

# Post cholecystectomy common bile duct dilatation and associated symptomatology

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## ABSTRACT

**Background:** Relationship between postcholecystectomy bile duct dilatation and associated symptomatology is a potential dilemma for treating surgeon for which various studies with variable results have been documented. **Materials and Methods:** This study is a 1 year prospective study conducted at IGMC, Shimla after taking proper consent and ethical approval from institutional ethical committee. Total 50 cases of symptomatic cholelithiasis belonging to either sex admitted in surgical wards of IGMC, Shimla for elective surgery were selected for present study. Cholecystectomy was done in all cases after doing all investigations. **Results:** Postoperatively within 48 h symptoms were observed in 29 patients. Out of these, flatulence was present in 1, nausea and vomiting in 7 and 8, respectively. Combined flatulence vomiting in 5 and flatulence-reflux-nausea in 1 patient. After 1 month of interval, all patients were symptom free. **Conclusion:** Symptoms which were present in the postoperative patients were unrelated to dilatation of common bile duct. Either these symptoms were the persistent symptoms present before the operation or related to anaesthetic drugs.

**Keywords:** Bile duct, cholecystectomy, post-operative, symptoms

## Introduction

Common bile duct dilatation in postcholecystectomy patients was first observed by Oddi in 1887.<sup>[1]</sup> This finding is frequently seen on USG done in the postoperative period. Many times the primary care physicians on finding the dilated common bile duct (CBD) on ultrasound (USG), in postcholecystectomy patients, consider it abnormal and prescribe the battery of tests to find out the cause of CBD dilation. To differentiate the physiological dilatation of CBD from postoperative injury in postcholecystectomy patients, costly and invasive procedures are required. It is necessary to determine the symptoms and biochemical changes associated

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with postcholecystectomy physiological dilatation of CBD, to reduce unwanted therapeutic and diagnostic procedures on CBD.

As most of the published studies related to this subject were based on the western population, it is assumed that these results may be different in the eastern population, who frequently show anomalous union of pancreaticobiliary duct (AUPBD) and a high incidence of bile duct stones.<sup>[2]</sup> We have conducted this study in the East on the population of Himalayan region of India. The present prospective study was undertaken to evaluate the symptomatology and biochemical changes associated with USG proved postcholecystectomy dilatation of CBD at 48 h and 1 month intervals following cholecystectomy.

## Materials and Methods

After getting permission from institutional ethical committee, the present study was conducted on 50 patients of either sex, with

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age between 20 to 75 years, diagnosed with symptomatic and USG proved cases of cholelithiasis. These patients were chosen randomly for open cholecystectomy and preoperative complete hemogram, biochemical investigations including fasting blood sugar, renal function tests, liver function tests, serum electrolytes and USG were done in order to rule out any associated liver or extra-hepatic biliary disorder. Preoperative USG was done between 15 and 1 day before surgery to know the status of gallbladder, liver, extra-hepatic tree, pancreas, kidney and other abdominal organs, and also to know the CBD diameter. All USG examinations were done on the same ultrasound machine in the Department of Radiology of our institution. Liver function tests and USG examination were repeated at 48 h and after 1 month of interval following cholecystectomy, to find out any relation between derangements of liver function test with postoperative CBD status. Prior informed and written consent of all the patients was taken.

Study excluded the patient with acute cholecystitis, choledocholithiasis, malignant tumors of gall bladder, history of jaundice, and cholecystectomy with sub-hepatic drain, CBD diameter more than 8 mm on preoperative USG examination and CBD exploration with biliary drainage.

All cases were operated under general anesthesia using Inj. Pentazocine 30 mg iv, Inj Ondansetron 4 mg iv, and Inj Propofol iv (1%, 2.5 mg/Kg body weight) as induction agents. Tracheal intubation was done with an appropriate size tube using Inj. Scoline (2 mg/Kg). Anaesthesia was maintained using oxygen, nitrous oxide, Isoflurane 1%, and Inj Atracurium. At the end of surgery muscle paralysis was reversed using Inj Neostigmine and Glycopyrrolate.

Open cholecystectomy was performed by applying the right upper quadrant transverse rectus splitting incision. Posterior rectus sheath and peritoneum were opened to enter the abdominal cavity and for preliminary exploration. The stomach and duodenum were examined and packed out of the way. Gall bladder and cystic duct were palpated for stones with special attention at infundibulum, where calculus may be overlooked. The condition of common bile ducts was also noted for any pathology, stones or strictures. The supra duodenal part of the common duct lying in the right free border of lesser omentum was palpated for any calculus. Cholecystectomy was done by one of the two principal methods. In the generally advocated retrograde method, cystic duct, and cystic artery were divided first and the gall bladder was then stripped off toward the fundus. In the fundus first method gall bladder dissection was commenced at the fundus and proceeded toward the neck. After completing the operation, hemostasis was ensured and no drain was kept in sub-hepatic space.

All patients were examined postoperatively for any complications like fever, vomiting, rigor, and jaundice at regular intervals and managed accordingly. If bowel sounds were present the next morning, the patient was allowed to take oral liquids and was made ambulatory. After 48 h of surgery, primary dressing was opened and wound

assessed. Postoperative waterproof Opsite dressing was done so that the USG transducer could be moved over the wound site. Ultrasound was done at 48 h and 1 month postoperatively to know the CBD size, any calculi in CBD and any free fluid in sub-hepatic space. If any significant collections (>50 ml) was found in sub-hepatic space, serial USG were taken to know the course of collections till it became insignificant and case was excluded from study.

## Observations

A total of 50 cases of symptomatic and USG proved cases of cholelithiasis, of either sex, with in age group of 20-75 years, randomly posted for elective open cholecystectomies were selected for the present study. Cholecystectomy was done in all cases and the following observations were made.

The youngest patient in this study was of 21 years and the eldest patient was of 74 years with the mean age of the patients were 40.2 years. In total 46 patients (46/50, 92%) were female and 4 patients (4/50, 8%) were male. All 50 patients had a history of pain in the past with onset ranges from 2 years to 1 month before operation. No patient with acute pain was operated. 38 patients (38/50, 76%) had a history of biliary colic and 12 patients (12/50, 24%) had an acute attack of pain more than 4 weeks ago from the time of admission. Gall bladder lump was palpable in 4 patients (8%) at the time of admission.

Peroperative findings were noted as follows. None of the patients showed CBD calculi or dilated CBD as was screened on preoperative USG examinations [Table 1]. None of the patients under our study had any preoperative complications.

Liver function tests were done preoperatively and postoperatively at 48 h and 1 month intervals and the results were within normal range. The mean preoperative total bilirubin was 0.522 mg% and the mean postoperative total bilirubin was 0.496 mg% and was within normal limits. None of the patients developed jaundice clinically or biochemically postoperatively. The mean preoperative CBD diameter on ultrasound examination was 4.2 mm. At an interval of 48 h in the postoperative period, all patients were subjected to repeat USG examination and the mean diameter of CBD was 5.58 mm, with an increase of 1.38 mm. After 1 month of cholecystectomy, on USG the mean diameter of CBD was found to be 6.02 mm. Thus at 1 month interval the increase in size of CBD was to the extent of 1.82 mm. Mean postoperative CBD diameter observed was  $(6.02 + 5.58/2) = 5.8$  mm, that is, the average of both postoperative readings and this increase was significant ( $P$  value <0.005) [Table 2].

It was observed that the mean CBD Diameter at 1 month (6.02 mm) was more than the mean CBD diameter 48 h (5.58) after cholecystectomy [Table 3].

During study it was observed that post cholecystectomy CBD dilatation was present in most of the patients with maximum dilatation in the older age group. Age-dependent postoperative

increase in CBD diameter is also seen in other studies. In our study it was seen that maximum dilatation of CBD in the postoperative period was noticed at 1 month interval in patients above the age of 50 years. The mean preoperative CBD diameter in patients of above 50 years was 4.0 mm and mean postoperative CBD diameter at 48 h and at 1 month interval was 6.08 mm and 6.67 mm, respectively ( $P < 0.005$ ). Similarly for patients in the age group of 30-50 years, the preoperative diameter of CBD was 4.40 mm and the postoperative mean CBD diameter was 5.63 mm and 6.07 mm at 48 h and 1 month, respectively ( $P < 0.005$ ). The increase in CBD diameter was also seen in patients of younger age group ( $< 30$  years) but to a lesser extent.

The preoperative diameter of CBD in this group was 3.5 mm and increased to 4.63 mm and 4.48 mm at 48 h and 1 month, respectively [Table 4].

None of the patients were found to have any significant collection ( $> 50$  ml) in sub hepatic space after 48 h.

Total 29 (58%) patients developed symptoms postoperatively and these symptoms persisted for 48 h after operation. These symptoms were present either alone or in combination [Table 5].

**Table 1: Per-operative findings of the patients**

Per-operative findings	No. of patients
Fibrosed gall bladder	7
Mucocele gall bladder	4
Adhesions around gall bladder	29
Congenital anomalies	Nil
Palpable CBD calculi	Nil
Dilated CBD	Nil

**Table 2: Postoperative dilatation**

	Preoperative	At 48 h	At 1 month
Baseline mean CBD Diameter (mm)	4.20 mm	-	-
Preop			
Mean of CBD diameter (mm)	-	5.58 mm	6.02 mm
Postop			
Mean increase in CBD diameter (mm)	-	1.38 mm	1.82 mm
Postop (Dilatation)			

**Table 3: Net postoperative dilatation (by taking mean of two postoperative readings)**

Preoperative CBD diameter(mm)	Postoperative CBD diameter 48 hrs + 1 month 2	Dilatation postop and preop	P
4.2	$5.58 + 6.02/2=5.8$ mm	1.60 mm	$< 0.005$

**Table 4: CBD dilatation observed in different age groups**

Age group	Mean preoperative CBD diameter (mm) in specific age group	Mean postoperative CBD diameter (mm) (48 hrs +1 month)/2	Dilatation (mm)	P
$< 30$ years	3.5	$4.63 + 4.48/2=4.56$	1.06	$< 0.005$
30-50 years	4.4	$5.63 + 6.07/2=5.85$	1.45	$< 0.005$
$> 50$ years	4	$6.08 + 6.67/2=6.38$	2.38	$< 0.005$

A total of 7 patients (14%) developed flatulence or belching postoperatively within 48 h of surgery. Only 1 patient (2%) had complained of occasional reflux after operation. In our study 15 patients (30%) developed nausea postoperatively. None of the patients in our study developed abdominal distension postoperatively. None of the patients developed any visceral pain except on the wound site. In total 20 patients (40%) developed vomiting postoperatively within first 48 h. All these patients showed postcholecystectomy increase in mean CBD diameter, which is not significantly different from mean value of 1.38 mm at same interval seen in whole group [Table 6].

## Discussion

Cholecystectomy is the second common intra-abdominal operation in Western countries (after Appendicectomy). Gallstone is the most common indication for cholecystectomy.<sup>[3]</sup> Carl Langenbuch of Berlin on July 15, 1882 performed first successful cholecystectomy.<sup>[4]</sup> Although laparoscopic cholecystectomy is preferred and advanced technique, in many patients certain situations make it safe for an open operation, like patients with previous upper abdominal operations, acute cholecystitis, cirrhosis, pregnancy, cholecystoenteric fistula, strong suspicion of gallbladder carcinoma, and when anatomical anomalies are suspected.<sup>[3]</sup>

This study "Postcholecystectomy common bile duct dilatation and associated symptomatology" are to find the implications of cholecystectomy on physiological, anatomical and bio-chemical changes induced on hepato-biliary system and any associated symptoms with it and also to avoid unnecessary costly tests to rule out the cause of this benign dilatation of CBD in postcholecystectomy patients.

In this study, 50 patients of chronic cholecystitis with USG proven cholelithiasis were randomly selected for open cholecystectomy. The female to male ratio of 11.5:1, as this disease is more common in female.<sup>[5,6]</sup> All the patients were having normal clinical investigative parameters.

Patients undergoing surgery for cholelithiasis require careful preoperative assessment of the status of bile duct. Ultrasound and LFT's have proved to be of immense help in this regard.

Relevance of estimation of serum alkaline phosphatase, serum bilirubin, SGOT, and SGPT in helping the diagnosis of various hepatic and extrahepatic diseases is well established and these have been recognized as significant predictors.<sup>[7]</sup> Conjugated hyperbilirubinemia results from interference with biliary excretion of bilirubin by hepatocytes. Thus cholestasis and increase in conjugated bilirubinemia occur only by impaired excretion and extrahepatic biliary obstruction.<sup>[7]</sup>

As in the present study no patient developed hyperbilirubinemia and also the mean preoperative and postoperative bilirubin levels were within normal range. In similar study liver function tests of the patients showed that 94% of had normal levels of serum bilirubin, 96% of the patients had normal values of SGOT, 100% patients had normal values of SGPT, 100% showed normal values of serum alkaline phosphatase and 96% of the patients had shown normal values of total serum proteins and all these patients were proved to be without any liver or extra hepatic biliary disorder. The mean preoperative diameter in this study was 4.12 mm (range 2.08.1 mm), postoperatively, the mean diameter of the CBD in early follow up period, that is, at 10<sup>th</sup> day and at 3 months, was found to be 4.75 and 5.14 mm, respectively.<sup>[8]</sup> However it can safely be concluded that cholecystectomy for cholelithiasis with chronic cholecystitis does not affect serum bilirubin levels. Liver function tests provide critical information of biliary tract disease in jaundiced patients. Marked rise in serum alkaline phosphatase is a sensitive indicator of extra hepatic biliary obstruction, regardless of etiology or location. Hepato biliary alkaline phosphatase is secreted by biliary duct endothelium. The increased serum level found in acute biliary obstruction usually results from back diffusion. Alkaline phosphatase does not rise in cholelithiasis until calculus

has obstructed the lumen of CBD.<sup>[7]</sup> The above finding was seen in our study also where all patients have alkaline phosphatase within normal range. Similarly elevations of SGOT and SGPT are mainly indicators of hepatocellular damage, although abnormalities may be seen in obstructed disease.<sup>[7]</sup> No significant changes in these enzyme levels have been noted in our study indicating that cholecystectomy does not result in adverse effect on liver functions.

In our study 58% of patients developed postcholecystectomy symptoms either alone or in combination in the first 48 h which gradually subsided. Among which 14% had flatulence and 2% had symptoms of reflux and all these patients had preoperative dyspeptic symptoms, there is no correlation with these symptoms and postcholecystectomy CBD dilatation as the dilatation observed in these symptomatic patients were not statistically different from that of whole group.

In some studies, it was seen that 15% of patients undergoing cholecystectomy for cholelithiasis failed to get relief from symptoms for which the operation was performed. However such problems are related to preoperative symptoms and are merely a continuation of those symptoms.<sup>[9]</sup> The causes of these symptoms may be (a) Extra biliary disorders: a few conditions of the abdomen give rise to symptoms similar to cholelithiasis and during investigations if gallstones are detected, cholecystectomy is performed. But the main disease remains, causing the same symptoms as prior to cholecystectomy. These conditions are hiatus hernia, peptic ulcers, and chronic pancreatitis. (b) Disorders of extra hepatic biliary tract: the common disorder which give rise to symptoms after cholecystectomy are (i) residual stones in common duct, (ii) stricture of bile duct (often caused by trauma during cholecystectomy), (iii) long cystic duct stump syndrome, and (iv) biliary dyskinesia.<sup>[6]</sup>

The symptoms of dyspepsia which includes feeling of fullness after food, belching, and reflux with heartburn and nausea are commonly seen in disease of gallbladder.<sup>[10]</sup> In the earlier studies this recurrence of symptoms were attributed to stones in the CBD, either these stones are formed primarily or might have been overlooked at the time of first operation, It is also considered that gallstones lead to infection involving liver, pancreas, and regional lymphatic, and these infections which

**Table 5: Distribution of patients with postcholecystectomy symptoms**

Symptoms	No. of patients
Flatulence	1
Nausea	7
Vomiting	8
Nausea and vomiting	7
Flatulence and vomiting	5
Flatulence + reflux and nausea	1

**Table 6: Postcholecystectomy symptoms and relation of CBD dilatation**

Symptoms	No of patients	Mean of the two readings of CBD dilatation (48 h and 1 month) in symptomatic patients (mm )	Mean of the two readings of CBD Dilatation (48 h and 1 month) in whole group (mm )	Difference in CBD dilatation (mm)	P
Flatulence	7	1.62	1.60	0.02	>0.05
Reflux	1	1.00	1.60	0.60	>0.05
Distension	Nil	–	–	–	–
Nausea	15	1.67	1.60	0.07	>0.05
Vomiting	20	1.75	1.60	0.15	>0.05
Paint abdomen	Nil	–	–	–	–
Fever	Nil	–	–	–	–
Jaundice	Nil	–	–	–	–

remained in the tissues causes symptoms.<sup>[11]</sup> The persistence of these symptoms had no correlation with common bile duct dilatation.<sup>[12,13]</sup> In a study by Chopra *et al.* 6 patients complaining of postcholecystectomy symptoms (5 out of them presented with upper abdominal pain and 1 out of 6 presented with dyspepsia). In all these cases upper GI endoscopy was done and 2 patients had gastric erosions, 3 had antral gastritis with duodenitis. One patient was having hiatus hernia with mild reflux esophagitis. All of these patients had CBD size less than 5mm at three months follow-up. It was found that the patients with postoperative common bile duct dilatation up to 3 mm or more than 3 mm did not present with any of the postcholecystectomy symptoms at subsequent follow ups. This showed that there is no relation of postcholecystectomy symptoms with the postcholecystectomy compensatory dilatation.<sup>[14]</sup> No patients in our study developed any kind of pain postoperatively except on wound site. Clinical experience suggests that patients with biliary colic have a better symptomatic outcome than those with more prolonged attack of pain. It was also seen that it had no correlation with CBD diameter. Preoperative flatulence is a factor for postoperative dis-satisfaction.<sup>[15]</sup> Karnail Singh *et al.* in a study on 100 patients, concluded that significant dilatation occurs in common bile duct after cholecystectomy in most of the patients without any physiological relevance. Postcholecystectomy symptoms not related to compensatory dilatation of common bile duct.<sup>[8]</sup>

In total 15 patients developed nausea and 20 patients developed vomiting within the first 48 h postoperatively and these were correlated with anesthetic complications. Certain anesthetic agents are liable to cause these complications. Irritation to the stomach by swallowed anesthetic vapors, swallowed blood or even hypoxia may induce vomiting tendencies in postoperative period. Large amount of fluid intake during recovery period from anesthesia may also induce vomiting.<sup>[13]</sup> No correlation of these symptoms with CBD Dilatation was noticed.<sup>[11,12]</sup>

No patients in the study group developed distension, jaundice, and fever postoperatively.

## Conclusion

In 43 (86%) patients postoperative CBD dilatation was observed, in 5 (10%) patients, no dilatation was observed and in 2 (4%) cases there was decrease in diameter of CBD.

Postoperatively no pathological cause for CBD dilatation was observed, sonologically.

In younger age group patients (<30 years) preoperative diameter was 4 mm and postoperative at 48 h and 1 month interval was 4.63 and 4.48 mm, respectively. In older age group patients (>50 years) the mean CBD diameter observed was 4 mm preoperatively; 6.08 mm and 6.67mm postoperatively at 48 h and 1 month interval. In patients with age group of 30-50 years, preoperative CBD diameter was 4.4 mm and postoperative was 5.53 and 6.07 mm at 48 h and 1 month interval, respectively. Thus the maximum

mean increase in the size of CBD in postoperative period was seen in elder age group and is also seen in other studies.

In all patients insignificant collection (<50 ml) was found in sub-hepatic space postoperatively.

Postoperatively within 48 h, symptoms were observed in 29 (58%) patients, out of these, Flatulence was present in 1 (2%), Nausea and vomiting in 7 (14%) and 8 (16%) patients respectively. Nausea with vomiting in 7 (14%), combined flatulence-vomiting 5 (10%) and flatulence, reflux and nausea in 1 (2%) of patient. At 1 month interval all patients were symptom free. There were no significant changes in biochemical tests at 48 h and at 1 month interval after cholecystectomy.

This study has been undertaken to evaluate the anatomical and physiological changes induced in CBD after removal of gallbladder for cholelithiasis and symptoms associated with these changes.

Significant dilatation does occur in CBD which is purely compensatory as there was no evidence of any pathological dilatation. This dilatation starts in early postoperative period till the CBD adapts to contain bile equal to the Gallbladder. More pronounced dilatation observed in elderly patients was probably due to age-related weakness of the CBD wall containing sparse elastin and smooth muscle fibers.

The symptoms which were present in immediate postoperative period and up to 48 h were of non-specific type and are seen in other major abdominal operations performed under general anesthesia and is clearly unrelated to dilatation of CBD as it is not associated with biochemical changes during that period. Either these symptoms were the persistent symptoms present before the operation or related to anesthetic drugs. These all disappear after early post-operative period and when patients were reviewed after 1 month all patients were symptom free. The conclusion of this study is to avoid unnecessary investigations like ERCP, MRCP, etc., if dilated CBD is seen on USG in postcholecystectomy patients, unless accompanied by deranged LFT and persistent symptoms.

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## Conflicts of interest

There are no conflicts of interest.

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