



MANAGEMENT OF CHOLEDOCHOLITHIASIS WITH SPECIAL REFERENCE TO USE OF CHOLEDOCHOSCOPY

Hepatobiliary Surgery

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ABSTRACT

AIM: To evaluate the role of operative flexible choledochoscopy after choledocholithotomy /transcystic choledochoscopy in reducing the incidence of retained stones in the common bile duct.

MATERIALS AND METHODS: The patients who had their common bile duct explored for proven common bile duct stones during three years period from 2013 to 2016 were reviewed prospectively at Departments of Surgical Gastroenterology & Pathology, Government Kilpauk Medical College Hospital, Chennai. During this period, forty four patients with confirmed common bile duct stone with or without gallstones were chosen. Initial decision to explore the common bile duct was made by ultrasound in 20 patients (45%), ERCP in 8 patients (18%), CT in 10 patients (23%), MRCP in 6 patients (14%)

RESULTS: In this prospective analysis of forty four patients, transcystic choledochoscopy was done in 4 patients (9.09%) and transcholedochotomy with choledochoscopy in 40 patients (90.91%). The failure rate of choledochoscopy accounted to just 2.27%.

CONCLUSION: The incidence of retained stone was comparatively lower in the study and it was comparable to international standards.

KEYWORDS

Choledocholithiasis, Choledochoscopy, CBD, MRCP, ERCP

INTRODUCTION

More than 95% of biliary tract disorders are related to gallstone¹. Choledocholithiasis means stones in the bile duct.

Despite good surgical techniques, about 8-16% of patients have retained stones in CBD after conventional choledocholithotomy^{2,3}. CBD stone is defined as retained, if discovered within two years of cholecystectomy and recurrent, if detected more than two years after cholecystectomy.⁴

Many studies since then have confirmed the value of flexible choledochoscopy as a reliable method of reducing the incidence of retained biliary tract stones. The reported incidence varied between 0% to 7%⁵. This study was undertaken with an aim to investigate how flexible choledochoscopy lowered the incidence of retained stones in the CBD after exploration.

AIM OF STUDY

- To evaluate the role of operative flexible choledochoscopy after choledocholithotomy / transcystic choledochoscopy in reducing the incidence of retained stones in the CBD.
- To study the role of T tube cholangiogram, ultrasound & MRCP in detecting any retained stones in the CBD.

MATERIALS AND METHODS

Forty four patients who had their common bile duct explored for proven CBD stones during three years period from 2013 to 2016 were reviewed prospectively in Departments of Surgical Gastroenterology and Pathology at Government Kilpauk Medical College Hospital, Chennai. Initial decision to explore the CBD was made by ultrasound in 20 patients (45%), ERCP in 8 patients (18%), CT in 10 patients (23%), MRCP in 6 patients (14%) as given in Figure 1.

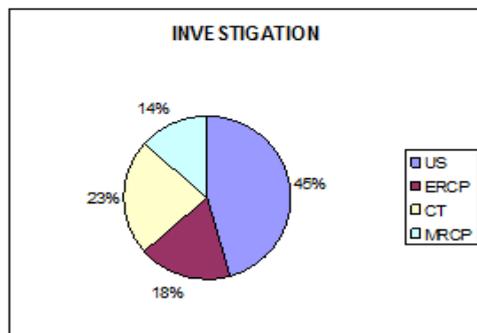


FIGURE 1

INCLUSION CRITERIA FOR CBD EXPLORATION

- Cholelithiasis with history of jaundice.
- Sonographic / ERCP / CT / MRI evidence of CBD stone.
- Patients with cholelithiasis with raised serum alkaline phosphatase and raised serum gamma glutamyl transferase.

EXCLUSION CRITERIA FOR CBD EXPLORATION

- Patients with CBD stones who refused operative treatment.
- Patients with CBD who were medically unfit for operation.

Out of 44 patients, excluding six patients (5 had previous cholecystectomy, one had cholecystectomy with choledochal cyst excision) all the remaining 38 patients underwent cholecystectomy. Conventional CBD exploration was done through the choledochotomy incision or through transcystic route (in dilated cystic duct) using Desjardin's forceps followed by CBD exploration using flexible video choledochoscopy (PENTAX FCN-15X) as diagnostic and therapeutic procedure.

The CBD stone picked up by the choledochoscopy was removed using dornia basket. Completion choledochoscopy was done to examine the CBD, common hepatic duct, right and left hepatic ducts. After confirming there were no residual stones, patients were subjected to either primary closure of CBD, choledochoduodenostomy or choledochojunostomy for those with dilated CBD (>15mm). Patients with undilated CBD (<15mm) underwent closure with 'T tube' drainage.

All patients were subjected to liver function tests, ultrasonogram on fourteenth postoperative day. Similarly, T tube cholangiogram was done on patients who had T tube in situ on the 8th- 10th postoperative day. All patients underwent MRCP after twelve weeks to rule out any residual stone. All resected gallbladder specimens were sent for histopathological analysis. All patients were regularly followed for a period of six months for clinical evidence of jaundice.

RESULTS

In this prospective analysis of 44 patients, transcystic choledochoscopy was done in 4 patients (9.09%) and transcholedochotomy with choledochoscopy in 40 patients (90.91%). Of these one patient showed retained stone in MRCP.

The failure rate of choledochoscopy accounted to 2.27%. The incidence of retained stone was comparatively lower in the study and it was comparable to international standard.

The commonest age group in the study was between 51-60 years. Age group ranges from 21 years to 65 years. The commonest gender

affected by choledocholithiasis was female (26 patients) accounting to 59.1% totally and males accounted for 18 patients (40.9%)

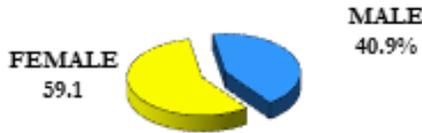


FIGURE 2

The commonest complaint given by the patients was pain (81.8%) and jaundice (81.8%). The other symptoms include vomiting (50%), fever (40.9%) past history of jaundice, clay coloured stools, pruritus (36.36%) dyspepsia (18.18%), loss of appetite (13.63%), loss of weight (9.09%), flatulence (4.5%)

TABLE 1. Complaints

S.No	Complaints	Number of patients	%
1.	Pain	36	81.8%
2.	Jaundice	36	81.8%
3.	Vomiting	22	50%
4.	Fever	18	40.90%
5.	Pruritus	16	36.36%
6.	Clay coloured stools	16	36.36%
7.	Past H/o jaundice	16	36.36%
8.	Dyspepsia	8	18.18%
9.	Loss of appetite	6	13.63%
10.	Loss of weight	4	9.09%
11.	Flatulence	2	4.5%

There was a past history of surgery in 14 patients (31.8%). There was previous history of endoscopic procedure in 8 patients (18.18%), the details of which are given in Table 2.

TABLE 2-previous Procedure

S.No	Endoscopic Procedure	Number of patients
1.	ERCP & Sphincterotomy	2
2.	ERCP & Stenting	4
3.	ERCP, Sphincterotomy with Stenting	2

CLINICAL FEATURES

The commonest clinical features was jaundice (68.18%) followed by fever (40.9%), pruritus (27.27%), palpable liver (27.27%), splenomegaly (4.54%), signs of liver failure (2.27%) and murphy's sign (2.27%), as depicted in Figure 3

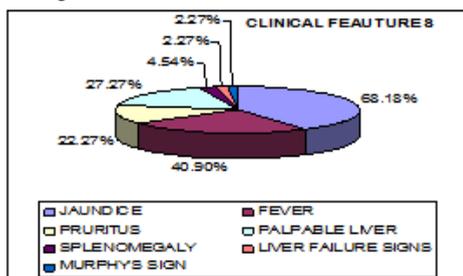


FIGURE 3

Preoperative investigations were done for all the patients. The numbers of patients showing abnormal values are depicted in Table 3

TABLE 3- Investigations

S.No	Investigation	Patients with abnormal values	% of abnormality
1.	Serum Bilurubin	30	68.18%
2.	SGOT	10	22.72%
3.	SGPT	10	22.72%
4.	SAP	22	50%

Of the 44 patients, 38 of them (86.36%) underwent cholecystectomy followed by CBD exploration. The remaining 6 patients had already undergone cholecystectomy. Choledochoscopy was done through choledochotomy route in 40 patients (90.91%) and through transcystic route in 4 patients (9.09%).

On comparison of the surgical procedures, majority underwent choledochoduodenostomy 31 patients (70.45%), T tube drainage in 6 patients (13.63) and primary closure of CBD in 6 patients (13.63%) and choledochojejunostomy was done in a patient (2.27%) who had excision for type 2 choledochal cyst with retained stone in the left hepatic duct.



FIGURE 4 -CBD Exploration



FIGURE 5- Choledochojejunostomy

When the operative findings were compared, it was found that out of 38 patients who underwent cholecystectomy, 12 patients had cholelithiasis. Out of twelve patients there was single stone in gall bladder in 2 patients (4.54%) and multiple stones in the gall bladder in 10 patients (22.72%).

The CBD stone was single in 34 patients (77.27) and multiple in 10 patients (22.72%). 12 patients (27.27%) showed both CBD and gall bladder stones. When the diameter of the CBD was analysed, it was found that the diameter ranged from 6-25mm (average 17mm). There were 2 patients (4.55%) who had associated distal CBD stricture. Biopsy of the stricture was done, which confirmed only fibrous tissue. The operative findings are shown below in Figure 6

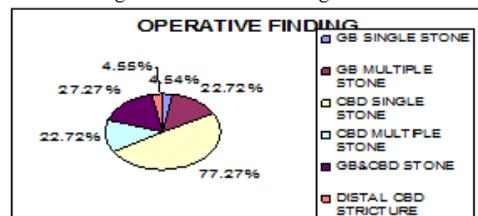


FIGURE 6

COMPLICATION

The commonest complication was wound infection in 14 patients (31.81%). The other complications were bile leak in 2 patients (4.55%), retained stone in one patient (2.27%), who had choledochal cyst excision for type 2 choledochal cyst. Figure 7 depicts the complication in detail.

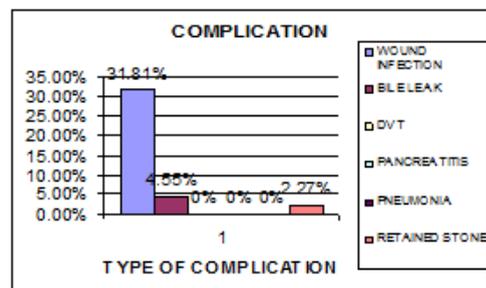


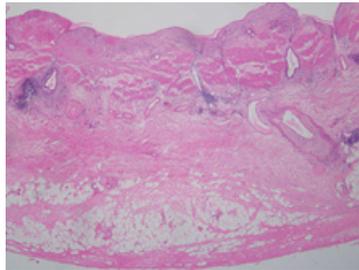
FIGURE 7

Post operative follow up was done for a period of six months by 'T' tube cholangiogram which was done in 6 patients (13.63%) on the 8th-10th post operative day. After confirming that no residual stone in the CBD and free flow of dye into the duodenum, the T tube was removed on the 12th-14th post operative day and subsequently discharged. MRCP was done in all patients on the completion of 12 weeks post operatively. One patient had retained stone in the left hepatic duct (2.27%). The particular patient already underwent choledoch jejunostomy and subsequent follow up showed no retained stone.

TABLE 4 - Histopathological diagnosis

S.No	No of specimens	HPE Report
1	33	Chronic cholecystitis
2	2	Xanthogranulomatous cholecystitis
3	2	Adenomyoma
4	1	Cholesterosis of GB

FIGURE 8-chronic Cholecystitis



DISCUSSION:

The flexible choledochoscope was first described by Shore and Lippman in 1965.⁵ In recent era, laparoscopic cholecystectomy eliminated the approach route to CBD by which choledochoscopy, can be performed in suspected CBD stone during or after removal of gall bladder. Laparoscopic choledochoscopy has been performed using small diameter fiberoptic instrument⁷. Flexible fiberoptic choledochoscope can reach stones in the bile duct via several different approaches. These can be either surgical or non surgical (minimally invasive)⁸. The commonest approach followed is operative choledochoscopy. It is usually performed as a method of exploration of bile duct in patients with dilated duct due to choledocholithiasis to remove stones or to confirm the absence of residual stones.

FIGURE 9-Choledochoscope



Comparison of conventional exploration of CBD without Choledochoscopy and Flexible Choledochoscopy

In most series reviewed, stones that are found within the biliary tree after conventional exploration are regarded as retained stones. The percentage incidence of retained stones is therefore been related to number of stone – positive explorations at which the choledochoscope was used. Few series are now reported on the results of exploration of the CBD where instrumentation alone is carried out and not followed by choledochoscopy (Table 5)⁹. The mean incidence of retained stones is 10.6% (median 10.0 percent).

TABLE 5- Conventional exploration of CBD

S.N	Reference	Year	Stone positive explorations	No retained stones	% of retained stones
1.	Jones & Davies	196	NA	NA	5
2.	Way et al	197	NA	NA	10
3.	Le Quang et al	197	78	1	1.3
4.	Shah & Bhanagat	198	23	3	13
5.	Gartell & Mc Ginn	198	32	6	18.7
6.	Rogers et al	198	58	7	12.7
7.	Jakimowicz et al	198	40	3	7.5
8.	Naphtoliz et al	198	50	5	8.5
9.	Sherris et al	198	191	37	19.4
Total					10.6

On analysis of the research data, the mean retained stone rate of only 2.0 percent is observed in Flexible choledochoscopy (Table 6)⁹, which is much lower than that achieved with either rigid choledochoscopy or conventional exploration

TABLE 6-Results of Flexible Choledochoscope:

S.No	Reference	Year	Stone positive exploration	No. retained stone	% of retained stone
1.	Shore and shore	1970	100	4	4.0
2.	Long land	1975	49	2	4.1
3.	Stotter et al	1975	20	0	0
4.	Finnis&Rowntree	1977	70	0	0
5.	Legrand et al	1978	200	4	2.0
6.	Yap et al	1980	84	4	4.8
7.	Bauer et al	1981	36	1	2.8
8.	Grange&Millard	1981	47	0	0
9.	Wang	1982	47	1	2.1
10.	Chen et al	1983	184	2	1.1
11.	Gartell& McGinn	1984	31	1	3.2
12.	Leggerl et al	1984	128	2	1.6
13.	Ashby	1984	65	1	1.5
14.	May & Corfield	1985	33	3	9.0
15.	Eleftheriadis et al	1985	88	0	0
16.	Ashby	1985	70	1	1.4
17.	Jakimowicz et al	1985	26	0	0
18.	Jakimowicz et al	1986	238	5	2.1
19.	Choi et al	1987	65	3	4.6
20.	Markowitz et al	1987	102	0	0
21.	Molina et al	1988	36	1	2.8
Total			1719	35	2.0

During open cholecystectomy the CBD was explored in 15% of all cholecystectomies and stones were removed in approximately 65% of these explorations. The incidence of concomitant choledocholithiasis varied between 8-20%¹⁰.

CONCLUSION:

Flexible choledochoscopy reduces the incidence of retained CBD stones in patients with choledocholithiasis. Hence we recommend that operative choledochoscopy should always be done after exploration of the CBD stones to reduce the incidence of retained stone. With surgical exploration of CBD alone, the incidence of patients with retained stones is 8 -16% whereas with the use of choledochoscopy, the incidence is reduced to 2.27%.

Females were commonly affected by choledocholithiasis. The commonest age group was between 51-60yrs. Commonest complaint was pain or jaundice.

Though the gold standard in the management of choledocholithiasis is precholecystectomy or postcholecystectomy ERCP and sphincterotomy and retrieval of stones, conventional use of choledochoscopy gives equivalent results as that of ERCP in the diagnosis and management of CBD stones. Hence in centers where ERCP facilities are lacking, flexible choledochoscopy plays a major role in reducing the retained stones in CBD. Since patients with choledocholithiasis may be completely asymptomatic, choledochoscopy should be done as a routine in suspected patients. As post operative MRCP plays a major role in detecting stones even smaller than 4mm, it should be used as a preoperative and postoperative evaluation of choledocholithiasis.

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