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Original Research Article

COMPARATIVE STUDY OF LAPAROSCOPIC VERSUS OPEN SURGICAL TREATMENT IN THE MANAGEMENT OF HEPATIC HYDATID CYST

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ABSTRACT

Background: *Hepatic hydatid disease, caused by Echinococcus granulosus, continues to pose a surgical challenge in endemic regions. Although open surgery has been the traditional mainstay, laparoscopic approaches are increasingly adopted for their potential benefits in reducing morbidity and enhancing recovery.* ***Objective:*** *To compare laparoscopic and open surgical management of hepatic hydatid cysts in terms of postoperative hospital stay and wound infection rates.* ***Study Design: A*** Randomized controlled trial was conducted. ***Settings:*** *Department of General Surgery, Lady Reading Hospital, Peshawar, Pakistan.* ***Duration of Study:*** *November 11, 2023, to May 11, 2024.* ***Methods:*** *A total of 94 patients aged 30 to 80 years with ultrasound-confirmed hepatic hydatid cysts were enrolled and randomized into two equal groups: laparoscopic surgery (Group A) and open surgery (Group B). The primary outcomes assessed were the duration of the postoperative hospital stay and the incidence of wound infection. Statistical analysis was performed using appropriate tests, with a p-value <0.05 considered statistically significant.* ***Results:*** *The mean age was 49.49 ± 13.65 years in Group A and 47.96 ± 11.89 years in Group B. Group A had a significantly shorter mean postoperative hospital stay (4.57 ± 1.03 days) compared to Group B (6.02 ± 1.42 days; p = 0.0001). Wound infections were reported in 2.1% of laparoscopic cases, compared to 14.9% in open surgery cases.* ***Conclusion:*** *Laparoscopic surgery for hepatic hydatid cysts is superior to open surgery in reducing postoperative hospital stay and wound infection rates. These findings support the adoption of minimally invasive techniques as the preferred modality in suitable patients.*

Keywords: Hepatic Hydatid Cyst, Laparoscopic Surgery, Open Surgery, Hospital Stay

INTRODUCTION

Hepatic Hydatid Cysts (HCC) constitute a cystic disease resulting from Echinococcus infection, which may lead to fatal outcomes in severe cases. These cysts primarily affect the liver, accounting for approximately 50% of cases, whereas occurrences in the lungs and other regions are relatively uncommon (1, 2). The prevailing symptom in HHCs is right epigastric pain, appearing in 38.2% of instances, while jaundice is the least common indication, found in 11.7% of cases (3). CT or MRI is indicated for incidental results involving liver cysts that demonstrate septate, irregular walls, as well as subcysts. CT can detect small cysts exceeding 1 cm in diameter. In conjunction with serology, CT illustrates diagnostic accuracy. MRI demonstrates greater effectiveness than CT in imaging the internal architecture of cysts, as well as assessing biliary tract engagement. Asymptomatic hepatic cysts require careful monitoring, and puncture drainage is not recommended. Indicative simple HCs require treatment through laparoscopic fenestration (4-7).

Treatment comprises an antihelminthic regimen, followed by surgical intervention. Conventional surgical approaches necessitate a significant incision, leading to associated morbidity with this benign condition. The use of laparoscopic surgery enables the attainment of similar objectives while reducing morbidity and facilitating early recovery (8, 9). The laparoscopic approach offers advantages, including smaller incisions and improved cosmetic outcomes. Recent studies demonstrate the reliability and efficacy of the laparoscopic methods used in HHC (10). A study reported the mean postoperative hospital stay in laparoscopic and open surgical management of HHC (4.676 $\pm$ 1.857 days and 3.805 $\pm$ 1.037 days).

Surgical intervention continues to be widely regarded as the most effective and reliable treatment modality for patients diagnosed with HHC. Despite notable advancements in medical treatment and interventional radiology, conventional operative procedures for the HHC remain. No such study has been conducted on this subject in our local population. The goal of this study is to compare the laparoscopic versus open surgical treatment in the management of HHC. The results of this study will help shed Light on treatment choices, such as laparoscopic and open surgical interventions for HHCs, which ultimately depend on factors such as the cyst's size, location, as well as the surgeon's experience and the available resources. Moreover, the decision will be made collaboratively between patients and the surgical team after considering the specific circumstances of the case, which will significantly reduce morbidity.

METHODOLOGY

This randomized controlled trial was conducted in the General Surgery Department of Lady Reading Hospital, Peshawar, from November 11, 2023, to May 11, 2024, following ethical approval from the hospital.

Ninety-four patients aged 30 to 80 years diagnosed with hepatic hydatid cysts were enrolled and equally randomized into two groups using a block randomization technique with consecutive non-probability sampling, the sample was selected based on the mean post-operative hospital stay (4.676 $\pm$1.857) vs (3.805 +1.037) (11) in days in patients treated with laparoscopic surgery and open surgery in management of hepatic hydatid cyst, 80% power and 95% confidence interval.

All the patients gave their consent. Group A underwent laparoscopic surgery while Group B was treated via conventional open surgery. The diagnosis of hepatic hydatid cyst was established based on clinical presentation, which included right hypochondrial pain, reduced appetite, and confirmed ultrasound findings such as the water-lily sign (indicating a floating membrane) or hyperdense septations with a spoke-wheel pattern. Patients with deep intraparenchymal cysts

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(occupying >50% of liver volume), thick calcified cyst walls, or heterogeneous complex masses were dropped out of the study.

For the laparoscopic approach (Group A), general anesthesia was administered, followed by the establishment of pneumoperitoneum at an intra-abdominal pressure of 12 mmHg. A 30° laparoscope was introduced through a 10 mm umbilical port with additional 5 mm trocars placed 2–3 cm below the subcostal margin in the midclavicular line. A fourth trocar was positioned in the anterior axillary line below the gallbladder, and a fifth Palanivelu hydatid trocar system was inserted under direct vision into the cyst cavity. After aspirating cyst contents, hypertonic saline (20%) was instilled for 10 minutes to ensure scolicidal efficacy. Cystectomy was performed using scissors or a hook, and the cavity was inspected for residual daughter cysts or biliary communications, which were sutured if identified.

In the open surgery group (Group B), a midline laparotomy was performed under general anesthesia. The operative field was isolated with hypertonic saline-soaked gauzes to prevent spillage. The cyst was punctured, aspirated, and injected with hypertonic saline for 5 minutes before cystotomy. The germinal membrane and daughter vesicles were excised, followed by omentoplasty to obliterate the residual cavity. All procedures were performed under the supervision of consultants with more than 5 years of experience.

Demographic data, including age, gender, socioeconomic status, employment status, and residence, were documented, along with information on wound infection, diabetes, and hypertension. The postoperative outcome and duration of hospital stay were noted.

For analysis, we used SPSS 23. Age and duration of stay at the hospital were calculated using the mean and SD. For demographics, diabetes, and wound infection, we used frequency and percentages. Both groups were assessed for hospital stay using a T-test. Stratification of hospital stay with various variables was performed using a T-test. A p-value ≤ 0.05 was considered statistically significant.

RESULTS

We had 94 patients, evenly divided into two groups: 47 underwent laparoscopic surgery (Group A), and 47 underwent open surgery (Group B). The mean age in Group A was 49.49 ± 13.65 years, while in Group B, it was 47.96 ± 11.89 years.

The gender distribution revealed that males comprised 24 (51.1%) of Group A and 27 (57.4%) of Group B, while females accounted for 23 (48.9%) and 20 (42.6%), respectively. Diabetes was present in 10 (21.3%) patients in Group A and 9 (19.1%) in Group B. Hypertension was present in 13 (27.7%) and 14 (29.8%) patients, respectively, in Group A and B (Table 1). The postoperative hospital stay was significantly shorter in the laparoscopic group, averaging 4.57 ± 1.03 days, compared to 6.02 ± 1.42 days for open surgery (p = 0.0001) (Table 2). Figure 1 presents the wound infection rate in both groups; group A had a lower incidence of wound infection. Tables 3-5 show stratifications of hospital stay by various variables.

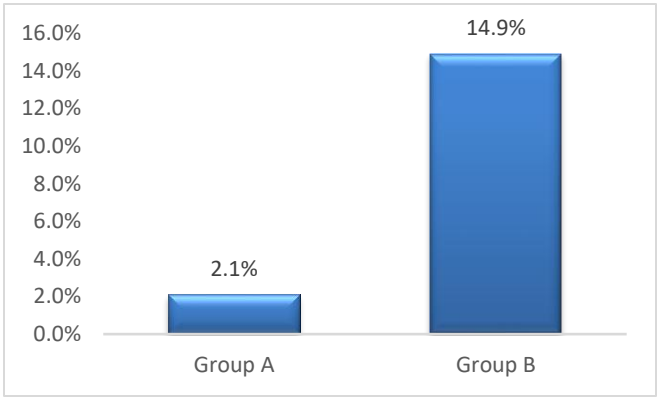

Figure 1: Wound infection

Table 1: Demographics and comorbidities

Demographics and comorbidities		Groups			
		Group A (Laparoscopic surgery)		Group B (Open surgery)	
		n	%	n	%
Gender	Male	24	51.1%	27	57.4%
	Female	23	48.9%	20	42.6%
Socioeconomic status	Lower class	12	25.5%	11	23.4%
	Middle class	31	66.0%	25	53.2%
	Upper class	4	8.5%	11	23.4%
Employment status	Employed	21	44.7%	22	46.8%
	Unemployed	26	55.3%	25	53.2%
Residence area	Rural	17	36.2%	21	44.7%
	Urban	30	63.8%	26	55.3%
Diabetes	Yes	10	21.3%	9	19.1%
	No	37	78.7%	38	80.9%
Hypertension	Yes	13	27.7%	14	29.8%
	No	34	72.3%	33	70.2%

Table 2: Comparison of post-op hospital stay between both groups

Postop hospital stay (Days)	Groups	N	Mean	Std. Deviation	P value
	Group A (Laparoscopic surgery)	47	4.57	1.037	0.0001
	Group B (Open surgery)	47	6.02	1.422	

Table 3: Stratification of Postoperative Hospital Stay by Age, Gender, and Socioeconomic Status

Variable	Stratification	Group A (Mean ± SD)	Group B (Mean ± SD)	P Value
Age	30–50 years	4.60 ± 1.07	6.03 ± 1.45	< 0.05
	>50 years	4.53 ± 1.01	6.00 ± 1.41	< 0.05
Gender	Male	4.63 ± 0.97	5.93 ± 1.33	< 0.05
	Female	4.52 ± 1.12	6.15 ± 1.57	< 0.05
Socioeconomic Status	Lower class	4.17 ± 0.84	5.82 ± 1.40	< 0.05
	Middle class	4.77 ± 1.02	6.16 ± 1.46	< 0.05

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	Upper class	4.25 ± 1.50	5.91 ± 1.45	> 0.05

Table 4: Stratification of Postoperative Hospital Stay by Employment Status, Residence, and Diabetes

Variable	Stratification	Group A (Mean ± SD)	Group B (Mean ± SD)	P Value
Employment Status	Employed	4.67 ± 1.20	6.14 ± 1.36	< 0.05
	Unemployed	4.50 ± 0.91	5.92 ± 1.50	< 0.05
Residence Area	Rural	4.41 ± 1.06	6.48 ± 1.37	< 0.05
	Urban	4.67 ± 1.03	5.65 ± 1.38	< 0.05
Diabetes	Yes	4.30 ± 1.06	5.89 ± 1.62	< 0.05
	No	4.65 ± 1.03	6.05 ± 1.39	< 0.05

Table 5: Stratification of Postoperative Hospital Stay by Hypertension, Wound Infection, and BMI

Variable	Stratification	Group A (Mean ± SD)	Group B (Mean ± SD)	P Value
Hypertension	Yes	5.08 ± 0.95	6.00 ± 1.47	> 0.05
	No	4.38 ± 1.02	6.03 ± 1.43	< 0.05
Wound Infection	Yes	5.00 ± 1.25	5.86 ± 1.77	> 0.05
	No	4.57 ± 1.05	6.05 ± 1.38	< 0.05
BMI (Kg/m²)	18–24.9	4.69 ± 1.14	6.00 ± 1.21	< 0.05
	>24.9	4.52 ± 1.00	–	< 0.05

DISCUSSION

Our study demonstrated comparable age distributions between the laparoscopic (49.49 ± 13.65 years) and open surgery groups (47.96 ± 11.89 years), reinforcing findings from Ahmad et al., where the mean ages were 40.26 ± 9.68 years (12). Gohil et al. reported 47.36 and 49.80 years for the laparoscopic and open groups, respectively (13).

The gender distribution in our cohort (51.1% males in the laparoscopic group vs. 57.4% in the open surgery group) was also consistent with prior studies, such as Shoraby et al., where males constituted 53.3% and 66.7% of the laparoscopic and open groups, respectively (14). Comorbidities such as diabetes (21.3% laparoscopic vs. 19.1% open) and hypertension (27.7% vs. 29.8%) were evenly distributed.

A key advantage of laparoscopic surgery in our study was the notably shorter hospital stay (4.57 ± 1.03 days) compared to open surgery (6.02 ± 1.42 days). This aligns robustly with multiple studies, including those by Ahmad et al., who reported that the laparoscopic group had a relatively shorter hospital stay compared to the open group (3.46 ± 1.32 vs. 4.85 ± 1.35 days) (12). Shoraby et al also documented shorter hospital stays for the laparoscopic group in their study (2.73 ± 0.88 vs. 5.40 ± 3.18 days) (14). Alabras et al. found a similar pattern in their research (3.38 ± 0.7 vs. 8.81 ± 5.4 days) (15).

A study conducted by Masood et al. on children with hepatic hydatid disease concluded that the laparoscopic cohort exhibited a shorter hospital stay, shorter duration for drain removal, and shorter duration of ambulation and oral intake compared with the open cohort (16). The consistency across these studies underscores the role of laparoscopy in accelerating recovery, likely due to reduced tissue trauma, earlier mobilization, and fewer wound-related complications.

Our study found relatively lower wound infection rates in the laparoscopic group (2.1%) compared to open surgery (14.9%). This disparity is affirmed by Ahmad et al., who document no incidence of wound infection in the laparoscopic cohort (0% vs. 14.63%) (12). Shoraby et al. also did not report any incidence of infection (0% vs. 20%) (14). and Gohil et al. similarly documented no incidence of wound infection as well (0% vs. 16%) (16). The higher infection rates in open surgery likely stem from larger incisions, prolonged exposure, and greater tissue manipulation (16). The near-absence of wound infections in laparoscopic groups across studies highlights its superiority in minimizing this common postoperative morbidity.

Biliary fistula rates, although not explicitly reported in our study, were a recurring complication in another research study, such as Alabras et al., who documented that the biliary fistula rate was lower in the laparoscopic group than in the open cohort (15). Studies have also demonstrated lower pain scores following laparoscopy compared to open surgery (12, 13).

The cumulative evidence strongly favors laparoscopic surgery for hepatic hydatid cysts, given its association with shorter hospitalization, fewer wound infections, and likely reduced pain. However, patient selection remains crucial; deep-seated or complex cysts may still require open techniques (13). Surgeons should prioritize laparoscopy for superficial accessible cysts while maintaining open surgery as a backup for complicated cases.

CONCLUSION

In conclusion, laparoscopic management of hepatic hydatid cysts was notably more effective in terms of a shorter hospital stay postoperatively than open management. We also found that laparoscopic management exhibited a lower incidence of wound infection.

DECLARATIONS

Data Availability Statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned. (IRB-993/LRH/MTI)

Consent for publication

Approved

Funding

Not applicable

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

AUTHOR CONTRIBUTION

SHAIS KHAN (Postgraduate Resident)

Data Collection, Data Entry, Data Analysis, Methodology Design, Manuscript Writing, and Manuscript Revision

AHMAD FARAZ (Associate Professor)

Critical Input, Conception of Study, Final Approval of Draft.

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REFERENCES

1. Cantay H, Anuk T. Factors affecting the choice of treatment in hepatic hydatid cyst surgery. J Invest Surg. 2022;35(4):731-6. https://doi.org/10.1080/08941939.2021.1924900
2. Nunnari G, Pinzone MR, Gruttadauria S, Celesia BM, Madeddu G, Malaguarnera G, et al. Hepatic echinococcosis: clinical and therapeutic aspects. World J Gastroenterol. 2012;18(13):1448. https://doi.org/10.3748/wjg.v18.i13.1448
3. El-Ghareeb AS, Waked NM, Al-Feky HM. Clinical and parasitological studies on pulmonary and hepatic hydatid cysts in hospitalized children and adults. J Egypt Soc Parasitol. 2016;46(1):9-18. https://doi.org/10.21608/jesp.2016.88925
4. Abbasi B, Akhavan R, Khameneh AG, Amirkhiz GD, Rezaei-Dalouei H, Tayebi S, et al. Computed tomography and magnetic resonance imaging of hydatid disease: A pictorial review of uncommon imaging presentations. Heliyon. 2021;7(5). https://doi.org/10.1016/j.heliyon.2021.e07086
5. Alshoabi SA, Alkalady AH, Almas KM, Magram AO, Algaberi AK, Alareqi AA, et al. Hydatid disease: a radiological pictorial review of a great neoplasms mimicker. Diagnostics. 2023;13(6):1127. https://doi.org/10.3390/diagnostics13061127
6. Bayrak M, Altıntas Y. Current approaches in the surgical treatment of liver hydatid disease: single center experience. BMC surgery. 2019;19:1-0. https://doi.org/10.1186/s12893-019-0553-1
7. Marrero JA, Ahn J, Reddy RK, Practice Parameters Committee of the American College of Gastroenterology. ACG clinical guideline: the diagnosis and management of focal liver lesions. J Am Coll Gastroenterol. 2014;109(9):1328-47.
8. Kern P. Echinococcus granulosus infection: Clinical presentation, medical treatment and outcome. Langenbecks Arch Surg. 2003;388(6):413-420. https://link.springer.com/article/10.1007/s00423-003-0418-y
9. Zaharie F, Bartos D, Mocan L, Zaharie R, Iancu C , Tomus C. Open or laparoscopic treatment for hydatid disease of the liver? A 10-year single-institution experience. Surg Endosc. 2013;27(6):2110-6. https://doi.org/10.1007/s00464-012-2719-0
10. Kaya S, Altuntas YE, Kaptanoglu L, Altin Ö, Kement M, Küçük HF, et al. Laparoscopic treatment of hepatic hydatid cysts. Our approach. Annali italiani di chirurgia. 2019;90(6):560-4. https://www.annaliitalianidichirurgia.it/journal/AIC/article/pii/2274
11. Omar AS, Osman TA, EL Barbary MG. Laparoscopic vs. Open Surgical Management of Liver Hydatid Cysts. Egypt J Surg. 2022;41(1):65-75. https://doi.org/10.4103/ejs.ejs_275_21
12. Ahmad U, Anwar A, Khan SA, Ain QU, Kamal M, Aman Z. Outcome of laparoscopic versus open surgery in patients with hydatid cyst of liver. Rawal Med J. 2020;45(4):806-809. https://www.rmj.org.pk/fulltext/27-1590556479.pdf
13. Gohil VB, Thakur SU, Mehta SM, Dekhaiya FA. Comparative study of laparoscopic and open surgery in the management of 50 cases of liver hydatid cyst. Int Surg J. 2020;7(4):1099-1105. DOI: http://dx.doi.org/10.18203/2349-2902.isj20201170
14. Shoraby M, Darwish AA, Hegab A. Laparoscopic approach versus open approach in the treatment of hydatid cyst of the liver, a prospective trial. Ain-Shams J Surg. 2015;8(1):1-8. https://doi.org/10.21608/asjs.2015.195068
15. Alabras M. Comparative Study of Laparoscopic Versus Open Surgery in Management of Liver Hydatid Cyst. Arab Board Med J. 2023;24(3):127-31. https://doi.org/10.4103/abmj.abmj_5_23
16. Masood PF, Mufti GN, Wani SA, Sheikh K, Baba AA, Bhat NA. Comparison of laparoscopic and open surgery in hepatic hydatid disease in children: Feasibility, efficacy, and safety. J Min Access Surg. 2022;18(3):360-365. https://doi.org/10.4103/jmas.JMAS_220_20

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