

Significance of Dilated CBD on Ultrasound in Complicated Biliary Pathology

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ABSTRACT

Background: In many ultrasound reports of the upper abdomen, we see CBD dilatation in addition to gall stones. In patients with suspected biliary pathology measurement of common bile duct (CBD) on ultrasonography is of utmost importance. CBD size on ultrasonography gives a clue to further investigations. What is the significance of dilated CBD, when liver function tests are normal? This is the objective of our study. "To find out the significance of dilated CBD on ultrasonography with normal labs in the diagnosis of complicated biliary pathology".

Method: We did retrospective study from January 1st, 2015 to December 31st, 2017. This study was done at Surgical Unit 1, Civil Hospital Karachi & Bantwa Memon Hospital, Kharadar Karachi. To reach at a conclusion related to our objective, we went through clinical records, laboratory data, ultrasonography reports and ERCP reports of the selected patients.

Statistical analysis was done on SPSS version 20.

Results: In our study 186 patients had gallstones on ultrasonography. 28% patients were male while 72% patients were female. On ultrasound common bile duct was dilated (> 7mm) in 42 patients (22%). Out of these 42 patients, 28(67%) had both dilated CBD & altered liver function tests (LFT) while 14 patients (33%) had isolated dilated CBD with normal liver function tests. 100% patients who had both dilated CBD & altered LFTS, had complicated biliary pathology while only 14% patients who had isolated dilated CBD with normal LFT, had complicated biliary pathology.

Conclusion: Majority of the patients who had isolated dilated common bile duct on ultrasonography with normal liver function tests is unlikely to have complicated biliary pathology.

Keywords Common Bile Duct, Ultrasonography, Gall Stones, Dilated CBD, Endoscopic Cholangiopancreatography.

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INTRODUCTION:

Biliary disease is very common worldwide. In the United States twenty million patients present with signs & symptoms related to gall stones^{1, 2}. When a patient presents with right upper abdominal pain or yellowish discoloration of sclera, we routinely go for laboratory investigations & ultrasound of the upper abdomen. Laboratory investigations alone are not sufficient to diagnose the specific biliary pathology but when it is combined with ultrasonography of the upper abdomen, it clarifies the diagnosis in most of the cases^{3, 4}. Generally symptomatic gallstones can be managed easily by conservative management or by surgery but associated complicated biliary pathology needs more investigations like ultrasound, labs, ERCP/ MRCP to reach at a definitive diagnosis. Many studies have shown that ultrasonography can give accurate diagnosis of biliary pathology in most of the cases⁵. Ultrasound can detect gallstones, gallbladder wall thickness, pericholecystic fluid and common bile duct dilatation but it is sonologist dependent^{6, 7}. There are limitations of ultrasound in the diagnosis of complicated biliary pathology. According to LAM & THOMSON incidence of CBD stones in association with gallstones is 3% to 8%^{8, 9}. In most of the cases, we get information from sonologist regarding common bile duct diameter but actual visualization of CBD stones is obscured by gut distension & inflammation around the gallbladder. When a patient has gall stones, it is essential to rule out associated complicated biliary pathology by ultrasound, labs and even ERCP/ MRCP if it is indicated before going for laparoscopic cholecystectomy⁸. Studies have shown that common bile duct dilatation alone is of little clinical significance in the presence of normal laboratory values^{10, 11}. It is of utmost importance to identify the patients who had gall stones in association with stones in the common bile duct or other biliary pathology. We have different options to deal with associated CBD stones like endoscopic retrograde cholangiopancreatography (ERCP), open CBD exploration or laparoscopic common bile duct exploration. Accurate diagnosis of associated biliary pathology in patients with gallstones avoids complications, prolonged hospital stay morbidity and even mortality. Until now dilatation of the common bile duct is a traditional marker for the possibility of

stone in the common bile duct but the literature shows that many CBD stones occur without CBD dilatation & majority of patients with CBD stones have abnormal liver function tests^{12, 13}.

Purpose of our study is to find out the importance of diameter of common bile duct on ultrasonography in the face of normal liver function tests for the diagnosis of associated complicated biliary pathology. By our study, we want to find out if there is any significance of CBD diameter on U/S, when liver function tests are normal.

MATERIAL AND METHODS:

We did retrospective study from 1st January 2015 to 31st December 2017 at Surgical Unit 1, Civil Hospital Karachi and Bantva Memon Hospital Karachi. Data was obtained from hospital medical record files and also from electronic medical records. Our inclusion criteria were adult patients (above the age of 18 years) presented with right upper abdominal pain and suspicious of gall stones. In these patients U/S abdomen and relevant laboratory test were done. In selected cases ERCP/MRCP was also done. Operative findings were also included in the study. Exclusion criteria were age below 18 years, patients presenting with associated acute pancreatitis or generalized abdominal pain and pregnant patients. Final diagnosis was done on the basis of U/S findings, laboratory results and in selected cases with the help of ERCP, MRCP and operative findings. With this data we assessed the significance of dilated CBD on U/S on the final diagnosis.

Laboratory tests were considered abnormal if Serum Bilirubin > 2mg/dl, Alkaline Phosphate > 120u/L, AST > 40u/L and ALT > 40u/L. Ultrasound assessment included the finding of Gallstones, GB wall thickness, free fluid around gall bladder and CBD diameter. CBD was considered dilated if its diameter was > 7mm.

All statistical analysis was done on SPSS version 20. Variable was compared using chi-square test. P-value of < 0.05 was significant.

RESULTS:

We included 240 patients in our study, 86

Table 1:

	No. of patients	%	Age range	Mean age
Total	240	-	18 – 74	43 years
Male	86	36	31 – 69	47 years
Female	154	64	18 – 74	37 years

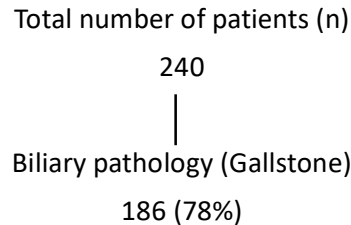
FLOW DIAGRAM OF RESULTS

TABLE 2

No. of patients (n)	CBD Stone	CBD stricture	Pancreatic patholog	
Dilated CBD with Abnormal labs	28	23 (82%)	01 (4%)	04 (14%)
Dilated CBD with normal labs	14	02 (14%)	-	-

males (36%) and 154 females (64%). Age ranged from 18 to 74 years (mean age 43 years) { table 1 }

Out of 240 patients, 186 patients had gallstones on U/S. 52 male (28%) and 134 females (72%). CBD was dilated (>7mm) in 42 patients (22%) on U/S. Out of these 42 patients, laboratory values was altered in 28 patients (67%). We performed ERCP in all these 28 patients who had abnormalities on both U/S and laboratory assessment. All these 28 patients who had dilated CBD and altered LFT proved to have complicated biliary pathology. 23 patients had CBD stone, 2 had periampullary carcinoma, 2 had Carcinoma head of the pancreas and 1 had biliary stricture. We also took the record of 14 patients (33%) who had isolated biliary dilation (>7mm) on U/S with normal laboratory values. ERCP was done for all these patients. Out of these 14 patients only 2 patients (14%) had CBD stone and 12 patients (86%) had no complicated biliary pathology. {flow chart} So in conclusion 86% patients with isolated CBD dilatation with normal laboratory values had

no complicated biliary pathology. Only 2 patients (14%) had complicated biliary pathology in the absence of laboratory abnormalities. {Table 2}

DISCUSSION:

Biliary disease is one of the most common pathology seen in the surgical practice. Clear identification of exact pathology is essential to see the best results in biliary surgery. For this we use different modalities – clinical assessment, laboratory tests, ultrasound, MRCP/ ERCP, per-operative cholangiogram. According to literature 3% - 8% patients have associated CBD stones in addition to gallstones^{8,9}. In contradiction in our study 13% patients have associated CBD stones. Use of U/S to assess the presence of CBD stones by considering CBD diameter is debatable. Review of literature regarding CBD stones reveals that measuring common bile duct diameter alone is not sufficient to rule out stones in CBD and also many cases of choledocholithiasis (28%) have normal common bile duct on ultrasonography¹⁴. In our study, we had di-

lated CBD in 22% patients & out of these 33% patients had normal liver function tests, while 67% patients had abnormal liver function tests. Literature suggests that majority of CBD stones are associated with abnormal LFTS. According to Pereira-Lima et al sensitivity of elevated liver function tests is 94.3% for CBD stones, while Yang et al. suggests elevation in any of the liver function tests is 87.5% sensitive for CBD stone^{12,13}. Elevation of alkaline phosphatase is suggestive of incomplete bile duct obstruction, which is not detectable by ultrasonography¹⁵. Many studies have shown CBD diameter cut off from 7-12mm¹⁶. If the CBD diameter is 7-10mm, predictability of CBD stone is 58% to 78% but if the diameter is >12mm alone, predictability is 90%⁶. Predictability (of complicated biliary pathology) is 100% if the dilation is associated with altered liver function tests¹⁷.

In comparison in our study only 14% patients had complicated biliary pathology when CBD was dilated alone with normal labs and 86% patients had no complicated biliary pathology with dilated CBD alone. It shows that, CBD dilatation alone is not so significant if liver function tests are normal. But when CBD was dilated and liver function tests were also elevated, then all the patients had associated biliary pathology. 23 patients had common bile duct stone, 2 patients had peri-ampullary carcinoma, 2 patients had Carcinoma head of pancreas & one had biliary stricture. All these patients had dilated CBD with altered liver function tests. So, we can conclude that in our study 100 % patients, who had dilated CBD with altered liver function tests, had associated complicated biliary pathology. This correlates with LEAPER and LOCAINE studies^{16,17}. In our study majority of patients with complicated biliary pathology had abnormal laboratory values. It correlates with other studies^{13,14}. We observed CBD dilatation is very insensitive index for the diagnosis of complicated biliary pathology. It testifies the studies by Becker and Parkash^{18,19}. There were some limitations in our study. First the experience of the sonologist was variable, secondly MRCP / ERCP to confirm the complicated biliary pathology was not freely available. Thirdly facilities for per-operative cholangiogram were also not available.

CONCLUSION:

Many cases of choledocholithiasis occur with normal CBD diameter and in many cases CBD is dilated without stone in it. Elevated liver function tests is a good marker to diagnose stone in the common bile duct or other biliary pathology, if is associated with dilatation of common bile duct. With our study and literature review, we can conclude that CBD dilatation alone is not so significant if liver function tests are normal in majority of the patients. Conflict of interest:

Authors express no conflict of interest.

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REFERENCES:

- 1 Benarroch-Gampel J, Boyd CA, Sheffield KM, Townsend CM, Riall TS. Overuse of CT in patients with complicated gallstone disease. *J Am Coll Surg* 2011 Oct 1; 213(4):524-30.
- 2 Jafari D, Cheng AB, Dean AJ. Dynamic changes of common bile duct diameter during an episode of biliary colic, documented by ultrasonography. *Ann Emerg Med* 2013 Aug 1;62(2):176-9.
- 3 Jang TB. Bedside biliary sonography: advancement and future horizons. *Ann Emerg Med* 2010; 56(2):123-5.
- 4 Jang TB, Ruggeri W, Dyne P, et al. The learning curve of resident physicians using emergency ultrasonography for cholelithiasis and cholecystitis. *Acad Emerg Med* 2010; 17(11):1247-52.
- 5 Kendall JL, Shimp RJ. Performance and interpretation of focused right upper quadrant ultrasound by emergency physicians. *J Emerg Med* 2001;21(1):7-13.
- 6 Kalimi R, Gecelter GR, Caplin D, Brickman M, Tronco GT, Love C, Yao J, Simms HH, Marini CP. Diagnosis of acute cholecystitis: sensitivity of sonography, cholescintigraphy, and combined sonography-cholescintigraphy1. *J Am Coll Surg* 2001 Dec 1;193(6):609-13.
- 7 Handler SJ. Ultrasound of gallbladder wall thickening and its relation to cholecystitis. *Am J Roentgenol* 1979 Apr 1; 132(4):581-5.
- 8 Yip A, Lam KH. An evaluation of routine operative cholangiography. *ANZ J Surg* 1988 May 1; 58(5):391-5
- 9 Faris I, Thomson JP, Grundy DJ, Le Quesne LP. Operative cholangiography: a reappraisal based on a review of 400 cholangiograms. *Br J Surg.* 1975 Dec 1; 62(12):966-72.

- 10 Cronan JJ. US diagnosis of choledocholithiasis: a reappraisal. *Radiology*. 1986 Oct; 161(1):133-4.
- 11 Hunt DR. Common bile duct stones in non-dilated bile ducts? An ultrasound study. *J Med Imaging Radiat Oncol*. 1996 Aug 1; 40(3):221-2.
- 12 Pereira-Lima JC, Jakobs R, Busnello JV, Benz C, Blaya C, Riemann JF. The role of serum liver enzymes in the diagnosis of choledocholithiasis. *Hepato-gastroenterology*. 2000; 47(36):1522-5.
- 13 Yang MH, Chen TH, Wang SE, Tsai YF, Su CH, Wu CW, Lui WY, Shyr YM. Biochemical predictors for absence of common bile duct stones in patients undergoing laparoscopic cholecystectomy. *Surg Endosc* 2008 Jul 1; 22(7):1620-4.
- 14 Lichtenbaum RA, McMullen HF, Newman RM. Preoperative abdominal ultrasound may be misleading in risk stratification for presence of common bile duct abnormalities. *Surg Endosc* 2000 Mar 1;14(3):254-7.
- 15 Weinstein BJ, Weinstein DP. Biliary tract dilatation in the nonjaundiced patient. *AJR Am J Roentgenol*. 1980 May 1;134(5):899-906.
- 16 Watkin DS, Haworth JM, Leaper DJ, Thompson MH. Assessment of the common bile duct before cholecystectomy using ultrasound and biochemical measurements: validation based on follow-up. *Ann R Coll Surg Engl* 1994 Sep; 76(5):317.
- 17 Lacaine F, Corlette MB, Bismuth H. Preoperative evaluation of the risk of common bile duct stones. *Arch Surg*. 1980 Sep 1; 115(9):1114-6.
- 18 Becker BA, Chin E, Mervis E, Anderson CL, Oshita MH, Fox JC. Emergency biliary sonography: utility of common bile duct measurement in the diagnosis of cholecystitis and choledocholithiasis. *J Emerg Med* 2014 Jan 1; 46(1):54-60.
- 19 Bose SM, Mazumdar A, Prakash SV, Kocher R, Katariya S, Pathak CM. Evaluation of the predictors of choledocholithiasis: comparative analysis of clinical, biochemical, radiological, radionuclear, and intraoperative parameters. *Surg Today*. 2001 Feb 1; 31(2):117-22.