ORIGINAL ARTICLE

Management of complicated hepatic hydatid cysts: Our single-center experience

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ABSTRACT

BACKGROUND: This study aims to evaluate preoperative laboratory and radiological findings in patients with hydatid cysts to predict the severity of postoperative complications and identify markers of clinical deterioration. The goal is to refine treatment strategies, optimize clinical decision-making, and improve postoperative quality of life in the management of complicated hydatid disease.

METHODS: This retrospective study included 74 patients who underwent surgical treatment for hydatid disease at our institution between September 2016 and September 2021. Patients with high American Society of Anesthesiologists (ASA) scores or hepatic lesions other than hydatid cysts were excluded. Based on the Clavien-Dindo classification, patients were categorized into two groups: Group 1 (mild complications) and Group 2 (severe complications). All patients received preoperative and postoperative albendazole therapy (15 mg/kg/day). Clinical, demographic, laboratory, and imaging data, along with cyst characteristics, surgical approach, complications, and postoperative morbidity, were analyzed to identify predictive factors for outcomes and complications.

RESULTS: Data from 74 patients who underwent surgery for hydatid disease were analyzed, with a median age of 43 years. The cohort was divided into two groups based on the Clavien-Dindo classification: Group 1 (mild complications, 81%) and Group 2 (severe complications, 19%). Statistically significant differences were observed in preoperative alkaline phosphatase (ALP) and hemoglobin (HGB) levels between the two groups ($p<0.05$). Most patients in Group 1 had simple cysts, while Group 2 showed a higher incidence of complicated cysts ($p=0.023$) and biliary fistulas ($p=0.01$). Postoperative complications, including percutaneous drainage, readmissions, and the need for endoscopic retrograde cholangiopancreatography (ERCP), were more frequent in Group 2 ($p<0.001$). Imaging modalities such as ultrasonography, computed tomography (CT), and magnetic resonance imaging (MRI) identified biliary involvement as a significant predictor of severe morbidity. Additionally, elevated preoperative ALP levels (≥133 U/L) were found to be a significant risk factor for postoperative morbidity. Receiver operating characteristic (ROC) analysis showed that an ALP level ≥133 U/L had a sensitivity of 64.29% and a specificity of 86.67%, with an area under the curve (AUC) of 0.805. These findings underscore the importance of specific clinical and laboratory markers in predicting postoperative outcomes in hydatid disease surgery.

CONCLUSION: Effective management of liver hydatid cysts requires a multidisciplinary approach, combining surgical expertise, pharmacological treatment, and a comprehensive understanding of disease pathophysiology. Continued research is essential to refine treatment protocols, enhance surgical outcomes, and improve patients' quality of life. Our findings emphasize that specific clinical factors, such as cyst type, need for postoperative drainage, hospital readmissions, length of hospital stay, preoperative ALP levels ≥133 U/L, and biliary system involvement, are significant predictors of postoperative morbidity in patients undergoing surgery for hydatid disease.

Keywords: Hydatid cyst; echinococcosis; complicated hydatid cysts; biliary fistula.

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INTRODUCTION

The surgical management of hepatic hydatid cysts, a clinical manifestation of cystic echinococcosis caused by Echinococcus granulosus, remains a critical aspect of hepatobiliary surgery. The liver is the most commonly affected organ, and hydatid cysts pose a significant public health challenge, particularly in endemic regions where the parasite's life cycle is closely associated with livestock farming and agricultural activities.[1,2] Treatment involves a range of surgical techniques tailored to the cyst's size, location, and associated complications. Approaches vary from minimally invasive methods, such as puncture-aspiration-injection-reaspiration (PAIR) and cyst deroofing, to more extensive procedures like pericystectomy and lobectomy. The choice of surgical technique is guided by the severity of the disease and the extent of organ involvement, with the aim of achieving optimal clinical outcomes while minimizing postoperative morbidity.[3,4] The management of liver hydatid disease encompasses a spectrum of surgical approaches, ranging from conservative to more radical interventions. Conservative surgeries, which typically involve less extensive procedures, aim to preserve liver function but may be associated with a higher incidence of postoperative complications, such as biliary leakage and recurrent cyst formation. In one study, biliary leakage occurred in 36 out of 186 patients (19.4%) with solitary liver hydatid cysts who underwent conservative surgery[2] In contrast, radical surgical options, such as pericystectomy or hepatic resection, have been shown to result in lower recurrence rates, making them the preferred choice for larger or more complicated cysts.[1,5] Early recognition of complications, including cyst rupture or infection, requires prompt surgical intervention to prevent serious outcomes, underscoring the importance of thorough preoperative planning and vigilant postoperative surveillance.[6,7] One study noted that approximately one-third of patients with hepatic cystic echinococcosis develop complications, including cyst rupture, secondary infections, and anaphylaxis.[8] Moreover, the incidence of intrabiliary rupture in hepatic hydatid cysts ranges from 2% to 42%, significantly increasing the risk of cholangitis and other biliary complications.[8] Additionally, combining surgical treatment with pharmacological therapy, using albendazole or mebendazole, has been shown to improve treatment outcomes, highlighting the benefits of adjunctive medical management.[5,9] Prompt identification and management of these complications are essential, as they substantially contribute to postoperative morbidity and prolonged recovery times.[10,11] This study aims to present our single-center experience in the surgical management of hepatic hydatid disease, with a particular focus on complex cases. We evaluate preoperative laboratory and radiological findings to predict the severity of postoperative complications and to identify parameters indicative of clinical deterioration. These insights aim to refine treatment strategies and improve patient outcomes in the management of complicated hydatid disease.

MATERIALS AND METHODS

This study included 74 patients who underwent surgical treatment for hydatid disease at our institution between September 2016 and September 2021. Patients with significant morbidities who were deemed unfit for general anesthesia, defined by a high ASA (American Society of Anesthesiology) score, and those with hepatic lesions other than hydatid cysts were excluded from the analysis.[12] Patients were categorized into two groups based on the Clavien-Dindo classification: Group 1 (mild complications) and Group 2 (severe complications). The study protocol was approved by the Local Ethics Committee under protocol number 2021/351, granted in October 2021. This study was conducted in accordance with the principles of the Declaration of Helsinki. Patients diagnosed with hydatid disease based on clinical evaluation, biochemical markers, and radiological imaging were included in the study. Imaging modalities, including ultrasonography (USG), computed tomography (CT), and magnetic resonance imaging (MRI), were used to assess the size, number, and anatomical location of the cysts.

A total of 74 patients were retrospectively analyzed, including 40 males (54%) and 34 females (46%). Patient ages ranged from 18 to 88 years, with a mean age of 43 years. Based on the Clavien-Dindo classification for postoperative complications, patients were divided into two groups: Group 1 (mild complications, Clavien-Dindo Grades I-II, n=60, 81%) and Group 2 (severe complications, Clavien-Dindo Grades III-V, n=14, 19%). The Clavien-Dindo classification, widely used in clinical research, categorizes postoperative complications based on the type of treatment required. All patients with active cysts received albendazole (15 mg/kg/day) for 2-3 weeks preoperatively, followed by a postoperative course of 4-12 weeks to reduce the risk of recurrence.

Patients were evaluated based on demographic and clinical findings, including age groups, presenting complaints, prior medication history (with a focus on albendazole use), comorbidities, and ASA grade (American Society of Anesthesiologists' physical status classification). These parameters were also compared between groups. Laboratory parameters assessed included white blood cell count (WBC; $10^3/\mu L$), hemoglobin (HGB; g/dL), platelet count (PLT; per μL), C-reactive protein (CRP; mg/L), indirect hemagglutination assay (IHA), aspartate aminotransferase (AST; U/L), alanine aminotransferase (ALT; U/L), alkaline phosphatase (ALP; U/L), gamma-glutamyl transferase (GGT; U/L), and bilirubin levels (mg/dL). Serological results and imaging findings from ultrasonography, computed tomography, and magnetic resonance imaging were also evaluated. Imaging assessments were conducted in accordance with the World Health Organization (WHO) and Gharbi classification criteria. Additional factors analyzed included cyst type (simple or complicated), size, localization, surgical approach (laparoscopic or open), operation time, length of hospital stay, postoperative readmission, and recurrence. Both early and late postoperative complications were

reviewed, including abscess formation, bile leakage, signs of bile leakage through the drain, management of bile leakage (e.g., endoscopic retrograde cholangiopancreatography (ERCP) or external drainage). Readmission rates and overall treatment outcomes were also analyzed. Postoperative morbidity (according to the Clavien-Dindo classification) and mortality rates were evaluated.

Statistical Analysis

The distribution of the data was assessed using the Shapiro-Wilk test. Comparisons between two independent groups with normally distributed data were performed using the T-test, while comparisons involving two independent groups with non-normally distributed data were conducted using the Mann-Whitney U test. Pearson's Chi-square test, Fisher's Exact test, and the Fisher-Freeman-Halton test were used to evaluate differences between categorical variables. To assess the effects of independent variables on dependent variables, univariable and multivariable logistic regression analyses were performed using the Enter and Forward Likelihood Ratio (LR) methods, respectively. Receiver Operating Characteristic (ROC) analysis was used to determine the cutoff value for significant numerical variables identified in the regression analysis. Descriptive statistics were presented as mean ± standard deviation or median (min-max) for continuous variables, and as n (%) for categorical variables. All statistical analyses were performed using SPSS Statistics version 26.0 (IBM Corporation, Armonk, New York, USA), with a significance level set at $p<0.05$.

RESULTS

A total of 74 patients underwent surgical treatment for hydatid cysts. The female-to-male ratio was 34:40 (45.9% and 44.1%, respectively), with a median age of 43 years (range: 18-88 years). Patients were divided into two groups according to the Clavien-Dindo Comorbidity Index (as defined [13]: Group 1, comprising 60 patients (81%), and Group 2 comprising 14 patients (19%). In Group 1, 34 patients (85%) were male, while in Group 2, six patients (15%) were male. Conversely, 26 patients (76.5%) in Group 1 were female, compared to eight patients (23.5%) in Group 2. When comparing the groups, the median age was 36.5 years (range: 18-84 years) in Group 1 and 51.50 years (range: 23-88 years) in Group 2. The ASA score, which evaluates a patient's overall physical status to determine surgical and anesthetic risk, was used for preoperative patient classification (Table 1).[12] The most common presenting symptom related to hydatid disease was nausea and vomiting, reported by 36 patients (48.6%). Clinical signs of complicated cysts included jaundice in nine patients (12.2%), cholangitis in two patients (2.7%), an irritating cough related to thoracic fistula in two patients (2.7%), and fever in one patient (1.4%)

Blood test results were compared between the two groups (mild and severe). Preoperative ALP (U/L) and HGB (g/dL) levels were found to be statistically significant ($p<0.001$ and $p=0.020$, respectively). However, no statistically significant differences were observed in the other parameters, including WBC (10^3/μL), PLT (/μl), CRP (mg/L), IHA, AST (U/L), ALT (U/L), GGT (U/L), and bilirubin (mg/dL) ($p>0.05$) (Table 2).

According to the type of surgical procedure, 28 patients (37.8%) were treated using a laparoscopic approach, while 36 patients (48.6%) underwent open surgical techniques, including total pericystectomy, partial cystectomy, and, in a few cases, liver resection (anatomic or non-anatomic; two patients, 2.7%) due to recurrence and complicated disease.

Table 1. Clavien Dindo classification: comparison between Group 1 (mild) and Group 2 (severe)

	Group 1 (Mild) (n=60)	Group 2 (Severe) (n=14)	Total (Number)
Age	36.50 (18-84)	51.50 (23-88)	
Gender			
Male	34 (85%)	6 (15%)	40 (100%)
Female	26 (76.5%)	8 (23.5%)	34 (100%)
Total	60 (81%)	14 (19%)	74 (100%)
*Values are presented as n (%) or median (min-max).			
ASA Score			
ASA I			37 (50.7%)
ASA II			30 (41.1%)
ASA III			6 (8.2%)
Length of Hospital Stay (days)			6.61±4.01 (2-23)
USG (cyst size in mm)			102.51±46.43 (40-250)

*Data are presented as frequency and percentage or mean ± standard deviation (min-max).

Table 2. Laboratory parameters and their association with postoperative morbidity

	Group 1 (Mild)	Group 2 (Severe)	p-value
WBC (103/µL)	9.02±2.74	8.78±2.83	0.765
HGB (g/dL)	12.79±1.77	11.50±2.01	0.020
PLT (/µl)	239.50 (100-446)	263 (105-527)	0.634
CRP (mg/L)	4.12 (0.02-132)	2.33 (0.02-116)	0.544
AST (U/L)	24 (10-427)	29.50 (9-129)	0.689
ALT (U/L)	26.50 (6-645)	36.50 (10-154)	0.907
ALP (U/L)	74 (15-288)	160.50 (64-536)	<0.001
GGT (U/L)	33 (11-420)	92 (12-189)	0.197
Total Bilirubin (mg/dL)	0.56 (0.18-5.15)	0.52 (0.16-21.10)	0.972
Direct Bilirubin (mg/dL)	0.24 (0.10-3.88)	0.28 (0.11-16.10)	0.485

*Values are expressed as n (%) or median (min-max).

Among patients with complicated disease (28 patients, 38%), those with cyst localization-related complications, such as biliary or lung fistulas, were managed with ERCP, external bile drainage, or partial lung resection (four patients, 5.4%). Additionally, two patients underwent splenectomy due to massive cyst size and localization leading to invasion of the splenic vasculature. In both surgical approaches, sterilization of the echinococcal cyst was performed using 20% hypertonic saline, which was left inside the cyst cavity for a minimum of 10 minutes. Drapes soaked in hypertonic saline were also placed in the surgical field to prevent peritoneal contamination in the event of cyst fluid spillage. Following this preparation, the definitive surgical procedure was carried out.

The length of hospital stay (in days) differed significantly between the groups, with Group 1 showing a shorter duration. However, there was no association between the groups in terms of albendazole use or mortality rate (p>0.05). Preoperative imaging methods were also evaluated for evidence of biliary system involvement. Biliary involvement, as detected by ultrasonography, computed tomography, and magnetic resonance imaging, was found to be statistically significant and more

Table 3. Factors related to postoperative morbidity: preoperative imaging and biliary system involvement

	Group 1 (Mild)	Group 2 (Severe)	p-value
Albendazole Usage			
Absent	2 (100%)	0 (0%)	1
Present	58 (80.6%)	14 (19.4%)	
Mortality			
Absent	58 (80.6%)	14 (19.4%)	1
Present	2 (100%)	0 (0%)	
Length of Hospital Stay (days)	5 (2-23)	9.50 (4-20)	0.001
USG			
Involvement -	42 (75%)	6 (42.9%)	0.028
Involvement +	14 (25%)	8 (57.1%)	
Computed Tomography			
Involvement -	45 (80.4%)	5 (38.5%)	0.005
Involvement +	11 (19.6%)	8 (61.5%)	
MRI			
Involvement -	28 (75.7%)	2 (22.2%)	0.005
Involvement +	9 (24.3%)	7 (77.8%)	

*Values are expressed as n (%) or median (min-max).

Table 4. Imaging findings: cyst size, number of cysts, World Health Organization (WHO) and Gharbi classifications

	Group 1 (Mild)	Group 2 (Severe)	p-value
USG			
<5 cm	4 (100%)	0 (0%)	0.707
5-10 cm	24 (82.8%)	5 (17.2%)	
>10 cm	32 (78%)	9 (64.3%)	
Number of Lesions (USG)			
1 lesion	30 (76.9%)	9 (23.1%)	0.451
2 lesions	16 (80%)	4 (20%)	
>2 lesions	14 (93.3%)	1 (6.7%)	
WHO Classification (CT)			
CE 1	3 (100%)	0 (0%)	0.081
CE 2	18 (94.7%)	1 (5.3%)	
CE 3	21 (65.6%)	11 (34.4%)	
CE 4	14 (87.5%)	2 (12.5%)	
CE 5	4 (100%)	0 (0%)	
Gharbi Classification (CT)			
Type 1	4 (100%)	0 (0%)	0.339
Type 2	16 (80%)	4 (20%)	
Type 3	36 (83.7%)	7 (16.3%)	
Type 4	3 (50%)	3 (50%)	
Type 5	1 (100%)	0 (0%)	

*Values are expressed as n (%) or median (min-max).

frequently associated with complicated disease, particularly in Group 2. However, findings from endoscopic ultrasound (EUS) and endoscopic retrograde cholangiopancreatography did not show a statistically significant difference between the groups (p=0.524) (Table 3). Groups were further compared based on cyst size, the number of lesions, and WHO classification. No statistically significant differences were found between the groups for these parameters (Table 4).

According to Table 5, patients in Group 1 generally presented with simple cysts, whereas Group 2 showed a higher tendency to develop complicated cysts (p=0.023). Additionally, biliary fistula was more commonly observed in Group 2 (p=0.01). Group 2 also exhibited significantly higher rates of biliary fistula, postoperative percutaneous drainage, and readmission (p=0.023, p=0.001, and p<0.001, respectively). There were no statistically significant differences between the groups in terms of cyst localization or the need for postoperative ERCP. Hydatid disease was confined to the liver in 68 patients (91%), while the remaining six patients had involvement of other organs (lung in four cases, spleen in two cases).

Risk factors associated with postoperative morbidity, as measured by the Clavien-Dindo Postoperative Morbidity Index, were analyzed using univariable logistic regression. Statistically significant factors (p<0.05) were identified. The risk of morbidity increased with biliary involvement detected via imaging (by 4 times with USG, 6.5 times with CT, and 10 times with MRI). Cyst classification was also a contributing factor, with morbidity being 3.8 times higher in patients with complicated cysts. Other significant predictors of increased morbidity included biliary fistula (11-fold increase), percutaneous drainage (9-fold increase), readmission (15-fold increase), and cholangitis (6-fold increase) (Table 6). Preoperative elevation of ALP levels (≥133 U/L) in blood serum was also identified as a risk factor associated with high morbidity, increasing morbidity risk by approximately 1-fold. Conversely, higher HGB levels (g/dL) were found to be protective, reducing the risk of postoperative morbidity by 31.9%. When the significant variables from the univariable logistic regression were included in the multivariable logistic regression model, postoperative percutaneous drainage was associated with a 25 times higher risk of morbidity compared to patients who did not require drainage. Similarly, elevated preoperative ALP levels (≥133 U/L) were identified as a risk factor, increasing the morbidity risk by 1.019 times (Table 6).

Based on ROC analysis, the cutoff value for preoperative ALP (U/L) levels, determined using the Youden J index, was found to be ≥133 U/L. Therefore, patients classified as Group 2 under the Clavien-Dindo Morbidity Index who had preoperative ALP (U/L) levels equal to or above this threshold were associ-

Table 5. Comparison between groups: cyst classification and localization, postoperative recurrence, biliary fistula, endoscopic retrograde cholangiopancreatography (ERCP), percutaneous drainage, and readmission

	Group 1 (Mild)	Group 2 (Severe)	p-value
Cyst Classification			
Simple	41 (68.3%)	5 (35.7%)	0.023
Complicated	19 (31.7%)	9 (64.23%)	
Cyst Localization			
Segment I	3 (5%)	2 (14.3%)	0.313
Left Liver Lobe	15 (25%)	1 (7.1%)	
Right Liver Lobe	34 (56.7%)	8 (57.1%)	
Both Liver Lobes (Right and Left Lobes)	7 (11.7%)	3 (21.4%)	
Recurrence			
Absent	52 (86.7%)	12 (85.7%)	1
Present	8 (13.3%)	2 (14.3%)	
Biliary Fistula			
Absent	55 (91.7%)	7 (50%)	0.001
Present	5 (8.3%)	7 (50%)	
Postoperative ERCP			
Sphincterotomy Only	0 (0%)	2 (25%)	
Sphincterotomy + Other Procedure	4 (100%)	6 (75%)	0.515
Percutaneous Drainage			
Absent	50 (83.3%)	5 (35.7%)	0.001
Present	10 (16.7%)	9 (64.3%)	
Readmission			
Absent	43 (71.7%)	2 (14.3%)	
Present	17 (28.3%)	12 (85.7%)	<0.001

Table 6. Univariable and multivariable logistic regression analysis results

	Univariable Binary Logistic Regression				Multivariable Binary Logistic Regression			
Dependent Variable: CI	β	**S.E.**	**OR (95% CI)**	**p-value**	β	**S.E.**	**OR (95% CI)**	**p-value**
HGB (g/dL)	-0.384	0.174	0.681 (0.485-0.957)	0.027				0.122
ALP (U/L)	0.014	0.005	1.014 (1.005-1.024)	0.004	0.018	0.007	1.019 (1.004-1.033)	0.018
USG								
(Biliary Involvement)	1.386	0.622	4 (1.182-13.537)	0.028				0.404
CT								
(Biliary Involvement)	1.876	0.662	6.5 (1.789-23.953)	0.005				0.320
MRI								
(Biliary Involvement)	2.388	0.889	10.88 (1.908-62.144)	0.007				0.057
Cyst Classification								
(Simple vs. Complicated)	1.357	0.623	3.88 (1.146-13.171)	0.029				0.570
Biliary Fistula	2.398	0.710	11 (2.736-44.220)	0.001				0.086
Percutaneous Drainage	2.197	0.657	9 (2.485-32.594)	0.001	3.220	1.387	25.038 (1.652-37.492)	0.020
Readmission	2.720	0.816	15.17 (3.068-75.079)	0.001				0.534
Cholangitis	1.844	0.657	6.32 (1.744-22.934)	0.005				0.790

*Univariable Logistic Regression Overall Significance: p<0.001 (Method: Enter). ** Multivariable Logistic Regression Overall Significance: p<0.001 (Method: Forward Likelihood Ratio [LR]).

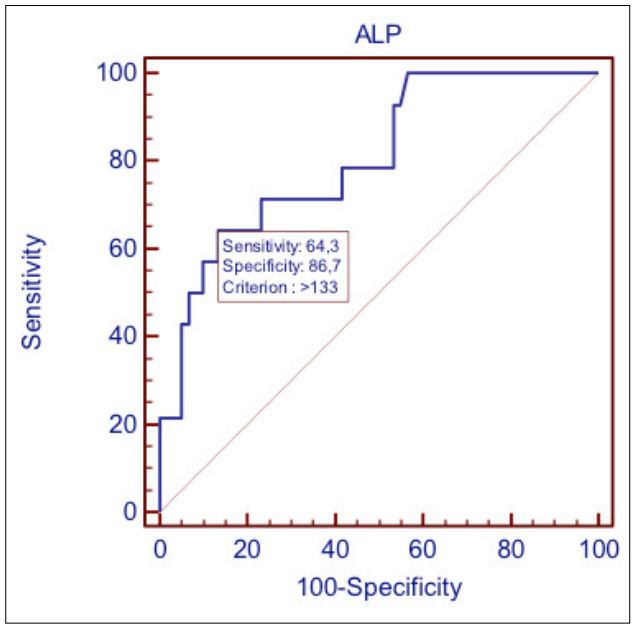

Figure 1. Cut-off values and coordinates of the receiver operating characteristic (ROC) curve for alkaline phosphatase (ALP, U/L)

ated with higher postoperative morbidity. In conclusion, the ROC analysis for preoperative ALP levels (≥133 U/L) yielded an area under the curve (AUC) of 0.805, with a sensitivity of 64.29% and a specificity of 86.67% ($p<0.001$) (Fig. 1).

DISCUSSION

Echinococcosis is an endemic disease, and the treatment approach depends on multiple factors, including cyst location, classification based on imaging techniques (according to WHO and Gharbi classification),[14] the presence of complications, and the patient's overall medical condition. It is essential to determine whether other diseases or lesions accompany the hydatid cyst. Surgical intervention is performed when indicated, with the choice of procedure guided by the cyst's characteristics. Commonly performed procedures include cystotomy and drainage, cystotomy with pericystectomy, and lateral segmentectomy for cysts located in the lateral segments of the liver.[15] In this study, we evaluated postoperative morbidity and its associated risk factors in patients who underwent surgery for hydatid disease in our clinical practice.

Pharmacological monotherapy is indicated in cases of liver hydatid cysts and is typically used as an adjunct to surgical treatment. Albendazole, administered at a dosage of 10-15 mg/kg daily, is generally well tolerated, although rare cases of liver injury have been reported. Therefore, it is recommended to monitor liver enzyme levels during treatment. The primary goal of albendazole therapy is to reduce the risk of recurrence following surgery. Medical treatment is generally not indicated for inactive or heavily calcified cysts, or in patients with chronic liver disease.[16] Another treatment option is the PAIR technique (puncture, aspiration, injection of 95% ethanol or hypertonic saline solution, and respiration), which is recommended by the World Health Organization – Informal Working Group on Echinococcosis (WHO-IWGE) for CE1, CE2, and CE3 stages of hepatic hydatid disease. However, PAIR is typically not sufficient as a standalone treatment, and surgical intervention remains the cornerstone of treatment.[17] The primary objective of treatment is to prevent secondary infections and complications, such as fistulization into adjacent organs, rupture into the peritoneal cavity, and anaphylactic reactions.

Various surgical techniques or hydatid cyst management have been described in the literature, including both laparoscopic and conventional open approaches. Currently, minimally invasive surgical procedures are gaining popularity. Laparoscopic management allows for cyst sterilization, removal using an endobag, and effective hemostasis. This approach typically involves total or partial pericystectomy, aspiration of cyst contents, cyst deroofing, and omentoplasty.[18] In this study, 29 patients (39%) were treated laparoscopically, following the principles of conventional surgical methods. The procedure included inactivating scolices with 20% hypertonic saline, aspirating the cyst contents, deroofing the cavity, evacuating all materials, and performing omentoplasty. At the end of both laparoscopic and open procedures, bile leakage was checked. If detected, bile duct suturing was performed (in 10 patients, 13.5%).

Endoscopic retrograde cholangiopancreatography was used as the first-line treatment for patients who developed postoperative biliary fistulas, which were identified either through drain output or clinical findings, although not all complicated cysts required ERCP. The ERCP procedures included sphincterotomy alone (12 patients), sphincterotomy with stent placement (10 patients), and sphincterotomy with membrane extraction (two patients). Follow-up included laboratory tests and imaging studies, with particular attention to cholestatic parameters such as ALP, GGT, and total and direct bilirubin, as well as ultrasonography. If persistent bile leakage occurred despite the ERCP procedure, patients were treated with percutaneous biliary system drainage (internal or external). The percutaneous drain could be left open or temporarily closed to create a pressure gradient within the cyst cavity following ERCP. Depending on the amount and nature of the drainage, the drain was typically removed within 14 to 21 days.

Postoperative morbidity and mortality are significant public health concerns worldwide. Each year, more than 300 million surgical procedures are performed globally, with postoperative complications and morbidity representing a substantial burden.[19] The Clavien-Dindo classification provides a standardized method for categorizing postoperative complications based on their severity and any deviation from the expected postoperative course. In our study, patients were divided into two groups: Group 1 (Mild) and Group 2 (Severe). Group 1 included patients classified as Clavien-Dindo

Grades I-II (60 patients, 81%), while Group 2 included those classified as Grades III-V (14 patients, 19%). Risk factors contributing to postoperative morbidity were evaluated and compared between these groups.

Patients in Group 1 generally had simple cysts compared to those in Group 2. Cases involving complicated cysts were associated with longer hospital stays. Complicated cysts increased postoperative morbidity by 3.8 times, primarily due to biliary system involvement, where detection of such involvement was associated with an 11-fold increase in morbidity. Additionally, postoperative abscess formation or recurrence can occur during the disease course. In cases where percutaneous drainage was performed postoperatively, the morbidity rate was nine times higher. Furthermore, the number of readmissions and the presence of cholangitis, if present, increased morbidity by 15 times and 6 times, respectively. It can be concluded that the preoperative ALP level (U/L), with a cutoff value of ≥133 U/L when detected in blood serum, was also identified as a risk factor for high morbidity, increasing the risk by approximately 1-fold. Conversely, the HGB level (g/dL) was identified as a protective factor, associated with lower postoperative morbidity and reducing the risk by 31.9%.

In our study, both groups showed a similar distribution of cyst types according to imaging modalities, with CE2, CE3, CE4, and Gharbi Types 2, 3, and 4 being the most frequent. When biliary system involvement was identified on imaging, complicated disease and high postoperative morbidity significantly increased. The risk was elevated by 4 times with ultrasonography, 6.5 times with computed tomography, and 10 times with magnetic resonance imaging. This trend can be attributed to the increased diagnostic accuracy provided by advanced imaging modalities.

In cases of complicated hydatid cysts, adopting disease-stage-specific strategies within a multidisciplinary approach can help reduce morbidity and mortality, as observed in our single-center experience. Our findings indicate that among patients undergoing surgery for hydatid disease, several factors significantly predict postoperative morbidity. These include cyst type, the need for postoperative percutaneous drainage, number of readmissions, length of hospital stay, elevated preoperative ALP levels (≥133 U/L), and especially biliary system involvement. Complicated cysts increased the risk of morbidity by 3.8 times, while biliary system involvement raised it by 11 times. Percutaneous drainage was associated with a 9-fold increase in risk, and readmissions raised the risk by 15 times. The presence of cholangitis increased morbidity risk by 6 times. Additionally, the risk of complications increased by 4 times with ultrasound, 6.5 times with computed tomography, and 10 times with magnetic resonance imaging.

CONCLUSION

The effective management of liver hydatid cysts requires a multidisciplinary approach that integrates surgical expertise, pharmacological therapy, and a thorough understanding of the disease's pathophysiology. Continued research and clinical advancements are essential to optimize treatment strategies, improve surgical outcomes, and enhance the quality of life for affected patients. Our findings highlight that specific clinical factors—such as cyst type, the need for postoperative percutaneous drainage, the number of hospital readmissions, the length of hospital stay, elevated preoperative ALP levels (≥133 U/L), and particularly biliary system involvement—are significant predictors of postoperative morbidity in patients undergoing surgery for hydatid disease.

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ORİJİNAL ÇALIŞMA - *ÖZ*

Komplike karaciğer kist hidatiğinde yönetim: Tek merkez deneyimimiz

AMAÇ: Bu çalışma, hidatik kistli hastalarda preoperatif laboratuvar ve radyolojik bulguları değerlendirerek, postoperatif komplikasyonların şiddetini tahmin etmeyi ve klinik kötüleşme belirteçlerini tanımlamayı amaçlamaktadır. Elde edilecek bulguların, tedavi stratejilerinin iyileştirilmesine, klinik karar verme süreçlerinin optimize edilmesine ve komplike hidatik hastalığın yönetiminde postoperatif yaşam kalitesinin artırılmasına katkı sağlaması beklenmektedir.

GEREÇ VE YÖNTEM: Eylül 2016 ile Eylül 2021 tarihleri arasında kurumumuzda hidatik hastalık nedeniyle cerrahi geçirmiş 74 hasta çalışmaya dahil edildi. Yüksek ASA skoru ve hidatik kist dışında karaciğer lezyonları olan hastalar çalışma dışında tutuldu. Hastalar, Clavien-Dindo sınıflamasına göre iki gruba ayrıldı: Grup 1 (hafif komplikasyonlar) ve Grup 2 (şiddetli komplikasyonlar). Tüm hastalara preoperatif ve postoperatif dönemde albendazol (15 mg/kg/gün) tedavisi uygulanmıştır. Klinik, demografik, laboratuvar ve görüntüleme verileri, kist özellikleri, cerrahi yaklaşım, komplikasyonlar ve postoperatif morbidite, sonuçlar ve komplikasyonlar için prediktif faktörleri belirlemek amacıyla değerlendirildi.

BULGULAR: Çalışmamızda, hidatik hastalık nedeniyle cerrahi tedavi gören 74 hastanın verileri analiz edildi ve bu hastaların ortalama yaşı 43 yıldı. Cohort, Clavien-Dindo sınıflamasına göre iki gruba ayrıldı: Grup 1 (hafif komplikasyonlar, %81) ve Grup 2 (şiddetli komplikasyonlar, %19). Preoperatif ALP ve HGB düzeylerinde, iki grup arasında istatistiksel olarak anlamlı farklar gözlemlendi ($p<0.05$). Grup 1'de çoğu hasta basit kistlere sahipken, Grup 2'de komplikasyonlu kistlerin ($p=0.023$) ve safra fistüllerinin ($p=0.01$) daha sık görüldüğü tespit edildi. Postoperatif komplikasyonlar, perkütan drenaj, yeniden hastaneye yatışlar ve ERCP gereksinimi, Grup 2'de daha sık görüldü ($p<0.001$). Ultrasonografi, BT ve MRI gibi görüntüleme teknikleri, safra yolları tutulumu gibi şiddetli morbiditeyi belirleyen önemli bir prediktif faktör olarak saptandı. Ayrıca, yüksek preoperatif ALP düzeyleri (≥133 U/L), postoperatif morbiditenin önemli bir risk faktörü olarak belirlendi. ROC analizi, ALP düzeyi ≥133 U/L'in %64.29 hassasiyet ve %86.67 özgüllükle, 0.805 AUC değeri ile postoperatif komplikasyonları tahmin etmede önemli bir belirteç olduğunu göstermektedir.

SONUÇ: Karaciğer hidatik kistlerinin yönetimi, cerrahi beceriler, farmakolojik tedavi ve hastalığın patofizyolojisi hakkında derinlemesine bir anlayışı entegre eden multidisipliner bir yaklaşım gerektirir. Sürekli araştırmalar, tedavi stratejilerinin geliştirilmesi, cerrahi sonuçların iyileştirilmesi ve hastaların yaşam kalitesinin artırılması için önemlidir. Bulgularımız, kist tipi, postoperatif drenaj ihtiyacı, hastaneye yatışlar, hastanede kalış süresi, preoperatif ALP düzeyleri ≥133 U/L ve safra yolları tutulumu gibi belirli klinik faktörlerin, hidatik hastalık cerrahisi geçiren hastalarda postoperatif morbiditeyi anlamlı şekilde tahmin ettiğini vurgulamaktadır.

Anahtar sözcükler: Biliyer fistül; ekinokokkozis; kist hidatiği; komplike kist hidatik.

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