts in 124 patients

Gharbi Classification	Surgery	Percutan Drainage
Type 1	17	17
Type 2	20	15
Type 3	35	8
Type 4	7	2
Type 5	3	0
	82	42

However there were no statistically significant differences between groups according to cyst size ( $P > 0.05$ ) (**Table 1**). On the other hand, the mean diameter of the cysts was  $7.56 \pm 2.63$  cm in patients with no HC recurrence and  $10.56 \pm 4.45$  cm in patients with recurrent diseases. The recurrence rate increased as the diameters of the cysts increased and there was a statistically significant difference in recurrence risk according to diameter ( $P < 0.05$ ).

All of the cysts were classified according to Gharbi classification of HC [7]. There were no statistically significant differences for both groups according to Gharbi classification (**Table 2**).

Five of 124 patients (4%) had HCs with biliary fistula. Surgical procedures were performed for cysts with fistula.

The patients were followed-up with a median time of 29 months (10.0-84.0 months). Within this period 9 recurrences (7.3%) were detected. Five of the recurrences were in Group II (11.9%) and four (4.9%) of them were in Group I. There were no statistically significant differences between groups according to recurrence. Three of the patients with recurrent cysts were reoperated and 5 of the cysts were drained percutaneously. One of the recurrent cysts was Type 5 according to Gharbi Classification at the time of detection. Because the cyst was inactive and small in size, no intervention was planned.

The mean length of hospital stay of all patients was  $5.42 \pm 3.16$  days (**Table 1**). Although this period was shorter in Group II there were no statistically significant differences between groups according to length of hospital stay.

One of the patients died 2 months after surgery. After radical excision of the cyst, a perihe-

patic abscess occurred and then several percutaneous drainages were performed. Despite aggressive treatment against infection, the patient died due to septic complications.

### Discussion

Echinococcosis is a zoonosis caused by *Echinococcus* spp. The oral intake of parasite eggs from a carnivore host causes the infection in human body. The intermediate hosts are live-stocks like sheep, cattle, horses, and goats and small carnivores are the definitive hosts. After the eggs are ingested from an infected dog or its contaminant environment by human, the hydatid cyst filled with larvae is formed. Liver is the most common localization for hydatid cyst. Lung, spleen, kidney, bone, and brain are the less frequent sites for HC [6, 8-10]. Hepatic hydatidosis, an uncommon entity in Western countries, is still a serious public health issue in the Eastern Regions and European Mediterranean areas [8].

Liver HC is usually asymptomatic but sometimes severe complications and even death can occur due to the rupture of the cyst. Small calcified cysts and serologically negative lesions can be followed without any invasive interventions. On the other hand, three modalities to treat liver HC are being used; chemotherapy, surgery, percutaneous drainage [11, 12]. Chemotherapy alone is not sufficient in the treatment of hydatidosis, but should be added to the preferred option to reduce the recurrence due to spillage of the cyst content during interventions [13]. The main goal of the treatment should be the elimination of the parasite without recurrence with minimal morbidity and mortality. Although surgical procedures have been the golden standard option for HC, there is still an ongoing controversy about the optimal way of surgery. Treatment modality should be selected for each patient individually according to patient condition and nature of the cyst. Patient preference, age, pregnancy, concomitant diseases that pose a risk for surgical interventions are the patient related factor in treatment planning [5, 11]. The nature of the cyst should be examined carefully before any intervention. The ultrasonographic classification is very important. Gharbi Classification is used to demonstrate the type of the cyst in our clinic. The size, number, localization of the cysts and any associated complications should also be

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evaluated. However, percutaneous drainage of the cysts is the new trend nowadays. On the other hand, all of these treatment options have risk for recurrence with varied percentages.

The overall postoperative recurrence rate of HC is about 1% to 25% [12, 14-16]. Radical surgery, pericystectomy or liver resection, has lower risk of recurrence than conservative procedures (partial cystectomy, unroofing, capitonnage, omentoplasty). Surgical procedures can be performed by a conventional open or laparoscopic approach. We prefer conventional open techniques for surgical interventions. Radiological scanning, clinical and serologic evaluation are used to evaluate relapses. Although more radical procedures are usually preferred after recurrence, percutaneous drainage can be performed in patients with simple cysts and with increased risk for mortality and morbidity as an alternative approach to radical surgery.

One of the most popular percutaneous techniques, PAIR (Puncture, Aspiration, Injection, and Re-Aspiration), has similar relapse reports as radical surgery in numerous studies [17, 18]. After the first puncture and aspiration, alcohol and/or hypertonic saline solution are used to eliminate the scolices. The scolicial agent is usually released for 30 minutes before aspiration. Although surgical recurrence rate was lower than PAIR's in our study, there was no statistically significant difference. The small sample size might affect the statistical analysis. Some possible factors effecting relapses are the type, number, size and localization of the cysts. All these criteria were similar in our study.

Most of the data about liver hydatidosis shows that majority of HCs are uncomplicated cysts and percutaneous drainage procedures are superior than surgical procedures with less morbidity, mortality, decreased hospital stay and cost effectiveness. The length of hospital stay differs in various studies due to the technique of percutaneous approach (1-4 days). Our patients stayed for about 6 days after percutaneous drainage. This duration seems to be prolonged, but we kept patients until the free drainage decreased to 10-30 ml/day. On the other hand, length of hospital stay after surgical treatment differs from 6 to 15 days in numerous studies. Patients who had undergone surgical procedures for HC stayed in hospital with a mean time of 7.04 days in our study.

Although there are some studies that report shortened hospital stay after PAIR than surgical intervention, no superiority was detected in our study [9, 19-20].

One of the most seen complications of HC is intrabiliary rupture with an incidence of 1-25%. Occult intrabiliary ruptures can be detected with higher incidence up to 80-90%. Although small ruptures are usually asymptomatic, cholangitis and obstructive jaundice, acute or chronic pancreatitis, and detection of germinative membrane in feces can be seen in frank cystobiliary fistula. Cystobiliary fistula is hard to diagnose especially in nonendemic areas. Computed tomography and ultrasonography are useless in most of the cases with occult CBF. However, a discontinuity of the cyst wall and dilatation of common biliary duct (CBD) may suggest a fistula between cyst and biliary tree. Magnetic resonance imaging has more power to reveal the fistula [3, 21, 22].

If CPS is detected before surgery, endoscopic retrograde cholangiography (ERC) and sphincterotomy can be performed to extract cyst content from biliary tract. This procedure can also help to close the fistula by reducing intrabiliary pressure. Despite all preoperative tests, some of the CBFs can be detected during surgical or percutaneous initiation. Visualization of bile leak from an orifice, bile-stained cystic fluid, dilated CBD can be detected during surgery and/or percutaneous drainage. However, because the pressure in cyst is usually higher than biliary tract, preoperative detection of the bile leakage is hard to realize. Suturing the orifice should be performed, if possible, when the rupture is detected during surgery. In cases of CBF suspicion, exploration of choledochus and T-tube drainage of CBD can be performed. Choledochoduodenostomy is another option especially in cases with remarkable enlargement in CBD. On the other hand, postoperative (ERC) can be performed. Sphincterotomy, nasobiliary drainage or stent applications can be performed alone or in combination. All of these drainage procedures decrease intrabiliary pressure and with the decrease of the pressure fistula closure can be provided [23-25]. Two of 5 patients with CBF were treated with choledochus exploration and T-tube drainage, and postoperative ERC + sphincterotomy was performed for 3 patients in our study.

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Mortality ranges 0% to 3.4% after surgical treatment of HC in literature. Mortality and morbidity are remarkably higher with radical procedures than conservative surgical options. Most of the reported deaths are related to patient condition, postoperative septic complications (e.g. abscess in remaining cyst cavity) and anaphylaxis due to cyst perforation [26-28]. One case (2.5%) of postoperative mortality was recorded in our study. The patient died after septic complications.

Percutaneous drainage techniques can be a good alternative to surgery in patients with univesicular, uncomplicated Gharbi type I, II, and selected Gharbi type III cysts and in patients with comorbidities. However, surgery is superior to percutaneous approaches in complicated cases. The hospital stay time, recurrence rate and postoperative complications were not enhanced when compared to percutaneous treatment in our study. So, surgical approach is still a preferable option in patients with liver hydatidosis when it is performed by experienced surgeons.

### Disclosure of conflict of interest

None.

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