Laparoscopic Versus Open Approach in Management of hepatic Hydatid Cystic Disease

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ABSTRACT

Introduction*: Hydatid disease has a worldwide distribution and commonly seen in sheep rearing areas. Tapeworm of genus Echinococcus is the parasite causing the disease. The most common site of involvement is the Liver. Treatment options are medical therapy, percutaneous drainage, or surgical intervention.* ***Objective****: Assessment of the outcome of either laparoscopic or open surgical treatment of liver hydatid cyst.* ***Patients and methods****: 48 patients with liver hydatid cysts underwent either laparoscopic or open surgical approach under cover of albendazol therapy. Both were divided in two groups according to the procedure done. The data collected were demographic data, Laboratory results, Radiological tests, type of surgical internvention, and post operative data.* ***Results****: The study involved 25 male and 23 females with a mean age of 36.76. Twenty patients (41.66%) had laparoscopic approach and 28 patients (58.34%) had open approach. Forty sex patients had one cyst and 2 patients had 2 cysts (P-value= 0.787). According to type of Operative Procedure: Deroofing was done in 38 patients, while Resection was done in 8 patients. Only 2 patients had Peri-cystectomy. With respect to Packing of the cyst with omentum, it was applied in 23 patients of open approach group and 9 patients of laparoscpic approach group (P-value= 0.013). The mean time of operation in the laparoscopic group was 74.75± 18.67 minutes while in the open group was 92.24±20.94 minutes (P-value=0.004).* ***Conclusion:*** *Hydatid Cystic lesions of the liver can be treated either by Laparoscopic or open surgical techniques with similar outcomes but with superiority of the laparoscopy due to less operative time and hospital stay.*
Keywords; *hepatic hydatid cyst, laparoscopy, deroofing, recurrence.*

INTRODUCTION

Hydatid disease has a worldwide distribution and is commonly seen in sheep rearing areas. The Larval stage of tapeworm of genus Echinococcus is the parasite causing the disease [1]. The most common site of involvement is the Liver (65–75%) because it is the first filter for the parasite larvae [2].

Hydatid disease has considerable negative economic and social effects. Delayed management may cause complications or even death. For these reasons, it is preferred that hydatid disease should be treated when it is diagnosed. Only in some circumstances spontaneous healing and calcification can occur when the parasite's died [3, 4].

Treatment options include medical therapy, percutaneous drainage or surgical intervention (Laparoscopic or open surgical approach)[5-7].

According to the recommendations proposed by WHO, radical surgery is the gold standard treatment for hepatic hydatid cysts[8]. Contraindications to surgery include complex or widespread disease, multiple cysts that are difficult to access, partially inactive or calcified liver cysts, advanced patient age, or co-morbidities interfering with anesthesia, or patient refusal of surgery [5-7].

Because the open procedures may have significant morbidity, the laparoscopic surgical approach becomes more popular [8]. Early reported laparoscopic treatment of hepatic HC was confined to simple drainage, more advanced laparoscopic methods are now possible, including deroofing, pericystectomy and even segmentectomy and hepatectomy [9–11]. However, many surgeons are still against the use of laparoscopy in treatment of hepatic hydatid disease because they fear difficulty in controlling spillage, more complications and recurrence rates[12,13].

The aim of this work was to assess the feasibility and outcome of laparoscopic versus open approach in treatment of hydatid liver cyst.

PATIENT AND METHODS

This study included 48 patients with liver hydatid cysts. All patients were studied for demographic data, pre-operative data including Laboratory tests, serological tests, and Radiological tests (Ultrasonography and CT to detect the criteria, number, size and site of cysts). All cases either laparoscopic or open approach were done under cover of albendazol therapy.

In *open approach:* Access to liver cysts was changeable according to the position and size of the cysts. In *laparoscopic approach:* Through a supraumbilical port for the scope. But the precise site of the trocars varied according to the position and size of the cyst. The abdominal cavity was examined, for dissemination. The liver was surrounded with towels soaked with 20 % hypertonic saline to protect the surrounding tissues. Then one of the following was done:

-*Cystostomy (deroofing)* where the cyst was punctured and decompressed with a 20-gauge needle. The cystic fluid was aspirated with a large needle then injection of 20% hypertonic saline without pressure and the cyst was then opened and the remaining contents, including the laminated membrane, were removed with sponge-holding forceps. The cavity was then obliterated with an omental flap or purse-string absorbable sutures.

- *Pericystectomy* by creating a surgical plane just around the cyst without opening it.
- *Liver resection* for peripherally placed cysts or pedunculated lesions.

Post operative data was assessed as the need for post-operative ICU, time of removal of the drains in days, hospital stays in days and post operative complications (as Hemorrhage, hospital acquired infection, bile leak, etc...). Follow-up was done on a 6-month basis by clinical examination and imaging. The outcome was classified into short-term findings for complications and mortality and long term findings for long term complications and recurrence.

Statistical analysis:

Data was collected and two types of analysis were done descriptive statistics and analytical statistics. P (probability) value was considered statistically significant if it was less than 0.05.

RESULTS

48 patients were included in this study and were classified into 2 main groups:

1. Laparoscopic approach including 20 patients **(41.66%)**.
2. Open approach group including 26 patients **(58.34%)**.

Demographically, both groups were with no statistically significance differences **(Table 1)**. As regard the clinical presentation, 17 (35.4 %) cases were asymptomatic and discovered accidentally. Abdominal pain was a presentation in 12 cases (25 %) patients **(Table 2)**.

Table 1: Demographic data among patients included in the study

		Open group		Laparoscopic group		Test of Significance	
Sex	*Male*	**16**	**33.33%**	**9**	**18.75%**	**P-value**	**0.348**
	Female	**12**	**25%**	**11**	**22.91%**		
Age	*Mean*	**36.93**		**36.6**		**P-value**	**0.915**
	SD	**9.5**		**11.23**			
	Range	**7-55**		**15-56**			

Table 2: The Clinical Presentation of patients included in the study

Clinical Presentation	Open group	Laparoscopic group	Total		Test of Significance	
Asymptomatic	**9**	**8**	**17**	**35.4%**	**P-value**	**0.887**
Pain	**7**	**5**	**12**	**25%**		
GIT symptoms	**9**	**5**	**14**	**29.1%**		
Palpable mass	**3**	**2**	**5**	**10.4%**		

Serological tests for Hydatid disease (ELISA, hemo-agglutination, and counting of esinophils) were done in all patients. They were positive in **38 patients (79.1%).** Ultrasound and Computed Tomography were done in all patients. **Forty sex patients (95.8%)** were found to have a single cystic lesion in their livers while the remaining **2 patients (4.16%)** were found to have two lesions. The mean size of the cystic lesions was found to be higher in the laparoscopic group **(42.64±22.77 cm2)** than the open surgery **group (30.63±18.84 cm2)** with no statistically significance difference. Twenty four patients (50 %) had their lesions in the right lobe while 23 patients (47%) of the patients had left hepatic lesions and only one patient (2.08%) in the open surgery group had a lesion in both lobes (segments 4,8) **(Table 3)**.

Table 3: Pre operative cystic lesions assessment

		Open group		Laparoscopic group		Total		Test of Significance	
Serological tests	*Positive*	**23**	**47.9%**	**15**	**31.2%**	**38**	**79.1%**	**P-value**	**0.408**
	Negative	**5**	**10.4%**	**5**	**10.4%**	**10**	**20.4%**		
No. of lesions	*1 lesion*	**27**	**56.2%**	**19**	**39.58%**	**46**	**95.8%**	**P-value**	**0.787**
	> 1 lesion	**1**	**2.08%**	**1**	**2.08**	**2**	**4.16%**		
Lesion size *(cm^2)*	**Mean**	**30.63**		**42.64**				**P-value**	**0.06**
	SD	**18.84**		**22.77**					
	Range	**4.2-99**		**20-114**					
Lesion among lobes	*Right*	**14**	**29.16%**	**10**	**20.8%**	**24**	**50 %**	**P-value**	**0.683**
	Left	**13**	**27%**	**10**	**20.8%**	**23**	**47.92%**		
	Both	**1**	**2.08%**	**0**	**0%**	**1**	**2.08%**		

Intra-operative data (Table 4): 38 patients (79.1 %) had deroofing of their cysts while **8 patients (16.6 %)** had liver resection and 2 patients **(4.16 %)** had peri-cystectomy (PC) with no statistically significant difference between both groups. Eleven **patients (22.9%)** had an additional procedure rather than the management of their cysts. In the open surgery group, **3 patients (10.7%)** had cholecystectomy, two patients had liver biopsy. In the laparoscopic group, four patients **(20%)** had laparoscopic cholecystectomy, two **(10%)** had repair of para-umbilical hernia, the overall in open group were 5 patients (10.4%) and laparoscopic group were 6 patients (12.5%) with no statistically significant difference. One patient **(2.08%)** in the laparoscopic group had uncontrolled intraoperative bleeding that requires conversion to open surgery. **In 32 patients (66.6%)** the remaining cavity had been packed with omentum with a higher proportion **(23 patients 47.9%)** in the open surgery group.**(Fig 1)** The difference was statistically significant **(P = 0.013)**. The mean time of operation in the laparoscopic group was **(74.75±18.67 min)** and in the open surgery group was **(92.24±20.94 min),** this difference was found to be statistically significant **(P = 0.004)**.

Post-operative data (Table 5): Only 7 patients **(14%)** required postoperative ICU; 3 patients due to excessive bleeding intraoperatively and 4 patients due to high ASA score (≥3) with no statistical significant difference between both groups.

Table 4: Intraoperative data.

		Open group		Laparoscopic group		Total		Test of Significance	
Operative Procedure	*Deroofing*	**22**	**45.8%**	**16**	**33.3%**	**38**	**79.6%**	**P-value**	**0.196**
	Resection	**4**	**8.3%**	**4**	**8.3%**	**8**	**16.6%**		
	PC	**2**	**4.16%**	**0**	**0%**	**2**	**4.16%**		
Additional procedure	*Yes*	**5**	**10.4%**	**6**	**12.5%**	**11**	**22.5%**	**P-value**	**0.293**
	No	**24**	**50%**	**14**	**29.16%**	**38**	**77.5%**		
Omentum Packing	*Yes*	**23**	**46.9%**	**9**	**18.75%**	**32**	**66.6%**	**P-value**	**0.013**
	No	**5**	**10.4%**	**11**	**22.9%**	**16**	**33.3%**		
Time of operation *(min.)*	*Mean*	**92.24**		**74.75**				**P-value**	**0.004**
	SD	**20.94**		**18.67**					
	Range	**70-180**		**50-120**					

Table 5: Postoperative data.

		Open group		Laparoscopic group		Total		Test of Significance	
ICU admission	*Yes*	**2**	**4.16%**	**5**	**10.4%**	**7**	**14.5%**	**P-value**	**0.075**
	No	**26**	**54.1%**	**15**	**31.2%**	**41**	**85.4%**		
Post-op complication	*Yes*	**8**	**16.6%**	**8**	**16.6%**	**16**	**33.3%**	**P-value**	**0.145**
	No	**20**	**41.6%**	**12**	**25%**	**32**	**66.6%**		
Removal of drains	*2 ds*	**7**	**14.5%**	**12**	**25%**	**19**	**39.5%**	**P-value**	**0.04**
	3-5ds	**18**	**37.5%**	**7**	**14.5%**	**25**	**52%**		
	>5 ds	**3**	**6.25%**	**1**	**2.08%**	**4**	**8.16%**		
Hospital Stay *(days)*	*Mean*	**5.49**		**3.75**				**P-value**	**0.046**
	SD	**3.78**		**1.97**					
	Range	**3-21**		**2-9**					

As regard complications in the open surgery group, 3 patients **(6.2%)** had wound infection treated with frequent dressings and antibiotics, 3 patients **(6.2%)** had postoperative collection that were managed conservatively, 2 patients **(4.1%)** had bile leak; one of them was treated expectantly while the other required ERCP, sphincterotomy and stent placement. As regard complications in the laparoscopic group, 4 patients **(8.3%)** had postoperative fluid collections that were managed conservatively, 2 patients **(4.1%)** had postoperative pleural effusion, one patient **(2.1%)** had postoperative bleeding that required blood transfusion and one patient **(2.1%)** had bile leak that was managed conservatively.

18 patients **(37.5%)** in the open surgery group had their drains removed 3-5 days postoperatively while 12 patients **(25%)** in the laparoscopic group had their drains removed 2 days postoperatively. The difference between both groups was found to be statistically significant (P = 0.04) **(Fig 2.)**.

On comparing the length of stay, it was higher in the open surgery group patients **(5.49±3.78)** than that of the laparoscopic group **(3.75±1.97)**. The difference was found to be statistically significant (P = 0.046).

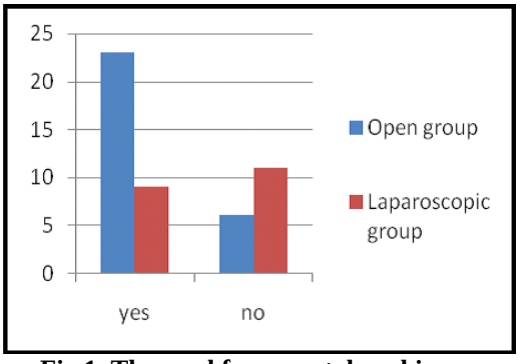

Fig 1. The need for omental packing

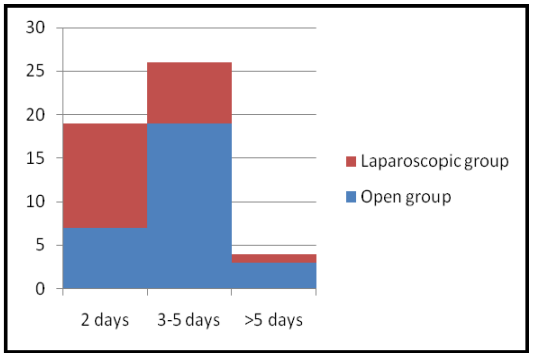

Fig 2. Removal of the drains

The follow-up was done monthly for 6 months then every 6 months by the use of clinical examinations and radiological ultrasound**.** On short term folow-up, incisional hernia was found in 2 patients in the open surgery group while port-site hernia was found in 1 patient in the laparoscopic group. On long term follow-up, Recurrence was detected in 1 patient **(2.1%)** from the open surgery group while no recurrence was detected among the laparoscopic group. No statistical significant difference was found so this finding is accidently not related to the method of management.

DISCUSSION

Hepatic hydatid disease is a common parasitic disease that has been reported worldwide. It can present with different symptoms, depending on the character of the lesions, or may be asymptomatic and discovered accidentally. While with the increase in size and/or complications of the cysts, abdominal discomfort or more specific signs and symptoms are noted [14]. In this study, 12 patients (25%) presented with pain, 14 patients (29.1%) presented with frequent vomiting and abdominal fullness and 4 patients (8.1%) with mass. In **(Falih 2011 study)**, pain was found in 18 patients (56%), a mass in 12 patients (37%) and dyspepsia in 4 patients (12%) [15]. In **(Bhadreshwara et al. 2015)** study, pain was found in 35 patients (35%), a mass in 17 patients (17%) and dyspepsia in 30 patients (30%) [16].

Due to the development in technology and especially the increasing number of more experienced surgeons, laparoscopic surgery has been introduced for the surgical treatment of hepatic hydatid disease. However, laparoscopy was not quickly accepted or used widely in management of hydatid disease due to the concern that the recurrence rate is high and the fear of intraperitoneal dissemination [17, 18]. Deroofing is one of the preferred surgical methods, as reported in many series. As it has easy application, no requirement of long-term experience, low risk of collection when the entrance roof is left wide, applicability to most cysts, and that the cavity may collapse or become filled over time, are the primary reasons for its selection[19]. In this study patients were treated mainly by deroofing either surgically or laparscopically (38 patients 79.1%) and to a little instance by resection and pericystectomy. This is different from the study done by **(Jerraya et al. 2015)** where 47 out of 49 patients were treated by deroofing [20].

One of the negative aspects of deroofing is that in postoperative long-term screenings, residual cavities may be reported as new cysts by an inexperienced radiologist. To prevent this, the postoperative tomography at the first month should be taken into consideration in the evaluation of the cavity when examining the later tomographies [19]. The risk of spillage and dissemination of hydatid material in the peritoneum during deroofing is probably more important in the laparoscopic than open approach. This higher risk can be explained by First, in open approach, puncture of the hydatid cyst was made after isolation of the cyst and its surrounding areas from the rest of the abdominal cavity by using gauze swabs soaked by scolicidal solution. This procedure prevents hydatid dissemination in the peritoneum even in case of spillage [20].

However, this precaution is not well feasible in laparoscopy. Secondly, in case of spillage, the effect of pneumoperitoneum insufflation would promote the spread of hydatid material throughout the peritoneal cavity [20]. Laparoscopic technique is easy to master and safe to perform. Total cystectomy or liver resection require an experienced hepatobiliary surgeon, and cannot be used in primary hospitals, where the incidence of hydatid disease is high [21].

The operative time was found to be shorter in the laparoscopic group than the open surgery group. No difference in the operating time between both groups was found in the study performed by **(Loehe et al. 2010)** where the operating time in both groups was 140 ± 72 minutes[22]. **32** patients had cavity packing by

omentum (omentoplasty) while in **(Gourgiotis et al. 2007)** study, 72 out of 169 patients **(42%)** had omentoplasty [23].

Only 7 patients required postoperative ICU admission either for postoperative morbidity, preoperative co-morbidity or eventful operation. Postoperatively, 6 patients had postoperative collection, 3 patients had wound infection, 3 patients had bile leak, 2 patients had postoperative pleural effusion, and one patient had bleeding, 1 patients with recurrence and 3 patients with hernia. In **(Tekin et al. 2003)** study, 7 patients had postoperative collection, 9 patients had bile leak, 2 patients with recurrence and 2 patients died [19]. While in **(Chen & Xusheng 2006)** study, no recurrence was detected after laparoscopic management which is similar to the findings in our laparoscopic group. Drain removal was found to be earlier in the laparoscopic group than the open surgery group. That was statistically significant. Also, the hospital stay was shorter in the laparscopic group. This matched the study performed by **(Mazoch et al. 2009)** where mean hospital stay in the laparoscopic group was 5 days compared to the open group where the mean hospital stay was 9 days [24]. The difference between both groups was statistically significant. The laparoscopic surgical approach to the cysts have several advantages as decreased postoperative pain, ileus, early mobilization and recovery, short hospital stay, and cosmetic benefits [25]. Laparoscopic management was chosen to treat simple, small cysts located superficially in the liver [26].

CONCLUSION

Hydatid Cystic lesions of the liver can be managed either by Laparoscopic or open surgical techniques with similar outcomes but with superiority of the laparoscopy regarding operative time and hospital stay. As in open approach precaution of hydatid spillage and management of the residual cavity must be taken. With a proper patient selection, laparoscopic surgery seems to be safe and feasible for uncomplicated accessible cysts.

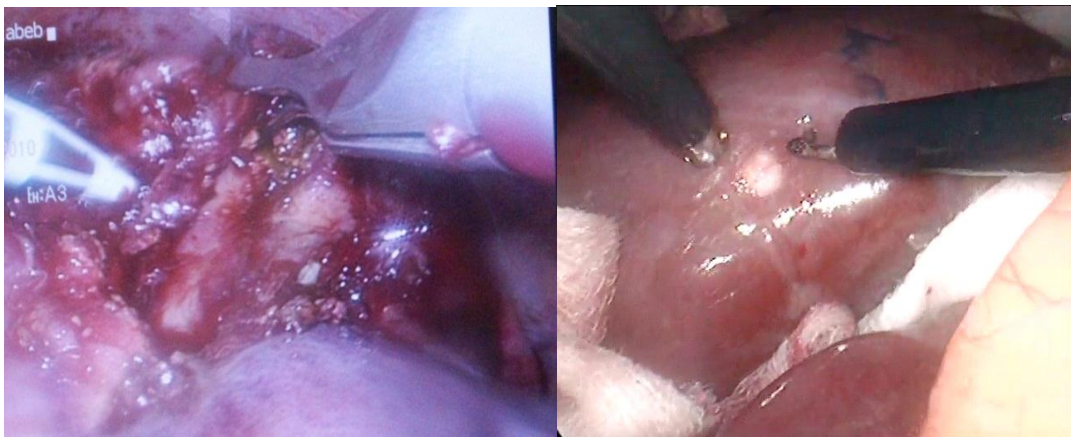

Fig. 3: A cases of hydatid disease in the right lobe of the liver. Laparoscopic deroofing was done.

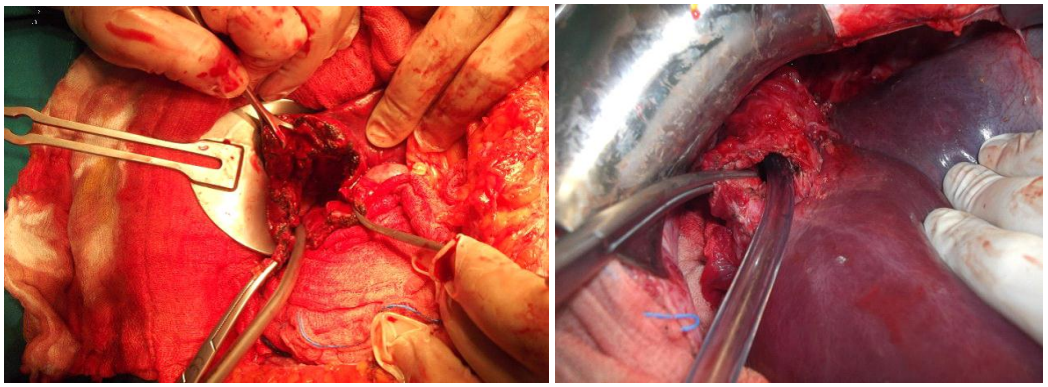

Fig 4: A cases of large hydatid cyst in Rt lobe, Open deroofing and packing were done.

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