International Surgery Journal
Shaikh AS et al. Int Surg J. 2021 Apr;8(4):1134-1142
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20211097

Original Research Article

Laparoscopic management in hydatid disease of liver: a series of 35 cases

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Received: 01 March 2021
Revised: 13 March 2021
Accepted: 15 March 2021

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ABSTRACT

Background: The purpose of this study is to analyse the sociodemographic factors & clinical features of hydatid disease of liver and to emphasize on the safety, efficacy and the role of laparoscopy in its management in the present scenario.
Methods: A prospective observational study was done for 35 patients who were diagnosed with and later underwent surgical intervention laparoscopically for hydatid disease of liver over a duration of 3 years from January 2017 to December 2019. Diagnosis was based on the history, clinical examination, ultrasonography of abdomen (USG) and contrast enhanced computed tomography scan of abdomen (CECT).
Results: A slight female preponderance with most cases in the 4th decade of life and belonging to rural areas and low socio-economic status. A single cyst in the right lobe of the liver was most common lesion. The most common surgery performed was laparoscopic de-roofing of the cyst with omentoplasty. The most common complication was intra-operative spillage of cyst contents followed by post-operative biliary leak.
Conclusions: In the present era laparoscopic surgery is safe, efficacious and plays a crucial role in the management of hepatic hydatid disease with its proven benefits over the conventional surgeries including less morbidity and mortality and reduced rate of recurrence.

Keywords: Hydatid disease, Echinococcosis, Laparoscopy, Liver, Omentoplasty

INTRODUCTION

Human hydatid disease or cystic echinococcosis is parasitic disease of world-wide distribution and is endemic in sheep rearing areas including the Indian subcontinent. It is caused by cestodes *Echinococcus granulosus* and *Echinococcus multilocularis* that lives in the small intestine of dogs and other canines. Humans are the accidental intermediate host in which the parasite exists in the larval form, structurally composed of a hydatid cyst containing a bunch of larvae in a fluid medium. The organ most commonly involved is liver followed by lungs. The laparoscopic surgery of a hydatid cyst was first described in literature in the year 1992 and later in the year 1994.[1,2] However, this was soon thereafter followed by a report of anaphylactic shock complicating laparoscopic treatment of hydatid cyst of the liver in the year 1998 and this created an extravagant fear of intra-operative anaphylaxis intimidating the surgeons from more widely accepting the minimal access surgery for the treatment of hydatid cysts.[3,4] However, during the last 2 decades various studies in literature validate the supremacy of laparoscopy in the treatment of hydatid disease of liver. This study intends at reinforcing

the role of laparoscopic management in cases of hydatid disease of liver.

Aim and objectives

Aim of treatment was complete removal of parasite without any spillage during operation and unnecessary damage to host tissue.

The objectives of this study were to analyse the sociodemographic factors and clinical features of hydatid disease of liver and to emphasize on the safety, efficacy and the role of laparoscopy in its management in the present scenario.

METHODS

A prospective observational study was conducted for patients at Sir JJ Group of Hospitals and Grant Government Medical College, Mumbai who were diagnosed with and later underwent surgical intervention laparoscopically for Hydatid disease of liver over a duration of 3 years from January 2017 to December 2019 after taking approval from Institutional Ethics Committee. In all patients, the diagnosis of echinococcal cyst was based on history, clinical examination, USG and CECT scan of abdomen.

Inclusion criteria

Inclusion criteria were 1) patients of either gender with hepatic hydatid cysts requiring surgery 2) patients who were ideal candidates for laparoscopic approach 3) patients with cyst size of more than 3 cm.

Exclusion criteria

Exclusion criteria were 1) patients with cyst size of less than 3 cm 2) pregnant women 3) patient not consenting for the study 4) cysts with a heterogeneous complex mass (Gharbi type IV) or a calcified wall (Gharbi type V) on ultrasonography 5) laparoscopically inaccessible cysts located in the posterior segments of liver and cyst close to main vasculature.

Study design

This is 1) prospective study for all the patients diagnosed with hydatid disease of liver over a period of 3 years who met with the above inclusion and exclusion criteria 2) all relevant blood and radiological investigations were done for each case 3) magnetic resonance cholangiopancreatography (MRCP) was done for all the cases with cyst size more than 6 cm or with jaundice 4) all the patients received tablet albendazole 10 mg/kg for 1-2 weeks in the preoperative period and for at least 4 weeks in the postoperative period 5) all patients received prophylactic antibiotic (Inj. Ceftriaxone 1g) 1 hour prior to surgery 6) pre-operative, intra-operative and post-operative period was monitored along with post-operative analgesia requirement and pain assessment by visual analogue score 7) all the operated cases were followed up at 1 month, 3 months and 6 months to assess symptomatic improvement and success of surgical procedure by ultrasonography. CT scan was done if any complication or recurrence was suspected.

Operative technique

General anaesthesia is given and patient placed in supine position. A 10 mm port is inserted at umbilicus and after the creation of pneumoperitoneum the hydatid cyst is identified with a 30° laparoscope. Two 5 mm working ports depending on the location of the hydatid cyst and another 10 mm port is inserted exactly over the hydatid cyst or as close to cyst as possible. 5% savlon (cetrimide and chlorhexidine gluconate) solution-soaked gauze inserted and spread over the surface of cyst and over the surrounding surface of liver except for the surface of cyst where it is to be punctured. It prevents the peritoneal contamination if spillage of hydatid fluid occurs. The cyst is punctured with the aspiration needle and the fluid is aspirated.

A 10 mm suction cannula is introduced into the cyst from the site of puncture and the contents of the cyst which include germinal membrane, daughter cysts, brood capsules scolices and the remaining fluid are evacuated. After the complete removal of the cyst contents 5 % savlon solution is instilled into the cyst cavity and aspirated after a period of 10 min. Different laparoscopic procedures such as deroofing, marsupialization, partial cystectomy and total cystectomy were chosen based on the size, location and technical ease for each patient. In deroofing, the superficial and visible part of the cystic wall was excised with a laparoscopic hook or scissor. The germinal membrane, daughter cysts and the excised cyst wall are put into the endobag. Then the laparoscope is introduced into the cyst cavity to visualize the interior for any potential bleeding, biliary communication and retained daughter cysts.

The presence of cysto-biliary communication can be confirmed by bile staining of a gauze inserted into the cystic cavity. The cysto-biliary communication if present is managed with combination of suturing with silk 3-0 and TISSEEL glue (fibrin sealant). Omentoplasty is done for the cases in which it was feasible. An abdominal drain was placed near the cyst cavity. All the patients are started on oral fluid intake on the 1st postoperative day. The drain was removed after 3 to 6 days depending on the amount and the character of the drainage. Patients were discharged and advised for follow-up.

Sample size

Sample size of the study was 35. Thirty-five consenting consecutive patients with hepatic hydatid cysts meeting the study criteria were included in the study.

Statistical analysis

We studied various demographic parameters, clinical presentation, laparoscopic techniques, complications and recurrence in the management of hydatid disease of liver. Data was assembled and on categorical measurements entered in Microsoft office Excel software to study the results in number or percentage.

RESULTS

The patient population belonged to different age groups. The highest number of patients were seen between the age group of 31-40 years while the second highest age distribution, 20% of the patients were in the age group of 41-50 years (Figure 1).

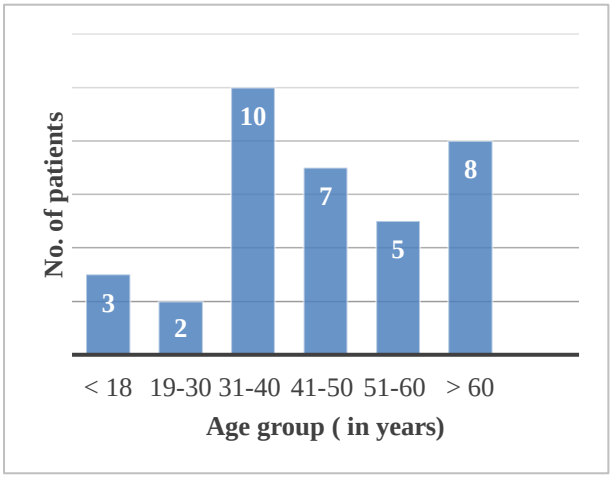

Figure 1: Age-wise distribution of study participants.

A slight female preponderance was seen in our study with 21 female patients (60%) and 14 male patients (40%) (Table 1).

Table 1: Gender distribution, socioeconomic profile and geographical distribution of study participants.

Demographic profile	Percentage
Gender distribution	
Females	60
Males	40
Socioeconomic status	
Lower status	68.57
Middle status	31.42
Geographical distribution	
Rural areas	62.85
Urban areas	37.14

Based on Modified Kuppuswamy scale, a greater proportion of patients (68.57%) belonged to lower socioeconomic status while the remaining (31.42%) belonged to middle socioeconomic status (Table 1).[5]

Majority of the patients (22, 62.85%) hailed from rural areas, while 13 patients (37.14%) belonged to urban areas (Table 1).

The majority of the patients presented with pain abdomen followed by abdominal mass. Fever was seen in 9 patients. 7 patients exhibited jaundice. Pressure symptoms such as lumbar backache, constipation and breathlessness were seen in 2 patients. 4 patients had dyspepsia and 1 patient presented with acute abdomen. 4 patients were asymptomatic at presentation (Figure 2).

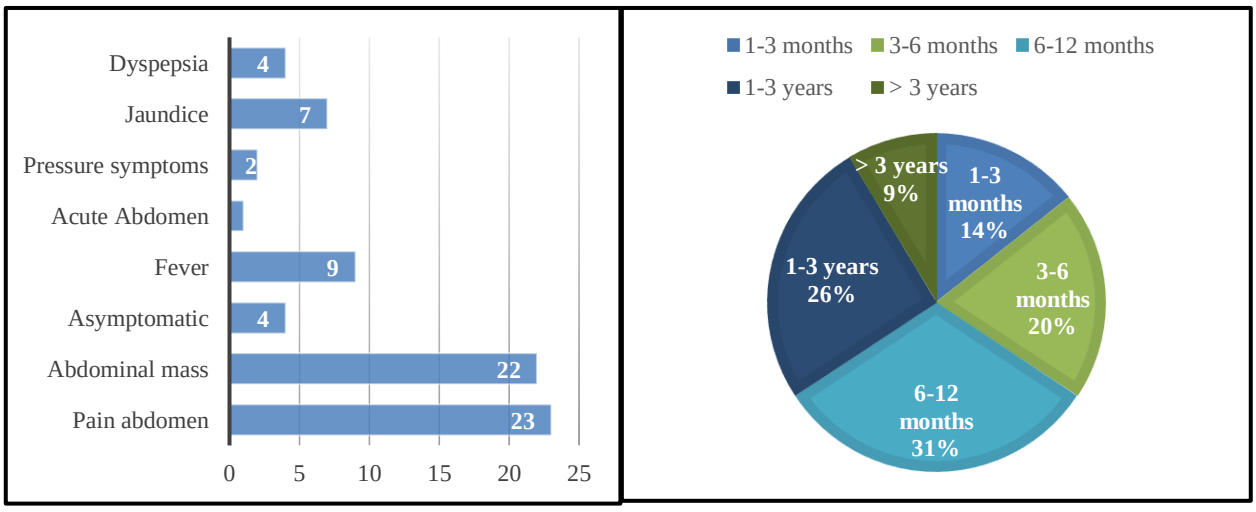

Figure 2: Clinical presentation and duration of illness in study participants.

Symptom duration of hepatic hydatid cysts assessed and categorized into categories of 1-3 months, 3-6 months,6-12 months, 1-3 years, and>3 years. Maximum number of patients (11, 31%) had illness lasting from 6-12 months, followed by 1-3 years (9, 26%). Long standing illness more than 3 years was seen in 3 patients (9%). 12 patients (34%) had symptoms lasting for less than 6 months (Figure 2).

Gharbi et al classified the hepatic hydatid cyst based on the Ultrasonography features which assist in deciding the further management.6 In the present study, of 38 cysts, 23 were of type III, 10 were of type II and 5 were of type I while type IV and type V were excluded from the study. The cyst size varied in the range from diameter of 4 to 18 cm with a mean diameter of 10 cm.

Only right lobe was involved in 27 patients, only left lobe was involved in 5 patients while both lobes were involved in 3 patients. Thus, right lobe was most commonly involved and this is consistent with previous studies.[7-10]

Cysto-biliary communication was suspected in 11 cases in whom there were features suggestive of extrinsic compression of the biliary tree by the hydatid cyst on MRCP. Out of the 11 cases, 5 cases had intraoperative biliary communication and 2 cases had postoperative biliary leak. In our study, intraoperative biliary communication was present in 10 cases which were managed intraoperatively with combination of suturing & TISSEEL glue.

Nineteen patients (54.29%) underwent laparoscopic de-roofing of the cyst (LDC) with omentoplasty. Eight patients (22.85%) underwent laparoscopic partial cystectomy (LPC) with omentoplasty. Two patients (5.71%) underwent laparoscopic total cystectomy (LTC) with omentoplasty. Laparoscopic total cystectomy alone was conducted in two patients (5.71%). Four patients (11.42%) underwent marsupialization of the cyst (Figure 3).

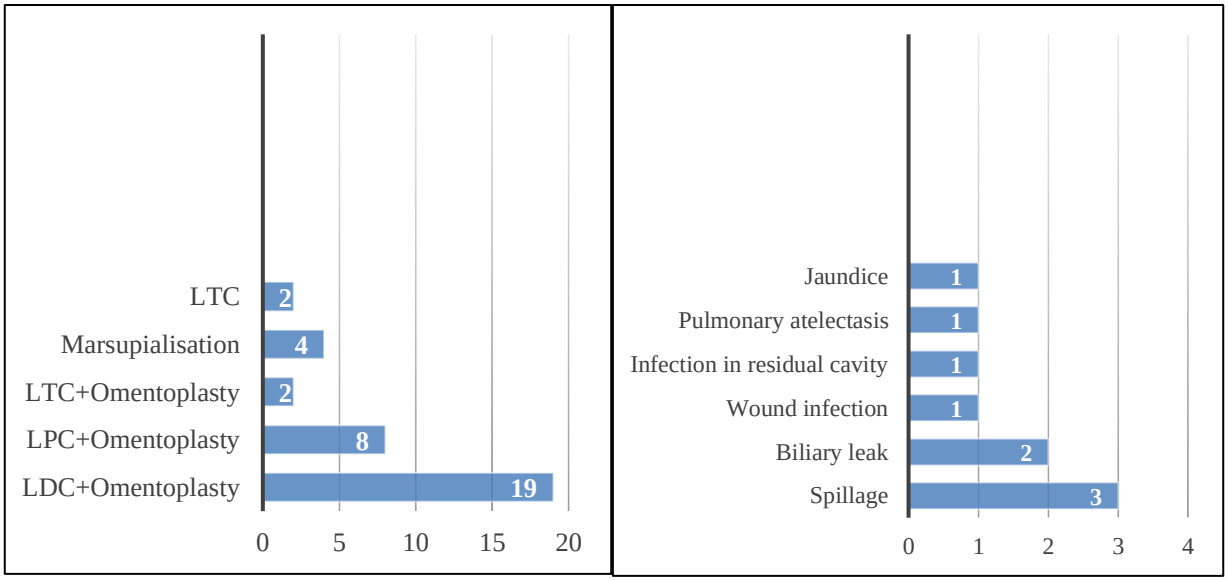

Figure 3: Laparoscopic procedures performed and associated complications.

Operative complications were seen in 20% of the patients. Spillage of cyst content was the most common complication seen in three (8.5%) of patients which followed rupture of cyst during insertion of the port in all the three cases. None of these followed any significant clinical sequelae such as anaphylaxis as described in literature. Biliary leak was present in 2 cases in the postoperative period evident on as biliary drainage. In one patient the biliary drainage decreased gradually and ceased off completely on post-operative day 7 and no further intervention was needed. In the other patient with persistent biliary leak on postoperative day 10, Endoscopic retrograde cholangiography (ERCP) with sphincterotomy was done. The biliary drainage decreased gradually to cease off completely after 4 weeks. Infection in the residual cavity and wound site infection occurred in one patient each which were managed with antibiotics. Pulmonary atelectasis, a dreaded complication that can follow laparoscopic hepatic hydatid cyst surgeries was seen in one patient in our study and was managed with chest physiotherapy, incentive spirometry and other deep breathing exercises. Jaundice was seen in one patient which most likely to have followed hepatic parenchymal damage during the procedure, however the serum bilirubin levels were not elevated (Figure 3).

Twenty-two patients had no residual cavity at the end of first month, while the number rose to 24 at the end of 6 months.

Decreasing residual cavity was seen in 4 patients at the end of 1 month, 5 patients at the end of 3 months and 3 patients at the end of 6 months follow up. One patient had increase in the size of the cavity i.e., recurrence at the end of first month. But the patient responded to medical treatment and showed reduction in the size of residual cavity by the end of 3 months. Eventually, the patient had no residual cavity at the end of 6 months. 8 patients were

lost to follow up. There was no post-operative mortality in the present study (Table 2).

Table 2: Follow up of patients.

Status	At 1 month	At 3 months	At 6 months
No residual cavity	22	22	24
Lost to follow-up	8	8	8
Decreasing residual cavity	4	5	3
Recurrence	1	0	0

DISCUSSION

Our prospective study represents 3 years of institutional experience in the management of hepatic hydatid cysts. It aims at studying the sociodemographic factors, clinical features and investigating safety, efficacy and feasibility of different laparoscopic approaches to hepatic hydatid cyst.

In present study, a slight female preponderance is seen which is consistent with the most of the previous studies.[7,8,11] However male preponderances was also seen in few studies (Table 3).

Table 3: Age and gender distribution in present and previous studies.

Study	Mean age (years)	Male	Female
Muqim et al[8]	38.6±14.03	16 (37.2)	27(62.79)
Palanivelu et al[12]	38.6	55 (83.3)	11 (16.7)
Yagci et al[13]	35.2±13.3	7 (63.94)	128(36.05)
Present study	35	(40%)	21 (60%)

In the present study, majority (28.57%) of the patients were seen in the age-group of 31 to 40 years, while 5.71% (lowest) were in the age-group of 19 years to 30 years. Few studies conducted have more incidence in 3rd and 4th decades of life (Table 3).[7,9]

Socioeconomic status and Geographical distribution have major influence in the etio-pathogenesis of parasitic infestations. Hydatid disease is more prevalent in rural areas and people belonging to low-socioeconomic status.

Hydatid disease is a slowly progressive disease and the symptoms and complications arise eventually. Most of the clinical features are due to compression of the bile duct presenting as obstructive jaundice, abdominal pain, anorexia, and pruritus. Mass effect on portal vein and hepatic vein can cause portal hypertension and Budd-Chiari Syndrome, respectively. As in the present study, pain in abdomen and mass per abdomen are the most common complaints at presentation and other common presentation are fever and jaundice while some cases are asymptomatic. This is consistent with many previous studies (Table 4).[7-9,11,12]

If the hydatid cyst is left untreated, the cyst can form fistula into the biliary tract or into the adjacent structure or ruptures into the peritoneal cavity causing peritoneal hydatidosis or develops daughter cysts within or rarely die de novo.

USG and CECT of the abdomen are non-invasive and highly accurate imaging investigations and should be done in all the cases. USG is particularly useful for the detection of cystic membranes, septa, and hydatid sand whereas CECT best demonstrates location and depth of the cyst and its relation to adjacent structures, cyst wall calcification, cyst infection, cyst wall defect and peritoneal seeding.[14]

Table 4: Clinical presentation in present and previous studies.

Study	Abdominal mass	Abdominal pain	Fever	Jaundice	Asymptomatic
Samala et al[7]	15(46.87%)	22(68.75%)	6(18.75%)	6(18.75%)	3(9.38%)
Muqim et al[8]	9 (20.93%)	34 (79.06%)	5 (11.62%)	3 (6.97%)	4(9.30%)
Chautems et al[11]	1(1%)	44(56%)	1(1%)	3(4%)	20(26%)
Palanivelu et al[12]	13(19.7%)	34(51.5%)	1(4.6%)	-	3(4.6%)
Present study	23(65.71%)	22(62.85%)	9(25.71%)	7(20%)	49(11.42%)

Although a variety of modalities of treatment such as medical treatment and percutaneous drainage has been described in the literature, surgical management remains the mainstay of treatment. Other modalities should be reserved for the patients in which surgical management is not feasible. However, use of albendazole as an adjuvant therapy to surgery in preoperative and postoperative period has been found to significantly reduce the viability of daughter cyst and recurrence of hydatid disease. Also, the use of albendazole reduces the tension in the cyst, making surgery easier and reduces the risk of spillage of cyst contents and the recurrence.[15,16]

The principal steps in the surgical management include neutralization of the parasite, evacuation of the cyst contents and the management of the residual cavity.

A major concern during laparoscopic surgery of hydatid cyst is the prevention of spillage of cyst contents under high intraabdominal pressure created by pneumoperitoneum. However, Bickel et al illustrated that

creation of pneumoperitoneum does not increase the risk of spillage and may even enhance safety.[17]

The most critical step during which the spillage of cyst contents occur is the initial puncture and aspiration. Gauzes soaked with scolicidal agent are used around the puncture site over the surface of cyst and over the surrounding surface of liver as a precautionary measure (Figure 4). Savlon is the potent and least concentration dependent scolicidal agent of choice.[18]

Removal of the germinal membrane and evacuation of the cyst contents is another critical step for which various techniques and aspiration or suction devices have been described in the literature. Simple needle aspiration, suction with liposuction device, large-diameter transparent bevelled cannula with continuous vacuum inside the cannula, Palanivelu hydatid system, perforator and aspirator called the "perfore-aspirator" and an aspirator grinder apparatus have been used in the laparoscopic management of hepatic hydatid cyst.[12,19-22] In the present study we used simple needle aspiration (Figure 4).

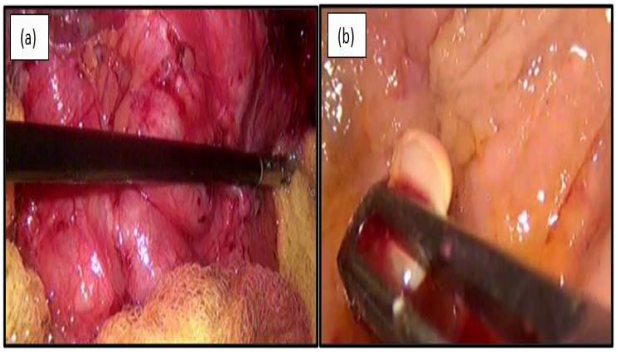

Figure 4: (a) placing savlon soaked gauze pieces around cysts, (b) removal of small cyst contents.

Various laparoscopic techniques described include total pericystectomy, partial pericystectomy with omentoplasty, deroofing with or without omentoplasty, marsupialization and capitonnage (Figure 5) [23-25]

Omentoplasty is thought to fill residual cavity, to assist healing of raw surfaces, and to promote resorption of serosal fluid and macrophagic migration in septic foci. Dziri et al reported that the obliteration of the cyst cavity with omentum reduces the abdominal complications after surgical treatment of hydatid disease (Figure 5).[26]

Radical procedures such as total pericystectomy and segmental hepatic resection have been described often in the previous studies which have the advantage of complete evacuation and least chances of spillage of cyst contents and therefore lowest recurrence. These procedures are more approving for the small peripherally located cysts that are away from the major vessels and ducts. However, they are associated with more morbidity when compared with other procedures.[27,28]

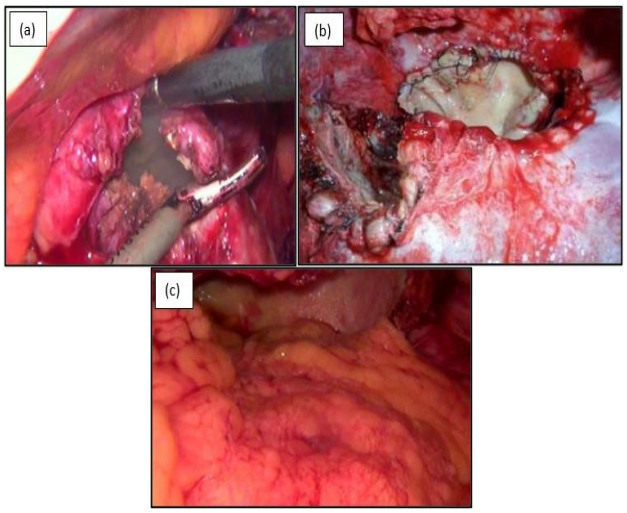

Figure 5: (a) Deroofing of the cyst, (b) Marsupialisation and (c) Omentoplasty.

In the present study laparoscopic de-roofing of the cyst with omentoplasty was the most common procedure done followed by laparoscopic partial cystectomy with omentoplasty which shows similar trend as of other studies (Table 5).

Table 5: Most common procedure in present and previous studies.

Study	Commonly performed procedure
Muqim et al[8]	Laparoscopic unroofing of cyst and drainage
Avgerinos et al[10]	Drainage and total or partial cystectomy
Yagci et al[13]	Laparoscopic unroofing of cyst and drainage
Ertem et al[23]	Cystotomy and partial cystectomy with drainage
Tuxun et al[29]	Laparoscopic cystectomy
Present study	Laparoscopic de-roofing of cyst with omentoplasty

Intra-operative and post-operative complications are indicators of success of laparoscopic procedures and have a major impact on the surgical outcome as well as cure of the illness. In our study, complications were seen in 26% of the patients which include intra-operative spillage of cyst content, biliary leakage, wound infection, infection in the residual cavity and jaundice. In the present study one case of biliary leak was treated conservatively and no further intervention was needed and in the other case Endoscopic retrograde cholangiopancreatography (ERCP) with sphincterotomy was done. Similar persistent biliary fistula was successfully treated with (ERCP) with sphincterotomy and endo-biliary stenting.[30-32] Other post-operative complications seen during laparoscopic surgery of hepatic hydatid cyst such as pancreatic fistula and rupture of the cyst that were not reported in this study but are found to have higher incidence in other studies.[9,10,33,34]

Complications can be reduced by proper selection criteria for those patients who are undergoing laparoscopic surgeries.

Fortunately, none of our surgery was converted to open surgery. The most common reason for conversion to open surgery in the literature is the inadequate access and exposure during laparoscopy.[8,23,29]

Recurrence of a hydatid disease is the reappearance of the active cysts in liver or at any extrahepatic location in a previously treated case of hepatic hydatid disease. It may be due to the inadequate management of primary disease, procedure related spillage of cyst contents or may be the manifestation of a disseminated disease. USG and CECT of the abdomen are effective in diagnosing the recurrent disease with increase in size of the cyst being the most important marker for recurrent disease.[35] As reported in the previous studies recurrence is less common in laparoscopic surgeries when compared with open surgery and percutaneous drainage.[13] In present study recurrence rate is 3 % at 1 month and no recurrence at 6 months follow up which is in concurrence with other studies (Table 6).[8,13,29,36]

Table 6: Recurrence rate in present and previous studies.

Study	Recurrence rate (%)
Muqim et al[8]	4.65
Yagci et al[13]	3.3
Tuxun et al[29]	1.7
Khoury et al[36]	3.6
Present study	3

A vigilant removal of the cyst contents avoiding the spillage during the primary surgery can significantly decrease the recurrence of the disease. Recurrence is actually never seen following complete resection of an intact cyst with radical surgical interventions. Thus, radical resection can be considered as management of the recurrent disease, however, these radical operations are technically more difficult, and reoperations have higher morbidity and mortality rates. Moreover, recurrence itself increase technical difficulties due to adhesions in the secondary operations.[35]

Laparoscopic approach is minimally invasive and allows better visualisation of the cyst cavity along with small biliary opening, bleeding sources and complete evacuation of the cyst but also have a disadvantage of inadequate exposure and the difficulty in tackling the spillage of cyst contents if it occurs. Also, with laparoscopic approach, cysts located deep into the liver have increased surgical risks, such as difficult identification, bleeding, or the inability to check for biliary rupture. Nevertheless, in our experience as compared to open surgery, patient who undergo laparoscopic surgery require less analgesia, mobilized and started on oral feed early, have a better postoperative recovery, reduced wound related complications, better cosmetic results and can be discharged earlier.

Limitations

Our study is a descriptive study paying attention to various laparoscopic techniques for the management of hydatid disease of liver, however the techniques are neither compared with each other nor with the other alternative therapies like open surgery, systemic chemotherapy and percutaneous drainage which would have been possible with a comparative study and would have yielded better results. Also, a longer follow-up period of 1-2 years would have helped in firmly establishing the recurrence rate with laparoscopic techniques.

CONCLUSION

Hydatid disease of liver is an endemic disease in certain parts of the world with increasingly high global socioeconomic impact. In the present era laparoscopic surgery is safe, efficacious and plays a crucial role in the management of hepatic hydatid disease with its proven benefits over the conventional surgeries including less morbidity and mortality and reduced rate of recurrence. However, further studies need to be encouraged in the laparoscopic surgery to set in motion a more unified approach in the surgical management of hepatic hydatid disease.

ACKNOWLEDGEMENTS

Authors would like to record appreciation for Dr. Ahana Ghosh, Dr. Guru Bharadwaj, Dr. Hemant Jawale and Dr. Shalmali Dharmadhikari, residents at Department of General Surgery, Grant Government Medical College & Sir JJ Group of Hospitals, who helped a lot in preparing this manuscript.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Shaikh AS, Tandur AE, Pathrabe YS, Patil DS, Bhandarwar AH, Shaikh NA. Laparoscopic management in hydatid disease of liver: a series of 35 cases. Int Surg J 2021;8:1134-42.