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Laparoscopic Management of Benign Cystic Lesions of the Liver

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Abstract **Original Research Article**

***Background*:** Benign cystic lesions of the liver are rare conditions. Owing to the improvement in investigation modalities like ultrasound and CT scan these lesions are found frequently today. A safe and effective method of laparoscopic management for hepatic hydatid cysts, simple liver cysts and liver abscess is described along with a review of the relevant literature. ***Objectives*:** To report our experience in laparoscopic management of hepatic hydatid cysts, simple liver cysts and liver abscess with the outcome, feasibility and complications of the procedure. ***Methods*:** This was a prospective observational study held at BSMMU, BIRDEM, DMCH, ShMCH and some private hospital in Dhaka city from July 2014 to December 2014. Total sample size was thirty cases. All patients diagnosed on ultrasound and CT scan and who have ful-filed the inclusion and exclusions criteria were included in the study. Laparoscopic unroofing, evacuation inocleation and aspiration were done. Operative procedure, operation time, conversion to laparotomy, complications, and mortality and recurrence rates were analysed. ***Results*:** There were three groups of benign cystic lesions: hepatic hydatid cysts (n=18), simple liver cysts (n=8) and liver abscess (n=4). Mean age of the patients were 43.6 years with hydatid cysts, 46.7 years with simple liver cysts, and 59.6 years in patients with liver abscess. Minimum age was 17 years and maximum age was 69 years. Male patients were 10 in hydatid cysts group, 3 in simple liver cysts group and 3 in liver abscess group. Most of the patients presented with pain, 72.22% in hydatid cysts, 62.5% in simple liver cysts and 100% in liver abscess. Most of the lesions were single and they were located in the right lobe of the liver in majority of cases. Benign cystic lesions were successfully treated laparoscopcally in 29 cases. Open surgery conversion was needed in one case 3.33%, with hepatic hydatid cysts. Complications included port site infection in 2 (6.67%), one in hydatid cyst another in liver abscess. bile leak in 1 (3.33%). There were no recurrence and also no mortality in the series. ***Conclusion*:** The laparoscopic approach is feasible, safe and effective in selected symptomatic patients with hepatic hydatid cysts, simple liver cysts and liver abscess.

Keywords: Hepatic hydatid cysts, liver cysts, liver abscess, benign cystic lesions.

INTRODUCTION

Benign cystic lesions of liver are rare lesions but are found more frequently today because of improvements in imaging modalities and the widespread use of ultrasound as a screening tool in patient with abdominal symptoms [1]. Benign cystic lesions of the liver include hydatid cyst of the liver, non-parasitic simple tiveliver cyst, and liver abscess.

Hepatic hydatid disease is an endemic disease in Mediterranean countries, North Africa, Middle East, Australia, New Zealand, Northern China and Indian subcontinent. However the disease may encounter sporadically because of increased travel and immigration. It is caused by the parasite, Echinococcus granulosus, which is a cestode that lives in the small intestine of dogs. Humans are the intermediate host. Common mode of infection is consuming unwashed or improperly washed infected fruits and vegetables and direct contact with the infected dogs. The most common site of occurrence of hydatid cysts in humans is the liver (50% to 93%) [2, 3].

Patients with hydatid cyst of the liver may be asymptomatic and discovered coincidentally when an ultrasound or CT scan is done for some other abdominal condition. However when symptoms present, patient may present with upper abdominal pain, right upper quadrant mass, fever, obstructive jaundice due to communication with the biliary tree by daughter cysts. If left untreated, the cyst grows and forms fistulas into adjacent organs or biliary system, ruptures into the peritoneal cavity causing seeding of multiple daughter cysts into the peritoneal cavity [2, 3, 11].

The treatment choices of hydatid disease of the liver have increased in the last 2 decades including medical treatment, percutaneous drainage, or a combination. Surgery remains the mainstay of treatment for hepatic hydatid disease. A variety of open surgical procedures are done for hepatic hydatid disease. Recently, laparoscopic treatment of hepatic hydatid disease has been increasingly popular and has undergone a revolution parallel to the progress in laparoscopic surgery. It is a new and encouraging approach with minimum morbidity and mortality [2, 3].

Simple liver cysts are not only represented by a single liver cyst but also multiple cysts, as well as polycystic liver disease. The etiology of the cysts is controversial, polycystic liver disease hereditary and its inheritance is typically autosomal dominant. Polycystic liver disease is frequently associated with polycystic disease of the kidney, pancrease, lungs, spleen [4].

Hepatic cysts are usually asymptomatic and not associated with the defects in liver function. They are sometimes found incidentally during routine ultrasound or CT scan. However, if they grow, they may become symptomatic. Symptoms depend on the size and location of the cysts. There may be abdominal discomfort possibly related to stretching of the overlying liver capsule, acute pain associated with haemorrhage in the cyst, or may present as right upper quadrant abdominal mass. Hepatic cyst infection may occur when a communication between the biliary tree and cyst is present [4-6].

The main diagnostic modalities for hepatic cysts are abdominal ultrasound and CT scan. Radiological findings to suggest that a cyst is simple are that it is regular, thin walled and unilocular, with no surrounding tissue response and no variation in density within the cyst cavity [5, 6].

As a benign lesion, asymptomatic hepatic cyst requires no treatment. However, surgical treatment is indicated if the cyst becomes symptomatic and laparoscopic deroofing is the treatment of choice for large symptomatic cysts [4, 6].

Various medical treatments are available for this liver abscess. However, large or multiloculated abscess and those failed with medical treatment were often treated inadequately through radiology guided drainage and the failure rate was high, because drainage catheters were of small caliber, preventing adequate drainage of the highly viscous pus. In these circumstances laparoscopic drainage of liver abscess represents an attractive alternative to open surgical drainage [6, 7].

Although different treatment options are available for these benign cystic lesions of the liver, laparoscopic techniques have presented an alternative to open surgical approach. With increasing experience in minimal access surgery, the endoscopic approach is being used for more and more operations. Laparoscopic procedures offer potential advantage associated with minimal access surgery, these includes decreased in the morbidity associated with a large laparotomy wound as well as the potential for faster postoperative recovery and shorter hospital stay [2-6].

OBJECTIVE

General Objective:

1. To determine the outcome of laparoscopic management in patients with benign cystic lesions of the liver.

Specific Objective:

1. To analyze technical feasibility of laparoscopic management for benign cystic lesions of liver.
2. To see the complications of laparoscopic management in patients with benign cystic lesions of the liver.

METHODOLOGY

Study Design: Prospective observational study.
Study Place: Department of surgery- BSMMU, BIRDEM, DMCH, ShSMC and some private hospital within Dhaka city.
Study Period: 6 months (July 2014-Dec 2014).
Study Population: All patients with benign cystic lesions of the liver both male and female will be enrolled in the study.
Main Outcome Variable: Laparoscopic surgery and management of benign cystic lesions of the liver.
Sample Size: 30 (thirty) samples were included in this study.
Sampling Method: Patients admitted to the above mentioned hospital and after meeting the inclusion and exclusion criteria a purposive sampling technique was applied for selecting the sample of the patients.

Inclusion Criteria:

- Hydatid cyst of the liver.
- Single or multiple large cysts of the liver.
- Large or multiloculated liver abscess.
- Failed medical treatment of hydatid cyst and liver abscess.

Exclusion Criteria:

- Deep seated hydatid cyst.
- Multiple small simple liver cyst.
- When patients refuse laparoscopic surgery.

Procedure of Preparing and Organizing Materials

The data were collected from patients admitted in the surgery department of above mentioned hospital with diagnosis of benign cystic lesions of the liver. General medical conditions of the patients were evaluated through history, physical examination. All the patients were prepared as usually as for any patient undergoing routine operation. In all the patients, the diagnosis of the cystic lesions was based on history, physical examination, ultrasound, CT scan and serological tests.

Procedure of Data Collection

Information was collected who give consent and participated in the study willingly. The sample size was 30. Duration of data collection was approximately 6 (six) months.

Data Analysis

After collection, data editing and clearing was done manually and prepared for data entry and analysis by using computer.

RESULTS

Table 1: Age distribution of 30 patients operated on laparoscopic approach

Hydatid cysts	**Total 18(n=18)**
Youngest patient	17 years
Oldest patient	63 years
Mean age	43.6 years
Simple liver cysts	**Total 8(n=8)**
Youngest patient	43 years
Oldest patient	65 years
Mean age	46.7 years
Liver abscess	Total 4(n=4)
Youngest patient	52 years
Oldest patient	69 years
Mean age	59.6 years

Thirty patients with three types of benign cystic lesions of the liver treated laparoscopically were included in the study. These three types of lesions were hepatic hydatid cysts, simple liver cysts and liver abscess. Among the 30 patients, hydatid cysts were 18 cases, simple liver cysts were 8 cases and liver abscess were 4 cases. Age and sex distribution of the study population are shown in Table-1 and Table -2.

Table 2: Sex distribution of 30 patients operated on laparoscopic approach

Hydatid cysts	**Total 18(n=18)**
Male	10(55%)
Female	8(45%)
Simple liver cysts	**Total 8(n=8)**
Male	3 (37%)
Female	5 (63%)
Liver abscess	**Total 4(n=4)**
Male	3 (75%)
Female	1 (25%)

In hydatid cyst group, out of 18 patients, 10 patients were male (55%) and 8 patients were female (45%). In simple liver cyst group, 3 patients were male (37%) and 5 patients were female (63%) out of 8 cases and In liver abscess cases, male were 3 cases (75%), and female was 1 case (25%). Mean age of the 3 groups of patients was 43.6 years (range 17 to 63) in hydatid cyst group, 46.7 years (range 43 to 65) in simple liver cyst group and 59.6 years (range 52 to 69) in liver abscess group. Youngest patient was 17 years and oldest patient was 69 years of age in the study population.

Table 3: Presentations of patients under went laparoscopic surgery for benign cystic lesions of the liver

Hydayid cysts	**18 (n=18)**
Abdominal pain	13 (72.22%)
Nausea, Dyspepsia	8 (44.44%)
Abdominal swelling/ Mass	5 (27.78%)
Fever	1 (5.55%)
Simple liver cysts	**8 (n=8)**
Abdominal pain	5 (62.5%)
Nausea, Dyspepsia	3 (37.5%)
Abdominal swelling/ Mass	0 (0.0%)
Fever	0 (0.0%)
Liver abscess	**4 (n=4)**
Abdominal pain	(100%)
Fever	4 (100%)
Nausea, Dyspepsia	2 (50%)
Abdominal swelling/ Mass	0 (0.0%)

Majority of the patients presented with pain. The mode of presentation of the patients is listed in Table 3.

Table 4: Number and location of benign cystic lesions of the liver

Hydatid cysts	**18 (n=18)**
Single cyst	16(88.89%)
Multiple cysts	2 (11.11)
Site—Right lobe of liver	15 (83.33%)
Site---Left lobe of liver	3 (16.67%)
Site---Bilateral	0(0.0%)
Simple liver cysts	**8 (n=8)**
Single cyst	7 (87.5%)
Multiple cysts	1 (12.5%)
Site---Right lobe of liver	7 (87.5%)
Site---Left lobe of liver	1 (12.5%)
Site---Bilateral	0

A single cyst was present in 16 (88.89%) cases of hydatid cysts (n=18), and in 7 (87.5%) cases of simple liver cysts (n=8). All the liver abscess (n=4) was present as a single cystic lesions.

The right lobe of the liver was more commonly involved than the left lobe in all the three groups of cystic lesions. Out of 18 cases of hydatid cyst, in fifteen (83.33%) cases cysts were located in right lobe of the liver, seven (87.5%) cases of simple liver cyst right lobe of the liver is involved and all the 4 (100%) cases liver abscess were found in right lobe.

Table 5: Types of surgery

Hydatid cysts	**18 (n=18)**
Unroofing and omentoplasty	17 (94%)
Partial pericystectomy	1 (6.0%)
Total Pericystectomy with omentoplasty	0 (0.0%)
Simple liver cysts	**8 (n=8)**
Unroofing of the cysts	8 (100%)
Liver abscess	**4 (n=4)**
Drainage of the abscess cavity	4 (100%)

In hepatic hydatid cyst group, unroofing and omentoplasty of the hydatid cyst was done in 17 patients, the rest 1 was dealt with partial pericystectomy. All the simple liver cysts 8 (100%) were treated by simple unroofing procedure. Liver abscess were treated by simple drainage of the abscess cavity. Types of surgery are listed in Table-5.

DISCUSSION

In this study three groups of benign cystic lesions namely hepatic hydatid cysts, simple liver cysts and liver abscess were included. This study evaluated the results of laparoscopic surgery in the management of hepatic hydatid cysts, simple liver cysts and liver abscess.

Benign cystic lesions of the liver are considered rare lesions. Owing to the improvements in imaging modalities and the widespread use of ultrasound and CT scan as a screening tool, these lesions are found more frequently nowadays [4].

Among the three groups of cystic lesions, hydatid cysts of the liver were 18 cases, simple liver cysts were 8 cases and the remaining 4 cases were liver abscess. The age range in this study was 17-69 years, with mean age of 43.6 years in hydatid cyst group, 46.7 years in simple liver cyst and 59.6 years in liver abscess group of patients respectively. Which is in keeping with the average age of presentation in the other series for these benign cystic lesions of the liver [2, 3, 5, 6].

Although males were predominantly affected in this study collectively in 3 groups but considering individual group, hydatid cysts and liver abscess were male predominant while simple liver cysts were female predominant in our study. Male predominance of hepatic hydatid cysts were reported by some studies [2, 8]. While the other studies have reported female predominance or equal infestation in either gender [3, 9].

Non-parasitic simple liver cysts were female predominance in this study. While all the other studies and literature supported this [1, 4, 5]. No study has reported regarding the gender predominance of liver abscess.

In this study abdominal pain was the most common mode of presentation in all 3 groups of lesions. Which has also been reported by other authors regarding these cystic lesions of the liver [3-6]. In our study pain was 72.22% in hydatid cysts, 62.5% in simple liver cysts and 100% in case of liver abscess. Hepatic hydatid cyst should be suspected in patients with abdominal mass, pain, fever or jaundice, however, in non-endemic areas most of the cases are asymptomatic and are detected incidentally [2, 3]. Simple liver cysts are also mostly asymptomatic [4].

In our study ultrasound and CT scan were the investigation modalities for diagnosis of these cystic lesions of the liver. In addition, serological tests such as ELISA were done for hydatid cyst. Serologic tests have a sensitivity of 65% to 90% [3]. Other studies regarding the diagnosis of hydatid cyst, simple liver cyst and liver abscess have also reported similar investigation modalities for detecting these lesions [4-6].

The main diagnostic modalities for hepatic cystic disease are abdominal ultrasound and CT scan. These examinations allow visualization of differences between hepatic cysts form: simple, multiple, and parasitic. Neoplastic processes developed in the epithelial layer of the cyst can also be detected by radiological examinations, presenting with an internal thickening or solid nodules in the cyst wall [4]. Radiological findings to suggest that a cyst is simple are that it is regular, thin walled and unilocular, with no surrounding tissue response and no variation in density within the cyst cavity [10].

Ultrasonography and CT scan are both effective for detection of liver hydatid disease. Ultrasonography is useful in detection of cystic membranes, septa and hydatid sand, while cyst wall calcification, cyst infection are best demonstrated by CT scan [3]. Certain features on ultrasound and CT scan may predict biliary communication which can be confirmed on magnetic resonance imaging (MRI) [3, 4].

Cystic neoplasms of liver such as biliary cystadenoma and cystadenocarcinoma comprise less than 5% of all liver cysts. The differential diagnosis of patients with complex cystic lesions of the liver includes biliary cystic neoplasm, as well as hydatid cyst, post traumatic cyst, liver abscess, polycystic

disease, haemorrhagic cyst, embryonal sarcoma, primary or metastatic necrotic neoplasm. Certain radiographic findings may be helpful when trying to differentiate biliary cystic neoplasm from other non-neoplastic pathologies [11]. Specifically, ultrasound, CT scan and MRI combined with clinicopathological features can aid in preoperative differentiation and characterization of hepatic cystic lesions.

In this study, the most common pathology was single cystic lesions that found mostly in the right lobe of the liver. In case of hydatid cyst, single cyst was found in 88.89% cases and multiple cysts in 11.11% cases. Single or multiple cyst in case of simple liver cyst were 87.5% and 12.5% respectively. Right lobe of the liver was involved in 83.33%, and left lobe in 16.67% cases of hydatid cyst. In simple liver cyst right lobe involvement was 87.5%, and left lobe involvement was 12.5%. In case of liver abscess, all the lesions were single and found in the right lobe of the liver. Bilateral lobe involvement in all three groups of lesions was nil in our series. Similar findings have also been reported by other authors [2, 3, 5, 6].

Laparoscopic treatment of hepatic hydatid disease has gained popularity in the last decade with encouraging preliminary results. Various laparoscopic techniques described are total or partial pericystectomy, puncture and aspiration of the contents followed by marsupialization, unroofing and drainage, unroofing and omentoplasty, partial or total pericystectomy with omentoplasty [2, 3]. A series of studies reported that, total pericystectomy seems to be the best operative procedure for small and peripherally located cysts. For large and deeply located cysts, the more extensive cystectomy and hepatectomy are accompanied by higher morbidity [3, 10, 11, 12].

A drainage tube was introduced into the cyst cavity for postoperative drainage.

Muqim *et al.,* from Pakistan has reported successful laparoscopic unroofing and evacuation of hepatic hydatid cysts in 43 patients with conversion to open surgery in only 3 cases [3]. Ertem *et al.,* has reported successful laparoscopic cystectomy and partial cystectomy with drainage in 33 patients along with omentoplasty in 15 patients with conversion to open surgery in only 2 patients [13].

In another series from India, evacuation and marsupialization, transcystic fenestration, and lobectomy were performed using a Palanivelu Hydatid System, especially designed trocar for contamination free management of liver hydatid disease [2]. Another study conducted by Ali Mohssen from Iraq reported laparoscopic cystectomy and partial cystectomy in 32 patients with hepatic hydatid cysts with good results and no conversion to open procedures [10].

A major disadvantage of laparoscopic surgery is the lack of precautionary measures concerning spillage. Various instruments have been described to evacuate the contents of the cysts without spillage. However, Palanivelu Hydatid System (PHS) is the most efficient instrument preventing spillage of liver hydatid cyst during laparoscopic treatment. The Palanivelu Hydatid System not only prevents spillage, but also assists complete evacuation and allows intracystic magnified visualization for cyst-biliary communication [2, 3, 10]. These specialized devices were not available at our study centres.

Laparoscopic treatment of hepatic cysts was first described in 1991 [4]. A number of studies reported that, percutaneous aspiration of simple liver cysts has very high recurrence rate. So, this technique is abandoned now-a-day. During laparoscopy for the treatment of liver cysts, it is possible to carefully observe the internal surface of the cyst, enabling direct visualization of suspected areas and also to perform biopsies [1, 4].

In this study, 4 patients were with liver abscess. All the 4 patients were treated by laparoscopic drainage of the liver abscess with adequate dose of intravenous antibiotics. Tay K. H, *et al.,* from Singapore, Aydin C *et al.,* from Turkey reported successful laparoscopic drainage of liver abscess with good outcome where surgical intervention was indicated for liver abscess [6, 7].

In this study, the average duration of surgery was 95 minutes for hydatid cysts, 55 minutes for simple liver cysts and 65 minutes for liver abscess. Surgery has taken more time in hepatic hydatid cysts operation and minimum time taken during simple liver cysts operation. In our series, only one patient (3.33%) has needed conversion of laparoscopic procedure to open surgery. That patient was with hepatic hydatid cyst. Conversion was needed due to unsatisfactory access and bleeding. Muqim *et al.,* reported conversion rate of 6.9%, in a study conducted on 43 patients with hepatic hydatid cysts due to same reason [3]. Some other authors reported conversion rate of 4% to 25% in hepatic hydatid cysts operation laparoscopically [9, 10, 12, 13].

Muqim *et al.,* reported 6.9% port site infection and 9.3% biliary leakage in 43 patients with liver hydatid cysts treated laparoscopically.The complications were managed conservatively [3]. Palanivelu C, *et al.,* reported minor biliary leakage and port site infection in a small percent of patients with liver hydatid cyst treated laparoscopically which was 13.7% and 3% respectively and managed conservatively [2]. Ali Mohssen from Iraq has reported one case of anaphylaxis and one case of biliary leakage out of 32 patients with liver hydatid disease treated by laparoscopic approach [10].

Other series of studies reported complications related to laparoscopic treatment of hepatic cysts included ascites, pleural effusion, dyspnoea, biliary fistula and complication rate was 10% to 35% [1, 4, 14]. However, in our study such type of complications was not observed in patients with simple liver cysts treated laparoscopically.

Study conducted by Palanivelu C, *et al.*, reported no recurrence during the follow up period of 5.8 years in 66 patients with hepatic hydatid cysts treated laparoscopically [2]. But another study by Muqim *et al.*, reported recurrence rate of 4.65% in 43 patients with hepatic hydatid cyst treated laparoscopically [3]. Another study by Ali Mohssen reported no recurrence during the follow up period of (6 -25) months in 32 patients with liver hydatid cysts treated laparoscopically [15]. The recurrence rate ranges from 3% to 10% following open surgery for hepatic hydatid cysts [3]. Thus, with laparoscopic management, the severity of morbidity and recurrence decrease as cpmpared with that in open surgery.

CONCLUSION

Minimally access surgery is the blessing of modern surgical technique. The revolutionary success of minimally access surgery has resulted in an intense effort to apply this concept for more challenging operations throughout the world. Through the era of minimally access surgery benign cystic lesions of the liver can be treated successfully in selective symptomatic cases. Treatment of hepatic hydatid cysts, simple liver cysts and liver abscess through the laparoscopic approach was safe and effective, presents great benefits to the patients and is less invasive than open procedure in properly selected patients. It is a technique with potentially decreased risk of intra-abdominal spillage, lesser complications and recurrence. So, this technique of minimally access surgery should be adopted for the treatment of benign cystic lesions of the liver like liver hydatid cysts, simple liver cysts and liver abscess in the tertiary hospitals in Bangladesh.

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