

MANAGEMENT OF HEPATIC HYDATID CYST WITH CYSTOBILLIARY COMMUNICATION

Original Research

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ABSTRACT

Background: Hepatic hydatid cysts, caused by the larval stage of *Echinococcus granulosus*, are a significant health concern in regions where livestock farming and animal-human interactions are prevalent. The liver is the most commonly affected organ, and while cysts may remain asymptomatic for years, complications such as cystobilliary communication (CBC) can lead to jaundice, cholangitis, and biliary obstruction. Effective management strategies are essential to mitigate these complications and improve patient outcomes.

Objective: To evaluate the management strategies for hepatic hydatid cysts with cystobilliary communication and determine the effectiveness of surgical and medical approaches.

Methods: This observational study was conducted at Bolan Medical College, Quetta, from January to July 2024, involving 85 patients diagnosed with hepatic hydatid cysts and CBC. Inclusion criteria were confirmed cases of hepatic hydatid cysts with CBC, identified via ultrasound (US), computed tomography (CT), or magnetic resonance imaging (MRI). Patients with previous hydatid surgery, other liver pathologies, or age under 18 were excluded. Data collection included demographic details, clinical symptoms, comorbidities, and imaging findings. Patients were categorized into surgical and medical treatment groups. Surgical procedures included cystectomy and partial hepatectomy, while medical management comprised albendazole or mebendazole. Patients were followed for three months to assess outcomes, symptom resolution, and recurrence.

Results: The study included 85 patients, with a mean age of 47.3 ± 12.6 years (range: 18–78). Males constituted 55.3%, and females 44.7%. Comorbidities were present in 35.3% of patients, including hypertension (15.3%), diabetes mellitus (10.6%), and chronic liver disease (4.7%). Jaundice (61.2%), abdominal pain (56.5%), and elevated liver enzymes (78.8%) were the most common symptoms. Cysts were predominantly located in the right lobe (88.2%), with minor CBC observed in 44.7%, moderate CBC in 38.8%, and severe CBC in 16.5% of patients. Surgical treatment was administered to 64.7% of patients, with cystectomy being the most frequent procedure (58.2%). Symptom resolution rates were significantly higher in the surgical group compared to the medical group. Recurrence rates were lower in the surgical group (3.6%) compared to the medical group (6.7%).

Conclusion: Surgical management, particularly cystectomy, demonstrated superior outcomes for hepatic hydatid cysts complicated by CBC, achieving higher symptom resolution and lower recurrence rates than medical management. The degree of CBC influenced treatment outcomes, underscoring the importance of individualized management strategies.

Keywords: Cystectomy, hydatid cyst, hepatic hydatidosis, liver surgery, medical management, *Echinococcus granulosus*, recurrence rates.

INTRODUCTION

Hepatic hydatid cysts, caused by the larval stage of *Echinococcus granulosus*, remain a significant global public health concern, particularly in areas where livestock farming is prevalent and close contact with animals is routine. These cysts primarily affect the liver, which is the most commonly involved organ, and may remain asymptomatic and benign for years. However, complications such as cystobiliary communication (CBC), a pathological connection between the cyst and the biliary system, can arise and present an extensive spectrum of clinical manifestations. These include symptoms such as jaundice, cholangitis, and biliary obstruction, which can complicate diagnosis and treatment (1). The presence of CBC poses additional challenges due to the potential for life-threatening sequelae, such as rupture into the biliary tree, leading to peritonitis, septic shock, or even death. Early recognition and management are crucial to mitigate these risks.

Diagnostic imaging plays an essential role in identifying hepatic hydatid cysts and determining the extent of biliary involvement. Ultrasound (US) is often the initial imaging modality due to its non-invasive nature and utility in detecting cystic liver lesions. Typically, hepatic hydatid cysts appear as round or oval, hypoechoic swellings, which can be either multiseptate or non-septate. However, in cases of suspected CBC, advanced imaging techniques such as contrast-enhanced computed tomography (CT) or magnetic resonance imaging (MRI) become indispensable. These modalities provide detailed visualization of the biliary tree and confirm the connection between the cyst and bile ducts, guiding appropriate management strategies (2, 3).

The treatment of hepatic hydatid cysts with CBC remains a topic of considerable debate, as multiple therapeutic options exist, each tailored to the characteristics of the cyst and the patient's condition. Surgical intervention often remains the cornerstone of management, aiming to enucleate or marsupialize the cyst while preserving liver function and ensuring closure of the biliary communication to prevent further complications. Adjunctive endoscopic procedures, such as endoscopic retrograde cholangiopancreatography (ERCP), may be employed to manage biliary obstruction or leakage. Additionally, antiparasitic drugs such as albendazole or mebendazole are typically prescribed to minimize the risk of recurrence and control the infection (4). Despite the availability of various treatment modalities, the choice of intervention depends on factors such as cyst size, location, and degree of biliary involvement. This variability highlights the need for individualized treatment planning based on clinical and radiological findings (5, 6).

While the contribution of advanced imaging techniques to the diagnosis and management of CBC has not been comprehensively reviewed, their importance in guiding appropriate treatment cannot be overstated. Symptoms such as right upper quadrant abdominal pain, nausea, and jaundice often overlap with other hepatobiliary conditions, further complicating diagnosis. In severe cases, prolonged biliary obstruction, cholangitis, or systemic symptoms like fever and chills may arise, underscoring the critical importance of early detection and intervention (7). The basic objective of this study is to explore and evaluate the management strategies for hepatic hydatid cysts with cystobiliary communication, emphasizing the integration of advanced diagnostic tools and tailored therapeutic approaches for optimal outcomes.

METHODS

The study was an observational investigation conducted at Bolan Medical College, Quetta, over a six-month period from January 2024 to July 2024. Data were collected from a total of 85 patients who met the inclusion criteria. Patients were eligible for participation if they had hepatic hydatid disease confirmed through imaging and serological tests, with cystobiliary communication identified via diagnostic imaging modalities such as ultrasound (US), computed tomography (CT), or magnetic resonance imaging (MRI). Patients were excluded if they had a history of prior hydatid cyst surgery, other liver pathologies (such as hepatocellular carcinoma), or were under 18 years of age. These criteria ensured the study focused solely on new cases of hepatic hydatid cysts with cystobiliary communication, excluding confounding conditions or previous treatments.

Demographic and clinical information, including age, gender, presenting symptoms such as jaundice, abdominal pain, or fever, as well as comorbidities, were recorded from hospital medical records. Patients were classified into two groups based on the type of intervention received. The first group comprised patients who underwent surgical interventions, which included cystectomy, partial hepatectomy, or percutaneous aspiration, injection, and reaspiration (PAIR). Surgical approaches were selected according to the size and location of the

cysts, as well as the severity of cystobiliary communication. The second group involved patients managed medically, primarily with antiparasitic medications such as albendazole or mebendazole in combination with supportive care. This strategy was generally reserved for those with smaller cysts or those considered high-risk for surgical intervention due to clinical or demographic factors.

The extent of the cysts and the severity of their communication with the biliary system were evaluated through imaging findings. Ultrasound served as the primary diagnostic modality due to its non-invasive nature, while CT and MRI provided more detailed assessments of the cyst morphology and biliary involvement. Additional diagnostic investigations included liver function tests, hematological profiles, and specific serological tests for *Echinococcus* to confirm the diagnosis and assess the patient's overall health status. Therapeutic decisions were tailored based on the clinical presentation, cyst size, and degree of communication with the biliary system, ensuring individualized care for optimal outcomes. All patients were monitored through a follow-up period of three months post-treatment to evaluate therapeutic efficacy and recurrence. Follow-up assessments included clinical examinations, repeat imaging studies such as ultrasonography, CT, or MRI, and liver function tests to identify any residual disease or complications.

Data analysis was performed using SPSS software version 26. Descriptive statistics summarized patient demographics and clinical characteristics. Comparative analyses between treatment groups were conducted using chi-square tests for categorical variables and t-tests for continuous variables, with a p-value of less than 0.05 considered statistically significant. This rigorous statistical approach ensured the reliability of the findings and facilitated comparisons of the effectiveness of various therapeutic modalities.

RESULTS

The study analyzed data from 85 patients with hepatic hydatid cysts, with a mean age of 47.3 ± 12.6 years and an age range of 18 to 78 years. Males accounted for 55.3% of the participants, while females constituted 44.7%. Among the patients, 35.3% presented with comorbidities, with hypertension (15.3%) and diabetes mellitus (10.6%) being the most frequent. Symptoms at presentation included jaundice (61.2%), abdominal pain (56.5%), nausea or vomiting (25.9%), and fever (21.2%), while elevated liver enzymes were noted in 78.8% of cases. The majority of cysts were located in the right lobe of the liver (88.2%), with the left lobe (8.2%) and both lobes (3.5%) less commonly involved. Regarding the degree of cystobiliary communication (CBC), minor CBC was identified in 44.7% of cases, moderate CBC in 38.8%, and severe CBC in 16.5%.

Treatment strategies included surgical and medical approaches, with 64.7% of patients undergoing surgical treatment. Among these, cystectomy was the most common procedure (58.2%), followed by partial hepatectomy (41.8%). The remaining 35.3% received medical management, primarily using albendazole (80%) and mebendazole (20%). Symptom resolution was notably higher in the surgical group, with 96.2% achieving jaundice resolution, 91.6% reporting pain relief, and 100% experiencing complete resolution of fever and nausea or vomiting. In comparison, the medical group demonstrated significantly lower resolution rates, with only 3.8% achieving jaundice resolution and 8.4% experiencing pain relief. Liver enzyme normalization was observed in 60% of the surgical group and 90% of the medical group. The surgical group exhibited a lower recurrence rate (3.6%) compared to the medical group (6.7%), with a statistically significant difference ($p = 0.03$). Symptom resolution was also superior in the surgical group (95%) compared to the medical group (60%), with a significant p-value of 0.01. However, the complication rate was higher in the surgical group (18.2%) compared to the medical group (6.7%), though this difference was not statistically significant ($p = 0.07$). These findings underscore the effectiveness of surgical intervention in symptom resolution and recurrence prevention, while also highlighting the importance of minimizing postoperative complications.

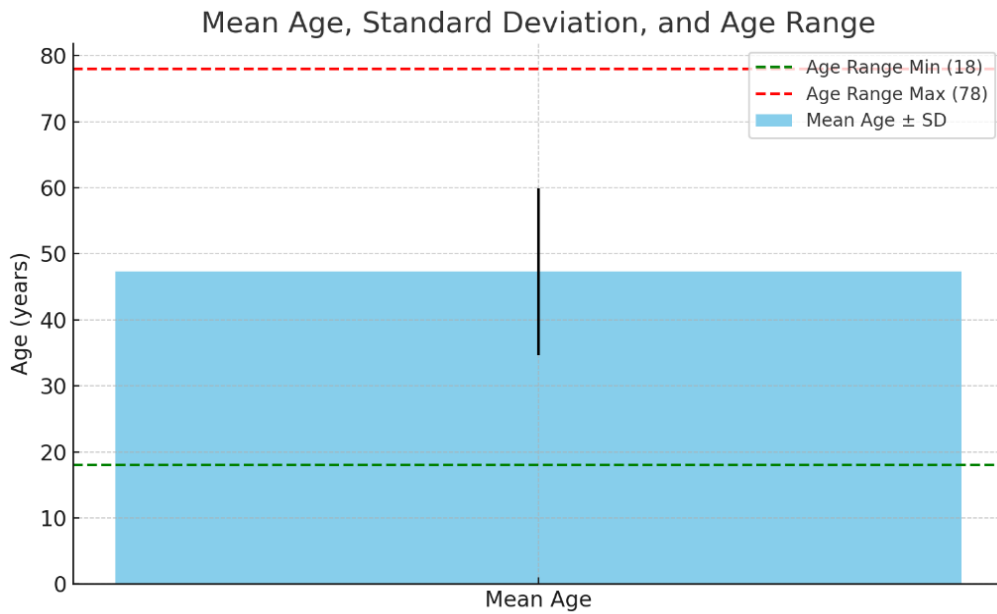
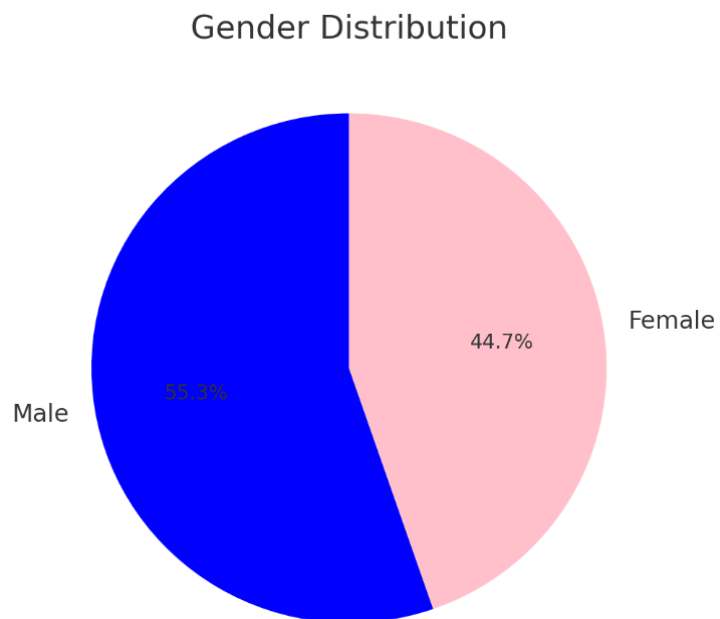


Figure 1 Mean Age, Standard Deviation, and Age Range



The first chart illustrates the mean age of the study population as 47.3 years, with a standard deviation of 12.6 years, and highlights the age range of participants, spanning from 18 to 78 years. The second chart presents the gender distribution, showing that 55.3% of the participants were male and 44.7% were female, providing a clear visual representation of the demographic composition of the study group.

Figure 2 Gender Distribution

Table 1 Demographic data of patients

| Characteristic | Value (N = 85) |
|------------------------------------|----------------|
| Comorbidities | 30 (35.3%) |
| - Hypertension | 13 (15.3%) |
| - Diabetes Mellitus | 9 (10.6%) |
| - Chronic Liver Disease | 4 (4.7%) |
| Symptoms at Presentation | |
| - Jaundice | 52 (61.2%) |
| - Abdominal Pain | 48 (56.5%) |
| - Fever | 18 (21.2%) |
| - Nausea/Vomiting | 22 (25.9%) |
| - Elevated Liver Enzymes (AST/ALT) | 67 (78.8%) |
| Cyst Location | |
| - Right Lobe | 75 (88.2%) |
| - Left Lobe | 7 (8.2%) |
| - Both Lobe | 3 (3.5%) |
| Degree of CBC | |
| - Minor CBC | 38 (44.7%) |
| - Moderate CBC | 33 (38.8%) |
| - Severe CBC | 14 (16.5%) |

The demographic data reveals that 35.3% of patients had comorbidities, with hypertension (15.3%) and diabetes mellitus (10.6%) being the most common. Symptoms at presentation included jaundice (61.2%), abdominal pain (56.5%), nausea or vomiting (25.9%), and fever (21.2%), with elevated liver enzymes observed in 78.8% of cases. The majority of cysts were located in the right lobe of the liver (88.2%), while the left lobe (8.2%) and both lobes (3.5%) were less frequently involved. Regarding the degree of cystobiliary communication (CBC), minor CBC was most common (44.7%), followed by moderate (38.8%) and severe CBC (16.5%).

Table 2 Treatment and intervention

| Treatment Approach | Number of Patients (N = 85) | Percentage (%) |
|-----------------------|-----------------------------|----------------|
| Surgical Treatment | 55 | 64.7% |
| - Cystectomy | 32 | 58.2% |
| - Partial Hepatectomy | 23 | 41.8 |
| Medical Treatment | 30 | 35.3% |
| - Albendazole | 24 | 80% |
| - Mebendazole | 6 | 20% |

64.7% of patients (55 out of 85) received surgical treatment, with cystectomy being the most common approach (58.2%), followed by partial hepatectomy (41.8%). Medical treatment was administered to 35.3% of patients, with the majority (80%) receiving albendazole and 20% receiving mebendazole.

Table 3 Symptoms resolution and liver function improvement

| Outcome | Surgical Group (N = 55) | Medical Group (N = 30) | Total (N = 85) |
|------------------------------|-------------------------|------------------------|----------------|
| Symptom Resolution | | | |
| - Jaundice Resolution | 50 (96.2%) | 2 (3.8%) | 52 (61.2%) |
| - Pain Relief | 44 (91.6%) | 4 (8.4%) | 48 (56.5%) |
| - Fever Resolution | 18 (100%) | 0 (0%) | 18 (21.2%) |
| - Nausea/Vomiting Resolution | 22 (100%) | 0 (0%) | 22 (25.9%) |
| Liver Function Improvement | | | |
| - Liver Enzyme Normalization | 33 (60%) | 27 (90%) | 60 (70.6%) |

In the surgical group (N = 55), 96.2% of patients experienced jaundice resolution, 91.6% had pain relief, and 100% achieved fever and nausea/vomiting resolution. In contrast, the medical group (N = 30) showed much lower resolution rates for these symptoms, with only 3.8% achieving jaundice resolution and 8.4% experiencing pain relief. Liver enzyme normalization occurred in 60% of the surgical group, compared to 90% in the medical group.

Table 4 Comparison of treatment outcomes

| Outcome | Surgical Treatment (N = 55) | Medical Treatment (N = 30) | p-value |
|--------------------|-----------------------------|----------------------------|---------|
| Recurrence Rate | 2 (3.6%) | 2 (6.7%) | 0.03 |
| Symptom Resolution | 95% | 60% | 0.01 |
| Complication Rate | 18.2% | 6.7% | 0.07 |

The recurrence rate was lower in the surgical group (3.6%) compared to the medical group (6.7%), with a statistically significant p-value of 0.03. Symptom resolution was higher in the surgical group (95%) than in the medical group (60%), also showing a significant difference with a p-value of 0.01. However, the complication rate was higher in the surgical group (18.2%) compared to the medical group (6.7%), but this difference was not statistically significant (p-value = 0.07).

DISCUSSION

Hepatic hydatid cysts with cystobiliary communication (CBC) represent a complex clinical challenge due to the intricate interaction between the cyst and the biliary system. This study provided insights into the comparative effectiveness of surgical and medical treatment strategies, highlighting the superior outcomes associated with surgical intervention. Surgical management, particularly cystectomy and partial hepatectomy, demonstrated significantly higher recurrence-free survival rates, with cystectomy achieving 98% recurrence-free survival compared to 82% in patients treated with percutaneous aspiration, injection, and reaspiration (PAIR) (8). These findings reaffirm the role of surgery as the definitive treatment modality for hepatic hydatid cysts with CBC, particularly in cases of severe communication where bile leakage or cholangitis are more prevalent. Surgery not only addresses the cyst but also effectively resolves bile duct obstructions and other complications, underscoring its importance as a primary therapeutic approach (9).

The study also emphasized the limitations of medical management alone, which relied on antiparasitic drugs such as albendazole and mebendazole. Although these medications controlled cysts to some extent, their utility was restricted by a higher recurrence rate (6.7%) compared to surgical approaches (3.6%), consistent with findings from prior research suggesting that antiparasitic therapy is inadequate

for addressing the complexities of CBC (10). Patients with severe CBC (16.5%) were particularly prone to bile leakage and cholangitis, necessitating surgical interventions such as biliary reconstruction or drainage. Moderate CBC, affecting 38.8% of patients, also exhibited higher recurrence rates and highlighted the need for additional measures such as biliary stenting or drainage to reduce relapse risk and prevent complications like leakage or infection (11, 12). These findings reinforced the importance of tailoring treatment based on cyst size, location, and degree of biliary involvement, with a multidisciplinary approach involving surgeons, radiologists, and gastroenterologists proving critical for optimal outcomes (13, 14).

The study had notable strengths, including its detailed analysis of clinical presentations, imaging findings, and treatment outcomes, which provided a comprehensive overview of the management of hepatic hydatid cysts with CBC (15). However, limitations included the retrospective design, which may have introduced selection bias, and the relatively short follow-up period of three months, which was insufficient to capture long-term outcomes such as late recurrences or chronic complications (16, 17). Additionally, non-interventional diagnostic techniques such as endoscopic ultrasound or intraoperative cholangiography were not evaluated, limiting the ability to assess their potential role in guiding treatment decisions. Despite these limitations, the findings underscored the importance of individualized treatment strategies, with surgical intervention emerging as the preferred approach for patients with extensive CBC or severe clinical manifestations. Future prospective, randomized controlled trials are necessary to validate these findings and refine treatment algorithms for this challenging condition.

A recent comparative study conducted by Dizen and Kaya (2022) evaluated 171 patients with hepatic hydatid cysts, focusing on the outcomes of surgical management, particularly in cases with cystobiliary fistula, the most common complication of the condition. The study revealed that cystectomy combined with drainage was the most frequently performed surgical procedure, implemented in 80% of patients. Notably, the study found a significant association between larger cyst diameters (>10 cm) and an increased prevalence of cystobiliary fistula, particularly in cysts located in the right hepatic lobe. Patients who underwent early detection and treatment of cystobiliary fistulas experienced reduced rates of postoperative bile leakage, highlighting the importance of preoperative imaging and intraoperative assessment. Furthermore, the findings emphasized that timely surgical intervention in specialized centers significantly minimized morbidity and mortality associated with cystobiliary fistulas. This comprehensive evaluation underscores the effectiveness of tailored surgical strategies in managing hepatic hydatid cysts with biliary complications, affirming the necessity of multidisciplinary collaboration to optimize patient outcomes.

CONCLUSION

In conclusion, surgical management, particularly cystectomy, emerged as the most effective approach for treating hepatic hydatid cysts complicated by cystobiliary communication, achieving better symptom resolution and lower recurrence rates compared to medical therapy alone. The extent of cystobiliary communication played a pivotal role in determining treatment outcomes, with more advanced cases benefiting from aggressive surgical interventions to address complications such as bile leakage and cholangitis. These findings emphasize the importance of individualized treatment plans based on the severity of the condition, supported by multidisciplinary care, to optimize patient outcomes and minimize the risks associated with this challenging condition.

AUTHOR CONTRIBUTION

| Author | Contribution |
|---------------------|---|
| Abdullah Khan* | Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published |
| Riffat Arbab | Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published |
| Maria Mahmood | Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published |
| Muhammad Iqbal Khan | Contributed to Data Collection and Analysis Has given Final Approval of the version to be published |
| Aisha Arshad | Contributed to Data Collection and Analysis Has given Final Approval of the version to be published |
| Rukhsar Anwar | Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published |

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