



EVALUATION OF LIVER FUNCTION ABNORMALITIES IN COMMON BILE DUCT STONES: A CROSS SECTIONAL DESCRIPTIVE ANALYSIS

General Surgery

Dr Mukund Singh Yadav

Junior Resident, Mahatma Gandhi Medical College And Hospital, Jaipur

Dr Lakshman Agarwal

Professor, Mahatma Gandhi Medical College And Hospital, Jaipur

Dr Devang Jain

Junior Resident, Mahatma Gandhi Medical College And Hospital, Jaipur

ABSTRACT

Introduction: Liver function tests (LFTs) serve as a valuable tool in distinguishing between obstructive and hepatocellular causes of biliary obstruction. Therefore, this study was conducted to evaluate the diagnostic accuracy of LFTs in predicting the presence of common bile duct (CBD) stones. **Methods:** A descriptive cross-sectional study was conducted on patients undergoing Endoscopic Retrograde Cholangiopancreatography (ERCP) for common bile duct (CBD) stones at Mahatma Gandhi Medical College and Hospital between 2023 and 2024. Data were collected using a non-probability (convenience) sampling method, and statistical analysis was performed using SPSS version 30. **Results:** Among the 150 patients studied, there was a noticeable predominance of older females. The overall incidence of abnormal liver function tests (LFTs) in patients with common bile duct (CBD) stones was 86%. Most LFT parameters were elevated, with serum glutamic oxaloacetic transaminase (SGOT) being the most frequently raised enzyme. Patients with biliary sludge identified on ERCP showed significantly higher levels of total, direct, and indirect bilirubin compared to those with CBD stones, and this difference was statistically significant. **Conclusion:** Liver function tests (LFTs) are frequently abnormal in patients with common bile duct (CBD) stones so LFT can be adopted as first-line diagnostic tests for predicting the presence of CBD stones. While LFTs are helpful in raising suspicion for choledocholithiasis, they are not definitive diagnostic tools

KEYWORDS

Common bile duct stones, Liver function tests

INTRODUCTION

Common bile duct (CBD) stones are found in approximately 10–15% of patients with cholelithiasis.¹ However, the incidence appears to be declining, likely due to earlier diagnosis and timely treatment of cholelithiasis based on established clinical risk criteria.² Accurate preoperative prediction of CBD stones remains essential, especially prior to procedures like laparoscopic cholecystectomy, to avoid unnecessary interventions and complications.

The aim of this study was to evaluate the clinical, biochemical, and radiological parameters associated with CBD stones in a cohort of 150 patients, with a specific focus on the diagnostic utility of liver function tests (LFTs). CBD stones (n = 142) are a common cause of biliary obstruction, and LFTs are often used to differentiate between hepatocellular and cholestatic processes.³

LFT components include total, direct, and indirect bilirubin, aminotransferases (AST and ALT), alkaline phosphatase (ALP), albumin, and prothrombin time (PT). In hepatocellular diseases, aminotransferases are typically elevated more than ALP, while cholestatic conditions such as CBD stones usually present with a marked rise in ALP relative to transaminases. A low serum albumin level may indicate chronic liver disease like cirrhosis, while normal albumin suggests an acute process, such as viral hepatitis or biliary obstruction. Similarly, an abnormal PT may result from vitamin K deficiency or liver dysfunction; lack of correction after vitamin K administration suggests hepatocellular damage.⁴

Given this background, the present study was conducted to analyze the correlation of LFT abnormalities in patients with CBD stones, and to assess whether these biochemical markers reliably reflect the underlying obstructive pathology.

METHODS

A descriptive cross-sectional study was conducted at Mahatma Gandhi Medical College and Hospital involving patients who underwent Endoscopic Retrograde Cholangiopancreatography (ERCP) for suspected common bile duct (CBD) stones between 2023 and 2024. The study included patients aged 19 years and above who had a radiological diagnosis of CBD stones, confirmed through either ultrasound or magnetic resonance cholangiopancreatography (MRCP). Patients with suspected CBD stones but no radiological evidence were excluded from the study.

Data were analyzed using SPSS version 30. Continuous variables were expressed as mean $\pm$ standard deviation (SD), while categorical

variables were presented as frequencies and percentages. An independent t-test was used to compare means between two groups for continuous variables, following assessment of data normality. A p-value less than 0.05 was considered statistically significant.

RESULTS

A total of 150 patients who underwent ERCP with radiological diagnosis of CBD stone were included in the study. During ERCP, CBD stones were found in 142 patients, and 8 patients had no visible stones but had biliary sludge. The positive predictive value (PPV) of radiological diagnosis was 94.7%, consistent with previously reported data.

Among the 142 patients with confirmed CBD stones, 41 patients (28.9%) had concurrent cholecystitis, and 101 patients (71.1%) had no cholecystitis (Table 1).

Table 1. Sociodemographic And Clinical Parameters Of Patients (n = 142)

Variables	Frequency (%)
Age (years)	
<40	41 (28.9%)
≥ 40	101 (71.1%)
Mean $\pm$ SD	52.61 $\pm$ 16.91
Gender	
Female	107 (75.3%)
Male	35 (24.7%)
Female : Male	3.1 : 1
Diagnosis	
CBD stone with cholecystitis	41 (28.9%)
CBD stone without cholecystitis	101 (71.1%)
Stone	
Present	142 (94.7%)
Sludge	8 (5.3%)

The overall incidence of abnormal LFT in CBD stones was 86%. Liver function tests (LFTs) were analysed, including total, direct, and indirect bilirubin, SGOT, SGPT, and ALP. Most LFT parameters were elevated, with SGOT being the most frequently raised enzyme.

Patients with sludge had significantly elevated bilirubin levels compared to those with stones, while transaminases and ALP were comparable (Table 2).

Comparison of LFTs between patients with and without cholecystitis showed no statistically significant differences in any parameters (Table 3).

Table 2: Comparison Of Lft In Patients With Stone Removal And Sludge Removal

Variables	Stone removal (n = 142)	Sludge removal (n = 8)	p-value
Total bilirubin (mg/dL)	2.59 ± 0.34	8.99 ± 1.97	<0.001
Direct bilirubin (mg/dL)	1.78 ± 0.31	5.59 ± 0.49	<0.001
Indirect bilirubin (mg/dL)	0.85 ± 0.33	3.39 ± 0.42	0.005
SGOT (U/L)	151.01 ± 15.7	150.13 ± 17.2	0.98
SGPT (U/L)	253 ± 14.5	152 ± 12.5	0.48
ALP (U/L)	455.18 ± 16.2	418.92 ± 13.7	0.89

Table 3: Comparison Of LFT in CBD Stones With Cholecystitis And Without Cholecystitis

Variables	With cholecystitis (n=41)	Without cholecystitis (n=101)	p-value
Total bilirubin	4.31 ± 0.53	4.63 ± 0.66	0.98
Direct bilirubin	2.31 ± 0.96	3.10 ± 0.93	0.40
Indirect bilirubin	2 ± 0.84	1.25 ± 0.52	0.39
SGOT	152.33 ± 16.8	149 ± 15.6	0.94
SGPT	155.82 ± 16.4	262 ± 17.5	0.42
ALP	455.79 ± 12.8	407.60 ± 14.6	0.13

DISCUSSION

In our study, out of 150 patients radiologically diagnosed with common bile duct (CBD) stones, only 142 cases were confirmed during Endoscopic Retrograde Cholangiopancreatography (ERCP), resulting in a positive predictive value (PPV) of 94.7%. This finding is consistent with the study by Mandelia et al., where the PPV of ultrasound was reported at 76.47% and MRCP at 95%.⁶

Among the patients with confirmed CBD stones, 71.1% were over the age of 40, and 75.3% were female, aligning with findings from Zgheib H et al.⁷ Similar demographic patterns were also reported in studies conducted by Song Y et al. and Hosseini SV in China and Iran, respectively.^{8,9} Although there is considerable geographic variation in the prevalence of biliary stone disease, it remains more common in females and older individuals across regions.

Liver function tests (LFTs) are considered moderately reliable predictors in cases of suspected choledocholithiasis.^{10,11} In our study, deranged liver enzymes were observed in both patients with CBD stones and those with biliary sludge. Notably, a study by Harran N using an animal model also reported significantly elevated aminotransferases, ALP, and total bilirubin in biliary sludge cases.¹²

Among the liver enzymes, SGOT was the most frequently elevated, followed by SGPT, ALP, and direct bilirubin. While ALP is classically considered the hallmark enzyme in obstructive jaundice, our findings suggest that SGOT can rise equally or even more than ALP, which is consistent with findings from Hayat JO, Isogai M, and others.^{13,14}

When comparing liver function in patients with CBD stones with and without cholecystitis, enzyme levels were elevated in both groups, with no statistically significant differences. This contrasts with a study by Ahn KS et al., where LFTs were significantly higher in patients with both cholecystitis and CBD stones.¹ However, our results are consistent with the findings of Padda MS et al., who also reported abnormal LFTs regardless of cholecystitis status and stated that Liver test patterns can aid in the diagnosis of choledocholithiasis, even in patients with concurrent acute calculous cholecystitis. Patients with choledocholithiasis—whether alone or in combination with acute calculous cholecystitis—are more likely to exhibit abnormal liver function tests.¹⁵

Similarly, a population-based cohort study by Videhult P et al. concluded that liver enzymes are not fully reliable predictors of CBD stones due to frequent false-positive and false-negative results, suggesting the involvement of additional mechanisms.¹⁶ Zare M et al. also found that ab elevated liver enzyme levels alone do not play a central role in diagnosing common bile duct (CBD) stones. Therefore, ERCP should not be performed solely based on elevated liver enzymes, particularly when ultrasonography findings are normal.¹⁷ A

systematic review and meta-analysis by Chen H et al. supported the presence of abnormal LFTs in CBD stone cases, though the authors emphasized their limited specificity and results showed that the mean CBD diameter of patients with acute cholecystitis and common bile duct stones was 7.2 mm compared to 5.8 mm without. Liver function test values in the presence of common bile duct stones were more likely to be deranged, with gamma-glutamyltransferase the most sensitive and specific marker for common bile duct stones in the setting of acute cholecystitis.¹⁸ In the setting of acute cholecystitis, however, gamma-glutamyl transferase (GGT) was identified as the most specific and sensitive marker, as also demonstrated in the study by Peng WK.¹⁹

CONCLUSION

This study demonstrated that liver function tests (LFTs) are frequently abnormal in patients with common bile duct (CBD) stones, reinforcing their role as supportive indicators in the diagnostic evaluation of biliary obstruction. Among the 150 patients studied, CBD stones were confirmed in 142 cases, while 8 had biliary sludge, with both groups showing elevated bilirubin and liver enzymes. Notably, patients with sludge had significantly higher levels of total, direct, and indirect bilirubin compared to those with CBD stones.

Although LFTs were deranged in both CBD stone cases with and without cholecystitis, no statistically significant differences were observed between the two groups, indicating that cholecystitis may not independently influence the extent of liver enzyme elevation. Additionally, SGOT was more frequently elevated than ALP, suggesting that transaminases can rise substantially in obstructive conditions, challenging the traditional assumption that ALP predominates in biliary obstruction.

LFT can be adopted as first-line diagnostic tests for predicting the presence of CBD stones. While LFTs are helpful in raising suspicion for choledocholithiasis, they are not definitive diagnostic tools.

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