
Laparoscopic approach in treating liver hydatid disease, Is it safe and effective?

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ABSTRACT

INTRODUCTION: Liver hydatid disease, caused by *Echinococcus granulosus*, poses significant health challenges, particularly in endemic regions. Traditionally, open surgery has been the primary treatment, although it is associated with high morbidity and prolonged recovery. Laparoscopic surgery, a minimally invasive alternative, offers potential benefits such as reduced complications and shorter hospital stays. However, concerns about cyst spillage and procedural complexity have limited its adoption. This study compared the outcomes of laparoscopic versus open surgery in managing liver hydatid disease.

METHOD: A retrospective study was conducted at Royal Medical Services hospitals from January 2018 to September 2022. Adult patients who underwent either laparoscopic or open surgery for liver hydatid cysts were included. The primary selection criterion for the surgical approach was surgeon preference. Notably, cysts in more challenging anatomical locations, such as deep segments (e.g., segment seven), were more frequently managed with open surgery, although this difference was not statistically significant. Data were collected from electronic medical records and computed tomography (CT) scans. Key outcomes analyzed included operative time, blood loss, postoperative complications, hospital stay, and recurrence rates. Statistical analysis was performed using SPSS version 28.

RESULTS: The study included 102 patients, with 43 undergoing laparoscopic surgery and 59 undergoing open surgery. Laparoscopic surgery was associated with less blood loss (150 mL vs. 300 mL, $p < 0.05$), fewer complications (14% vs. 30%, $p < 0.05$), and a shorter hospital stay (3 vs. 6 days, $p < 0.05$). Although the operative time was longer for the laparoscopic group (105 vs. 90 minutes, $p < 0.05$), the recurrence rate was lower (4.6% vs. 10.2%, $p < 0.05$).

CONCLUSION: Laparoscopic surgery offers significant advantages over open surgery for the treatment of liver hydatid disease, including reduced morbidity, shorter hospital stays, and lower recurrence rates. The findings support the increased adoption of the laparoscopic approach, acknowledging that surgical approach selection was based on surgeon preference and anatomical considerations.

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INTRODUCTION

Liver hydatid disease, which is caused primarily by the parasitic infection *Echinococcus granulosus*, remains a significant health issue in endemic regions. The disease manifests as cystic lesions in the liver, which can cause a range of symptoms, from asymptomatic cases to severe complications

such as cyst rupture or biliary obstruction. Surgical intervention is often required to manage these cysts, with the primary goals being to eliminate the parasite, prevent recurrence, and manage any complications [1]. Historically, open surgery has been the gold standard for the treatment

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of liver hydatid cysts. This technique, while effective, is associated with considerable morbidity, extended hospital stays, and significant postoperative pain [2]. With advancements in medical technology, laparoscopic surgery has emerged as a minimally invasive alternative. This technique offers several potential advantages, including reduced postoperative pain, shorter hospital stays, faster recovery times, and lower complication rates [3]. Despite these benefits, the adoption of laparoscopic surgery in hydatid disease treatment remains a topic of ongoing debate, primarily due to concerns about the risk of cyst content spillage and the complexity of the procedure [4]. This manuscript examines the benefits of laparoscopic surgery versus traditional open techniques in managing liver hydatid disease, underpinned by an extensive review of the current literature. [5].

METHODS:

This was a retrospective observational study. After approval was obtained from the Institutional Review Board (Ethical Committee), patients meeting the study inclusion criteria were identified. The inclusion criteria included all adult patients treated surgically for liver hydatid disease during the study period at the hospitals of the Royal Medical Services between January 2018 and September 2022. Surgical treatment included cyst deroofing, pericystectomy, or hepatectomy performed via an open or laparoscopic approach. Patients with pretreatment and preoperative abdominal CT data with images accessible to the study team were included. Patients were followed for at least six months postoperatively with at least one abdominal CT scan. Patients with single or multiple liver hydatid cysts were included. The exclusion criteria included patients treated with medical treatment only, patients with extrahepatic hydatid disease only without liver involvement, patients without preoperative imaging or imaging data not accessible to the study team, and patients lost to follow-up. Patients' electronic medical records and preoperative and postoperative abdominal computed tomography (CT) images were reviewed. Data points were collected and

stored in a secured password-protected spreadsheet accessible only to study members. The data were collected by general surgery specialists and hepatobiliary fellows who participated in the study. Data collection was supervised by the principal investigator. Interpretation of abdominal CTs was confirmed by experienced hepatobiliary specialists in complicated or unclear images. Recurrent disease was defined as the emergence of new active cysts after intentional curative surgery; this includes the reappearance of a cyst at a site of previously treated hydatid cyst or the presence of new distant hydatid cysts [23]. The analyzed data included patient demographics, preoperative risk profiles represented by the American Society of Anesthesiology (ASA) score, cyst location and World Health Organization (WHO) hydatid cyst classification, surgical approach, intraoperative data, preoperative and postoperative medical treatment, postoperative complications, and follow-up data. One hundred and two patients treated over the past four years were identified. The diagnosis of liver hydatid disease was based on abdominal computed tomography (CT). Serology testing for *Echinococcus granulosus* was not performed on a regular basis for all patients. **ALBENDAZOLE TREATMENT:** The treatment protocol at our institute included administering albendazole (15 mg/kg) three months preoperatively and one to six months postoperatively based on the type of surgery. Patients who usually undergo pericystectomy do not receive postoperative albendazole. Patients with cyst deroofing received albendazole for 28 days. Patients with ruptured cysts intraoperatively or major leaks of hydatid cyst contents received albendazole for at least three months postoperatively. Typically, patients undergo follow-up CT scans after the initial treatment period. The WHO classification of liver hydatid cysts was used to assess treatment response. If patients experienced significant side effects or were unable to tolerate albendazole, the treatment was ceased. Patients who could not tolerate albendazole or who did not receive albendazole preoperatively or postoperatively were not excluded from the study.

The most common side effects of albendazole include nausea, vomiting, abdominal pain, and elevated liver enzymes.

SURGICAL APPROACH The following principles were maintained in open and laparoscopic approaches for the surgical treatment of hydatid disease. At the time of surgery, the precise location of the cyst was identified and correlated with the radiological findings. The operative field was covered with surgical gauze soaked with 0.05% chlorhexidine gluconate, and the cyst content was fully aspirated. The hydatid cyst was then injected with a scolicidal agent. Several types of scolicidal agents, including formalin, hydrogen peroxide, hypertonic saline, chlorhexidine gluconate, absolute alcohol, and cetrimide, have been reported in the literature. At our institute, the most commonly used agent is 0.05% chlorhexidine gluconate. The volume of chlorhexidine gluconate injected corresponded to 2/3 of the volume of aspirated cystic fluid. After seven minutes, the chlorhexidine gluconate agent was reaspirated. The internal cyst components were deroofed with an energy sealing device for hemostasis. The cyst aspirate was inspected for bile staining. Additionally, the inside of the cyst was inspected. Any bile duct communications were sutured and closed. In the case of infected cysts, a closed suction drainage tube was inserted. Extra care was taken to ensure that no spillage occurred to prevent seeding and secondary infestation. Omentoplasty was performed based on the hydatid cyst location in relation to the liver surface. More radical surgical approaches, such as partial hepatectomy or pericystectomy (removing the hydatid cyst with 1 cm of the surrounding liver margin without opening the cyst), could be performed based on the anatomic site and dimensions of the cyst. In our experience, the indications for cholecystectomy in hydatid disease included: (1) the presence of symptomatic gallbladder disease; (2) the localization of the hydatid cyst to segments 4b or 5 of the liver; and (3) the occurrence of complicated hydatid cysts with suspected biliary fistula, where saline injection was

used to assess the presence of a biliary fistula. It is important to note that concomitant cholecystectomy was not specifically documented in this study, as the primary objective was to compare the outcomes of open versus laparoscopic surgical techniques. In our experience, the primary intraoperative method used for identifying biliary fistulas in patients with hydatid disease is saline injection through the cystic duct. This technique allows for the assessment of any communication between the hydatid cyst and the biliary system. While other diagnostic methods, such as intraoperative cholangiography, bile leakage tests, and endoscopic retrograde cholangiopancreatography (ERCP), can be employed, saline injection remains the preferred and most commonly utilized approach in our practice for intraoperative evaluation of biliary fistulas. Non-invasive imaging techniques, such as magnetic resonance cholangiopancreatography (MRCP) and ultrasound, can also assist in preoperative assessment, but saline injection is central to the identification and management of biliary fistulas during surgery.

STATISTICAL ANALYSIS The Statistical Package for the Social Sciences (SPSS) version 28 was used for statistical analysis. The data are presented as the means and standard deviations (SDs) or medians and ranges. The outcomes of the laparoscopic and open approaches for treating hydatid disease were compared via chi-square or Fisher's exact tests for categorical variables and via Student's t test or the Mann–Whitney U test for continuous variables, depending on the data distribution. A p value less than 0.05 was considered statistically significant.

RESULT

One hundred and two patients underwent surgical intervention for liver hydatid disease. Among them, 59 patients (females 41), were treated via an open surgical approach, whereas 43 patients (females 26), with underwent laparoscopic procedures. The demographic characteristics of the patients were similar between the two groups, with a mean age of 39.2 ± 15.1 years in the open surgery group and 38.5 ± 14.5 years

in the laparoscopic group (P Value = 0.5974). The comparative demographics and outcomes are summarized in table 1. Most patients in both groups had an ASA score of I or II, indicating a relatively low preoperative risk profile. Cyst characteristics, including the mean diameter (mean cyst diameter for laparoscopy group = 7 cm $\pm$ SD 2.47, mean cyst diameter for open group = 8 cm $\pm$ SD 8.8, P value = 0.2448) and location within liver segments (P value = 0.7216), were comparable between the two groups. Our primary selection criterion was surgeon preference. Although cysts located in more challenging anatomical areas—such as those in segment seven—were more frequently managed with open surgery, this tendency did not reach statistical significance. Table 2 summarizes the distribution of hydatid cyst according to liver segment involved. Intraoperatively, the median operative time was longer in the laparoscopic group, with a median of 105 minutes, then in the open surgery group, with a median of 90 minutes (P value = 0.0347). However, the laparoscopic approach was associated with significantly less intraoperative blood loss, with a median of 150 mL compared with 300 mL in the open surgery group (P value = 0.0017, 5 Postoperative complications were less common in the laparoscopic group, with 14% of patients experiencing complications compared with 34% in the open surgery group (P value = 0.040, 1). In the open surgery group, the most common complications were wound infections and biliary fistulas, whereas in the laparoscopic group, biliary fistulas and transient fever were the most common complications. The median length of hospital stay was significantly shorter for patients who underwent laparoscopic surgery, with a median hospital stay of 3 days, than for those who underwent open surgery, with a median hospital stay of 6 days (P value = 0.00000439). The recurrence rate of hydatid cysts was lower in the laparoscopic group, with a recurrence rate of 4.6%, than in the open surgery group, at 10.17% (P value = 0.04256). No mortality was reported in either group during the study period. Postoperative albendazole therapy was administered to 81% of patients in both groups for a median duration of 3 months, the medication was well tolerated in both groups

DISCUSSION

The results of this study underscore the significant benefits of laparoscopic surgery over the traditional open surgical approach in the treatment of liver hydatid disease. The reduced incidence of postoperative complications in the laparoscopic group, particularly wound infections and biliary fistulas, aligns with the advantages generally attributed to minimally invasive surgery. These findings are consistent with the body of literature that supports the use of laparoscopic techniques to minimize tissue trauma, reduce infection rates, and increase patient recovery [20]. The shorter hospital stays observed in patients who underwent laparoscopic surgery reflect the faster recovery associated with minimally invasive techniques. This benefit not only improves patient outcomes but also has important implications for health care resource utilization, reducing overall hospital costs and enabling the allocation of resources to other patients in need. Studies have consistently shown that laparoscopic surgery is associated with shorter recovery times and earlier discharge, contributing to enhanced patient satisfaction and better long-term outcomes [21]. The lower recurrence rate observed in the laparoscopic group is particularly noteworthy. These findings suggest that laparoscopic surgery may be more effective in ensuring complete cyst removal and reducing the risk of recurrence, which is a critical factor in the management of liver hydatid disease. The enhanced visualization provided by laparoscopic techniques allows for more meticulous dissection and careful management of the cyst cavity, reducing the likelihood of residual disease and subsequent recurrence. Several studies have reported similar findings, highlighting the importance of surgical precision in preventing the recurrence of hydatid cysts [22]. Despite the clear advantages of laparoscopic surgery, the slightly longer operative time observed in this study reflects the complexity of the procedure and the learning curve associated with mastering laparoscopic techniques. However,

as surgeons gain experience and become more proficient in laparoscopic methods, the operative time is likely to decrease, further enhancing the benefits of this approach. The reduced intraoperative blood loss observed in the laparoscopic group further supports the use of this technique, particularly in patients where minimizing blood loss is a priority. This finding is consistent with the literature, which emphasizes the precision and control offered by laparoscopic instruments in minimizing intraoperative bleeding [22]. In conclusion, laparoscopic surgery presents several significant advantages over open surgery in the management of liver hydatid disease. The reduced morbidity, shorter hospital stays, and lower rates of postoperative complications observed in this study underscore the benefits of this minimally invasive approach. However, the choice of surgical technique should be individualized based on patient characteristics, cyst location, and surgeon expertise. Continued advancements in laparoscopic techniques and instrumentation are likely to further increase the efficacy and safety of this approach, making it an increasingly viable option for the treatment of liver hydatid disease. Further research, including long-term follow-up studies and randomized controlled trials, is needed to confirm these findings and establish laparoscopic surgery as the preferred approach for treating liver hydatid disease

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