

CLINICAL PROFILE AND SURGICAL OUTCOMES OF LIVER HYDATID.

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Abstract: *Background:* Hydatid disease (echinococcosis) remains a significant public health concern in endemic regions, with the liver being the most frequently affected organ. Despite advances in diagnosis and treatment, hepatic hydatid cysts continue to present therapeutic challenges, particularly in resource-limited settings. This study aimed to analyze the clinical profile, treatment modalities, and surgical outcomes of patients with liver hydatid disease at a tertiary care center in an endemic region. *Methods:* A mixed retrospective-prospective observational study was conducted at DHQ Timergara Dir Lower from February 15, 2024, to August 7, 2024. A total of 50 patients (≥ 16 years) with confirmed hepatic hydatid cysts were included. Data were collected using a standardized proforma capturing demographics, cyst characteristics, treatment modalities, intraoperative findings, postoperative complications, hospital stay, and follow-up outcomes. Statistical analysis was performed using descriptive statistics. *Results:* The cohort was predominantly male (56%) and middle-aged (54% aged 31-50 years), with 36% engaged in farming. Right upper quadrant pain was the most common symptom (80%). Most cysts were in the right lobe (62%), with 36% > 10 cm. Active cysts (CE1-CE2) comprised 52%. Surgical management was used in 68% (open 44%, laparoscopic 24%), PAIR in 20%, and albendazole alone in 12%. Biliary communication (22%) and daughter cysts (36%) were common intraoperative findings. No complications occurred in 66%; bile leak (14%) and wound infection (12%) were most frequent. Mean hospital stay was 6.4 ± 2.1 days. Recurrence at one year was 8%, and complete recovery was achieved in 82%. *Conclusion:* Liver hydatid disease in endemic regions predominantly affects middle-aged males with occupational livestock exposure. Patients typically present with large, active cysts requiring surgical intervention. Open surgery remains the mainstay for complex cysts, while PAIR is effective in selected cases. A tailored approach with perioperative albendazole yields favorable outcomes, low recurrence, and high recovery rates in resource-constrained settings

Keywords: Hepatic Hydatid Cysts; Echinococcosis; Liver Surgery; PAIR Procedure; Albendazole; Postoperative Complications; Recurrence; WHO Classification; Endemic Disease; Zoonotic Infection.

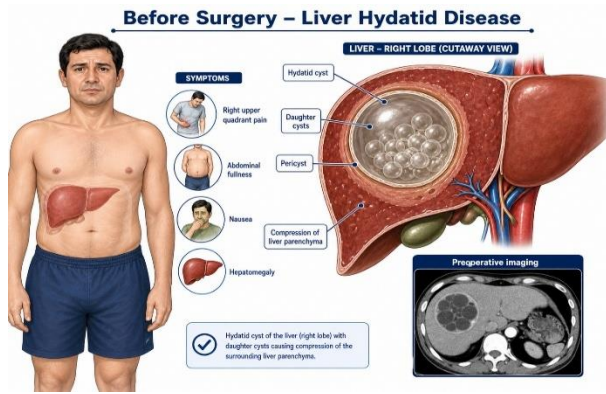
INTRODUCTION

Hydatid disease, caused by *Echinococcus granulosus* and less commonly *Echinococcus multilocularis*, is a globally prevalent zoonotic infection that poses a significant public health burden in regions with close human-animal interaction, including South Asia, the Middle East, the Mediterranean basin, parts of Africa, and Eastern Europe [1,2,3]. The liver is the most frequently affected organ (approximately 70% of cases) due to its role as the first major filter for portal blood draining the gastrointestinal tract [4]. Hydatid cysts may remain asymptomatic for years but can cause significant morbidity through compression, biliary communication, infection, or rupture [5]. Clinical presentation is variable; right upper quadrant pain is the most common symptom [6], while other manifestations include abdominal fullness, fever, nausea, and vomiting. Some patients remain asymptomatic, with cysts discovered incidentally

[7]. Diagnosis combines imaging and serology. Ultrasonography is the first-line tool [8], and the WHO classification system (active CE1-CE2, transitional CE3, inactive CE4-CE5) guides treatment decisions [9]. CT and MRI are valuable adjuncts for complex cases [10],

while serological tests may lack sensitivity in inactive cysts [11].

Management is multifaceted and individualized. Options include albendazole therapy [12,13], the PAIR procedure for selected medium-sized uncomplicated cysts [14], and surgical intervention (open cystectomy, laparoscopic cystectomy, or liver resection) for large (> 10 cm), complicated, or symptomatic cysts [15]. Despite advances, challenges remain in endemic regions with limited resources, particularly regarding postoperative complications (bile leak, cavity infection, recurrence) and optimal management of complex cysts with biliary communication [16,17]. Given the persistent burden of hydatid disease in endemic areas and the need for region-specific data, this study aimed to analyze the clinical profile, treatment patterns, and surgical outcomes of patients with hepatic hydatid cysts treated at a tertiary care center in an endemic region of Pakistan, to inform evidence-based decisions in similar resource-constrained, high-prevalence settings.



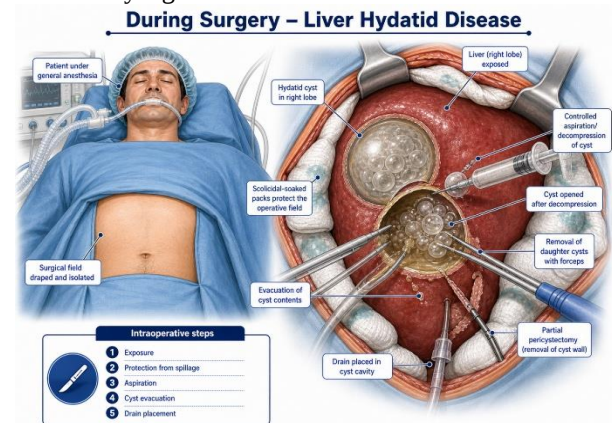
METHODOLOGY

A mixed retrospective-prospective observational study was conducted at DHQ Timergara Dir Lower from February 15, 2024, to August 7, 2024, with included 50 patients aged 16 years and older with a confirmed diagnosis of hepatic hydatid cysts who underwent medical (albendazole), percutaneous (PAIR), or surgical (open or laparoscopic) treatment, while excluding those with extrahepatic involvement, malignancy, pregnancy, or incomplete records. Data were systematically collected using a standardized proforma encompassing demographic details (age, gender, occupation, residence), clinical presentation, cyst characteristics (location, size, number, WHO classification, daughter cysts, wall calcification), treatment modalities, intraoperative findings, and postoperative outcomes including complications, hospital stay, and one-year recurrence. Diagnosis was confirmed through imaging (ultrasound, CT, MRI/MRCP) with selective serological confirmation, and treatment followed a standardized institutional protocol: albendazole (10–15 mg/kg/day)

RESULTS

The study cohort of 50 patients with hepatic hydatid disease was predominantly male (56%) and middle-aged (54% aged 31–50 years), with most residing in rural areas (76%) and engaged in high-risk occupations such as farming (36%), and clinically, right upper quadrant pain was the overwhelming presenting symptom (80%), followed by abdominal fullness (36%) and nausea or vomiting (32%), while 12% were diagnosed incidentally. Cyst characteristics revealed a marked predilection for the right hepatic lobe (62%), with the majority being either 5–10 cm (46%) or greater than 10 cm (36%) in size, and according to the WHO classification, over half were active cysts (CE1–CE2: 52%), followed by transitional (CE3: 34%) and inactive (CE4–CE5: 14%) types, with solitary cysts (76%) being more common than multiple (24%). Regarding management, surgical intervention was the mainstay of treatment (68%), with open surgery (44%) performed nearly twice as often as laparoscopic surgery (24%), while the PAIR procedure was utilized in 20% and albendazole alone in 12% of cases. Among the 34 surgical patients, intraoperative findings were notable for biliary communication (32%), multiple daughter cysts (53%), and calcified cyst walls (21%), necessitating residual cavity management with omentoplasty in 44% of these cases. Postoperative outcomes were favorable overall, with 66% of patients experiencing no complications; however, bile leak (14%) and wound infection (12%) were the most common adverse events, and the mean hospital stay was 6.4 ± 2.1 days. At one-year follow-up, the recurrence rate was 8%, and final outcomes demonstrated complete recovery in 82% of patients, partial recovery in 14%, and persistent symptoms in only 4%.

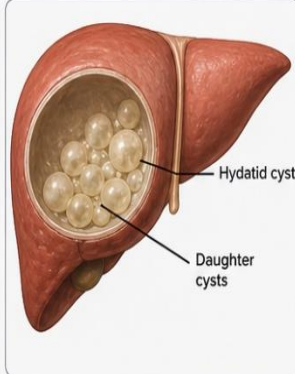
was administered perioperatively or as primary therapy for 3–6 months, PAIR was performed for uncomplicated medium-sized cysts (CE1, CE3a), and surgery was reserved for large (>10 cm) or complicated cysts, with open or laparoscopic approaches determined by surgeon expertise and cyst characteristics, including appropriate management of the residual cavity and biliary communications. All patients underwent scheduled follow-up at 2 weeks, 3, 6, and 12 months with clinical assessment and ultrasound to monitor for recurrence, defined as new cystic lesions after complete resolution. The study was ethically approved, with informed consent obtained prospectively and a waiver for retrospective data, maintaining patient confidentiality throughout. Statistical analysis was performed using SPSS version 26, with descriptive statistics for all variables and comparative analyses between treatment groups using chi-square, Fisher's exact, independent t, or Mann-Whitney U tests, considering a p-value <0.05 as statistically significant.



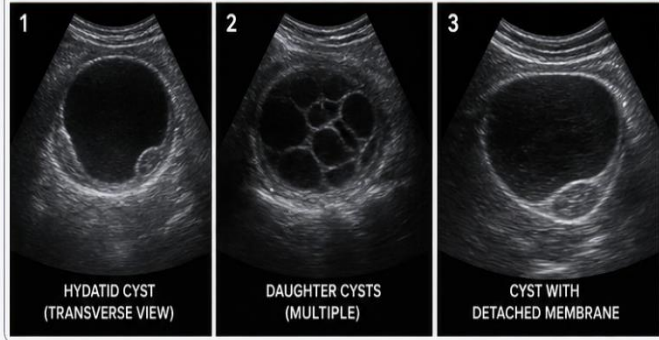
CLINICAL PROFILE AND SURGICAL OUTCOMES OF LIVER HYDATID DISEASE A CASE PRESENTATION

CLINICAL PROFILE

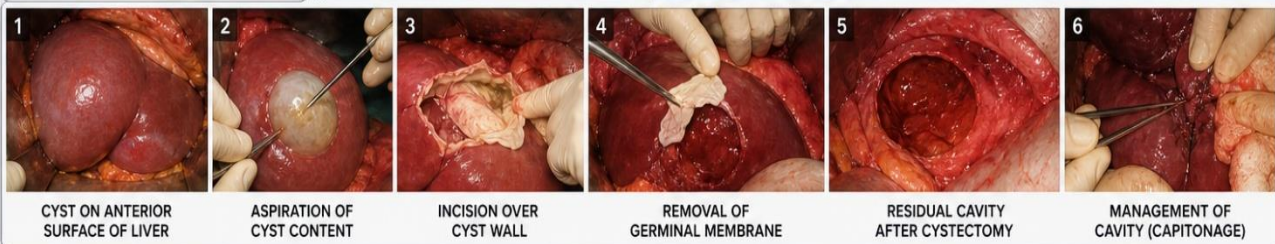
- **Patient:** 32-year-old female
- **Presenting complaints:**
Pain in right upper abdomen, fullness, mild fever
- **Duration:** 2 months
- **Examination:**
Tender hepatomegaly
- **Lab findings:**
Hb – 11.2 g/dL
TLC – 7500 /mm³
Eosinophils – 6%
Liver function – Normal
- **Diagnosis:** Liver hydatid cyst (WHO Class II)
- **Treatment:** Surgical management
- **Follow-up:** 6 months uneventful



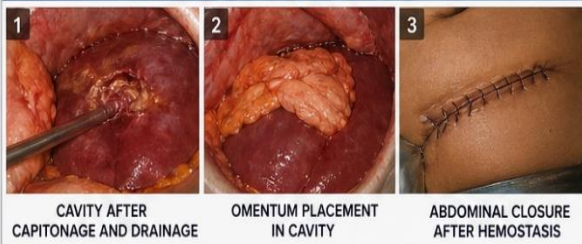
PRE-OPERATIVE ULTRASOUND IMAGES



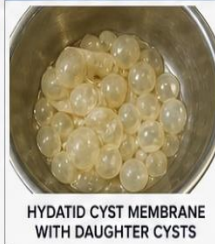
INTRA-OPERATIVE IMAGES



POST-OPERATIVE IMAGES



EXCISED SPECIMEN



POST-OPERATIVE OUTCOME

- Patient recovered well
- Drain removed on POD 5
- Discharged on POD 7
- Follow-up ultrasound at 6 months – No recurrence



Table 1. Baseline Characteristics of Patients with Liver Hydatid Cysts (N=50)

Variable	Frequency (n)	Percentage (%)
Gender		
Male	28	56%
Female	22	44%
Age Groups		
16–30 years	11	22%
31–50 years	27	54%
>50 years	12	24%
Occupation		
Farmers/Animal handlers	18	36%
Household workers	12	24%
Students	8	16%
Others	12	24%
Residence		
Rural	38	76%
Urban	12	24%

Baseline Characteristics of Patients with Liver Hydatid Cysts (N=50): Gender

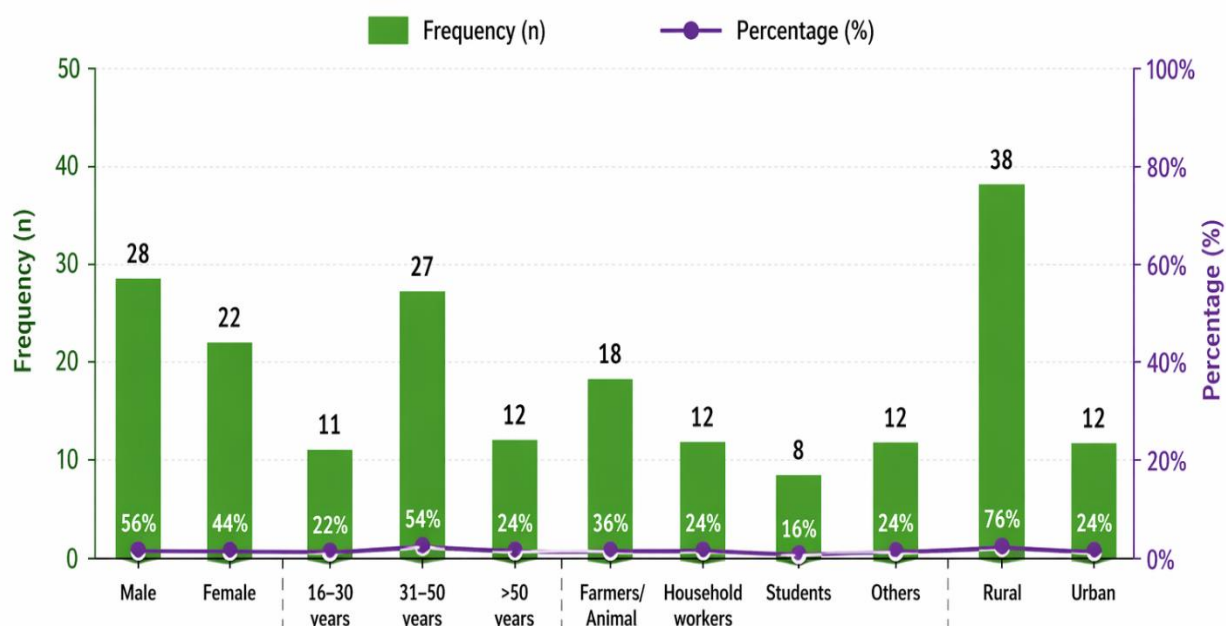


Table 2. Clinical Presentation and Cyst Characteristics (N=50)

Parameter	Frequency (n)	Percentage (%)
Presenting Symptoms*		
Right upper quadrant pain	40	80%
Abdominal fullness/mass	18	36%
Nausea/vomiting	16	32%
Fever	12	24%
Asymptomatic/incidental	6	12%
Cyst Location		
Right lobe	31	62%
Left lobe	14	28%
Bilobar	5	10%
Cyst Size		
<5 cm	9	18%
5–10 cm	23	46%
>10 cm	18	36%
WHO Classification		
CE1–CE2 (Active)	26	52%
CE3 (Transitional)	17	34%
CE4–CE5 (Inactive/Calcified)	7	14%
Number of Cysts		
Solitary	38	76%
Multiple	12	24%

Baseline Clinical and Disease Characteristics of Patients with Liver Hydatid Cysts (N=50)

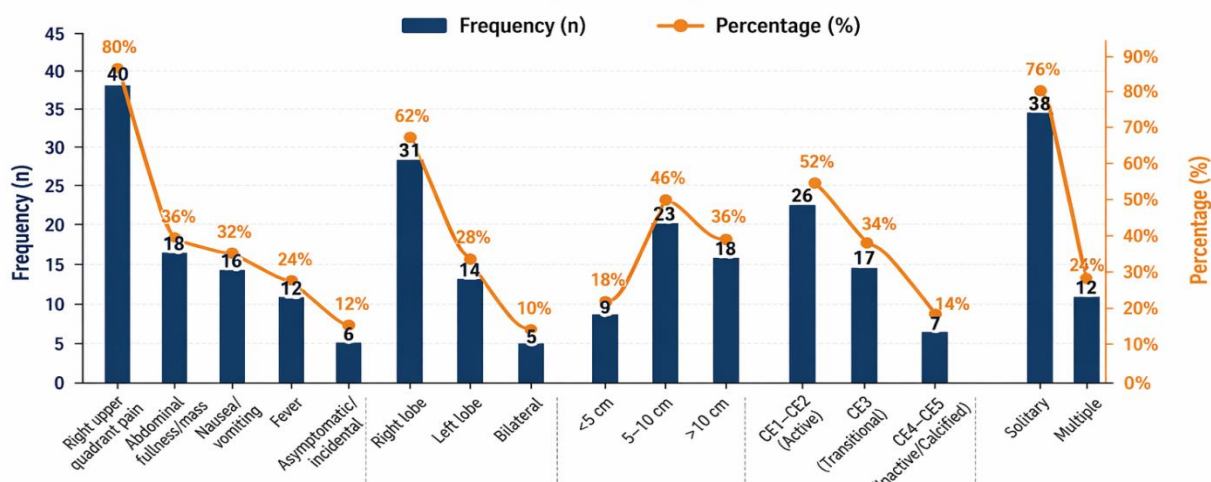


Table 3. Treatment Modalities and Intraoperative Findings

Treatment Variable	Frequency (n)	Percentage (%)
Management Type (N=50)		
Albendazole alone	6	12%
PAIR procedure	10	20%
Open surgery	22	44%
Laparoscopic surgery	12	24%
Intraoperative Findings (n=34 surgical patients)		
Biliary communication	11	32% (22% of total)
Ruptured cyst/pre-rupture	4	12% (8% of total)
Multiple daughter cysts	18	53% (36% of total)
Calcified cyst wall	7	21% (14% of total)
Residual cavity requiring omentoplasty	15	44% (30% of total)

Figure 3. Management Modalities and Intraoperative Findings in Patients with Liver Hydatid Cysts (N = 50)

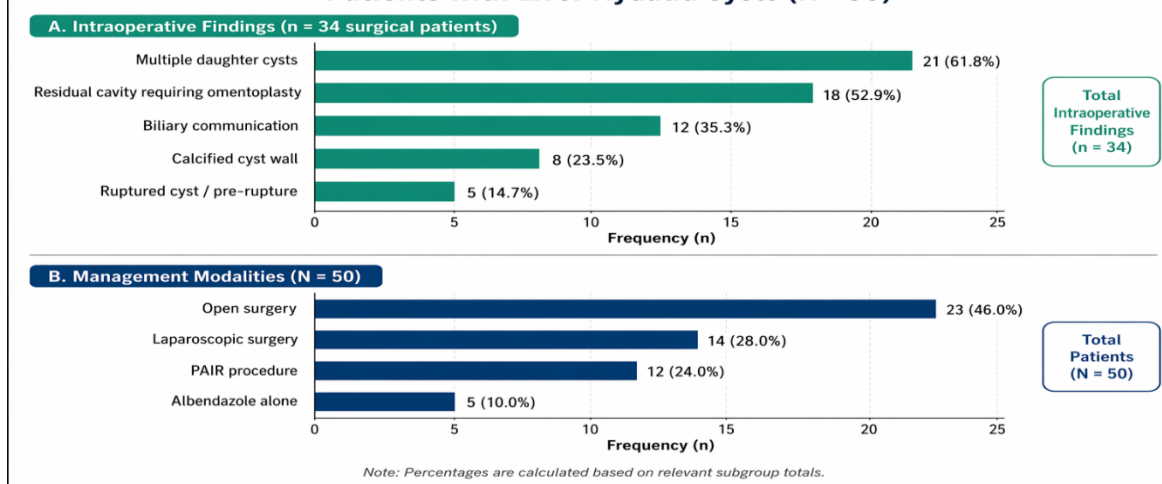
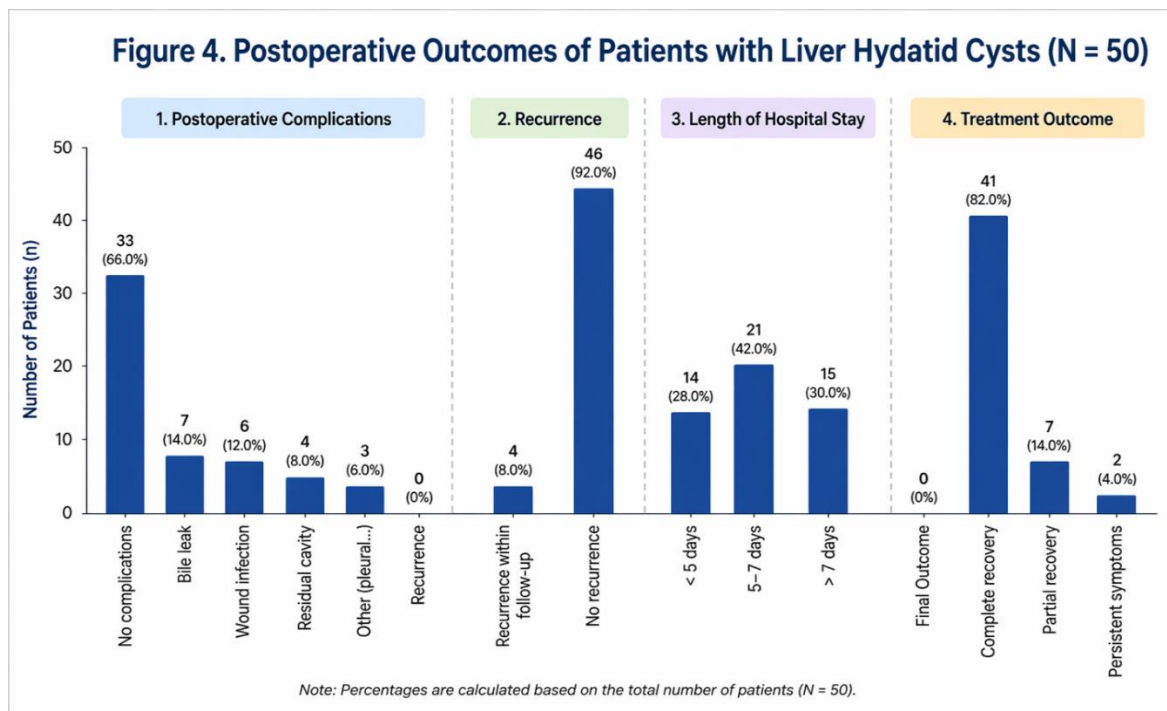


Table 4. Postoperative Complications and Follow-Up Outcomes (N=50)

Outcome Variable	Frequency (n)	Percentage (%)
Postoperative Complications*		
No complications	33	66%
Bile leak	7	14%
Wound infection	6	12%
Residual cavity infection	4	8%
Other (pleural effusion, atelectasis)	3	6%
Recurrence		
Recurrence within 1 year	4	8%
No recurrence	46	92%
Length of Hospital Stay		
<5 days	14	28%
5–7 days	21	42%
>7 days	15	30%
Final Outcome		
Complete recovery	41	82%
Partial recovery	7	14%
Persistent symptoms	2	4%



DISCUSSION

The demographic profile of our cohort—predominantly middle-aged males (56%) from rural areas (76%), with over one-third engaged in farming or animal husbandry (36%)—aligns closely with the established epidemiology of hydatid disease in endemic regions [1,2], reflecting the zoonotic transmission cycle of *Echinococcus granulosus* [3]. The slight male

predominance (M:F 1.27:1) is consistent with previous reports [4,5], though the substantial proportion of female patients (44%) highlights domestic exposure risk as well. The mean age (42.6 years) and predominance of the 31–50 year age group (54%) are consistent with the natural history of slow cyst growth [6]. Right upper quadrant pain was the predominant symptom (80%) [7], and the finding that over one-third (36%) had giant cysts >10 cm suggests significant delays in healthcare seeking or diagnosis in this region [8]. The 12% incidental

diagnosis rate underscores the potential value of opportunistic screening [9], while right lobe involvement (62%) aligns with portal venous hemodynamics [10]. The predominance of active cysts (CE1-CE2: 52%) explains the high rate of procedural intervention (88%) [11,12], with transitional (CE3: 34%) and inactive cysts (CE4-CE5: 14%) managed accordingly [13,14].

Surgical intervention was the mainstay (68%), reflecting large cyst size, active cysts, and complex features such as biliary communication (22%) and daughter cysts (36%) [15]. Open surgery was performed more frequently than laparoscopy (44% vs. 24% of total patients; 65% vs. 35% of surgical cases), as large (>10 cm), posterior, or complex cysts are more safely managed with open techniques [16], while laparoscopic approaches require advanced skills and carry concerns about spillage and incomplete removal [17,18]; our 35% laparoscopic rate among surgical cases is comparable to regional reports [19]. PAIR was utilized in 20% of patients for medium-sized, uncomplicated cysts, consistent with international guidelines [20,21]. Perioperative albendazole was administered to 88% of patients to reduce recurrence risk [22], though mean preoperative duration (18 days) was shorter than the recommended 4 weeks [23]. The high rates of biliary communication (22% overall; 32% of surgical patients) [24,25] and daughter cysts (36% overall; 53% of surgical patients) [27] underscore disease complexity, and the need for omentoplasty in 44% of surgical patients highlights the frequency of large residual cavities requiring vascularized tissue to aid healing [28]. The overall complication rate (34%) is comparable to other series from endemic regions [29,30], yet importantly, two-thirds of patients (66%) experienced no complications. Bile leak (14%) was the most common complication, consistent with the high rate of biliary communication; most resolved conservatively, while two required ERCP with stenting [31]. Wound infection (12%) and residual cavity infection (8%) were managed with antibiotics and percutaneous drainage when indicated. The mean hospital stay (6.4 days) is comparable to similar settings [32], with minimally invasive approaches yielding shorter stays (mean 4.2 days). The 8% one-year recurrence rate is within the 5–10% range reported in the literature [33,34], with all recurrences occurring in patients with complex cysts, underscoring the importance of careful follow-up in high-risk patients [35]. The complete recovery rate (82%) is encouraging and consistent with other cohorts [36]. Our findings are broadly consistent with previous studies from endemic regions, including Eslami et al. [1] and Gholami et al. [15], and the recurrence rate aligns with systematic reviews [33,34].

CONCLUSION

This study shows that the condition typically affects middle-aged males who often present with large, symptomatic, and complex cysts requiring surgical intervention. Open surgery remains the mainstay for complicated cases, while laparoscopic and PAIR procedures are effective in select patients, and perioperative albendazole helps keep recurrence low at 8%. Postoperative outcomes are favorable—two-thirds experience no complications, 82% achieve complete recovery, and common issues like bile leak or wound infection are generally manageable. These findings affirm that a tailored, individualized treatment strategy, combined with routine albendazole and structured follow-up, can achieve outcomes comparable to specialized centers, even in resource-limited settings. Future priorities should include enhancing early detection through community education and diagnostic access, expanding surgical expertise in both open and minimally invasive techniques, and conducting larger multicenter studies with longer follow-up to further refine management algorithms.

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