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OUTCOMES OF CBD EXPLORATION WITH STONE EXTRACTION AND LIVER RESECTION IN MANAGEMENT OF HEPATOLITHIASIS –IN OUR CENTRE EXPERIENCE

Hepatobiliary Surgery

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ABSTRACT

Aim : To describe the outcomes of CBD Exploration with Stone Extraction and Liver Transplant in the management of hepatolithiasis and to assess the long term outcome in each surgical method .

Design : Retrospective study

Methods : Clinical records of 34 patients diagnosed as hepatolithiasis underwent CBD Exploration with Stone Extraction and Liver Transplant were reviewed .Clinical data, operative notes ,post operative events and follow up records from Jan2009 to Dec 2018 were retrieved and analysed . Outcomes : Recurrence of intrahepatic stone and cholangitis

Results : 34 patients were surgically managed for hepatolithiasis . 19 patients (55 %) underwent liver resection(Left lateral segmentectomy - 6,Left hepatectomy -8,Right hepatectomy -4,Mesohepatectomy -1.) . Among the patients who underwent liver resection, 9 patients (47 %) was previously managed by CBD exploration with stone extraction for hepatolithiasis . The remaining 15 patients were managed by CBD exploration , intraoperative cholangioscopy , stone extraction with either choledochoduodenostomy or hepaticojejunostomy + / - access loop . Of these 15 patients , 2 patients developed biliary cirrhosis and underwent liver transplant , 2 patients died due to recurrent cholangitis and the remaining 11 patients are under follow up and not develop any recurrent stones /cholangitis in the 5 year follow up period.

Conclusion : The long- term outcomes of Liver resection for Hepatolithiasis in selected patients had excellent outcome than intrahepatic stone removal primarily by surgical CBD Exploration /Intraoperative Choledochoscopy . Stone extraction group Subsequently develop recurrent intrahepatic stone and recurrent cholangitis and invariably need Liver resection or liver transplant .Liver resection also has the advantage of removing the diseased liver and reducing the risk of intrahepatic cholangiocarcinoma in the future .

KEYWORDS

Hepatolithiasis ,Hepatectomy ,CBD exploration,Intra operative choledochoscopy.

INTRODUCTION :

Hepatolithiasis is defined as the presence of gallstones in the bile ducts proximal to the confluence of right and left hepatic duct irrespective of the coexistence of the stones in the common bile duct and gall bladder stones . It is highly prevalent in parts of Asia, such as China, Japan, and South Korea, with a reported incidence between 3.1% and 21.2% (1). In India, exact etiology is unknown and under-reported as it is mostly found in rural areas because of malnutrition, low socio-economic status and other environmental factors. .. Malnutrition and low socioeconomic status are associated with high incidence of hepatolithiasis . Ultimaltely it can lead to recurrent cholangitis , segmental liver atrophy , biliary cirrhosis and cholangiocarcinoma . The main dictum in the surgical management of hepatolithiasis is complete removal of intra and extrahepatic stone , eradication of diseased tissues like atrophic liver and biliary strictures and establishing satisfactory bile drainage . Hepatectomy might be a rational option as it removes the stones , strictured bile ducts and atrophic liver tissues . Due to recent surgical advancement , hepatectomy has become the definitive and effective treatment in selected surgical patients (2) . In this study , we compared the surgical options for hepatolithiasis , Liver resection vs CBD exploration and intrahepatic stone retrieval .

MATERIALS AND METHODS :

Clinical records of patients who underwent CBD Exploration with Stone Extraction and Liver Transplant of hepatolithiasis from January 2009 to December 2018 in our institute were analysed . All Patients with symptomatic hepatolithiasis (Pain , recurrent cholangitis) , patients with bile duct stricture and atrophy of the liver parenchyma were included in the study .The following datas were analysed : patient demographics , clinical history, preoperative liver functions , surgical procedure , duration of surgery , postoperative morbidity and mortality . Bile cultures sent intraoperatively were tabulated .Morbidity was defined as proposed by dindo et al . complications recorded were Wound infection , bile leak , cholangitis , sepsis , recurrence of intrahepatic stones .

Statistical analysis :

Categorical variables are analysed by chi suare test or fishers exact test as appropriate . A p value less than 0.05 was considered significant for all tests . Multivariate analysis was performed by analyzing all the variables which were significant at univariate analysis ($p<0.05$) in multiple regression . Statistical analysis was done by SPSS version 13.0 .

Results :

Clinical data :

Thirty four patients , included 17 male and 17 female , with median age of 44 yrs (range 29-76 yrs)underwent surgery for hepatolithiais in our institute in the forementioned period . Demographic data , Liver

function tests and Pre- operative procedures are given in table 1. Serum bilirubin was increased in 55.8% of patients , while AST/ALT were increased in 35.2 % of patients : the majority of the patients had increased level of serum alkaline phosphate . 2 patient underwent ERCP , 6 patients underwent PTBD both carried 23.52 % .

Table.1

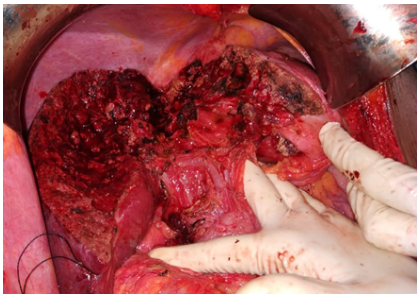
Demographic data	
Characteristics	No. of patients (%)
Median age (Yrs)	40-47
Sex (M/F)	17/17 (50/50%)
Increased sr. Bilirubin	19 (55.8%)
Increased sr. AST/ALT	12 (35.2%)
Increased Sr. ALP	28 (82.3%)
Previous Non-surgical management	
ERCP	2 (5.8%)
PTBD	6 (17.6%)
Total	8 (23.4%)

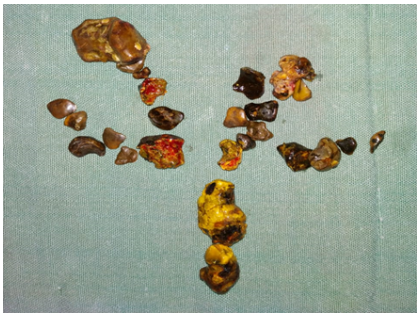
The most frequent symptom at referral was recurrent cholangitis (47 %).Preoperative diagnostic assessment included ultrasonography (performed in all patients) magnetic resonance with MRCP (3)and CT scan . Endoscopic drainage or percutaneous drainage was used, in these patients, to relief biliary sepsis in acute cholangitis.

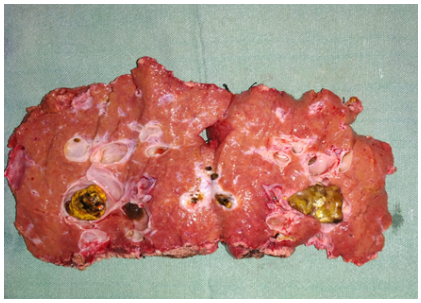
Table.2

Clinical features	
Symptoms	No.of patients (%)
Abdomen pain	34 (100%)
Jaundice	14 (41.1%)
Fever	16 (47%)
Recurrent cholangitis	16 (47%)

According to the classification of the Japanese Group for Study of Hepatolithiasis ,(4) there were 12 patients (35.30 %) with stones only in intrahepatic bile ducts (type I), and 22 patients (64.70 %) with stones in intrahepatic and extrahepatic bile ducts (type IE). The patients were further classified according to the location of stones within the liver: the disease was located unilateral in 26 patients (76.47%),bilateral in 8 patients (23.52%).







Surgical procedures :

The choice of surgical procedure was based primarily on the location of the stones ,presence of stricture and status of liver parenchyma (5).The procedure was planned after subside of acute cholangitis . Patient WBC count become normal ,blood c/s and bile c/s become no growth .Totally 34 patients were surgically managed with CBD Exploration with Stone Extraction and Liver Transplant for hepatolithiasis . 19 patients (55 %) underwent liver resection(Left lateral segmentectomy -6,Left hepatectomy -8,Right hepatectomy -4,Mesohepatectomy -1.) . Among the patients who underwent liver resection, 9 patients (47 %) was previously managed by CBD exploration with stone extraction for hepatolithiasis . The remaining 15 patients were managed by CBD exploration , intraoperative cholangioscopy , stone extraction with either choledocho duodenostomy or hepaticojejunostomy + / - access loop . Of these 15 patients , 2 patients developed biliary cirrhosis and underwent liver transplant , 2 patients died due to recurrent cholangitis and the remaining 11 patients are under follow up and disnt develop any recurrent stones / cholangitis in the 2 year follow up period . Samples of bile were taken for culture during surgery in all patients.IOUS and Cholangioscope were used in the procedure .Cholangioscopy was carried out only in patients requiring a removal of stones from the remnant liver and CBD .Liver resection was performed by Kelly crushing technique ,>3mm biliovascular pedicles ligated and divided and bipolar forceps were used for coagulation of the rough parenchymal surface.An intraoperative bile leak test was performed routinely and 16 Fr vaccum drain and 28 Fr tube drain was kept in sub hepatic space routinely .Surgical speicemen sent for histopathology lab routinely .

Table.3

Surgical procedures	
Surgical procedure	No. of patients (%)
CBD Exploration / Stone extraction / with CDD	7 (20.5)
CBD Exploration / Stone extraction with HJ	5 (14.7%)
CBD Exploration /Stone extraction with HJ with access loop	2 (5.88%)
HJ Revision /Ioc/Stone Extraction	1 (2.94%)
Total	15 (44.2%)
Hepatectomy	
Left lateral segmentectomy	6 (17.6%)
Left hepatectomy	8 (23.5 %)
Right hepatectomy	4 (11.7%)
Mesohepatectomy	1 (2.94%)
Total Hepatectomy	19 (55.8%)

Bile culture

A total of 5 microorganisms were isolated from bile frequently . The most commonly isolated bacteria were Klebsiella species , Escherichia coli species followed by Pseudomonas species,acinetobacter and proteus .. The majority of patients had mixed infection with more than one microorganism. (6)

Table.4

Isolated Micro-organism in Bile C/S	
Organism	No.of patients
E.Coli	6
Klebsiella	9
Acinetobacter	2
Pseudomonas	4
Proteus	2
Total	23/34

Table .5

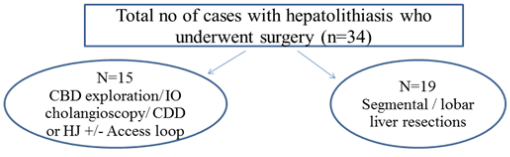
Risk factors for infectious complications (7)	
	No.of patients
Age	
<50 yrs	23 (67.64 %)
>50 yrs	11 (32.35%)
Previous ERCP/PTBD	
Yes	8 (23.52%)
No	26 (76.47%)
Preoperative cholangitis	
Yes	16 (47.05%)
No	18 (52.95%)
Clinical h/o duration > 2 yrs	
Yes	8 (23.52%)
No	26 (76.47%)
Preoperative Total Sr Bilirubin >1 mgs%	
Yes	19 (55.88%)
No	15 (44.11%)
Preoperative AST/ALT	
Yes	12 (35.29%)
No	24 (70.58%)
Preoperative ALP	
Yes	26 (76.47%)
No	8 (23.52%)
Location of stone	
Intra hepatic	12 (35.29%)
Intra hepatic and Extra hepatic	22 (64.70%)
Location of Intra hepatic stone	
Unilateral	24 (70.58%)
Bilateral	8 (23.52%)

Outcomes :

There was no mortality. Uneventful in 12 patients (35.2%), minor complication grade 1 -2 occur in 15 patients(44.1%) and major complication grade 3-4 occur in 7 patients(20.5%) . Most common complication was wound infection (8)in 22 patients (64.7%), bile leak(9) occur in 9 patients (26.4%) , septicaemia(10) occur in 5 patents(14.7%) and 2 pateients (5.88%) required percutaneous drainage for intraabominal abscess .

Table.6

Summary of post operative course and complication	
	No.of patients (%)outoff 34
Post operative course	
Uneventful	12 (35.2%)
Minor complication (grade 1 -2)	15 (44.1%)
Major complication (grade 3-4)	7 (20.5 %)
Type of complication	
Wound infection	22 (64.7%)
Bile leaks	9 (26.4%)
Septicaemia	5 (14.7%)
Intra abdominal abscess	2 (5.88%)



	CBD exploration N=15	Liver resection N=19	
		Primary procedure.N=10	Staged procedure, N=9
No complications	9	8	5
Recurrent stones/ stricture/ cholangitis	2	2	3
Biliary cirrhosis	2	0	0
Death	2	0	1

CONCLUSION:

The long- term outcomes of Liver resection for Hepatolithiasis in selected patients had excellent outcome than intrahepatic stone removal primarily by surgical CBD Exploration /Intraoperative Choledochoscopy(11) . Stone extraction group Subsequently develop recurrent intrahepatic stone and recurrent cholangitis and invariably need Liver resection or liver transplant .Liver resection also has the advantage of removing the diseased liver and reducing the risk of intrahepatic cholangiocarcinoma in the future .

DISCUSSION :

Hepatolithiasis is characterized by its natural course of recurrent cholangitis and stone formation , stricture formation and atrophy of liver parenchyma(12) . Recurrent stone formation and stasis secondary to fibrosis and stricture precipitate biliary sepsis, which presents as conditions such as acute cholangitis, liver abscess, or portal phlebitis. CBD exploration and stone extraction by choledochoscopy with maintain the biliary enteric continuity has become a well established procedure for the removal of stones . The patients in this group in our series who had a failure, are probably representative of the natural course of the disease in which cholangitis recurs within a short time. For patients whose intrahepatic stones were successfully removed, the occurrence of cholangitis was much delayed compared with those with failure of removal. In a selected group of patients in whom the disease was localized to 1 lobe or a few segments, resection removed, not only the stones but also the associated pathologic changes, including ductal stricture, fibrosis, and microabscess. This has been shown to have good results in compare with previous reports. In this selected group of patients treated with Liver Resection - the longterm outcome was excellent(13). A large proportion of them remained well even 5 years after their resection(14). The chance of recurrent cholangitis was significantly less than CBD exploration with stone extraction (15,16). It was generally agreed at our institution that Liver Resection should be offered to patients with associated atrophy of the involved segments, mostly those in whom the left lobe was involved, because of the reduced operative risk.

Resection of atrophic segments was not technically difficult, as most of the tissue had been destroyed. Stone removal could also be facilitated through the transected duct orifices. It seems a safe procedure, with the likelihood of postoperative liver failure being remote.. The recurrence of cholangitis after choledochoscopic removal consistently occurred earlier in those with stricture. This group of patients with stricture would definitely benefit from a more aggressive approach. In patients without stricture or atrophy can consider CBD exploration with stone removal .Patients with intrahepatic stones without stricture or in elderly patients whose life expectancy is short.The overall incidence of cholangiocarcinoma in association with hepatolithiasis has been reported to be 5% to16%(17-19).In our study this occurred in one of our patients. Resection offered an advantage in eliminating the risk of occurrence of cholangiocarcinoma. (20).

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