

ORIGINAL ARTICLE

Surgical outcomes and management strategies in intraperitoneal rupture of hydatid cysts: A retrospective analysis

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ABSTRACT

BACKGROUND: Hydatid cyst disease, a parasitic infection caused by *Echinococcus* species, primarily affects the liver and lungs, with potential for spontaneous or traumatic rupture into the peritoneal cavity. Although hydatid cyst perforation is rare, it necessitates urgent surgical intervention to prevent severe complications such as anaphylaxis, bile leakage, and secondary infection.

METHODS: This retrospective study analyzed 13 patients with hydatid cyst perforation who were treated in a general surgery clinic between 2017 and 2022. Data regarding clinical presentation, diagnostic methods, surgical approaches, postoperative outcomes, and follow-up were reviewed. All patients underwent emergency surgery involving cyst evacuation, peritoneal lavage with scolicalid agents, and postoperative albendazole therapy.

RESULTS: The cohort included eight male and five female patients, with a mean age of 33 years. Spontaneous perforation occurred in 12 cases, and one case was due to trauma. The liver was the most commonly affected organ (92.3%). Surgical interventions consisted of partial cystectomy with omentopexy in 12 patients. The recurrence rate was 8%. Postoperative complications were minimal, including two bile fistulas that resolved spontaneously and one case of wound infection. The average hospital stay was 9.2 days, and the mean follow-up duration was 18.8 months. One patient with cirrhosis died due to complications from portal hypertension.

CONCLUSION: Hydatid cyst rupture is a rare but potentially life-threatening condition, particularly in endemic regions. Prompt surgical intervention, combined with postoperative albendazole therapy, is essential to reduce morbidity, mortality, and recurrence. Lifelong monitoring is recommended for patients with intraperitoneal perforations to manage potential complications of hydatidosis.

Keywords: Albendazole therapy; emergency surgery; hydatid cyst rupture; intraperitoneal perforation; peritoneal lavage.

INTRODUCTION

Hydatid cyst disease is a parasitic infection caused by *Echinococcus* species. There are five known species: *E. granulosus*, *E. multilocularis*, *E. equinus*, *E. oligarthrus*, and *E. vogeli*. Among these, *E. granulosus* and *E. multilocularis* are the most common causes of cystic disease.^[1] This disease, known since the

time of Hippocrates, was first described in terms of treatment by Hippocrates himself.^[2] Humans serve as intermediate hosts, while dogs act as the definitive hosts.^[3-5] Hydatid cyst disease is endemic in Mediterranean countries, South America, the Middle East, South Africa, New Zealand, and Türkiye. However, due to increased travel to endemic and tropical regions, the incidence of the disease has also been ris-

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ing in developed countries.^[6,7] The World Health Organization (WHO) has reported concerning mortality rates associated with this disease.^[8]

The liver is the most commonly affected organ in hydatid cyst disease, followed by the lungs.^[9-11] Approximately 75% of cases involve the liver and 15% involve the lungs, although the disease can affect virtually any organ.^[1,8] Hydatid cyst disease does not present with a specific clinical picture. It is generally asymptomatic, and when symptoms do occur, they vary depending on the affected organ and the size of the cyst. Diagnosis is based on clinical evaluation, serological testing, and radiological imaging techniques. Treatment options include antiparasitic therapy (such as albendazole), percutaneous interventions, and surgical procedures.

Liver cysts may rupture spontaneously or as a result of trauma.^[12] Rupture can occur into the bile ducts, adjacent organs, or the intraperitoneal cavity. Rupture into the intraperitoneal cavity constitutes a surgical emergency requiring immediate intervention.^[13] Currently, there is no standardized approach to the management of cyst rupture.^[14] The most appropriate treatment method is determined by the physician, taking into account the patient's condition and the available resources of the healthcare facility.^[15]

Cases of intraperitoneal perforation of hydatid cysts are at risk for lifelong hydatidosis. This presents several unresolved challenges, including the optimal method of intra-abdominal lavage during surgery, the appropriate duration of postoperative albendazole therapy, and the frequency and total duration of follow-up.

In this study, we aimed to address these issues through a retrospective analysis of 13 cases of hydatid cyst perforation, supported by a review of the relevant literature.

MATERIALS AND METHODS

This study included 13 patients with hydatid cyst perforation who were treated at the general surgery clinic between January 2017 and December 2022. Demographic data, clinical findings, diagnostic methods, surgical treatments, postoperative complications, length of hospital stay, and follow-up information were retrospectively reviewed and analyzed.

This study was conducted in accordance with the principles of the Declaration of Helsinki and was approved by the Ethics Committee of Gaziantep City Hospital (Approval No: 2024/07). Informed consent was not required, as this was a retrospective study using anonymized clinical data, and no individual patient could be identified from the information presented.

Patient Selection

Patients who presented with acute abdominal pain and were diagnosed with hydatid cyst perforation based on clinical, lab-

oratory, and radiological findings were included in the study. The diagnosis was generally confirmed using imaging techniques such as ultrasound (US) and computed tomography (CT).

Data Collection

The following parameters were recorded for each patient using the hospital's electronic medical records: basic demographic data (age and gender), the etiology of perforation (categorized as spontaneous in 12 patients and traumatic in one patient), the duration and nature of symptoms prior to hospital admission, diagnostic methods (US, CT, or surgery), localization and size of the hydatid cyst, length of postoperative hospital stay, postoperative complications and associated risk factors, follow-up duration and frequency, and recurrence of hydatid cysts in the medium and long term (Tables 1 and 2).

Surgical Treatment

All patients underwent emergency surgical treatment. Hydrocortisone and epinephrine were administered to patients presenting with allergic reactions, while other patients received hydrocortisone to prevent allergic responses. The surgical approach involved a wide median laparotomy incision. In one case, the diagnosis of a hydatid cyst was not established preoperatively. The patient underwent emergency surgery with a preoperative diagnosis of an incarcerated umbilical hernia. Cutaneous involvement of a hydatid cyst was discovered, and total cyst excision (including excision of the umbilicus) and herniorrhaphy were performed.

Surgical techniques were selected at the discretion of the attending surgeon. The procedures performed included the following: cyst evacuation (12 cases), partial cystectomy (12 cases), peritoneal lavage/irrigation with isotonic or hypertonic solution (13 cases), abscess drainage (three cases), management of bile fistulas (in six cases, non-absorbable sutures were used when visible bile ducts were identified), cholecystectomy (two cases), choledochotomy with T-tube drainage for bile duct stones identified during cholecystectomy (one case), and omentoplasty for residual cavities in liver cysts. In all patients, two drains were placed: one in the pelvic cavity and one in the operative lodge, before abdominal wall closure (Table 2).

To prevent the spread of cyst contents during evacuation, the area surrounding the cyst was packed with gauze, pads, or compresses soaked in hypertonic solution in all cases.

Postoperative Care and Follow-up

All patients received postoperative albendazole therapy at a dosage of 10 mg/kg/day for four weeks, followed by a two-week drug-free interval to reduce the risk of recurrence. Serological tests were not used for diagnosis or follow-up.

Patients were followed regularly after surgery. Follow-up imaging with ultrasound and CT scans was performed to moni-

Table 1. Preoperative evaluation: symptoms, etiology, preoperative findings, and diagnoses of patients with ruptured hydatid cysts

	Age	Gender	Cause of Perforation	Symptom Duration (days)	Clinical Presentation	Serology	History of HD	Cyst Location	Preoperative Antihelminthic	Diagnostic Tools	Cyst Size (mm)	Additional Findings
Case 1	54	Female	Spontaneous umbilical hernia, cutaneous fistula	15	Pain, cirrhosis	No	No	Umbilicus	No	None	70×60	Hernia
Case 2	25	Male	Spontaneous	4	Pain, fever, nausea, vomiting, ileus	No	No	Pancreas	No	CT	Pancreas: 100×100 KC: 70×50	Abscess, colon meso invasion
Case 3	18	Male	Spontaneous	5	Pain, jaundice	No	No	Liver (S2-3), choledoch	No	CT+USG +MRCP	120×130	Abscess
Case 4	25	Female	Traumatic	1	Pain, trauma	No	No	Liver (S7)	No	CT	100×95	Pelvic fluid
Case 5	68	Male	Spontaneous	3	Pain	No	Yes (prior surgery)	Liver	No	CT	100×85	Pelvic fluid, cholelithiasis
Case 6	36	Female	Spontaneous	1	Pain, anaphylaxis, angioneurotic edema	No	No	Liver (S7-8)	No	CT+USG	46×36	Pelvic fluid
Case 7	42	Male	Spontaneous	2	Pain, fever	No	No	Liver (S6)	No	CT	110×90	Pelvic fluid
Case 8	28	Male	Spontaneous	3	Pain, fever, nausea, vomiting	No	No	Liver (S8-5)	No	CT+USG	100×60	Pelvic fluid
Case 9	51	Male	Spontaneous	1	Pain	Negative	No	Liver (S2-3)	No	CT	130×70	Pelvic fluid
Case 10	30	Female	Spontaneous	2	Pain, fever, nausea, vomiting	Negative	No	Liver (S8-5)	No	CT+USG	127×115	Pelvic fluid
Case 11	16	Female	Spontaneous	4	Pain, fever, nausea, vomiting	No	Yes	Liver (S5)	No	CT	45×35	Abscess
Case 12	19	Male	Spontaneous	2	Pain, anaphylaxis, urticaria	No	No	Liver (S6)	No	CT	63×37	Pelvic fluid
Case 13	24	Male	Spontaneous	2	Pain, fever, nausea, vomiting	No	No	Liver (S5)	No	CT	70×60	Pelvic fluid

Liver; s: Segment of the Liver; CT: Computer Tomography; USG: Ultrasonography; MRCP: Magnetic Resonance Cholangiopancreatography.

Table 2. Postoperative data: overview of surgical techniques, treatment, hospital stay duration, complications, and follow-up in patients with ruptured hydatid cysts

	Surgical Approach	Complication	Hospital Stay (days)	Postoperative Antihelmintic Therapy	Follow-up (months)	Recurrence	Additional Notes
Case 1	Total Cystectomy+ Herniorrhaphy	Cirrhosis, wound infection	5	Albendazole (1 month)	3	No	Died from portal hypertension
Case 2	PC + AD + O + Irr	None	14	Albendazole (3 months)	18	No	
Case 3	PC + AD + BTS + Chc + Chd + T + O + Irr	None	14	Albendazole (3 months)	25	Yes	
Case 4	PC + O + Irr	None	5	Albendazole (3 months)	3 (patient discontinued)	No	
Case 5	PC + BTS + Chc + O + Irr	Bile fistula (closed spontaneously)	11	Albendazole (6 months)	19	No	
Case 6	PC + O + Irr	None	7	Albendazole (4 months)	24	No	
Case 7	PC + O + Irr	None	9	Albendazole (4 months)	18	No	
Case 8	PC + BTS + O + Irr	None	10	Albendazole (6 months)	24	No	
Case 9	PC + O + Irr	None	9	Albendazole (6 months)	36	No	
Case 10	PC + BTS + Irr	Bile fistula (closed spontaneously)	15	Albendazole (11 months)	23	No	
Case 11	PC + AD + BTS + O + Irr	None	6	Albendazole (6 months)	3 (patient discontinued)	No	
Case 12	PC + BTS + O + Irr	None	8	Albendazole (4 months)	24	No	
Case 13	PC + O + Irr	Wound infection	7	Albendazole (6 months)	24	No	

PC: Partial Cystectomy; AD: Abscess Drainage; O: Omentopexy; I: Irrigation (+Aspiration); BTS: Biliary Tract Suturing; Chc: Cholecystectomy; Chd: Choledochotomy; T: T-Tube; Portal HT: Portal Hypertension.

tor for recurrence or disease progression.

Postoperative use of albendazole, as well as the duration and frequency of follow-up, were not standardized due to variability in surgical approaches and patient non-compliance.

Statistical Analysis

In this retrospective study, data from 13 patients who underwent surgical treatment for hydatid cyst perforation between 2017 and 2022 were analyzed. The data were evaluated using descriptive statistics, and categorical variables were analyzed for frequency using SPSS (Statistical Package for the Social Sciences) version 29.0.2. (IBM Inc., Chicago, IL, USA)

Continuous variables were expressed as mean \pm standard deviation (SD), while categorical variables were presented as percentages (%).

Clinical and demographic data were assessed, including age, sex, presenting symptoms and their duration, causes of hydatid cyst rupture, prior history of hydatid cyst, cyst size and localization, complications, length of hospital stay, postoperative use of antihelmintic agents, follow-up duration, recurrence rates, and mortality.

RESULTS

Of the 13 patients, five were female (38.5%) and eight were male (61.5%), with a mean age of 33.53 ± 15.88 years (range:

Table 3. Descriptive clinical and critical values

	Mean±SD	Median (Min-Max)
Age	33.53±15.88	28 (16-68)
Symptom duration (days)	3.46±3.68	2 (1-15)
Cyst size (mm)	91.61±30.03	100 (45-130)
Hospital stay (days)	9.23±3.41	9 (5-15)
Postoperative antihelminthic therapy duration (months)	4.84±2.44	4 (1-11)
Follow-up duration (months)	18.76±10.04	23 (3-36)

Table 4. Categorical clinical characteristics and percentages

	n (%)
Gender	
Male	8 (61.5)
Female	5 (38.5)
Cause of Rupture	
Spontaneous	12 (92.3)
Traumatic	1 (7.7)
Symptoms	
Pain	13 (100)
Fever	6 (46.1)
Vomiting	5 (38.5)
Other	6 (46.1)
History of HD	
Yes	2 (15.4)
No	11 (84.6)
Cyst Location	
Both lobes (liver)	1 (7.7)
Left lobe (liver)	2 (15.4)
Right lobe (liver)	8 (61.5)
Pancreas	1 (7.7)
Umbilicus	1 (7.7)
Complications	
No	9 (69.2)
Yes	4 (30.8)
Recurrence	
No	12 (92.3)
Yes	1 (7.7)
Mortality	
No	12 (92.3)
Yes	1 (7.7)

16-68). Spontaneous perforation was observed in 12 patients (92.3%), while traumatic perforation occurred in one patient (7.7%). The mean time from symptom onset to hospital admission was 3.46 days (range: 1-15 days). All patients presented with pain as the primary symptom; fever was the second most common symptom, occurring in five patients. Nausea and vomiting were present in four patients. One patient presented with trauma, one with anaphylaxis/angioneurotic edema, one with jaundice, one with ileus, and one with cirrhosis accompanied by a cutaneous fistula. Two patients had a history of prior hydatid cyst surgery.

The cyst was located in the liver in 12 patients and in the umbilicus in one patient. Additional cysts were identified in the pancreas (one patient), bile duct (one patient), and spleen (one patient). None of the patients had received preoperative antiparasitic therapy. CT was used as the diagnostic imaging modality in 12 patients. Both US and CT were used in four patients, and MRCP (Magnetic Resonance Cholangiopancreatography) was used in one patient. Cyst sizes ranged from 43×35 mm to 120×130 mm, with a mean size of 91.61±30.03 mm. Pelvic fluid was detected in eight patients, and abscesses in three patients.

Surgical techniques included partial cystectomy and omentopexy in 12 patients, and total cystectomy in one patient. Bile duct suturing was performed in five patients. Two patients underwent cholecystectomy, and choledochotomy with T-tube placement was performed in one case.

Postoperative complications included bile fistulas in two patients, which closed spontaneously during follow-up, and wound infection in one patient. All patients received albendazole therapy postoperatively for at least one month. The mean hospital stay was 9.23±3.41 days (range: 5-15 days), and the mean follow-up duration was 18.8 months (range: 3-36 months). Recurrence was observed in one patient during follow-up. One patient with cirrhosis died due to complications from portal hypertension (Tables 1, 2, 3, and 4).

DISCUSSION

Spontaneous perforation of hydatid cysts into the abdominal cavity is a rare event, even in regions where the disease is endemic.^[12] In a retrospective study by Placer et al.,^[16] only 15 patients were diagnosed with this condition over a 20-year period. Another study reviewing 12 years of data identified 16 cases of traumatic rupture. Hydatid disease is a parasitic infection caused by the larval stage of *Echinococcus granulosus*.^[17-19] Humans become accidental hosts by ingesting contaminated food, after which *E. granulosus* ova are released into the proximal duodenum and jejunum. Between 4% and 25% of infected individuals present with concurrent hepatic and pulmonary hydatid cysts.^[17] In cases involving hepatic hydatid cysts, complications such as rupture into the biliary ducts, biliary compression, cyst infection, allergic reactions, anaphylaxis, and rupture into the peritoneal cavity, pleural space, or lung parenchyma occur in 5% to 40% of patients.^[13,20,21] The incidence of intraperitoneal rupture of hepatic hydatid cysts ranges from 1% to 16%.^[18,20,22,23] Factors contributing to cyst rupture include younger age, cyst diameter greater than 10 cm, superficial localization, and increased intracystic pressure.^[20,22-25] In our study, the mean patient age was 33.53 years, which is consistent with findings reported in the literature. Spontaneous rupture was observed in 12 cases, representing 92.3% of our cohort, a rate notably higher than that reported in prior studies. Only 5 out of 13 patients had cysts larger than 10 cm in diameter. One patient, initially diagnosed with an incarcerated umbilical hernia, was found during surgery to have a hydatid cyst fistula containing a germinative membrane, making this a unique case in the literature.^[26]

Abdominal pain, nausea, vomiting, and urticaria are the most common symptoms of hydatid cyst rupture.^[12,13] Allergic reactions occur in up to 25% of cases. In cases involving rupture into the peritoneal cavity, symptoms are often related to peritoneal irritation, and peritonitis tends to be more severe when bile leakage or cyst infection is present.^[12,13,20,27] Allergic reactions can range from mild urticaria to severe anaphylaxis, with anaphylactic shock or severe allergic responses occurring in 1% to 12.5% of patients.^[12,20,21] In our study, two patients (15%) presented with anaphylactic reactions. Epinephrine and hydrocortisone were administered to those patients, while hydrocortisone was given prophylactically to the remaining patients to prevent allergic complications.

Ultrasonography and computed tomography scans are essential diagnostic tools for hydatid disease, aiding in the identification of detached membranes and intraperitoneal fluid. The sensitivity of ultrasonography for detecting cyst rupture is reported to be 85%, while CT offers a sensitivity of 100%.^[17-20] CT imaging provides the most comprehensive information regarding the location and extent of intra-abdominal disease and can also detect additional cysts in the abdomen.^[20] In our study, CT was used in 12 patients, and both CT and ultrasonography were used in an additional four cases.

Emergency surgery is required in cases of hydatid cyst rupture. The primary goals of surgical treatment are to prevent complications, eradicate local disease, and minimize morbidity, mortality, and recurrence rates.^[12,14,20,28] However, like all surgical procedures, it carries risks of complications. The choice between radical and conservative surgical approaches remains a topic of ongoing debate. In complicated cases, procedures such as external drainage, partial cystectomy, and omentopexy are commonly employed, whereas hepatectomy and pericystectomy are rarely performed. For patients with stable general conditions, primary cyst treatment is recommended. In endemic regions, conservative methods are generally preferred, while radical procedures are more frequently used in non-endemic areas. In our study, we adopted a conservative approach, performing partial cystectomy in 12 patients (92%). Following surgery, one of the most critical steps is thorough irrigation of the intraperitoneal cavity with a scolicidal agent and the safe removal of cyst contents.^[20]

Beyrouti reported four cases of morbidity (23.5%) and two mortalities (11.8%) in a series of 17 patients.^[20,27] In another study, Sozuer reported two complications (10%) and no mortalities among 21 patients.^[12] In our study, three patients (23%) experienced complications, including two cases of spontaneously resolving bile fistulas and one case of wound infection. One patient (8%) died due to cirrhosis-related portal hypertension.

Albendazole has been shown to be effective in preventing recurrences. In our study, albendazole was administered postoperatively to all patients. Reported recurrence rates in the literature include 6.7% by Beyrouti, 14% by Sozuer, 11.1% by Akcan, and 7.7% by Dreci.^[12,14,26,29] In our cohort, one patient (8%) experienced recurrence, which aligns with these findings. During surgery, peritoneal lavage was performed using isotonic saline in most cases. Hypertonic saline, known for its scolicidal properties, was used selectively; however, it should be noted that excessive use may lead to hyponatremia, necessitating close monitoring. Upon reviewing case details, it was found that isotonic saline was used for intra-abdominal lavage, and the patient received albendazole for three months postoperatively. Serological methods were not used during follow-up.

CONCLUSION

Spontaneous perforation of hydatid cysts is rare, although it does occur in endemic regions. In such areas, it is crucial to consider this condition in the differential diagnosis of patients presenting with acute abdominal pain. Despite its rarity, spontaneous rupture is a serious condition that requires urgent surgical intervention. The primary goals of surgical treatment are to prevent complications and reduce morbidity and mortality. Postoperative medical treatment is essential to reduce recurrence rates.

Patients with intraperitoneal perforation of hydatid cysts re-

main lifelong candidates for hydatidosis.

Therefore, we recommend the following management strategies for these rare cases:

- During surgery, extensive irrigation with isotonic saline is recommended for abdominal lavage. Hypertonic saline may be used selectively for its scolical effects, but its use should be carefully monitored due to the risk of hypernatremia.
- Postoperative administration of albendazole for a minimum of six months is recommended.
- Patients should be monitored every 3 to 6 months for at least two years.

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ORİJİNAL ÇALIŞMA - ÖZ

Hidatik kistlerin intraperitoneal rüptüründe cerrahi sonuçlar ve yönetim stratejileri: Retrospektif bir analiz

AMAÇ: Echinococcus türlerinin neden olduğu parazitik bir enfeksiyon olan hidatik kist hastalığı, genellikle karaciğer ve akciğerleri etkiler. Bu kistler, nadir de olsa spontan veya travmatik olarak periton boşluğuna rüptüre olabilir. Rüptür durumunda anafilaksi, safra kaçağı ve sekonder enfeksiyon gibi ciddi komplikasyonları önlemek için acil cerrahi müdahale gereklidir.

GEREÇ VE YÖNTEM: Bu retrospektif çalışmada, 2017-2022 yılları arasında genel cerrahi kliniğinde hidatik kist rüptürü nedeniyle tedavi edilen 13 hastanın verileri incelendi. Hastaların klinik semptomları, tanı yöntemleri, cerrahi yaklaşımları, postoperatif sonuçları ve takip süreçleri analiz edildi. Tüm hastalara acil cerrahi müdahale yapıldı; prosedürler arasında kist drenajı, skolisidal ajanlarla periton lavajı ve postoperatif albendazol tedavisi yer aldı.

BULGULAR: Çalışmaya 8 erkek ve 5 kadın hasta dahil edildi; hastaların yaş ortalaması 33 idi. Olguların 12'sinde spontan rüptür, 1'inde ise travmatik rüptür saptandı. En sık etkilenen organ karaciğerdi (%92.3). Cerrahi yöntem olarak 12 hastada parsiyel kistektomi ve omentopeksi uygulandı. Rekürrens oranı %8 olarak belirlendi. Postoperatif komplikasyonlar minimaldi; iki hastada görülen safra fistülü spontan olarak düzeldi, bir hastada ise yara enfeksiyonu gelişti. Ortalama hastanede kalış süresi 9.2 gün, takip süresi ise 18.8 ay olarak tespit edildi. Sirozu olan bir hasta portal hipertansiyona bağlı olarak kaybedildi.

SONUÇ: Hidatik kist rüptürü, özellikle endemik bölgelerde nadir fakat hayatı tehdit eden bir durumdur. Morbidite, mortalite ve rekürrensi azaltmak için acil cerrahi müdahale ve postoperatif albendazol tedavisi şarttır. İntraperitoneal rüptür geçiren hastalarda hidatidozun potansiyel komplikasyonlarını yönetmek için ömür boyu takip önerilmektedir.

Anahtar sözcükler: Acil cerrahi; albendazol tedavisi; hidatik kist rüptürü; intraperitoneal perforasyon; periton lavajı.

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