

Predictive Factors for Preoperative Diagnosis and Management of Cystic Liver Lesions: A Six Years Single Centre Experience

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ABSTRACT

Introduction: Surgical management differs for different cystic lesions of liver. Various clinical, biochemical and radiological features are specific to a particular cystic liver lesion pathology and its associated complications. Preoperative diagnosis helps to select appropriate surgical approach and tailoring appropriate management.

Aim: To evaluate the clinical, biochemical, radiological predictive factors to differentiate between hydatid diseases, simple cyst of liver and biliary cystadenoma. Also to evaluate appropriate management for hydatid disease with cystobiliary communication.

Materials and Methods: A retrospective study was conducted at Institute of Surgical Gastroenterology, Madras Medical College, Chennai, Tamil Nadu, India. Data were collected from 65 patients including 44 patients of hydatid disease, 13 patients of simple cyst, and 8 patients of biliary cystadenoma using a maintained database from January 2014 to December 2019 with a follow-up period up to December 2020 (mean follow-up

of 47.06±24.37 months). Various parameters like presence of cholangitis, deranged liver function test, number of cystic lesion, presence of calcification, presence of septation with or without enhancement were assessed. Data were statistically analysed using Analysis of Variance (ANOVA) and Chi-square test.

Results: There were 44 (67.69%) females and 21 (32.31%) males in this study with mean age of 50.44±12.23 years. Though multiseptation was associated with 27 (61.36%) of hydatid cysts and 1 (7.69%) of atypical simple cyst, it was more specifically present in biliary cystadenoma 8 (100%). Presence of daughter cyst (n=24, 54.55%) in hydatid disease and multilobulated appearance (n=5, 62.5%) in biliary cystadenoma were strong predictors of diagnosis. Radical surgery was associated with significantly less postoperative bile leak than conservative surgery in patients of hydatid disease with cystobiliary communication.

Conclusion: Predictive factors can help to make preoperative diagnosis correctly. Radical surgery reduces postoperative bile leak in patients of hydatid disease with cystobiliary communication.

Keywords: Biliary cystadenoma, Cystobiliary communication, Hydatid cyst, Simple cyst

INTRODUCTION

Incidence of cystic disease of liver has risen up from 5-18% due to advancement of imaging modalities [1]. Commonly encountered cystic lesions which pose a diagnostic challenges are hydatid disease, simple cyst and polycystic liver disease, and intrahepatic biliary cystadenoma. Symptomatic simple cyst can be managed with deroofting of cyst [2], but biliary cystadenoma due to its premalignant condition [3] need to be excised completely. One of the most common complication of hydatid cyst is cystobiliary communication [4]. Both radical and conservative surgeries have been described for hydatid disease with cystobiliary communication. As the management is different, it is of utmost importance to predict the preoperative diagnosis correctly [5].

Calcification of cyst, presence of multiseptation, enhancement of cyst wall, multilobulated appearance, multiple cystic lesions are among the few radiological features present in various cystic lesions of liver. Hydatid cyst with cystobiliary communication patient can present with cholangitis with altered Liver Function Test (LFT) [6]. Seo JK et al., in their study had taken into account these various criteria of cystic liver lesions as well as presenting symptoms to differentiate between atypical simple cyst and biliary cystadenoma. Unlike them, in this study, along with the above two, more commonly found hydatid cyst disease was also included [6].

While laparoscopic liver resection for biliary cystadenoma needs expertise [7], laparoscopic deroofting for simple liver cyst is a common approach [1]. Though there are literature evidences which suggest that hydatid cyst can be managed laparoscopically, chances of peritoneal spillage is more with laparoscopic approach [8]. So,

correct preoperative diagnosis is required to select an appropriate surgical approach with either laparoscopy or open procedure and tailoring management plan according to the pathology and their complications.

Hence, present study was planned to analyse the clinical, biochemical, radiological predictive factors of hydatid diseases, simple cyst of liver, biliary cystadenoma to reach a preoperative diagnosis and select an appropriate surgical management.

MATERIALS AND METHODS

This retrospective study was conducted at Institute of Surgical Gastroenterology, Madras Medical College, Chennai, Tamil Nadu, India. This study was planned in January 2021 and all cystic liver disease patients operated between January 2014 to December 2019 were analysed. As it is a retrospective study, Ethical Committee clearance was not taken.

Inclusion criteria: All the patients who presented with symptoms of cystic lesion of liver such as pain, jaundice or presence of cholangitis, who were operated within the study period, were included in this study.

Exclusion criteria: Asymptomatic patients with incidental findings of liver cyst who had not been operated, were not included in this study. A total of 65 patients were included, who presented within the study duration. Data were collected from the institute maintained database from January 2014 to December 2019 and followed-up upto December 2020 (mean follow-up period 47.06±24.37 months). Data were analysed in terms of age, sex, associated symptoms, altered LFT (such as increase total bilirubin and liver enzymes),

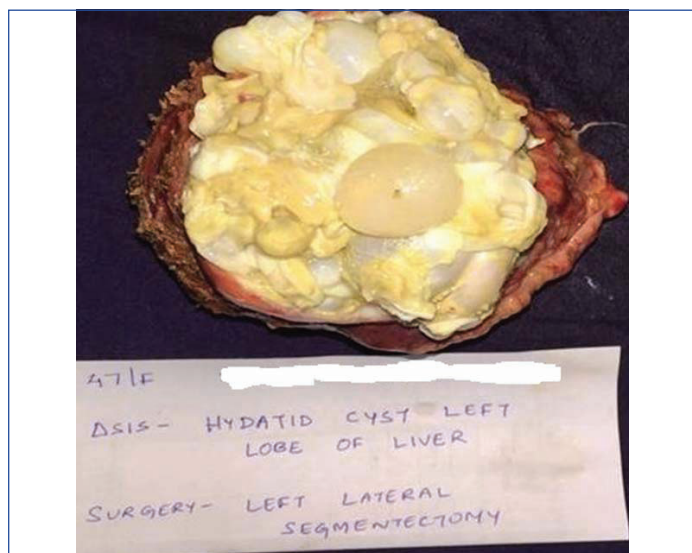
radiological findings (such as presence of calcification, septation, contrast enhancement of the septa, biliary radicals dilatation etc), operative findings (such as duration, blood loss, morbidity, mortality) and histopathology of excised cyst and postoperative follow-up till December 2020 for recurrence.

Study Procedure

In all patients final diagnosis was confirmed by pathological analysis. Cystic lesions in Ultrasonography (USG) were further characterised with contrast enhanced Computed Tomography (CT) scan and sometimes also with Magnetic Resonance Imaging (MRI). Patients with jaundice as presentation and sometimes atypical feature of cyst like non enhancing thickened cyst wall were better evaluated with MRI.

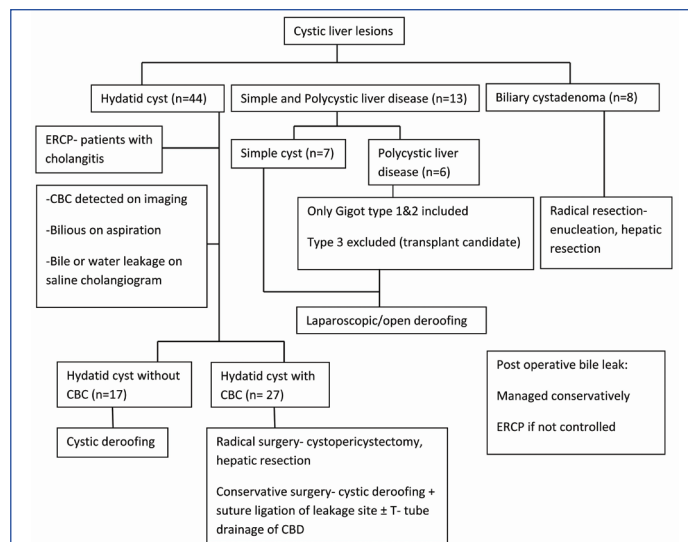
Patients with hydatid cyst were classified according to Gharbi classification [9]. (type I- pure cystic fluid collection, type II- fluid collection with membrane detachment, type III- multiseptated, type IV- heterogenous, type V- thick calcified wall) and given atleast one week of Albendazole (400 mg twice a day) therapy to reduce cyst viability [10]. Patients presented with features of severe cholangitis were managed with preoperative ERCP (Endoscopic Retrograde Cholangiopancreatography) sphincterotomy [11].

Intraoperatively, aspiration of cyst was done in 61 cases to reduce the intracystic pressure in controlled way. Four cases with strong preoperative clinical suspicion and imaging criteria suggestive of biliary cystadenoma were left out (in fear of tumour spillage from biliary cystadenocarcinoma). Both conservative surgery and radical surgery [5] were used in management of hydatid cyst. Radical surgery [Table/Fig-1] was used only in patients with cystobiliary communication [12]. Intraoperatively normal saline cholangiography was done through exploration of CBD (Common Bile Duct) or cannulation through cystic duct after cholecystectomy. Postoperative complications like bile leak were managed conservatively if bile leak was <50 mL for three days. Plan to ERCP or re-exploration was decided when conservative management failed [12]. Patient selection and management plan is given in [Table/Fig-2].



[Table/Fig-1]: Left lateral segmentectomy done for hydatid cyst.

According to Gigot's classification (type I- limited number large cyst, type II- multiple medium size cyst with remaining large non cystic liver, type III-diffuse involvement of whole liver)- only type 1 and type 2 polycystic liver disease patients were taken up for the study [13]. Simple cystic disease and polycystic disease patients become symptomatic with abdominal pain mainly due to intracystic haemorrhage, or hepatomegaly due to cyst enlargement. In both diseases, cysts were unilocular and have thin septa lined by cuboidal or columnar epithelium. In few cases simple liver cyst patients also had multiple small cysts.



[Table/Fig-2]: Patient selection and management flowchart [15].

CBC: Cystobiliary communication

Both patients of symptomatic simple cyst and polycystic liver disease were managed with laparoscopic cystic deroofing [14]. With all above mentioned similar features of cystic lesion and similar management technique, both simple cyst and polycystic liver disease was counted and analysed as a single entity of simple cyst. All biliary cystadenoma patients were managed with open hepatic resection or enucleation [15] [Table/Fig-2].

No serum or intracystic fluid CA 19-9 analysis has been done routinely as they provided no significant difference between biliary cystadenoma and simple cyst [6]. Total bilirubin >2 mg/dL and Alkaline Phosphatase (ALP) value >130 IU/L were considered as raised values. Cyst located near hilum (seg 4, 5) and left lobe of liver (seg 2,3,4) were also counted and analysed as a whole for statistical analysis [16].

STATISTICAL ANALYSIS

Continuous variable were expressed as mean±SD. The ANOVA tests, Pearson's Chi-square test were used wherever appropriate. The p-value <0.05 was considered to be significant. Logistic regression model was used to calculate the odds ratio. Statistical analysis was performed in EPI INFO™ version 7.2.3.0.

RESULTS

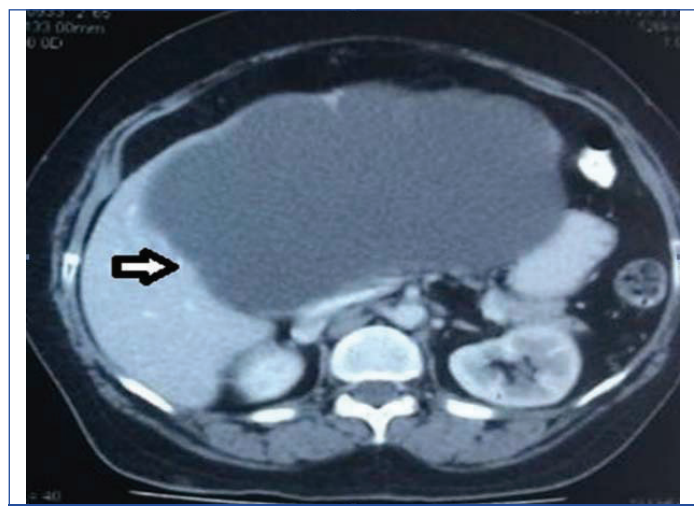
There were 44 patients of hydatid cyst, 13 patients of simple cyst (both simple cyst and polycystic disease patients were counted as a single entity), 8 patients of biliary cystadenoma were included in this study. Mean age of patients was 50.44±12.23 years. Total 26 (59.09%) patients of hydatid disease, 10 (76.92%) patients of simple cyst and all biliary cystadenoma 8 (100%) patients were female (p=0.193). Pain abdomen was present in almost all patients (n=64). Fever (n=19, 43.18%) and jaundice (n=9, 20.45%) was present in patients of hydatid disease only. Only 30.23% hydatid disease patients were having altered LFT with mean total bilirubin 1.67±2.77 mg/dL (p=0.317), and ALP 159.06±145.43 IU/L (p=0.08) [Table/Fig-3].

After USG, 95.38% (n=62) and 43.08% patients were further evaluated with contrast enhanced CT and MRI respectively. Mean cyst size was 10.78±4.65 cm for hydatid cyst, 15.22±5.21 cm for simple cyst, 12.12±5.81 cm for biliary cystadenoma (p=0.0212). Most of the hydatid cyst 27 (61.36%) and simple cyst 8 (61.54%) patients involved right lobe of liver while all of biliary cystadenoma 8 (100%) were present in left lobe of liver. There was single cystic lesion in all biliary cystadenoma patients (p=0.01). Some imaging characteristics appeared to be highly specific to a specific diagnosis and were not found in others, like daughter cyst (n=24, 54.55%), capsule breach (n=7, 15.91%) and intracystic floating membrane (n=19, 43.18%) in

Variables	Hydatid cyst n (%), n=44	Simple cyst n (%), n=13	Biliary cystadenoma n (%), n=8	p-value
Age (yrs) (mean±SD)	48.5±12.5	57.61±11.13	49.5±8.12	0.057
Sex (male/female)	18/26	3/10	0/8	0.193
Clinical features				
Pain	44 (100)	13 (100)	7 (87.5)	0.02
Fever	19 (43.18)	0	0	0.001
Jaundice	9 (20.45)	0	0	0.08
Abdominal distention	7 (15.91)	7 (53.85)	4 (50)	0.008
Early satiety	4 (9.09)	6 (46.15)	1 (12.5)	0.007
Hepatomegaly	25 (56.82)	9 (69.23)	3 (37.5)	0.361
LFT findings				
Total bilirubin (mg/dL)	1.67±2.77	0.6±0.21	1.05±0.64	0.317
ALP (IU/L)	159.06±145.43	88.76±40.12	79.25±38.8	0.08

[Table/Fig-3]: Clinical characteristics and demographic data.
Statistical test used- Chi-square test, ANOVA test

hydatid disease. Similarly multilobulated appearance [Table/Fig-4] of cyst was present only in biliary cystadenoma patients (n=5, 62.5%). Common features among the pathologies were multiseptation, presence of calcification; enhancement in contrast; IHBRD (Intrahepatic Biliary Radical Dilatation), internal debris and thick septa [Table/Fig-5].



[Table/Fig-4]: Multilobulated appearance of biliary cystadenoma in CT scan.

Variables	Hydatid cyst (n=44)	Simple cyst (n=13)	Biliary cystadenoma (n=8)	p-value
CT scan	42 (95.45)	12 (92.31)	8 (100)	0.71
MRI	19 (43.18)	5 (38.46)	4 (50)	0.87
Cyst size (cm)	10.78±4.65	15.22±5.21	12.12±5.81	0.0212
Right lobe	27 (61.36)	8 (61.54)	0	0.0049
Left lobe/near hilum	17 (38.64)	5 (38.46)	8 (100)	0.004
Multiple cyst	6 (13.64)	6 (46.15)	0	0.01
Daughter cyst	24 (54.55)	0	0	<0.01
Capsular breach	7 (15.91)	0	0	0.1538
Multiseptated	27 (61.36)	1 (7.69)	8 (100)	<0.01
Contrast enhancement	4 (9.09)	1 (7.69)	6 (75)	<0.01
IHBRD	7 (15.91)	1 (7.69)	1 (12.5)	0.74
Floating membrane	19 (43.18)	0	0	<0.01
Internal debris	23 (52.27)	4 (30.77)	3 (37.5)	0.342
Thick septa	5 (11.63)	0	6 (75)	<0.01
Calcification	18 (40.91)	0	5 (62.5)	<0.01
Multilobulated appearance	0	0	5 (62.5)	<0.01

[Table/Fig-5]: Radiological Imaging characteristics (N=65).
Statistical test used- Chi-square test

Common imaging features which were statistically significant in initial Chi-square test were analysed with univariate and multivariate logistic regression model. Some features were completely absent or present in all cases of a specific pathology, were not included in regression analysis. With this analysis it was found that increase in total bilirubin {Odds Ratio (OR)-26.02} and calcification (OR-3.61) in imaging studies were strongly associated with hydatid cyst, whereas most of simple cyst patients had symptoms of early satiety (OR- 8.05) and multiple cystic lesion (OR- 6.57) in imaging studies. Thick septa (OR-10.723) and contrast enhancement (OR-10.72) were found to be strong features of biliary cystadenoma [Table/Fig-6].

Variables	Univariate analysis		Multivariate analysis	
	Odds ratio	p-value	Odds ratio	
Hydatid cyst	Early satiety	0.2	0.02	0.19
	Total bilirubin	8.38	0.04	26.02
	Multiple cyst	0.39	0.15	-
	Presence in right lobe	2.57	0.08	-
	Cyst size	0.87	0.02	0.83
	Multiseptated	2.11	0.16	-
	Contrast enhancement	0.20	0.02	0.05
	Calcification	13.84	0.01	3.01
Simple cyst	Thick septa	0.32	0.09	-
	Multiple cystic lesions	6.57	0.076	-
	Early satiety	8.05	0.004	8.05
	Presence in right lobe	1.84	0.53	-
	Cyst size	1.82	0.12	-
	Contrast enhancement	0.35	0.33	-
Biliary cystadenoma	Thick septa	2.72	0.22	-
	Early satiety	0.67	0.72	-
	Total bilirubin	0.48	0.51	-
	Contrast enhancement	31.99	0.003	10.723
	Calcification	3.61	0.101	-
Thick septa	30.60	0.003	10.72	

[Table/Fig-6]: Logistic regression analysis of various features.

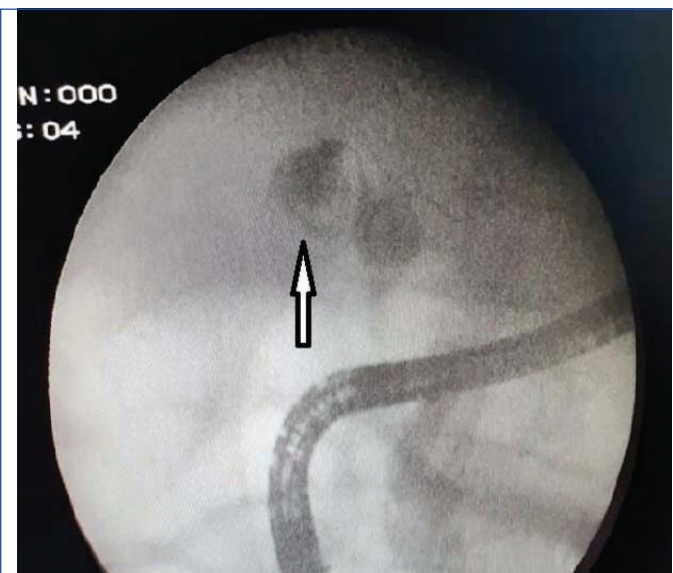
Intraoperatively, presence of bile staining of cyst content (n=17, 38.63%) or turbid, whitish colour fluid (n=22, 50%) was strongly suggestive of hydatid cyst (p<0.01). Conservative management (cyst deroofing and omentoplasty) was done in 35 patients of hydatid disease. All patients of simple cyst were managed with cystic deroofing. Cystopericystectomy was done for three patients of hydatid disease, while hepatic resection was carried out in six patients. Three patients of biliary cystadenoma were managed with enucleation of cyst [15] and hepatic resection was done for another five patients. Intraoperatively bile leakage was present from excise cyst wall margin in one patient of simple cyst, which was suture ligated. Postoperatively 11 (25%) patients of hydatid cyst and one patient of biliary cystadenoma developed bile leak. Four patients were managed conservatively, while ERCP was done for five patients (four patients of hydatid disease, one patients of biliary cystadenoma). Re-exploration was done for three patients of hydatid cyst- with fistulojejunostomy for one patient, CBD exploration and T tube drainage for one patient and external drainage for one patient. Blood loss (518.75±196.28 mL), duration of surgery (227.5±55.22 mins) and length of stay (9.75±1.75 days) was significantly more in biliary cystadenoma group (p<0.01). Two patients of hydatid disease with pre existing chronic liver disease and one hydatid disease patient with cholangitis died in postoperative period. One patient of biliary cystadenoma died due to postoperative pulmonary complications [Table/Fig-7].

Hydatid cyst with cystobiliary communication was diagnosed in 27 patients. Two patients presented with cholangitis and underwent

ERCP. In ERCP it was found to have communication with cystic cavity. [Table/Fig-8] Seventeen (62.96%) patients were detected to have cystobiliary communication intraoperatively with the findings of bile staining of content, or bile or saline leakage in normal saline cholangiogram. Among the 11 patients of hydatid cyst with postoperative bile leakage, eight patients were not having any preoperative or intraoperative findings of communication and only detected to have cystobiliary communication postoperatively. Most of the patients of hydatid cyst with cystobiliary communications were female (n=15, 55.55%) and presented with fever (59.26%) and altered liver function test results. On radiological imaging mean size was 12.30 ± 4.59 cm. Most of the cyst belonged to Gharbi type 3

Variables	Hydatid cyst n (%)	Simple cyst n (%)	Biliary cystadenoma n (%)	p-value
Cyst aspiration				
Bile staining	17 (38.63%)	0	0	<0.01
Haemorrhagic	0	5 (58.36%)	0	<0.01
Turbid/White colour	22 (50)	0	0	<0.01
Clear	5 (11.36)	8 (61.54)	3 (37.5)	
Conservative surgery	35 (79.55)	13 (100)	0	<0.01
Approach (Laparoscopy/Open)	3/32	8/5	0/8	<0.01
Radical surgery	9 (20.45)	0	8 (100)	<0.01
Cystopericy-stectomy/Enucleation	3 (6.82)	0	3 (37.5)	<0.01
Hepatic resection	6 (16.64)	0	5 (62.5)	<0.01
Cystobiliary communications	27 (61.36)	1 (7.69)	1 (12.5)	<0.01
Intraoperative bile leakage	17 (38.63)	1 (7.69)	0	<0.01
Postoperative bile leak	11 (25)	0	1 (12.5)	<0.01
Management of bile leak				
Conservative	4 (9.09)	0	0	0.48
Re-exploration	3 (6.82)	0	0	
ERCP	4 (9.09)	0	1 (12.5)	
Blood loss (mL)	197.611 \pm 240.24	36.53 \pm 54.71	518.75 \pm 196.28	<0.01
Operation duration (mins)	155.34 \pm 82.93	82.30 \pm 11.26	227.5 \pm 55.22	<0.01
Length of stay (days)	7.43 \pm 3.39	5.23 \pm 1.83	9.75 \pm 1.75	0.01
Follow-up (mean \pm SD)	46.09 \pm 25.62	47.53 \pm 21.17	51.62 \pm 24.48	0.84
Recurrence	3(6.82)	2(15.38)	0	0.40
Mortality	3(6.82)	0	1(12.5)	0.48

[Table/Fig-7]: Perioperative findings. Statistical test used chi-square test



[Table/Fig-8]: Cystobiliary communication detected by ERCP (arrow).

class and there were significant presence of dilated common bile duct (n=7), atrophy hypertrophy complex of liver (n=13) and capsular breach of cyst wall (n=7) [Table/Fig-9].

Variables	Cystobiliary communication n (%)	p-value
Age, (years), (mean \pm SD)	50.29 \pm 13	0.23
Sex (female/male)	15/12	0.774
Fever	16 (59.26)	0.016
Jaundice	8 (29.63)	0.12
Hepatomegaly	19 (70.37)	0.02
Total bilirubin	2.32 \pm 3.4	0.001
ALP	203.48 \pm 170.71	<0.01
Serology	11 (40.74)	0.029
Imaging features		
Cyst size (cm), (mean \pm SD)	12.30 \pm 4.59	0.005
Gharbi type of cyst		
Type 2	7 (25.93)	0.18
Type 3	15 (55.56)	
Type 4	5 (18.52)	
Single cyst/ multiple cyst	23 (60.53)/4 (66.67)	1
Dilated CBD	7 (25.93)	<0.01
Atrophy-hypertrophy	13 (50.60)	<0.01
Capsular breach	7 (25.93%)	1
Diagnosis of cystobiliary communications		
Preoperative ERCP	2 (7.40%)	
Intraoperative detection	17 (62.96%)	
Postoperative bile leak	8 (29.62)	

[Table/Fig-9]: Hydatid cyst with cystobiliary communication (N=27).

Statistical test used- chi-square test; p-value is calculated between total no of hydrated cyst (44) and hydrated cyst with cystobiliary communication (27)

Eighteen patients were managed by conservative surgery including suture ligation of cystobiliary communication and among those 18 patients, associated T-tube drainage of CBD were done in 15 patients. Postoperative bile leak was significantly less with radical surgery (p=0.04) but blood loss (550 \pm 277.26 mL) and operative duration (255.55 \pm 57.90 mins) were significantly more. Although hospital stays and mortality rate, recurrence rate were not significantly different [Table/Fig-10].

Variables	Radical surgery n (%) (n=9)	Conservative surgery n (%) (n=19)	p-value
Postoperative bile leak	1 (11.11)	10 (55.56)	0.04
Blood loss (mL)	550 \pm 277.26	117.77 \pm 90.65	<0.01
Operative time (min)	255.55 \pm 57.90	164.44 \pm 65.81	<0.01
Recurrence	0	2 (11.11)	0.79
Hospital stay(days)	9.33 \pm 4.24	8.22 \pm 3.43	0.47
Mortality	1 (12.50)	2 (13.33)	1

[Table/Fig-10]: Surgery in hydatid cyst with cystobiliary communication.

Statistical test used- chi-square test

DISCUSSION

Incidence of symptomatic simple cyst is uncommon before 40 years. Adults more than 50 years present with larger cysts and are more symptomatic than the younger ones. Also incidence of symptomatic or complicated simple cyst is more in females (9:1) [17]. Biliary cystadenoma were generally observed in women of above 40 years [3]. This neoplasm is slowly progressing, so it gradually increases in size and becomes symptomatic with abdominal distension and pain [18]. In this study also, 100% of biliary cystadenoma and 76.92% of simple cyst patients were females in their late 40s age with a mean size of more than 12 cm.

Abdominal pain was associated with all patients who presented with hydatid disease in a study done by Mansy W et al., which was

similar to present study [8]. Patients with simple cyst are usually asymptomatic in nature and may present with abdominal pain (80%) due to intracystic haemorrhage (Fong ZV et al.) [19], hepatomegaly and early satiety (Everson GT) [20]. In this study both hepatomegaly ($p=0.007$), abdominal distension ($p=0.008$) and early satiety (multivariate OR- 4.26) were significantly associated with simple cyst. Though presence of fever and jaundice could be seen with simple cyst or biliary cystadenoma [6], we have not found any. In our study, patients of hydatid disease who had presented with fever, increased total bilirubin and ALP values, hepatomegaly, serology positivity, cyst size >12 cm, and presence of atrophy- hypertrophy complex were significantly associated with cystobiliary communication, which was similar to the findings described by Saylam B et al., [21].

Hydatid cyst or simple cyst can present as single or multiple cysts in both lobes but biliary cystadenoma patients almost exclusively present as a single cyst in left lobe. Presence of daughter cysts or intracystic floating membrane was highly suggestive of hydatid cyst. Though most of the simple cyst can be clearly identified in USG, atypical simple cyst/ intracystic haemorrhage can present as multiseptated, thick wall, mural nodule, intra cystic debris due to clotted blood, and enhancement in contrast studies [22]. These features were found to be present in all three pathologies and with univariate logistic regression analysis multiseptation (OR-2.11) and calcification (OR-13.84), and in multivariate analysis, only presence of calcification (OR-3.01) was found to be strongly associated with hydatid cyst. Multilobulated appearance (62.5%) and multiseptation (100%) were very specific to biliary cystadenoma. In multivariate regression analysis, contrast enhancement, thick septa was found to be associated with biliary cystadenoma. We have not found any association of presence of IHBRD with biliary cystadenoma unlike Seo JK et al., [6].

Intraoperatively, before proceeding with excision, cyst fluid aspiration helps in diagnosis. Presence of turbid or whitish fluid is suggestive of hydatid disease. Billious and pus aspiration indicate cystobiliary communication [23]. Generally simple cyst contains clear fluid which can be brownish in colour due to intracystic haemorrhage [19]. The CT scan can detect major cystobiliary communication, but miss minor communications. The ERCP is ineffective to detect cystobiliary communication because of high intracystic pressure, [23] though the authors found in two cases.

Laparoscopic approach of cystic deroofing for simple cyst is standard and simple, though for posteriorly situated cyst (seg 6,7), open approach is better due to technical difficulties. The authors had also followed the same for one patient with posteriorly located cyst. As the biliary radicals are compressed at the periphery by the enlarged cyst, chances of bile leak is present after partial excision of cyst wall. Careful inspection of cyst wall and suture ligation should be done if any bile leak is found. Hepatic resection as well as enucleation[15] is adequate for biliary cystadenoma to remove the cyst completely. According to Jerraya H et al., [24] laparoscopic approach in hydatid cyst was associated with cyst rupture and increased recurrence. Contradictory to that, Palanivelu C et al., [25] showed successful laparoscopic management of hydatid cyst without any spillage or recurrence. Three cases of hydatid cyst in our study were also managed laparoscopically and there was no recurrence.

As described by Akbulut et al., the authors have also specified the criteria for liver resection in hydatid disease [5]. Hydatid cyst with cystobiliary communication, large cyst replaced 2-3 segments of liver, cyst present in left lateral segment, presence of atrophy hypertrophy complex, and patients without co-morbidities were taken for liver resection. Though radical surgery was associated with more intraoperative blood loss and operative duration than conservative surgery, it was associated with significantly less postoperative bile leak [5]. We did not find any significant differences in hospital stay and recurrence between these two.

Limitation(s)

There was less number of patients in simple cyst and biliary cystadenoma group. With more number of patients, radiological imaging features correlation between three groups would have been better. Also longer follow-up period would reveal more recurrence.

CONCLUSION(S)

Patients presenting with fever, high total bilirubin, presence of daughter cyst, intracystic floating membrane, and calcification in imaging studies were found to be highly specific for hydatid disease. Presence of multiseptation, multilobulated appearance, thick septa and enhancement in contrast studies can accurately distinguish biliary cystadenoma from atypical simple cyst of liver. Multiple cystic lesions are most commonly associated with simple cyst and polycystic liver disease. Large cyst >12 cm, altered LFT, presence of cholangitis, latex agglutination seropositivity, presence of dilated CBD and atrophy-hypertrophy complex in imaging features signify presence of cystobiliary communication in hydatid cyst. Radical surgery significantly reduced incidence of postoperative bile leak at the cost of increased operative morbidity.

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