International Surgery Journal
Rao GB et al. Int Surg J. 2017 Nov;4(11):3633-3637
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20174636

Original Research Article

Pre-operative MRCP: is it necessary before routine laparoscopic cholecystectomy to exclude CBD stone-prospective study in tertiary care hospital

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Received: 07 September 2017
Accepted: 22 September 2017

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ABSTRACT

Background: Cholelithiasis is a common disease and at present the laparoscopic cholecystectomy is the gold standard treatment. The diagnosis of associated common bile duct stone for patients with gallstones is important for prompt surgical decision, treatment efficacy and patient safety. However, whether upper abdominal ultrasound and Liver function test (LFT) is adequate before doing lap cholecystectomy remains controversial. There are different opinions regarding the routine magnetic resonance cholangiopancreatography (MRCP) to detect the possible presence of common bile duct (CBD) stones before laparoscopic cholecystectomy.
Methods: This study was carried on a total of 106 patients who were admitted and treated for gall stone diseases in the Department of General Surgery, GSL General Hospital over a period of 24 months. After admission all cases were subjected for liver function test, USG abdomen and MRCP. The collected observational data was analyzed.
Results: Among the 106 patients, a total of 17cases showed concurrent gallstones and choledocholithiasis, 11 cases choledocholithiasis were revealed by ultrasound examination, while 6 cases of choledocholithiasis were not detected by ultrasound examination but were confirmed by MRCP.
Conclusions: CBD stone may be missed even in the presence of deranged liver enzymes or dilated CBD in USG abdomen. Hence for patient safety routine preoperative MRCP examination is recommended before doing laparoscopic cholecystectomy to rule out the likelihood of concomitant CBD stones. The cost-effectiveness of such expensive investigation is to be studied further taking into consideration preventive costs and patient morbidity and mortality.

Keywords: CBD stone, Cholelithiasis, LFT, Magnetic resonance cholangiopancreatography, USG abdomen

INTRODUCTION

In the 20th century laparoscopic cholecystectomy has become one of the common procedure amongst surgical procedure for gall stone diseases. For patients with gallstones, approximately 5-15% of cases may have associated with choledocholithiasis.[1] With the development of medical technology, laparoscopic cholecystectomy (LC) has been more and more used for the treatment of gallstones. However, during treatment, common bile duct stones are often easily overlooked. Thus, exploring an easy approach to preoperatively clarify the presence of associated CBD stones has important clinical implications.

Currently, patients with upper abdomen pain/dyspepsia suspected of gallstone diseases undergo ultrasonography examination and hepatobiliary biochemical serum analyses (serum bilirubin, alkaline phosphates, etc.) as part of routine preoperative screening. Ongoing (even if minor) elevations of LFT parameters should prompt the need to exclude CBD stones even in the presence of a normal CBD diameter on ultrasonography.[2,3]

However, according to the literature, the accuracy and sensitivity of elevated liver enzymes in the diagnosis of Cholelithiasis with associated CBD stone are not high.[3] Elevated level of liver enzymes did not have major role in CBD diagnosis and even with normal ultrasonography findings.[4]

A large number of studies have indicated that the accuracy of ultrasound diagnosis of choledocholithiasis is not high. When liver enzymes are elevated in the biochemical tests choledocholithiasis cannot be ruled out even if the ultrasound result is normal. In particular, the accuracy of ultrasound is generally ranges from 55-65%. As a result, the diagnosis of choledocholithiasis by ultrasound and other conventional methods is not particularly reliable.[4,5] Endoscopic retrograde cholangiopancreatography (ERCP) has the highest accuracy in diagnosis of CBD stone. But this approach is invasive, needs expertise, and also expensive. Hence ERCP is generally preferred more for therapeutic approach rather than diagnostic tool.[6]

Computer tomography (CT) has been proven to misanalyse some calculi and hence this approach is generally not used for the diagnosis of gallstone/ CBD calculi.[6,7] The accuracy of endoscopic ultrasound (EUS) in detecting choledocholithiasis is similar to ERCP, but it needs a skillful endoscopist.

However, magnetic resonance cholangiopancreatography (MRCP) showed a high accuracy in the diagnosis of choledocholithiasis. Both EUS and MRCP provide good diagnostic accuracy with EUS providing statistically better diagnostic accuracy and sensitivity with comparable specificity. EUS should be incorporated in the diagnostic algorithm in patients suspected of choledocholithiasis whenever appropriate.[8] Amongst all approaches tested, MRCP has been considered an accurate and convenient method for the diagnosis of choledocholithiasis.[9] However, routine use of MRCP for all gallstone disease patients to exclude CBD stone is still controversial as cost effectiveness is an issue. This study aimed to investigate the reliability of preoperative ultrasonography and the necessity of routine MRCP before performing lap cholecystectomy.

METHODS

This study was performed in the Department of surgery-Laparoscopic Division, GSL medical College and General Hospital, Rajahmundry.

A total of 106 patients were included in the study group. All patients diagnosed with gall stone diseases after initial evaluation for pain upper abdomen, fatty food dyspepsia, retrosternal discomfort was included in study group. They were admitted to the Department of General Surgery of the GSL medical college and general hospital from the period of June 1, 2014 through December 31, 2016.

The study protocol was approved by the ethical committee. Written informed consent was obtained from all participants prior to entry into the study. After admission into the hospital the patients were explained regarding the disease.

All patients investigated with USG abdomen, Liver function test and Magnetic resonance cholangio pancreaticography.

MRCP investigation charge was not collected from the patient under the study protocol.

Exclusion criteria

- Acalculous cholecystitis
- Chronic liver disease
- Cholelithiasis
- Hemolytic disorders
- Periampullary cancer with cholelithisis
- Previous history of biliary tract surgery
- Those not willing to undergo MRCP or with contraindications for MRCP.

All patients are subjected for MRCP after initial evaluation and USG imaging.

Patient diagnosed with CBD stone after investigation were subjected to lap cholecystectomy with CBD exploration or ERCP stone extraction and then lap cholecystectomy.

RESULTS

A total of 106 patients with gallstone diseases admitted to the Department of General Surgery who underwent both ultrasound and MRCP examinations were analyzed. A total of 17 patients showed concurrent gallstones and choledocholithiasis, accounting for 16.03 % of all cases.

All the patient after admission and clinical evaluation were subjected to biochemical and USG abdomen. On correlation of USG abdomen, clinical and deranged LFT a total of 17 cases were suspected as CBD pathology.

Some patients were having more than one parameter positive. In this study out of 6 cases with jaundice 4 cases were found to have CBD stone.

Ten patients had altered liver function test of which 7 cases were detected having CBD stone.

Table 1: Age and sex distribution patients with gall stone diseases.

Age in years	21-30	31-40	41-50	51-60	61-70	71-80	81-90	
Male	2	12	10	7	2	1	1	35(33.02%)
female	3	24	18	12	10	3	1	71(66.98%)
total	5	36	28	19	11	4	3	106

Table 2: Patients with suspicious CBD stone.

Parameters/observation	Number (N=106)	Percentage
Clinically jaundice	6 /106	5.66
Deranged LFT	10/106	9.433
Dilated CBD/stone CBD in USG Abdomen	11/106	10.37

Table 3: Correlation with jaundice, raised LFT and dilated CBD.

Clinical jaundice 6 cases	Dilated CBD / CBD stone - 4 case	Jaundice with dilated CBD 4 cases
Deranged LFT 10 cases	Dilated CBD/ CBD stone 7cases	Deranged LFT with Dilated CBD 7 cases
Clinical jaundice 6 cases	Deranged LFT 6 cases	Jaundice with deranged LFT 6 cases

MRCP was done in all the cases after the initial evaluation with LFT and USG abdomen. MRCP detected stone in Gall bladder and Common bile duct 17 cases. MRCP detected 15 cases from the suspected in 17 cases (after clinical, biochemical and imaging).

2 cases were asymptomatic. They do not have clinical jaundice or deranged liver parameters but MRCP shows calculus of 5mm in the CBD.

10 cases of 17 cases of CBD calculus under gone ERCP stone extraction and lap cholecystectomy. For other 7 cases lap cholecystectomy, intraoperative cholangiogram and then LAP CBD exploration was done. The remaining 89 cases Laparoscopic cholecystectomy was done. USG abdomen and MRCP findings were compared. USG abdomen showed dilated CBD in 11 cases while 04 cases showed gall stone with normal CBD. MRCP showed 17 cases (15 +2) as CBD calculus.

Table 4: Findings of USG abdomen and MRCP in relation to CBD.

Imaging	Dilated CBD	Dilated CBD with stone	Normal CBD with stone	Normal CBD
USG abdomen	06	05	Nil	95
MRCP		15	2	89

The sensitivity and specificity for USG abdomen in CBD stone detection was 84.62% and 95.70% respectively. However, the sensitivity and specificity for MRCP in CBD stone detection was 100% in our study.

DISCUSSION

106 cases were taken into the study protocol admitted in department of surgery after fulfilling the criteria.

The mean age was 54 years. 66.98 % were female in the study group. In all study female population were having more gall stone diseases.[2]

All the cases after admission evaluated clinically and then undergo Liver function test, USG abdomen.17 patients out of 106 cases had at least one clinical, biochemical and radiological and indication towards the suspicion of CBD pathology. Kurinchi Selvan Gurusamy et al reported many people may have common bile duct stones in spite of having a negative ultrasound or liver function test. False-positive results are also possible and further non-invasive testing is recommended to confirm common bile duct stones to avoid the risks of invasive testing.[3,4]

Deranged LFT and jaundice is found in 6 cases out of 15 cases harboring the Common bile duct stone. Raised LFT and clinical jaundice were not significantly different in patients with chronic, acute or complicated cholecystitis and high-risk patients should undergo further imaging to exclude choledocholitiasis.[3-5] In all our cases we proceeded for MRCP.

Dilated CBD / dilated CBD with stone found in 11 out of 17 suspected case of CBD pathology. Study by Hoffmann C et al, demonstrated that abdominal ultrasound is a high-efficiency method in the preoperative diagnostic of gallbladder and common bile duct stones and in all cases of bile duct dilatation (7 mm and more) they found an obstruction of the common bile duct.[10] To contradict the study Boys JA et al, concluded CBD diameter is not sufficient to identify patients at significant risk for CBD stones.[11] In our study from 106 cases total 17 cases were having CBD stone but dilated CBD/ dilated CBD with stone were found only in 11 cases. The sensitivity was 84.62% and specificity was 95.70% 15 out of 17 suspected cases were found to have CBD stone in MRCP.

MRCP was done in all cases (n =106). From the initial study 17 cases were having either clinical jaundice / deranged LFT or dilated CBD with stone. MRCP detected stone in CBD in 15 cases out of 17. The other 2 cases were found to be acute cholecystitis with normal CBD. Kkats JI concluded in the case of CBD stone suspicion, MRCP should be the diagnostic procedure of choice. MRCP had a sensitivity of 83% and a specificity of 99% for this diagnosis in their study.[12] Guarise AI in their conclusion mention that after the exclusion of stones with diameter smaller than 6 mm, the sensitivity, specificity and accuracy were 100%, 99% and 99%, respectively. MRCP accuracy was related to the size of the stones. MRCP is sufficiently accurate to replace ERCP in patients with suspected choledocholithiasis.[13] In our study the sensitivity and specificity for MRCP in CBD stone detection was 80.49% to 100.00% and 95.94% to 100.00% respectively with 95% confidence limit.

Two cases in the study group were not having clinical jaundice, and USG showed Gall stone with Normal CBD but MRCP revels normal CBD with stones of size 6 to8 mm. Asymptomatic CBD stone in our study group (2/106=1.88%). The incidence of asymptomatic bile duct stones is about 10%, but up to 2% of patients show no signs of the disease.[14]

In our study we did MRCP for all cases the positive predictive value is 100% but if we did MRCP for the suspected CBD stone case (after LFT and USG abdomen) then we should do only for 17 cases (15/17 cases).

Recommending MRCP for all cases is the waste of resources. Jarhult et al, concluded routine preoperative evaluation of the bile tree seems unnecessary before laparoscopic cholecystectomy in patients with uncomplicated gallstone disease but the 2 cases who are asymptomatic CBD stone will have retained stone and in the future they may develop cholangitis and jaundice.[15] Epelboym IL suggested that routine IOC is the preferred strategy in a cost-effectiveness analysis of the management of symptomatic cholelithiasis with asymptomatic choledocholithiasis.[16] MRCP was both more costly and less effective under all tested scenarios. As per the author conclusion we have to do all cases lap cholecystectomy with CBD exploration. Surgical exploration of common bile ducts is a major surgical procedure and cannot be undertaken lightly. People with positive test results are likely to undergo endoscopic sphincterotomy and extraction of stones or surgical exploration of common bile ducts while people with negative test results are likely to be followed up.

Nebiker CA et al, investigated the bile ducts by magnetic resonance cholangiopancreaticography (MRCP) prior to cholecystectomy in their study which was similar to our study. They conclude although MRCP is diagnostically useful in the perioperative management in some cases, its routine use in the DRG-era may not be justified due to the costs.[17] On the other hand Yan Qiu et al concluded the accuracy of preoperative ultrasonography for the diagnosis of associated CBD stones for patients with gallstones is not high and routine preoperative MRCP examination is suggested for patients with gallstones to rule out possible concomitant CBD stones.[18]

The sensitivity and specificity in detection of CBD stone by MRCP in our study was 100%. We did not analyze the investigation cost in our study as it was made free by the hospital which is around 2500 rupees. However, with increasing awareness, consumer forum issue cost may not be matter for the patient safety. In the diagnostic era MRCP should not be neglected because of cost issue and routine preoperative MRCP should be done before laparoscopic cholecystectomy.

CONCLUSION

Deranged LFT with clinical jaundice are the risk factor to suspect Common bile duct stone but USG abdomen may likely to miss CBD stone and USG abdomen is operator dependent. For the patient safety even if cost is more routine preoperative MRCP examination is recommended for patients with gallstones to rule out the likelihood of concomitant CBD stones before laparoscopic cholecystectomy.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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Cite this article as: Rao GB, Nayak SR, Teja SBR, Palacharla R. Pre-operative MRCP: is it necessary before routine laparoscopic cholecystectomy to exclude CBD stone-prospective study in tertiary care hospital. Int Surg J 2017;4:3633-7.