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ORIGINAL ARTICLE

Efficacy and Safety of Laparoscopic Management Techniques in Hepatic Hydatid Disease

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ABSTRACT

Introduction: *Hepatic hydatid disease remains an important problem for public health in endemic areas. In recent years, laparoscopic approaches have emerged as a valid alternative to open surgery and may offer possible advantages in terms of morbidity and convalescence.* ***Methods & Materials:*** *A prospective observational study was conducted at Avicenna Hospital Limited, Sirajganj from July, 2021 to June, 2024 on 50 patients with hepatic hydatid disease managed laparoscopically. Systematic analysis of patient demographics, clinical presentations, radiological characteristics, surgical techniques employed, intraoperative parameters, and postoperative outcomes was conducted. The four laparoscopic techniques employed were partial pericystectomy, cyst unroofing with omentoplasty, total pericystectomy, and simple drainage. Data were analyzed using SPSS version 26.* ***Results:*** *The mean age was 42.6±11.4 years with 56% males. Right upper quadrant pain was the most common presentation (78%). Single cysts were seen in 74% of patients and mostly in the right lobe (68%). Mean operative time was 96.4±21.8 minutes with a conversion rate of 6%. The overall complication rate was 20%, with bile leak being the most common complication (8%). No mortality was seen. Factors showing significant association with complications included cyst size ≥8 cm (p=0.01), presence of multiple cysts (p=0.03), biliary communication (p=0.004), and operative time ≥100 minutes (p=0.02). Mean hospital stay was 4.3±1.6 days.* ***Conclusion:*** *Laparoscopic management of hepatic hydatid disease is an effective and safe approach with acceptable complication rates and no mortality. Optimal outcomes require careful selection of patients and meticulous surgical technique. Larger size of the cysts, biliary communication, and longer operative time are the important risk factors for postoperative complications.*

Keywords: *Laparoscopic Management, Hepatic hydatid disease, Echinococcus granulosus*

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INTRODUCTON

Hepatic hydatid disease caused by the larval stage of *Echinococcus granulosus* remains an important global public health problem and is particularly endemic in the Mediterranean basin, the Middle East, South America, East Africa, and parts of Asia [1]. It is estimated that 2-3 million people are infected worldwide, while incidence rates in highly endemic areas exceed 50 per 100,000 person-years and prevalence ranges between 5-10% in some populations [2,3]. The liver is most frequently affected with nearly three-quarter of all cases of hydatid cysts occurring in the liver, and the remaining quarter in the lungs [4]. Transmission is by the fecal-oral route and usually occurs in communities where there is a high density of sheep and cattle, and consequently, infected dogs with which people come into close contact. Aside from its clinical impact, hepatic hydatid disease has major economic implications, with estimated annual losses approaching 3 billion US dollars due to medical costs, loss of productivity, and effects on agriculture [5]. The infection predominantly affects rural communities of lower socioeconomic classes with limited access to medical treatment and proper sanitation. Generally, hepatic hydatid cysts grow slowly and, for long periods, may remain asymptomatic; they are often discovered incidentally while imaging for other causes. The most common symptoms and signs when patients become symptomatic include right upper quadrant pain, hepatomegaly, abdominal mass, and rarely obstructive jaundice from compression of bile ducts [6]. The management of hepatic hydatid disease has evolved significantly over the past decades. Conventional treatment had conventionally relied on open surgical techniques, varying from conservative interventions such as cyst drainage and partial pericystectomy to more aggressive ones, including total pericystectomy and hepatic resection [7]. Medical therapy with benzimidazoles, mainly albendazole, plays an important adjunctive role, either perioperatively to minimize recurrence and risk of anaphylaxis or as primary therapy in selected inoperable or disseminated cases [8]. In addition, percutaneous interventions, such as the PAIR technique, have been endorsed by the World Health Organization for very carefully selected cysts, particularly active CE1 and transitional CE3a lesions

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larger than 5 cm [9]. Minimally invasive surgery has unequivocally marked a significant paradigm shift in the management of hepatic hydatid disease. Since the first case report of a laparoscopic procedure in 1994, several reports have demonstrated advantages over open surgery, such as less postoperative pain, shorter hospital stay, quicker recovery, fewer wound complications, and a better cosmetic outcome [10,11]. Laparoscopic management has certain technical difficulties, mainly intraperitoneal spillage of the cyst contents that may cause anaphylaxis and secondary echinococcosis. Specialized techniques and devices, such as the Palanivelu Hydatid System, have been developed to safely evacuate the cyst intraoperatively during a laparoscopic procedure. Despite increasing acceptance, there is still much controversy over optimal patient selection, choice of laparoscopic technique, and long-term outcomes. Current evidence suggests that superficial uncomplicated cysts without biliary communication, in patients with single or limited numbers of cysts, are best managed with laparoscopic techniques. The WHO-IWGE ultrasound classification (CE10-CE5) remains at the centre of treatment planning and prognostication. This study aimed to assess the efficacy and safety of laparoscopic management techniques for hepatic hydatid disease.

METHODS & MATERIALS

This prospective observational study was conducted at Avicenna Hospital Limited, Sirajganj from July, 2021 to June, 2024. A total of 50 consecutive adult patients diagnosed with hepatic hydatid disease and managed laparoscopically were included. Eligible patients were aged 18 years or older, had cysts suitable for laparoscopic intervention, including superficial lesions with a limited number of cysts, WHO-IWGE stages CE1, CE2, CE3a, and CE3b, absence of significant vascular or complex biliary involvement, fitness for general anesthesia, and no pregnancy [12]. Patients were excluded if they were younger than 18 years, had inactive or calcified cysts (CE4 and CE5), extensive biliary communication requiring complex reconstruction, deep-seated cysts in posterior liver segments, more than three cysts with extensive bilobar involvement, severe cardiopulmonary comorbidities, complicated hydatid disease requiring emergency intervention, coagulopathy, prior extensive abdominal surgeries with dense adhesions, or refusal to undergo laparoscopic surgery. All patients underwent thorough preoperative assessment, including clinical evaluation, complete blood count, liver function tests, serological testing, chest radiography, and detailed abdominal imaging to assess cyst characteristics. Perioperative albendazole therapy was administered at a dose of 10-15 mg/kg/day starting four weeks preoperatively and continued for one to three months postoperatively. Laparoscopic surgery was performed under general anesthesia using a standard four-port technique, with cyst aspiration, instillation of scolicidal agents, and evacuation of contents. Surgical techniques included laparoscopic partial pericystectomy, cyst unroofing with omentoplasty, total pericystectomy, or drainage alone, selected according to cyst features. Data were entered and analyzed using SPSS version 26, including continuous variables expressed as mean ± standard deviation and categorical variables as frequencies and percentages, and a p-value <0.05 was considered statistically significant.

RESULTS

Table I showed a mean age of 42.6±11.4 years. The age distribution was 41-50 years with 30%; 31-40 years, 28%; >50 years, 24%; and ≤30 years, 18%. There was a predominance of males, 56%, over females, 44%. The rural background of the majority (64%) of patients suggests the endemic nature of the disease in agricultural communities where sheep and cattle rearing are practiced, while 36% were from urban areas. [Table I]

Table – I: Demographic Characteristics of the Study Population (*n* = 50)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	18-30	9	18%
	31-40	14	28%
	41-50	15	30%
	>50	12	24%
Mean age ± SD	-	42.6 ± 11.4	-
Sex	Male	28	56%
	Female	22	44%
Residence	Rural	32	64%
	Urban	18	36%

As indicated in table II, the most common symptom was the right upper quadrant pain that was observed in 78% of the cases. In 42% of the cases, there was a palpable mass in the abdomen, and this is normally present in individuals who have huge cysts. 40% of the patients reported dyspepsia. Fever was seen in 22% of the cases. In 10% of the patients, there was obstruction of jaundice. Notably, many were asymptomatic, 14% with incidentally discovered cysts when imaging studies were performed for other conditions. [Table II]

Table – II: Clinical manifestations of patients with hepatic hydatid disease

Clinical Feature	Frequency (n)	Percentage (%)
Right upper quadrant pain	39	78%
Abdominal mass	21	42%
Dyspepsia	20	40%
Fever	11	22%
Jaundice	5	10%
Asymptomatic (incidental)	7	14%

There were multiple responses

Table III shows that in 74% of the patients, single cysts predominated, while multiple cysts were seen in 26%. The right hepatic lobe was involved in 68%, reflecting the liver's blood flow distribution from the portal vein, followed by the left lobe

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in 22% and bilateral involvement in 10%. The mean cyst diameter was 7.8±2.6 cm, ranging from small to very large cysts. According to the WHO-IWGE classification, active cysts (CE1-CE2) constituted 62% of all cases. The transitional stage CE3 constituted 28%, while inactive cysts represented only 10% due to a selection bias, as CE4-CE5 cases were mostly excluded. [Table III]

Table – III: Radiological Characteristics of Hepatic Hydatid Cysts

Variable	Category	Frequency (n)	Percentage (%)
Number of cysts	Single	37	74%
	Multiple	13	26%
Lobar involvement	Right lobe	34	68%
	Left lobe	11	22%
	Both lobes	5	10%
Mean cyst diameter (cm)	-	7.8 ± 2.6	-
WHO cyst type	CE1-CE2	31	62%
	CE3	14	28%
	CE4-CE5	5	10%

Table IV shows that Laparoscopic partial pericystectomy was the most common procedure (46%) that involved resection of the accessible cyst wall with preservation of the viable liver parenchyma. Laparoscopic cyst unroofing with omentoplasty was carried out in 38%. In patients with anatomy suitable for more thorough dissection, laparoscopic total pericystectomy was undertaken in 12%. Laparoscopic drainage alone was used in 4%, mainly in patients with smaller cysts or significant comorbidities that precluded extended dissection. [Table IV]

Table – IV: Laparoscopic Techniques Used for Management

Surgical Technique	Frequency (n)	Percentage (%)
Laparoscopic partial pericystectomy	23	46%
Laparoscopic cyst unroofing + omentoplasty	19	38%
Laparoscopic total pericystectomy	6	12%
Laparoscopic drainage only	2	4%

Table V shows that the mean operative time was 96.4±21.8 minutes and the estimated blood loss was 84.2±36.5 ml. Mean hospital stay of 4.3±1.6 days, significantly shorter when compared with the mean length after traditional open surgery. The time to oral feeding was 1.6±0.7 days, depicting minimal gastrointestinal disturbance and early resumption of normal function, hallmarks of advantages after laparoscopic surgery. [Table V]

Table – V: Intraoperative and Postoperative Outcomes

Outcome Variable	Mean ± SD / (n) (%)
Operative time (minutes)	96.4 ± 21.8
Estimated blood loss (ml)	84.2 ± 36.5
Mean hospital stay (days)	4.3 ± 1.6
Time to oral feeding (days)	1.6 ± 0.7

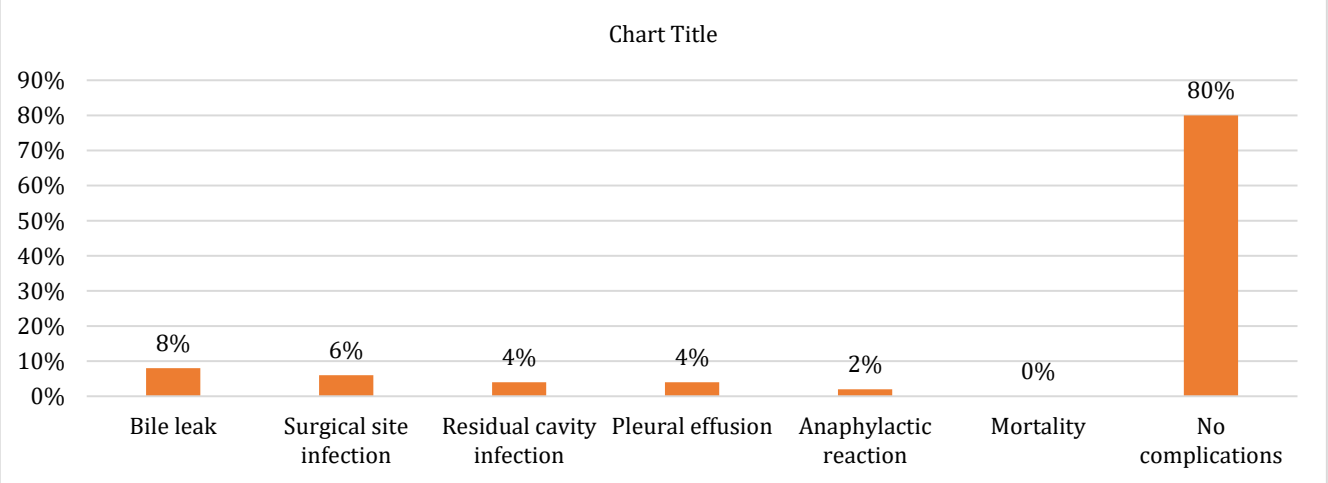

Figure – 1: Postoperative Complications (Safety Outcomes)

Figure 1 illustrates that the complication rate was 20%, with no mortality. Bile leak was the most frequent complication, seen in 4 patients (8%). Surgical site infection affected 3 patients (6%), residual cavity infection occurred in 2 patients (4%), pleural effusion developed in 2 patients (4%), and a single patient (2%) had a mild anaphylactic reaction intraoperatively.

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As demonstrated in Table VI, the cysts that were found to have a diameter of 8 cm and above were linked to a high complication rate of 70% compared to 40%, p=0.01. The probability of complications when multiple cysts are present was 50% as compared to that of solitary cysts 22.5, p=0.03. It had higher rates of complications, 60% against 25.0, p=0.004. Likewise, operative times over 100 minutes were correlated to a 70% complication rate as opposed to 35% in operative times less than 100 minutes, p=0.02, which indicated the possibility of a more complicated anatomy or technical difficulty. [Table VI]

Table – VI: Factors Associated with Postoperative Complications (Univariate Analysis)

Variable	Complication Present (n=10) n (%)	Complication Absent (n=40) n (%)	p-value
Cyst size ≥8 cm	7 (70%)	16 (40%)	0.01
Multiple cysts	5 (50%)	9 (22.5%)	0.03
Biliary communication	6 (60%)	10 (25.0%)	0.004
Operative time ≥100 min	7 (70%)	14 (35%)	0.02

DISCUSSION

This study has proven that less invasive procedures are safe and efficient in the appropriately chosen cases. The findings affirm a growing body of literature that laparoscopic surgery is a legitimate alternative to the old-fashioned open methods which has shown positive outcomes in terms of operation and acceptable complication rates without compromising the oncologic and parasitological safety [12-14]. The average age is 42.6 years with a higher number of males who constitute 56%. It usually afflicts middle-aged men due to occupational exposure that concerns the livestock farming and direct contact with infected animals which are the ultimate hosts of Echinococcus granulosus [15]. In addition, the rural population (64%) depicts a strong correlation between hydatid disease and an agricultural population with lack of veterinary control, poor hygiene and an active human-animal contact. These observations highlight the ongoing community health cost of hydatid disease in these endemic regions and provide reason to be concerned at proper, ongoing preventive measures; dog deworming, better livestock husbandry and community-based health education initiatives [16]. Our study had a mixed clinical presentation with right upper quadrant pain being the most prevalent, which was noted in 78% of the patients. This result complies with a prior study by Tan et al., who attribute the leading causes of symptoms to hepatic capsule stretching and local mass effect by swelling cysts [17]. Importantly, 14% of the patients were asymptomatic and happened upon their diagnosis and this testifies to the sluggish nature of hepatic hydatid cysts growth and highlights the need for opportunistic imaging in the endemic areas. Although the jaundice was only witnessed in 10% cases, its presence suggests a biliary involvement and need to have a careful preoperative work-up to ensure proper planning of surgery and to reduce the postoperative complications. Radiological examination revealed predominance of right lobe involvement in 68% and single cysts in 74% cases which corresponds to a study carried out by Christaki et al., which demonstrated the pattern of hepatic blood flow and hematogenous dissemination of parasitic embryos [18]. The average cyst size of 7.8 cm is an indication that the majority of the patients had moderate and large cysts, which needed to be treated. Most of the active (CE1-CE2) and transitional (CE3) WHO-IWGE cyst stages represent a sufficient selection of the cases that should be treated laparoscopically. The reliability of the WHO-IWGE classification as a framework of making management decisions and predicting the outcome of therapeutic outcomes has already been confirmed by previous systematic reviews [19]. Most of the laparoscopic procedures performed were partial pericystectomy, cyst unroofing with omentoplasty, total pericystectomy, and drainage alone, which shows the necessity to use separate surgical approach in relation to cyst size, location, and complexity. Operative outcomes yielded positive results as to technical feasibility with sufficient blood loss, operative times, and a conversion rate of 6, which is similar to other conversion rates in specialized centers. Laparoscopic surgery has significant advantages over open surgeries in terms of cost reduction in terms of healthcare and provision of superior recovery and satisfaction to the patient [20]. The reported 20% complication rate is within the reported range of laparoscopic surgery in hydatid removal and will be significantly low when compared with the higher rates reported in the past after open surgery [21]. Bile leak was the most common complication, which is in agreement with the issue of occult cysto-biliary communications which is not easy to detect during preoperative stages [22]. The majority of leaks are managed by means of conservative treatment, and endoscopic surgeries are still effective in case of persistent fistulas. Risk factor analysis as applied to postoperative complications, in turn, revealed that cysts size, multiple cysts, biliary communications, increased operative times, etc. were predictive as in the previous reports. What is more important is that mortality is absent, and severe complications are rare in this series, which makes laparoscopic treatment, when properly used and with proper expertise, a safe and effective treatment modality in the selection of patients. Recent observations are also confirmed by meta-analyses which depict either similar or even better outcomes when laparoscopic surgery is done as compared to open techniques.

LIMITATIONS OF THE STUDY

The single center nature of the study and the relatively short follow up period of this study reduce the generalizability and determination of long-term recurrence rates. Absence of an open surgery control group at the time of surgery, would also preclude a direct and comparative analysis of the outcome between laparoscopic and open surgeries.

CONCLUSION

Laparoscopic management of hepatic hydatid disease is a safe and effective therapeutic option with acceptable complication rates and favorable outcomes. The technique confers significant advantages of reduced operative morbidity, shorter hospitalization, and quicker recovery compared to traditional open approaches. Careful selection of patients according to cyst characteristics is essential for optimal outcomes, particularly size, number, location, and lack of complex biliary involvement. The presence of cysts larger than 8 cm, multiple cysts, biliary communication, and an extended duration of operations are the key risk factors of postoperative complications and must be used to inform preoperative counseling and surgical planning.

RECOMMENDATION

Large, multicenter randomized controlled trials with extended follow-up are required to establish the comparative efficacy

and long-term recurrence rates of laparoscopic versus open surgery. Standardized training regimes and surgical skills evaluation instruments would improve the reproducibility and safety of laparoscopic hydatid surgery on various practice environments.

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REFERENCES

1. *Brunetti E, Kern P, Vuitton DA. Expert consensus for the diagnosis and treatment of cystic and alveolar echinococcosis in humans. Acta tropica. 2010 Apr 1;114(1):1-6.*
2. *Govindasamy A, Bhattarai PR, John J. Liver cystic echinococcosis: a parasitic review. Therapeutic Advances in Infectious Disease. 2023 May;10:20499361231171478.*
3. *World Health Organization. Echinococcosis [Internet]. Geneva: World Health Organization; 2021 May 17 [cited 2025 Mar 8]. Available from: https://www.who.int/news-room/fact-sheets/detail/echinococcosis*
4. *Brunetti E, Kern P, Vuitton DA. Expert consensus for the diagnosis and treatment of cystic and alveolar echinococcosis in humans. Acta tropica. 2010 Apr 1;114(1):1-6.*
5. *Moldovan R, Neghina AM, Calma CL, Marincu I, Neghina R. Human cystic echinococcosis in two south-western and central-western Romanian counties: a 7-year epidemiological and clinical overview. Acta tropica. 2012 Jan 1;121(1):26-9.*
6. *Mehta P, Prakash M, Khandelwal N. Radiological manifestations of hydatid disease and its complications. Tropical parasitology. 2016 Jul 1;6(2):103-12.*
7. *Palanivelu C, Jani K, Malladi V, Senthilkumar R, Rajan PS, Sendhilkumar K, Parthasarthi R, Kavalakat A. Laparoscopic management of hepatic hydatid disease. JSLS: Journal of the Society of Laparoendoscopic Surgeons. 2006 Jan;10(1):56.*
8. *Dehkordi AB, Sanei B, Yousefi M, Sharafi SM, Safarnezhad F, Jafari R, Darani HY. Albendazole and treatment of hydatid cyst: review of the literature. Infectious Disorders-Drug Targets (Formerly Current Drug Targets-Infectious Disorders). 2019 Jun 1;19(2):101-4.*
9. *Cochrane Infectious Diseases Group, Kuehn R, Uchiumi LJ, Tamarozzi F. Treatment of uncomplicated hepatic cystic echinococcosis (hydatid disease). Cochrane Database of Systematic Reviews. 1996 Sep 1;2024(7).*
10. *Ertem M, Karahasanoglu T, Yavuz N, Erguney S. Laparoscopically treated liver hydatid cysts. Archives of Surgery. 2002 Oct 1;137(10):1170-3.*
11. *Bari SU. Laparoscopic Management of Hepatic Hydatid Cyst: A Single Institute Based Experience. World Journal of Laparoscopic Surgery. 2024 Feb 14;17(1):9-13.*
12. *Brunetti E, Tamarozzi F, Macpherson C, Filice C, Piontek MS, Kabaalioglu A, Dong Y, Atkinson N, Richter J, Schreiber-Dietrich D, Dietrich CF. Ultrasound and cystic echinococcosis. Ultrasound international open. 2018 Sep;4(03):E70-8.*
13. *Masood PF, Mufti GN, Wani SA, Sheikh K, Baba AA, Bhat NA, Hamid R. Comparison of laparoscopic and open surgery in hepatic hydatid disease in children: Feasibility, efficacy and safety. Journal of minimal access surgery. 2022 Jul 1;18(3):360-5.*
14. *Wang Z, Zhu HH, Yang JY, Wang Y, Gai ZG, Ma FC, Yang DW. Laparoscopic versus conventional open treatment of hepatic cystic hydatidosis: a systematic review and meta-analysis of cohort studies. Videosurgery and Other Miniinvasive Techniques. 2022 Sep 3;17(3):406-17.*
15. *Deeb S, Sayyedahmad D, Sharif Z, Manasrah S, Abusharkh H, Abuasbeh Y. Successful management of a rare extensive hepatopulmonary hydatidosis with over 35 cysts: A case report and literature review. International Journal of Surgery Case Reports. 2025 Aug 14:111807.*
16. *i Gavara CG, López-Andújar R, Ibáñez TB, Ángel JM, Herraiz ÁM, Castellanos FO, Ibars EP, Rodríguez FS. Review of the treatment of liver hydatid cysts. World journal of gastroenterology: WJG. 2015 Jan 7;21(1):124.*
17. *Tan GX, Miranda R, Sutherland T. Causes of hepatic capsular retraction: a pictorial essay. Insights into Imaging. 2016 Dec;7(6):831-40.*
18. *Christaki E. Classification of parasitic diseases. InThe Surgical Management of Parasitic Diseases 2020 Jul 24 (pp. 23-45). Cham: Springer International Publishing.*
19. *Batirel A, Regmi SK, Singh P, Mert A, Konety BR, Kumar R. Urological infections in the developing world: an increasing problem in developed countries. World Journal of Urology. 2020 Nov;38(11):2681-91.*
20. *Ng WQ, Neill J. Evidence for early oral feeding of patients after elective open colorectal surgery: a literature review. Journal of clinical nursing. 2006 Jun;15(6):696-709.*
21. *Sokouti M, Sadeghi R, Pashazadeh S, Abadi SE, Sokouti M, Rezaei-Hachesu P, Ghojazadeh M, Sokouti B. A systematic review and meta-analysis on the treatment of liver hydatid cyst: Comparing laparoscopic and open surgeries. Arab journal of gastroenterology. 2017 Sep 1;18(3):127-35.*
22. *Habeeb TA, Podda M, Tadic B, Shelat VG, Tokat Y, Alsaad MI, Kalmoush AE, Nassar MS, Mustafa FM, Badawy MH, Shaaban MS. Biliary fistula and late recurrence of liver hydatid cyst: Role of cysto-biliary communication: A prospective multicenter study. World Journal of Methodology. 2023 Sep 20;13(4):272.*