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Laparoscopic Management of Hydatid Liver Disease in Children: A Retrospective Review at Qazi Hussain Ahmed Medical Complex, Nowshera (2019–2024)

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Funding Source: None
Conflict of Interest: None

Received: Aug 12, 2024
Accepted: Nov 25, 2024

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ABSTRACT

Objective: This study reviews the outcomes of laparoscopic management of pediatric Hydatid liver disease (HLD) at Qazi Hussain Ahmed Medical Complex over five years.

Methods: A retrospective review was conducted for pediatric patients treated between June 2019 and June 2024 in our hospital. A total of 28 children (10 females and 18 males; mean age 9.12 ± 2.8 years) were included in this study. Data collected over these five years incorporated demographics, cyst characteristics, surgical methods, operative time, hospital stay duration, postoperative complications, and recurrence rates. Statistical analysis was executed using SPSS version 26.

Results: The majority of cysts (64.3%) were found in the right hepatic lobe, with the remainder (35.7%) in the left lobe. The average cyst size was 7.33 ± 1.8 cm. Mean operative time was 85.2 ± 12.4 minutes, and the average hospital stay was 3.71 ± 1.2 days. Minor bile leakage occurred in 10.7% of cases but was treated conservatively. No major intraoperative complications or mortality were reported in our study. Recurrence was identified in 7.1% of patients over an 18-month follow-up period.

Conclusion: Laparoscopic surgery provides a reliable and efficient alternative to conventional open surgical methods for the management of pediatric HLD. It provides added benefits such as shorter hospital stays, lower morbidity, and improved cosmetic results. However, its wider application in the developing world continues to be limited by a lack of resources and late disease manifestation.

Keywords: Hydatid liver disease, Laparoscopic surgery, Echinococcus granulosus, Pediatrics.

Cite this article as: Akhtar W, Bacha R, Ahmad A, Khan J, Naeem T. Clinical Outcomes and Complications of Pediatric Hypospadias Repair: Experience from a Tertiary Care Hospital. Ann Pak Inst Med Sci. 2024; 20(4):899-903. doi. 10.48036/apims.v20i4.1034

Introduction

Human echinococcosis, also known as hydatidosis or hydatid disease, is a chronic parasitic zoonosis caused by the larval stage of *Echinococcus granulosus*, a tapeworm that primarily affects the liver and lungs.[1] The disease burden is particularly high in pastoral and rural communities where humans live in close proximity to livestock and dogs, facilitating the parasite's life cycle. In over 90% of cases, hydatid cysts are located in the liver and lungs, although they can develop in virtually any organ including the brain, spleen, bones, and kidneys, making it a multisystem disease with varied clinical implications.[2]

Transmission occurs when humans accidentally ingest parasite eggs through contaminated food, water, or direct contact with infected dog feces. In endemic regions such as South Asia, weak veterinary public health infrastructure, home slaughtering of livestock, and the presence of stray dogs contribute significantly to the high transmission rates.[3] In these areas, including Pakistan, echinococcosis remains a serious public health problem, especially among children who often come into closer contact with infected animals. Pediatric hydatid disease can result in significant morbidity due to organ dysfunction or cyst rupture, and prevalence rates as high as 5.2 per 100,000 children have been reported in some endemic zones.[4]

Although the disease is relatively rare in industrialized nations, increased migration and international travel have led to more frequent diagnoses in non-endemic regions such as the United States and Western Europe,

emphasizing its global relevance.[5] In such areas, diagnosis is often delayed due to a lack of clinical suspicion.

The clinical presentation of hydatid liver disease (HLD) in children is often insidious. While some may present with abdominal pain, hepatomegaly, or vomiting, many remain asymptomatic until the cysts grow large or become complicated. Diagnosis typically begins with ultrasonography, which is the modality of choice due to its high sensitivity, cost-effectiveness, and non-invasive nature.[6] Additional imaging modalities like CT and MRI are used for further anatomical delineation and surgical planning, particularly in cases involving deep-seated or multiple cysts.[2]

Management of HLD depends on cyst size, location, complications, and the overall condition of the patient. While pharmacological treatment using albendazole or mebendazole is appropriate for selected small or inoperable cysts, surgery remains the mainstay of therapy for most patients.[6] Surgical options include open and minimally invasive approaches. Laparoscopic surgery has gained increasing favor due to its minimally invasive nature, reduced postoperative discomfort, shorter hospital stays, and quicker recovery times, especially in pediatric populations.[7] However, its adoption in low- and middle-income countries has been limited due to a lack of skilled personnel, insufficient training, and inadequate laparoscopic infrastructure.[8]

Despite its growing success in specialized centers, there remains a paucity of local data on the outcomes of laparoscopic management of pediatric HLD in Pakistan. This study aims to retrospectively evaluate the safety, feasibility, and clinical outcomes of laparoscopic treatment of hydatid liver disease in children in our setup.

Methodology

A retrospective observational study was conducted at Qazi Hussain Ahmed Medical Complex, Nowshera, covering the five-year period from June 2019 to June 2024. The study was started after taking Ethical approval from the institutional review board of Qazi Hussain Ahmed Medical Complex prior to data collection and analysis. The approval was granted via letter no. 32/ERB/NMC.

Medical records of patients aged 16 years or younger, diagnosed with hepatic hydatid disease and treated surgically through laparoscopic intervention, were reviewed. Inclusion criteria consisted of all pediatric patients (≤16 years) with a confirmed diagnosis of hepatic hydatid cysts who underwent laparoscopic surgery during the study period. Patients requiring conversion to open surgery or those with incomplete clinical records were excluded from the study.

Data were extracted from patient files using a structured proforma and included demographic information (age, sex, and place of residence), cyst characteristics (number, size, and location), preoperative investigations, intraoperative findings, operative time, postoperative complications, and overall clinical outcomes. Additional parameters included duration of hospital stay, type of intraoperative cyst cavity management, and administration of albendazole therapy before and after surgery. All patients received a standard preoperative chemoprophylactic regimen consisting of albendazole at a dose of 10 mg/kg/day for four weeks. This treatment aimed to sterilize the cysts by destroying protoscolices and to minimize the risk of recurrence in case of intraoperative spillage, in accordance with World Health Organization (WHO) guidelines.[9]

Laparoscopic surgery was performed under general anesthesia using either a three-port or four-port technique depending on the cyst's size and anatomical location. Once the cyst was identified, it was punctured and its contents aspirated. A scolicidal agent, 20% hypertonic saline, was then injected into the cyst cavity and left in situ for 10 to 15 minutes before being completely evacuated. The germinal membrane was carefully removed, and the residual cavity was managed either through omentoplasty or the placement of a surgical drain, as deemed appropriate by the operating surgeon based on intraoperative findings. After surgery, all patients received two additional courses of albendazole therapy. Each course lasted four weeks, beginning after the tenth postoperative day, with a two-week drug-free interval between the two courses.

Statistical analysis was carried out using SPSS version 26. Continuous variables such as age, cyst size, duration of surgery, and length of hospital stay were expressed as mean ± standard deviation (SD), while categorical variables like gender, number of cysts, complications, and outcomes were reported as frequencies and percentages. The chi-square test was used to compare categorical data, and the independent sample t-test was used for continuous data. A p-value of less than 0.05 was considered statistically significant for all comparisons.

Results

A total of 28 pediatric patients underwent laparoscopic management for hepatic hydatid disease during the study period. The mean age of patients was 9.12 ± 2.8 years, with a male predominance observed in 18 cases (64.3%). The majority of hydatid cysts were located in the right hepatic lobe (64.3%), while the remaining cases involved the left lobe (35.7%). Most patients (85.7%) had single, large cysts, whereas only a few presented with multiple cysts. The average cyst diameter was 7.33 ± 1.8 cm. Demographic and cyst characteristics are presented in Table 1.

Table I: Demographic and Cyst Characteristics. (n = 28)

Variable	Value/Frequency (%)
Age of the patients (years)	
Mean ± SD	9.12 ± 2.8
Gender	
– Male	18 (64.3%)
– Female	10 (35.7%)
Cyst location	
– Right lobe	18 (64.3%)
– Left lobe	10 (35.7%)
Number of cysts	
– Single cyst	24 (85.7%)
– Multiple cysts	4 (14.3%)
Cyst diameter (cm)	
Mean ± SD	7.33 ± 1.8

All patients underwent preoperative albendazole therapy, and laparoscopic surgery was performed using either a three-port or four-port technique depending on cyst location. The mean operative time was 85.2 ± 12.4 minutes, and the average hospital stay was 3.71 ± 1.2 days. Cyst cavity management was performed with either omentoplasty or drain placement, as appropriate. There were no major intraoperative complications, and no conversions to open surgery were required. Operative details are shown in Table II.

Table II: Distribution of Operative Details. (n = 28)

Variable	Value/Frequency (%)
Operative time (minutes)	
Mean ± SD	85.2 ± 12.4
Hospital stay (days)	
Mean ± SD	3.71 ± 1.2
Complications	
Intraoperative complications	0 (0%)
Conversion to open surgery	0 (0%)

In terms of postoperative complications, 3 patients (10.7%) experienced minor bile leakage, all of which were managed conservatively by maintaining the surgical drain for a longer period. The leaks resolved spontaneously without the need for re-intervention. Additionally, one patient (3.6%) developed a superficial port site wound infection, which responded well to topical antibiotics. No cases of anaphylaxis, or bleeding were observed. During the 18-month follow-up, recurrence was noted in 2 patients (7.1%), both of whom had initially presented with large cysts. The recurrent cases were detected through routine follow-up ultrasound and managed with standard protocol. No additional surgical interventions were required as shown in Table III.

Table III: Postoperative Complications and final outcome. (n = 28)

Complication	Frequency (%)
Postoperative Complications	
Bile leakage (minor)	3 (10.7%)
Superficial wound infection	1 (3.6%)
Anaphylaxis	0 (0%)
Major complications	0 (0%)
Final outcome	
Recurrence (within 18 months)	2 (7.1%)
Reoperation required	0 (0%)
Successful resolution	26 (92.9%)

Discussion

This retrospective study reinforces the safety and efficacy of laparoscopic management for pediatric hepatic hydatid disease (HLD), in line with the growing body of global literature that supports minimally invasive approaches in such cases. Our results corroborate findings from previous studies that highlight the advantages of laparoscopy in terms of reduced morbidity, shorter hospital stay, and favorable postoperative outcomes in children with HLD.[10,11]

The mean operative time in our study was 85.2 ± 12.4 minutes, which is comparable to international reports where laparoscopic procedures typically range from 75 to 90 minutes.[12] This is significantly shorter than the average durations associated with open surgeries, which often exceed 110–150 minutes due to the time consumed in large incisions, closure, and extensive tissue dissection.[13] Slightly longer laparoscopic operative times reported in some centers may be attributable to meticulous cyst handling, especially to prevent spillage and to ensure complete removal of the germinal layer.[12] Our findings validate the view that laparoscopic surgery, when performed by experienced surgeons, is not only time-efficient but also safe.

Hospital stay in our patients averaged 3.71 ± 1.2 days, substantially less than the 6 to 8 days commonly required after open surgery.[14] This difference has important implications for resource-limited settings, as shorter hospitalizations reduce healthcare costs, improve bed

turnover, and offer greater convenience for pediatric patients and their families. Moreover, early mobilization reduces the risk of postoperative complications such as respiratory infections, which are more common in children undergoing open abdominal surgery.[15]

Comparable results have been reported in an Egyptian study that documented a mean hospital stay of around 3 days with minimal complications, reinforcing the safety of laparoscopy when performed in well-equipped centers by skilled personnel.[16] However, studies from centers with less experience, such as one conducted in Jamshoro, Pakistan, reported longer hospital stays (mean 6 days), likely due to intraoperative and postoperative complications.[17]

Postoperative complications in our study were minimal. Three patients (10.7%) experienced minor bile leakage, all of which were managed conservatively by prolonging drainage. None required reoperation. One patient (3.6%) developed a superficial wound infection, which resolved with topical antibiotics. No major complications or mortalities occurred. These outcomes are consistent with those of other studies, which report bile leak rates after laparoscopic HLD surgery ranging from 2% to 15%.[18–20]

A global review involving 914 patients noted leak rates as high as 36.7% in some series, though most leaks in pediatric patients tend to resolve spontaneously with conservative management.[21] Variability in leak rates across studies may be attributed to cyst characteristics—particularly cysto-biliary communication or larger cysts—and to the surgical expertise involved. Meticulous dissection, careful handling of the cyst wall, and avoidance of injury to bile ducts are essential in minimizing these complications.

Recurrence occurred in two of our patients (7.1%) during an 18-month follow-up period. Although slightly higher than some reports, our recurrence rate falls within the range described in literature, where rates vary between 2.7% and 10% depending on follow-up duration, surgical technique, and use of chemoprophylaxis.[22–25] Bari et al.[22] and Bayrak et al.[23] reported recurrence rates of 2.7% and 2.85%, respectively, attributing their lower figures to consistent use of pre- and postoperative albendazole therapy. In contrast, Jerraya et al.[25] reported recurrence rates approaching 10% and noted an association with multivesicular and deeply located cysts. Recurrence may also reflect spillage of viable scolices, incomplete removal of the germinal membrane, or undetected cysto-biliary communications. Nonetheless, the comparatively low rate of recurrence in our cohort highlights the importance of standard WHO-recommended albendazole therapy before and after surgery, as followed in our protocol.[9]

Laparoscopy offers several other benefits that are particularly advantageous in pediatric populations: reduced postoperative pain, faster recovery, low rates of wound infections, and better cosmetic outcomes. However, widespread adoption in developing countries like Pakistan remains limited by challenges such as a lack of trained pediatric laparoscopic surgeons, limited access to advanced equipment, and late presentation of cases due to diagnostic delays.

It is important to note that while laparoscopy is effective in most cases, certain complex scenarios such as giant or multiple cysts, cysts with calcified walls, or extensive biliary communication may require modified laparoscopic approaches or conversion to open surgery. Future research, particularly prospective multicenter studies with larger samples and longer follow-up, will be crucial to validate the long-term outcomes of laparoscopic treatment and refine the indications further.

In conclusion, our findings strongly support the use of laparoscopic surgery for the management of pediatric hepatic hydatid disease in appropriately selected patients. With proper surgical training, adherence to standardized protocols, and access to necessary resources, laparoscopy can serve as a safe, effective, and reproducible approach in endemic regions.

Conclusion

This study demonstrates that laparoscopic management of hepatic hydatid disease in pediatric patients is a safe, effective, and minimally invasive approach with low complication and recurrence rates. With a mean operative time of 85.2 minutes, short hospital stays averaging 3.7 days, and minimal postoperative morbidity, laparoscopy proves to be a favorable alternative to open surgery. Proper pre- and postoperative albendazole therapy, along with careful surgical technique, contributes significantly to positive outcomes. Wider adoption of laparoscopic techniques, especially in endemic and resource-limited settings, requires investment in surgical training and infrastructure to maximize its benefits in pediatric populations.

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