

A COMPARATIVE STUDY OF THE IMAGING AND TREATMENT MODALITIES IN THE MANAGEMENT OF CHOLEDOCHOLITHIASIS

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ABSTRACT

AIM

The objectives of this study are to compare the investigative modalities used in the diagnosis and to compare the treatment undertaken in the management of patients with choledocholithiasis.

MATERIAL AND METHODS

Data was collected in prefixed proforma in our hospital between April 2012 to Oct 2014 after considering inclusion and exclusion criteria.

- Data regarding imaging studies for diagnosis of choledocholithiasis was collected.
- After diagnosis, patients were subjected to different treatment modalities.
- The outcomes, complications and morbidity of the procedures were compared analysed.

RESULTS

- Mean age was more than 50 years. Pain abdomen was the most common preventing complaint.
- Ultrasound was the commonest imaging modality done with sensitivity of more than 60% in finding the CBD stone
- CT and MRCP in diagnosis of choledocholithiasis were concerned and dilatation of the common bile duct was detected equally by both methods.
- ERCP and surgical methods in form of laparoscopic or open surgery were different treatment modalities used; ERCP was the common treatment modality done. Open surgery and laparoscopic cholecystectomy were next commonest treatment modalities done respectively.

CONCLUSIONS

- Occurrence of choledocholithiasis increases with age.
- USG is both cheap and effective with sensitivity more than 60% but MRCP is more preferable as a biliary imaging modality.
- Choledochoduodenostomy is an optional method of management following CBD exploration while T-tube drainage and primary closure of the CBD following exploration have comparable results.

KEYWORDS

Choledocholithiasis, Endoscopic Retrograde Cholangiopancreatography (ERCP), Magnetic Resonance Cholangiopancreatography (MRCP), Choledochoduodenostomy, T-Tube drainage.

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INTRODUCTION: Common bile duct stones are one of the medical conditions leading to surgical intervention. They may occur in 3%-14.7% of all patients for whom cholecystectomies are performed.^{1,2} When patient present with common bile duct stones, the one important question that should be answered: what is the best modality of treatment under the given conditions? There are competing technologies and approaches for diagnosing common bile duct stones with regard to diagnostic performance

characteristics, technical success, safety and cost effectiveness.

Management of common bile duct (CBD) stones usually requires two separate teams: the gastroenterologist and the surgical team.³

The common methods of diagnostic imaging include trans-abdominal ultrasonography (USG), computerized tomography scan (CT) and magnetic resonance cholangiopancreatography (MRCP). The main options for treatment of CBD stones are pre-operative ERCP with endoscopic biliary sphincterotomy (EST), laparoscopic or open surgical bile duct clearance.

Variables such as patient demographic availability of endoscopic, radiological and surgical expertise, and healthcare economics will all have significant influence on practice.⁴

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AIM: The objectives of This Study Are:

- To compare the investigative modalities used in the diagnosis of choledocholithiasis and to arrive at an optimal method of investigation.
- To compare the treatment methods undertaken and to identify the ideal method of management of patient with choledocholithiasis depending upon case-specific parameters.

RESULTS: The study was conducted over a period of two years from April 2012 to Oct 2014. The total study population was 99 patients, including 44 women.

Age Distribution: The mean age of the study population was 56.09 years. 65 patients were aged 50 yrs. and above.

Gender Distribution: The study population of 99 patients included 55 males and 44 females.

Presentation: Pain abdomen was the most common presenting complaint, seen in 69 patients (69.67%), followed by 27 patients with cholangitis (27.27%). 32 patients presented with jaundice (32.32%) and 10 patients with vomiting (10.1%).

Investigations: Lab: It was found that 49% of patients had elevated bilirubin with direct hyperbilirubinemia. 46% of patients had an elevated alkaline phosphatase level.

Imaging: Ultrasound was performed in 76 patients (76.7%), CT in 18 patients (18.2%) and MRCP in 50 patients (50.5%)

USG: Among the patients who underwent USG (n=76), 43 were found to have stones in the CBD (56.6%), 27 patients were found to have a dilated common bile duct by USG (35.5%), the minimum CBD diameter detected was 9 mm.

CT Scan: Of the 18 patients who underwent CT scan, 10 (55.5%) were found to have choledocholithiasis, while dilated common bile duct was detected in 9 patients (50%). Only 5 patients had both CT scan and MRCP done. Of these, choledocholithiasis was detected by CT in 3 cases, which concerned with MRCP findings. Dilatation of the common bile duct was detected equally by both methods.

MRCP: 50 patients underwent imaging by MRCP, of which 31 patients (62%) were found to have dilated common bile duct. In 14 of these patients, the dilatation had not been detected by USG. 45 patients (90%) were found to have choledocholithiasis, of these 27 cases were missed by USG. 8 patients were excluded from the study after the stage of imaging. Out of the rest, 3 patients were found to have high cardiac risk and were not amenable to any form of intervention of sedation. The rest were lost to follow up.

Treatment: The treatment modalities undertaken were hence studied over a population of 91 patients. The methods of management studied were endoscopic, in the form of ERCP and surgical, in the form of laparoscopic or open surgery.

ERCP was performed in 65 patients, in which 35 were male patients. Of the ERCP patients, 18 patients (27.69%) underwent laparoscopic cholecystectomy following the ERCP 29(44.6%) underwent only ERCP as treatment, while 8 patients (12.3%) underwent open surgical treatment following of ERCP (15.38%). 12 patients (18.46%) developed post ERCP pancreatitis and 1 patient had post ERCP cholangitis.

Open surgery was performed in 35 of the 91 patients (38.46%). Among these, 32 underwent a CBD exploration (91%). Following exploration, 12 patients (34.3%) underwent drainage in the form of a Choledochoduodenostomy. The procedure was used in management of cases where the CBD was dilated to 15 mm and above. 2 patients with distal CBD stricture underwent Choledochoduodenostomy.

10 patients (28.6%) underwent T-tube drainage and 9 patients (25.7%) underwent a primary closure of the CBD. Only 1 patient underwent choledochojejunostomy following the CBD exploration. 3 were only subjected to open cholecystectomy.

Among the patients who underwent surgical treatment, 8 (22%) had complications 5 patients (14%) had wound infection, 1 patient had persistent discharge from her drain, and two patients had post-op sub-hepatic collection, all of which were managed conservatively.

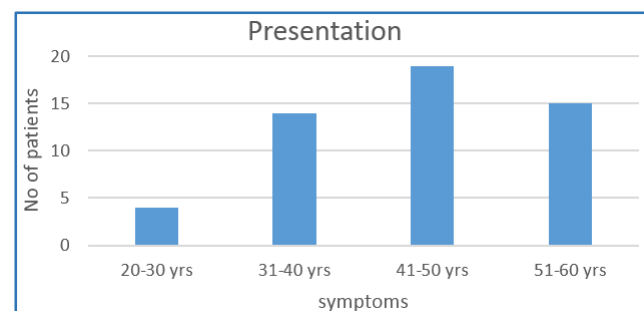


Fig. 1

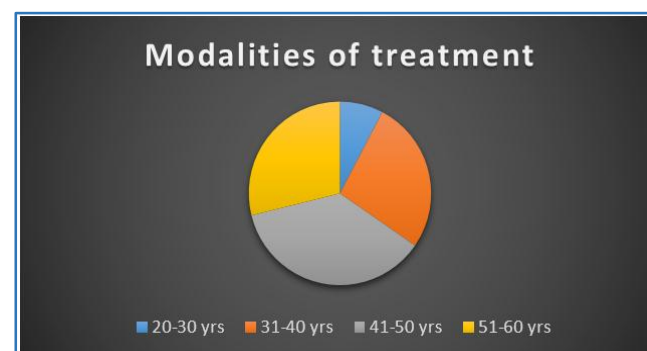
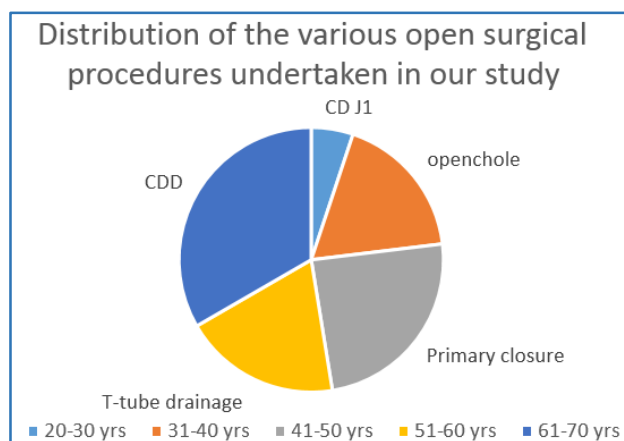
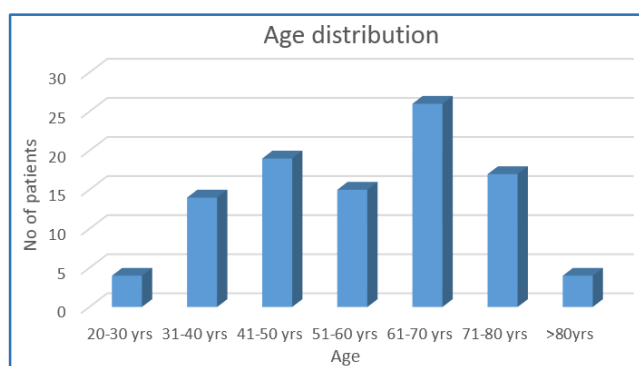
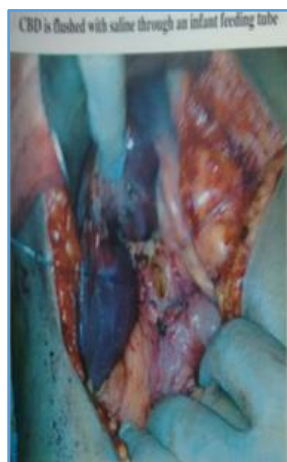


Fig. 2

**Fig. 3****Fig. 4****Fig. 5: Cholecystectomy is made after gaining control of the CBD****Fig. 6: Cholecystectomy and Duodenoscopy have been made**

DISCUSSION: This study was aimed at studying various aspects of choledocholithiasis at our hospital over a 30-month period. In addition to studying the clinical profile of the condition and the methods of presentation. We have compared the various investigative modalities undertaken at the centre and analysed the methods of management of common bile duct stones.

Demographic Profile: To begin with, our study population had 99 patients, of whom 55 were male. Farrokh et al⁵ found no statistical difference in incidence of choledocholithiasis in males and females.

The body mass index (BMI) of patients was another factor that was studied. The mean BMI in this study was found to be 26.08. There was a positive correlation between BMI and the presence of CBD stones.^{6,7} The mechanism for the close association between BMI and gall stones disease are that cholesterol-supersaturated bile can be observed in obese people.

Presentation and Investigations: Clinically, pain abdomen was the most common presentation but was found to have no diagnostic significance in a study by Rubin and Beal.⁸ Jaundice was seen in 32% and altered liver enzymes in 46% of patients, which is comparable with other studies.⁹ Biochemical analysis revealed that 49% had elevated bilirubin with direct hyperbilirubinemia and alkaline phosphatase was raised in 46% of patients, which is comparable with other studies.⁹

Biochemical analysis revealed that 49% had elevated bilirubin with direct hyperbilirubinemia and alkaline phosphatase was raised in 46%. For the serum bilirubin, serum alkaline phosphatase levels and the width of the CBD, there was a definite association between the degree of abnormality and the probability of choledocholithiasis.¹⁰

Imaging: Sensitivity of the USG in the detection of CBD stones in our study was found to be 61%. It was 75% in a study conducted by Mohammed K Alan et al.¹¹ CBD diameter of greater than 6 mm an USG is associated with a higher prevalence of choledocholithiasis.

Sensitivity of CT scan was found to be 88.9% in detecting CBD stones and dilatation compared to a sensitivity of 82% in a study by Pedrosa et al.¹²

In our study, the sensitivity of MRCP was found to be 83.3%. The accuracy of MRCP in diagnosing CBD stones is comparable with that of ERCP and IOC.¹³

Treatment: 29 of the patients, who underwent ERCP, did not undergo any further treatment in the form of cholecystectomy. Findings of Keulemans et al who found that the gall bladder is being left in situ more frequently in current practice.¹⁴

Open surgery was performed in 35 patients with 32 patients undergoing a common bile duct exploration. 12 patients underwent choledochoduodenostomy. Diameter of the CBD used for constructing the choledochoduodenostomy measure at least 14 mm for good long term results.

Of the open surgeries, following CBD exploration 10 patients underwent closure of the duct over a T tube while 9 patients underwent primary closure of CBD. Primary closure significantly reduces hospital stay and is a safe as closure. With T-tube, in both the short and long term.¹⁵

CONCLUSIONS: The above study was an analysis of the varies aspects of presentation diagnosis and management of choledocholithiasis as seen at our institution. Based on the results obtained, we have derived the following conclusions:

- The occurrence of choledocholithiasis is found to increase with increase in age, female gender is at a greater risk, increased BMI has a positive correlation with abdominal pain and jaundice as common mode of presentation.
- Altered liver enzymes had a positive effect on the detection rates of choledocholithiasis.
- As a primary imaging modality, USG is both cheap and effective with a sensitivity of more than 60% in detecting CBD stones. Both CT scan and MRCP provides better outline of the biliary anatomy and is more preferable as a biliary imaging modality.
- In a undialated system, ERCP with sphincterotomy provides acceptable rates of biliary drainage. When the duct is dilated to 14 mm and above, choledochoduodenostomy is an optimal method of management following CBD exploration. Choledochoduodenostomy is also useful as a drainage procedure in the management of distal CBD structure. Both T-tube drainage and primary closure of the CBD following exploration have comparable results.

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