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Laparoscopic or open treatment for liver hydatid cyst? A single-institution experience: a prospective randomized control trial

Saad Ab-razq Mijbas[1], Samer Makki Mohamed Al-Hakkak[*2], Ali Abood Alnajim[2], Hassan Abdulla Abadi AL-Aquli[1]

[1]Department of surgery, Faculty of medicine, Kufa University, Najaf city, Iraq
[2]Department of surgery, Faculty of medicine, Jabir Ibn Hayyan Medical University, Najaf city, Iraq

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ABSTRACT

The gold standard modality of management of cystic echinococcosis remains surgery. Regardless of the increased interest in nonsurgical techniques. The study aims to compare laparoscopic versus open methods of the hydatid cyst of the liver regarding complication rate, postoperative hospital stays, and effectiveness. A prospective randomized study. One hundred two patients with liver hydatid cyst in which 60 patients fulfil study requirements. Those undergone either open surgical or laparoscopic approaches under cover of albendazole treatment. The data divided into two groups, group 1 (28), group2 (32), we collected demographic data, surgical approach types, and postoperative data. The overall of 102 patients with hydatid cyst of the liver was randomized,60 patients full the study requirements, 28 patients (46.67%) had a laparoscopic procedure, and 32 patients (53.33%) had an open method. The total number of liver hydatid cysts was 70, and the operative time means 77 min (range, 60–120 min) in the laparoscopic group and 55 min (range, 40–110 min) in the open group which is significant (P-value 0.0267). The postoperative hospital stay means time was 32 hours (range, 1–3 days) in the group of the laparoscopic procedure and 52 hours (range,2–5days) in the group of open type. The postoperative surgical complication was significantly less in the laparoscopic group than the open group (p-value 0.014). A Hydatid liver cyst can be managed either by open surgical or laparoscopic techniques with comparable results. Still, the laparoscopic approach is superior in less postoperative pain, hospital stay and time, but it is essential in choosing the suitable patients.

*Corresponding Author

Name: Samer Makki Mohamed Al-Hakkak
Phone: +9647801003495
Email: sammerhakak1971@yahoo.com

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INTRODUCTION

Hydatid disease (HC) is an endemic disease in many cattle-raising and sheep- and part of the world, the Middle East, Eastern Europe, Mediterranean countries, and South America. The people (HC) is mainly caused by infestation with the dog tapeworm in the larval stage called Echinococcus granulosus. (Moro and Schantz, 2009; Nunnari, 2012; Khanfar, 2004) The cysts occur mainly in the liver of the humans being, (50-75%), then in the lungs (25%), and 5-10% distribute along with the arterial system to anybody tissue or organs except hair, nail, and teeth. (Gode, 2010) Asymptomatic hydatidosis of

the is the most common clinical presentation of cystic echinococcosis (CE). The worldwide anniversary incidence of CE is 1–200 per 100 000. (Nunnari, 2012) The standard gold therapy remains surgery. The principal treatment modality of CE regardless of the increased interest in nonsurgical techniques. (Hasan and El-Sayed, 2010) Although drug therapy with imidazoles and using PAIR method (puncture aspiration installation and re aspiration) have also shown to be an effective treatment in selected patients. (Casado *et al.*, 2001; Haddad *et al.*, 2001) As the open methods are followed by significant morbidity, especially in terms of infection of the wound. The era of laparoscopic surgery (LS) made many surgeons have attempt laparoscopic interference for liver hydatid cyst. They have had results similar to those of open surgery plus the advantage of minimally invasive surgery. (Ertem *et al.*, 1998; Manterola *et al.*, 2002) The LS has become increasingly widespread. (Yagci *et al.*, 2005) The first laparoscopic treatment of hydatid disease described in 1992. (Katkhouda *et al.*, 1992).

MATERIALS AND METHODS

A prospective randomized study performed in our department of surgery, our teaching medical centre, from1st of October 2016 to the 1st of October 2018with.The clinical, laboratory and radiological features of HC of the liver included in this study where 108 patients with hydatid liver cyst randomized taken, only 60 patient included in our research where they divided into two groups. Group one 28 patients undergo LS and group two undergo open surgical (OS)resection of liver HC All Patients sent for ultrasonography (US) and computed tomography (CT) scan of the abdomen in addition to chest radiography(CXR). All patients were treated preoperatively with three courses of 21-day durations/course of albendazole 10-15mg/kg twice a day). Patients with the following criteria excluded from the study

1. Having more than two liver hydatid cysts.
2. A cyst located in liver segment 1and 7.
3. A cyst set more than one cm depth from the surface of the liver
4. Cysts with thick calcified walls.
5. Recurrent hydatid cyst disease.
6. Previous multiple upper abdominal surgeries.
7. Severe cardiopulmonary disease.
8. Serious coagulation abnormalities
9. Cyst less than 3 cm in diameter

A patient was randomized for LS or OS of liver hydatid cyst either hydatid cyst proved by the US or CT examination. After taken of Informed consent from all collaborating patients. Before operation investigations performed. As per inclusion criteria, 60 patients were allocated randomly into two groups, for surgical management of liver hydatid cyst by either LS or OS.

Laparoscopic surgical approach

All operations were done under general anaesthesia and in the supine position. Surgery of the right lobe cyst, three ports placed, one infra-umbilical 5- 10 mm port through which a 0°or30° telescope inserted in, CO2 pneumoperitoneum was established, and intra-abdominal pressure maintained in a range of 8-16mmHg. Another 10 mm port is made at the epigastric region as close to the cyst and used as a working port, and one additional 5 mm port inserted according to the location of the cyst. For the left lobe cyst, one 10 mm and one 5 mm port was placed in the midclavicular line at the level above the umbilicus, in addition to infra-umbilical ports. From the 10 mm working port, gauzes soaked with 10% povidone-iodine, a scolicidal agent, were inserted in the cavity of the abdomen and were placed around the cyst. The cyst pierced with long laparoscopic needles connected to suction vacuum through the epigastric port. Another suction was used through the right 5 mm port to avoid cystic spillage content accidentally. The fluid of the cystic was aspirated, and then 10% povidone-iodine was injected inside of the cyst cavity via the same needle, and then aspirated again. This procedure repeated three times, and then the needle was withdrawn while still connected to vacuum suction to prevent back spillage from the needle. A puncture needle in the cyst enlarged sufficient enough to allow the tip of suction enters inside the cyst then the suction tip introduced inside the cavity of the cyst, aspirated of the contents by the help of a suction cannula Figure 1. The cystic wall after deflated held with a grasper and deroofing of the cyst performed with the use of a hook electrical diathermy Figure 2. The daughter cysts and the laminated membrane carefully extracted as in Figure 3 and by the use the endo-bag. Then a 30° telescope was introduced in the cavity for excellent visualization and to find any biliary communication or remnant cysts. The cavity of the cystic was washed with povidone-iodine many times. The partial cystectomy performed using a monopolar electrocautery hook or scissor. Two drains introduced, one inside the cavity of the cyst and other in

the subhepatic space. Endobag with daughter cysts removed through the 10 mm port.

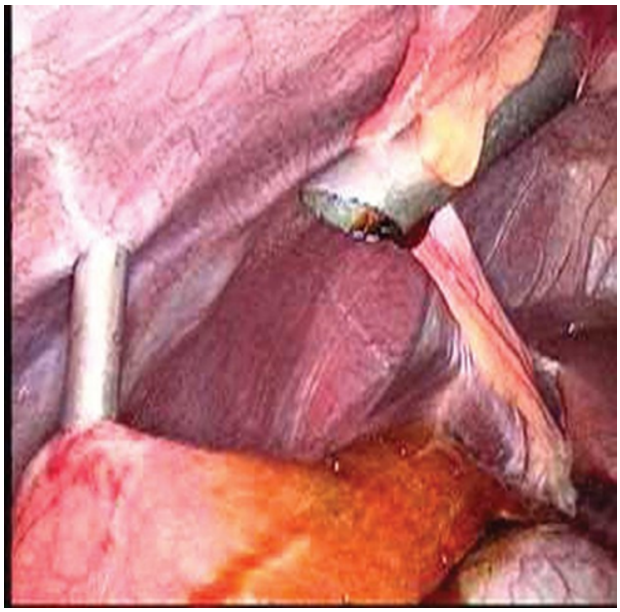

Figure 1: Aspiration of hydatid cyst with 5mm port electrocautery hook

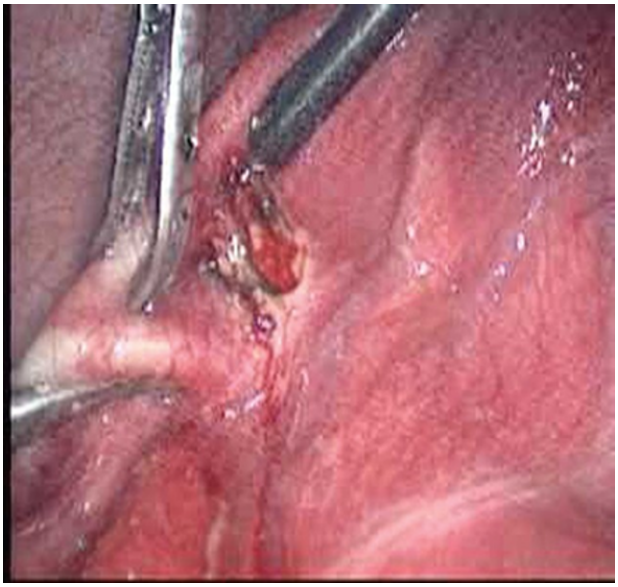

Figure 2: De-roofing of a cyst with

Open surgical approach

All operations performed under general anaesthesia and in the supine position. The right subcostal Kocher incision. The pericystic area and field of operation covered with gauze immersed with scolicidal material (10% povidone-iodine) to avoid the scolices spillage into the cavity of the peritoneum. The cyst is drilling, and fluid withdraw. The fluid that aspirated in uncomplicated cysts is clear and colorless and is called rock water. Before injecting the scolicidal agent, as much fluid as possible withdrawn to avoid the scolicidal material dilution.

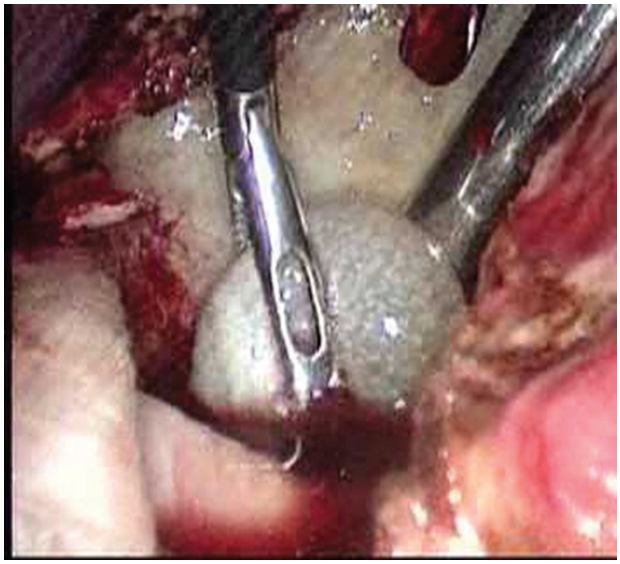

Figure 3: Daughter cysts removal.

Then scolicidal agent is injected into a cyst cavity and wait for approximately 10 minutes. However, if the aspiration of cyst fluid containing bile hints a connection between the cyst and the bile duct, so a scolicidal agent should not inject to avoid sclerosing cholangitis. Then, the scolicidal material is re-aspirated, and the cyst is de-roofed. The contents of the cyst, such as daughter cysts and the germinative membrane, are removed. The cavity should be open accurately for any apparent connection with the biliary tree and the existence of exogenous cysts implanted in the cyst cavity wall. The following step is treating the residual cavity, which performed by using different procedures like external drainage and, omentoplasty and capitonage. Postoperatively, in both LS and OS, oral clear fluid intake was permitted on the next day of surgery. The drain inside the cyst was removed 72 hours after the operation if no significant drainage of bile and subhepatic drains removed after 4th-day post-surgery. Discharged of patients and were advised of a follow-up at after five days, one month, three months, six-month and 12 intervals as shown in CONSORT diagram Figure 4. Postoperatively all patients were given albendazoletablet10-15 mg/ Kg body weight for six weeks.

RESULTS

The study included 60 patients with liver hydatid cyst, of the 37(62%) were female while 23(38%) were male as shown in Figure 5, which showed the gender distribution of patients in this study. Patients ages ranged from 11 to 68 years, with the most prevalent age group was the 4th decade, as shown in Figure 6, which showed the age distribu-

Table 1: Demographic features of the cysts and the surgical procedures used in the patient

Parameter	Open group (OS)	Laparoscopic group (LS)	P-value <0.05 significant
Cyst location (Couinaud's classification)			
Segments II,III,IV	12	7	
Segments V,VI	15	17	0.530
Segment VIII	10	9	
Cyst size (maximum diameter) (cm) <5	10	11	
5–10	21	21	0.182
>10	6	1	
Character (type of the cyst)			
Clear pure fluid cyst (Gharbi type 1)unilocular	25	27	0.657
Daughter cyst hydatid (Gharbi type 3) Multiloculor	12	6	
Location of cysts according to Liver lobes			
Right lobe	20	23	
Left lobe	6	4	0.686
Both lobes	4	3	
Number of cysts			0.685
One cyst	23	27	0.0718
Two cysts	7	3	

Table 2: Mean operative time and post-operative stay.

Parameter	Open group	Laparoscopic group	P value
Mean operative time (min)	55	77	0.0267
Mean post-operative hospital stay (hour)	52	32	0.014

Table 3: Duration and complications of the surgical methods performed in the patient people.

Parameter	Open group	Laparoscopic group	P value
Postoperative Complication	4	1	
Wound infection, seroma, abscess			
Intraabdominal collection and abscess	0	1	0.014

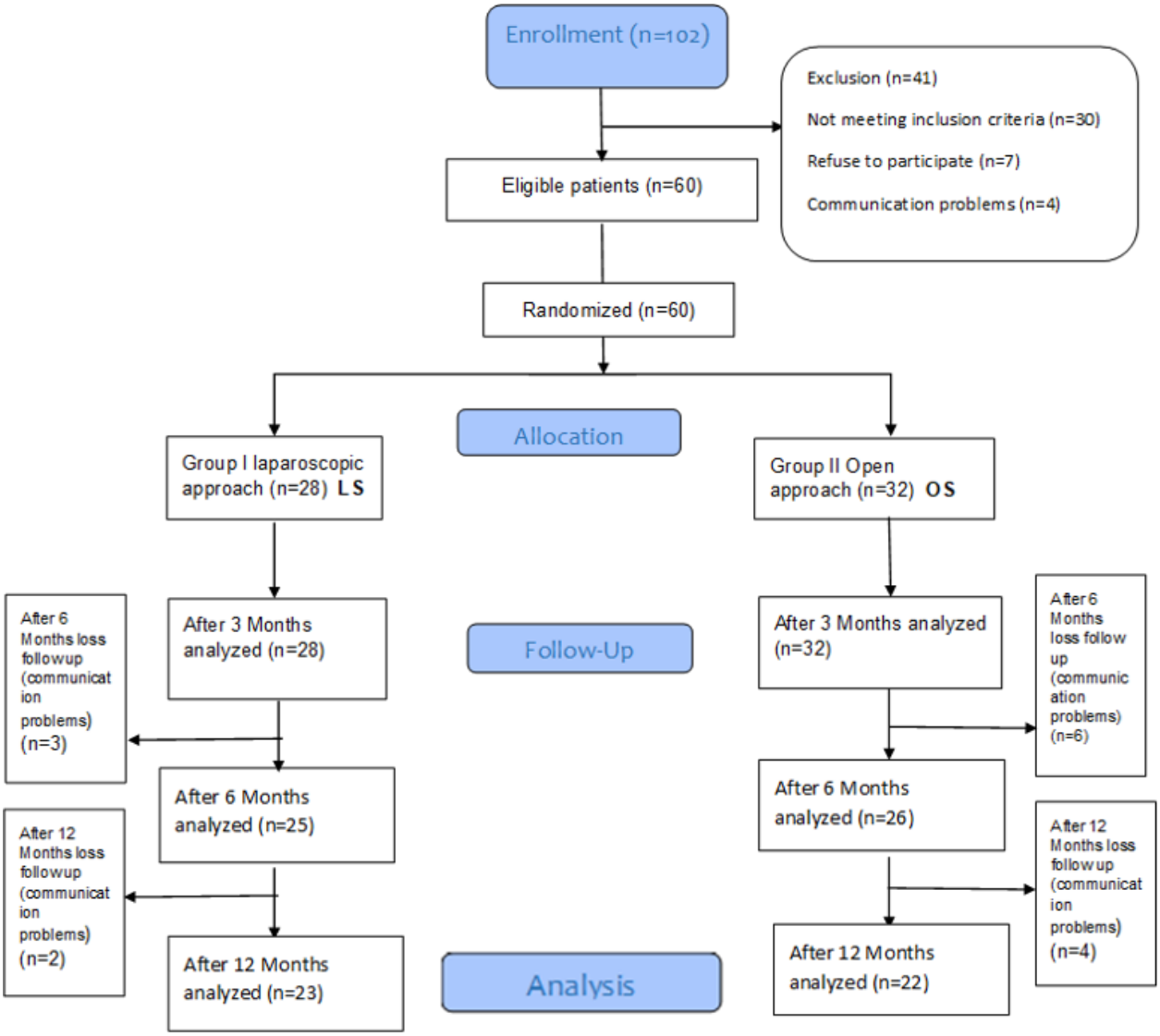

Figure 4: Consort diagram for patients included in the study.

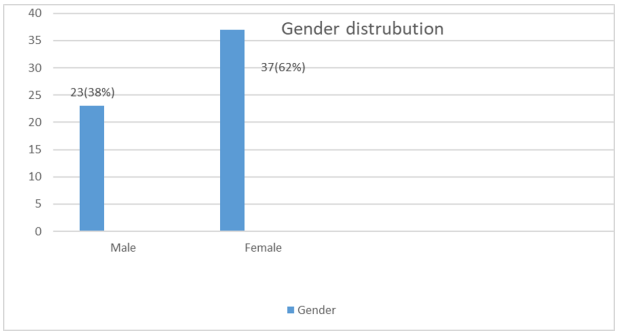

Figure 5: Genderdistribution of patients with hydatid cyst disease included in this study.

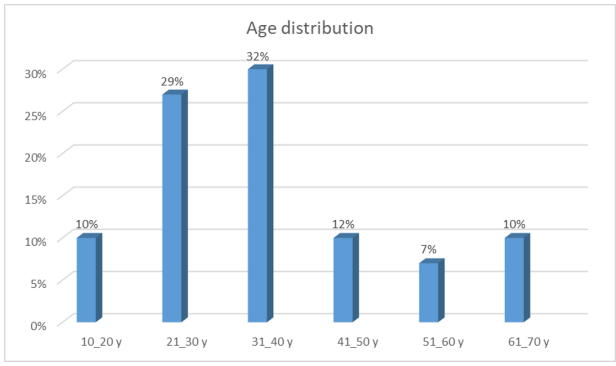

Figure 6: Age distribution ofpatients with hydatid cyst disease included in this study.

tion of patients enrolled in the research. Most of the patient complaint was pain or heaviness at the right hypochondrium and\or epigastrium, shown in Figure 7, which revealed the presenting symptoms of patients. This study reported that 50 patients had a single liver hydatid cyst, while ten patients had two hepatic cysts. The total number of liver hydatid cysts were 70, of the 40(57.14%) hydatid cysts underwent OS resection of hydatid cysts while 30(42.66%) hydatid cysts underwent LS removal. The hydatid cysts classified according to there, loca-

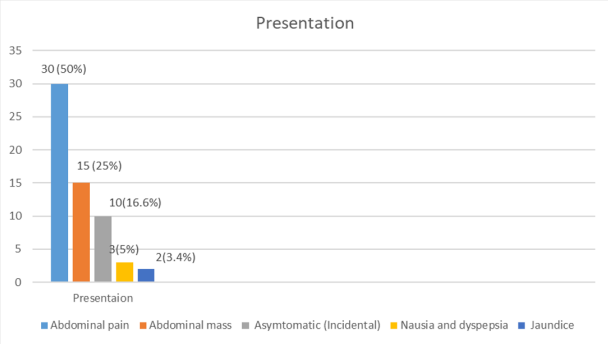

Figure 7: The presenting symptoms of patients with hydatid cyst disease included in this study.

tion, size, size of the cyst which showed no difference between studied groups: as in Table 1. Anaphylaxis or significant bile leakage not reported during the procedure in both groups. Both mean time of operation and mean of postoperative hospital stay was significant with (p-value 0.014). The mean operative time was 77 min (range,60–120 min) in the LS group and 55 min (range, 40–110 min) in the OS, as shown in Table 2. The mean postoperative stay in hospital was 32 hours (range, 1–3 days) in the LS group and 52 hours (range,2– 5days) in the OS group (P-value 0.0267). The postoperative surgical complication was significantly higher in an OS group than the LS group (p-value 0.014), as shown in Table 3. Hydatid cyst disease recurrences not observed in either group during this period (follow up period). No death reported in this study, so the mortality rate was 0 % for both groups.

DISCUSSION

Despite the prospect for the management of HC liver have increased frequently in modern years including medical managements, PAIR, or a conjunction of these two, surgery considered the standard modality of management of hepatic HC. (Hasan and El-Sayed, 2010; Yagci *et al.*, 2005) Because of the advance in technology and particularly the high numbers of more expert surgeons, LS has been admitted for the surgical management of liver HC as well as for the surgical management of many other organs. HC of liver managed Laparoscopically should not be considered as modern surgical methods but rather novel and minimally invasive access. Similar to any other surgical procedures, LS of HC liver obeys the basic principles of surgery in managing HC liver by OS including avoidance of hydatid spillage, sterilization, emptying of the cyst cavity, and treatment of the retained cavity. (Hasan and El-Sayed, 2010) In the beginning, laparoscopy not widely used in the management of HC liver due to the worry that the risk of dissemination. intra-peritoneal and the recurrence rate might be higher with LS than with the OS. (Dervenis *et al.*, 2005; Rihani *et al.*, 2005) Many authors have tried to decrease these hazards with LS by preoperative and postoperative albendazole treatment. Appropriate isolation of the cyst from the peritoneal cavity by using different apparatus and the utilized of a wide-angle telescope. (Ayles *et al.*, 2002; Bickel *et al.*, 2001; Palanivelu *et al.*, 2006) The actual hazard of spillage is lower than might be predictable (Manterola *et al.*, 2002), and the short-term recurrence rate varies between 0 and 9 % after laparoscopy, whereas in open approach, it is higher (0–30 %). (Seven *et al.*, 2002; Cirenei and Bertoldi, 2001)

Several studies have proven the usefulness of LS over open surgery in the management of a liver HC. The happening of spillage and anaphylaxis are minimum with LS. (Sharma *et al.*, 2009) The major quality of LS is that the laparoscopy can introduced in the cystic cavity; permitting its visualization. The picture of the cavity of the cyst show on screen is two to three times magnifier so any biliary connection or remnants of the germinal membrane can be distinguished and managed accordingly thus preventing bile leak, infection complications and disease recurrence. However, this visualization cannot obtain and difficult to manage in the open surgery of hydatid cyst. This study reported a postoperative complications rate of 20 % in the open approach while the study did not report any complication in the laparoscopic method. Previous studies showed that morbidity happen postoperative ranges from 12 to 63 % in OS and from 8 to 25 % in the LS. (Dervenis *et al.*, 2005) Our study showed that the morbidity rate was significantly lower in the LS, at most due to a decrease incidence of complications of abdominal wound (0 vs 8.72 %, p = 0.015) and other common complications (0 vs 5.23 %, p = 0.023). Also, this study did not report any mortality in open or laparoscopic methods. The death related surgery after LS is almost zero in laparoscopic series; whereas it ranges from 0 to 3 % in OS. (Cirenei and Bertoldi, 2001) Comparable to the results that were reported by other studies (Palanivelu *et al.*, 2006; Baltarboile'ye *et al.*, 2009). Although the mean operative time was slightly longer with the LS than the OS that is statistically significant, we believe that this disadvantage can easily be overcome by increased experience of the surgical team. The encouraging outcomes from our research favour expanding the scope of LS in HC, induced primarily by decrease morbidity postoperatively, rapid recovery, shorter hospital stay, early return to work, and better cos-

metic results. This study reported two recurrences of the disease in both groups in the short term period 12 months after both methods. Similar to previous studies showed that the recurrence rate of HC of the liver after a LS is comparable to open surgery. (Ramachandran and Arora, 2001) Anteriorly located hepatic cysts can be treated successfully laparoscopically with decrease complication (0%-17%) and recurrence rates (1%–9%) (Baskaran and Patnaik, 2004). Our study report hydatid cyst recurrence after twelve months of follow-up. However, the follow-up period is short.

CONCLUSION

Laparoscopic surgery is a safe operative option for the management of liver hydatidosis. The procedure gets lower postoperative complications, and shorter hospital stays. Laparoscopic surgical excision of hydatid cyst liver should consider in selected cases. Multicentric randomized study better for evaluation of hydatid cyst surgery whether laparoscopic vs open.

Ethical approval

The ethical committee of the, Faculty of Medicine, Jabir Ibn Hayyan Medical University

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Conflict of interest statement

All authors stat they don't have any conflict of interest.

Declarations

Ethical consent has been taken from all patients.

Author contributions

[1]Has conceptualized, and designed the study and also the surgeon who performed all surgeries, gain interpretation, and analysis of data

[2]The corresponding author accepts total responsibility for the study and/or the attitude of the work, had access to the information, and planned the decision to publish, revised the article grammar adjusted ideal content and final agreements of the version to be published

[3] Writing assistance, an assistant surgeon who performed surgery and follow up the patients

[4]Data collected and followed up the patients, drafting the article

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