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Original Research Article.

Trends in Liver Function Test After Common Bile Duct Exploration

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ABSTRACT

Background: CBD exploration remains an important technique for treating hepatobiliary diseases. Absolute indications of CBDE includes palpable stones in the common bile duct. Most CBD interventions are done with surgery (open/laparoscopic) or endoscopically. Symptoms and signs suggestive of common bile duct stones are abdominal pain, jaundice, nausea, vomiting, fever, cholangitis, pancreatitis, and elevated levels of bilirubin or liver enzymes. The aim of the present study is to determine the trends in Liver Function Tests i.e., Serum bilirubin (unconjugated and conjugated), SGOT, SGPT, Alkaline Phosphatase in pre-operative and post-operative patients of Common Bile Duct exploration.

Materials and Methods: This study was conducted on fifty patients in who came with CBD stones and were to undergo CBD exploration either open or laparoscopically. The blood samples were taken preoperatively post operatively to determine the levels of serum bilirubin and SGOT, SGPT, S.ALP and trends were determined.

Results: Liver function test improved after CBD exploration which were abnormal due to CBD stones.

Conclusion: The present study revealed that in the patients undergoing common bile duct exploration have abnormal levels of liver function test due to common bile duct stone which caused obstruction to outflow of bile. Post-Surgery there is improvement in liver function test. And improvement in the levels usually starts from post operative day 3 or 4 with complete normalization by postoperative day 30 which was due to complete resolution of pathology.

Keywords: CBD Exploration, Liver Function Test, CBD Stones.

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INTRODUCTION

Common bile duct exploration (CBDE) remains an important technique and is a part of every gastrointestinal surgeon's armamentarium for treating hepatobiliary diseases. Absolute indications of CBDE includes palpable stones in the common bile duct stones seen on intraoperative cholangiography. Common bile duct exploration should be performed in all patients with common bile duct stones who have either failed, or are not candidates for, endoscopic therapy due to any reason.[1,2]

Most CBD interventions are done with surgery (open/laparoscopic) or endoscopically. Open common bile duct exploration may be performed in patients requiring open cholecystectomy, for patients who have failed or suffered complications from laparoscopic common bile duct exploration, and in circumstances where necessary equipment, experience, and/or resources are limited. Laparoscopic common bile duct exploration (LCBDE) was associated with successful stone clearance rates ranging from 85% to 95%, a morbidity rate of 4%–16% and a mortality rate of around 0%–2%.[3,4] Common bile duct stone (CBDS) is a relatively frequent disorder with a prevalence of 10-20% in patients with gallstones.[5] CBDS are broadly classified by their location of origin:

1. **Primary CBDS:** Those stones whose point of origin is CBD itself. In the primary stones, bilirubin is dominant component and is associated with biliary stasis and infection.
2. **Secondary CBDS:** Those stones which originate in the gallbladder and subsequently migrate into the bile duct. These stones are the most common type of CBDS. In secondary stones, cholesterol is dominant component.[6] CBDS are often asymptomatic and are detected incidentally during workup in up to 7–20% of patients with gall bladder stones awaiting cholecystectomy. Symptoms and signs suggestive of common bile duct stones are abdominal pain, jaundice, nausea, vomiting, fever, cholangitis, pancreatitis, and elevated levels of bilirubin or liver enzymes.[7]

Biological Basis of Liver Chemistries

Serum Bilirubin - Bilirubin is a normal heme degradation product that is excreted from the body predominately via secretion into bile. Bilirubin is insoluble in water and requires conjugation (glucuronidation) into the water-soluble bilirubin mono- and diglucuronide forms before biliary secretion. Hyperbilirubinemia and serum elevations of hepatic alkaline phosphatase may be associated with cholestatic conditions. Cholestatic diseases can be categorized as either anatomic obstructions to bileflow[4] (extrahepatic cholestasis) or as functional impairments of bile formation by the hepatocyte (intrahepatic cholestasis). The initial evaluation of an elevated isolated serum bilirubin level is, thus, a determination of whether the bilirubin elevation is caused by conjugated (direct) or unconjugated (indirect) bilirubin.

Causes of Direct Hyperbilirubinemia[8]: When more than 50% is direct bilirubin.

1. Gallstones.
2. Gallbladder tumors.
3. Inflammatory scarring or obstruction of extrahepatic ducts.
4. It can be resolved by surgery.
5. Dubin-Johnson syndrome.
6. Rotor syndrome.
7. Drugs may cause cholestasis.[7]

Causes Of Indirect Hyperbilirubinemia[8]: When less than 15 to 20 % is direct bilirubin.

1. Increased RBC hemolysis (Erythroblastosis fetalis).
2. Sickle cell anemia.
3. Hepatitis.
4. Cirrhosis.
5. Crigler-Najjar syndrome.
6. Gilbert syndrome.
7. Congenital enzyme deficiency.
8. Drugs
9. Transfusion reactions.

Serum glutamic pyruvic transaminase (SGPT) or Alanine aminotransferase (ALT) ALT is purely cytoplasmic catalysing the transamination reaction. Normal serum ALT is 7–56 U/L.[9,10]

Serum glutamic oxaloacetic transaminase (SGOT) or Aspartate amino transferase (AST) AST also catalyse transamination reaction. AST exist two different isoenzyme forms which are genetically distinct, the mitochondrial and cytoplasmic form. Normal serum AST is 0 to 35 U/L. About 80% of AST activity of the liver is contributed by the mitochondrial isoenzyme, whereas most of the circulating AST activity in normal people is derived from the cytosolic isoenzyme.[8,9]

Mild ALT and AST Elevations (Less Than 5 Times the Upper Limit of Normal): ALT-Predominant Elevation Chronic viral hepatitis, Chronic HBV, Medications (Acetaminophen, Alphamethyldopa, etc), steatohepatitis, Hereditary hemochromatosis, Chronic autoimmune hepatitis, etc.

Etiology of Mild ALT and AST Elevations (ALT and AST Elevations Less Than 5 Times the Upper Limit of Normal): AST-Predominant Elevation Alcohol use, drug-induced liver injury, NASH, hemolysis, myopathic processes, etc.

Etiology of Severe ALT and AST Elevations (Greater Than 15 Times the Upper Limit of Normal) Acute viral hepatitis (A–E, herpes), Medications/toxins, Ischemic hepatitis, Autoimmune hepatitis, Wilson's disease, Acute bile duct obstruction, Acute Budd Chiari syndrome, Hepatic artery ligation, etc

Alkaline phosphatase (ALP): The alkaline phosphatase family of enzymes is zinc metalloenzymes that are present in nearly all tissues. ALP is present mainly in mucosal epithelia of small intestine, proximal convoluted tubule of kidney, bone, liver and placenta. The serum ALP activity is mainly from the liver with 50% contributed by bone. Isolated hepatic alkaline phosphatase isoenzyme elevations may be the sole abnormality in primary biliary cirrhosis or other cholestatic diseases, or with infiltrative diseases of the liver (hepatic metastasis, hepatitis, cirrhosis, etc).[7,10]

AIMS AND OBJECTIVES

The aim of the present study is to determine the trends in Liver Function Tests i.e., Serum bilirubin (unconjugated and conjugated), SGOT, SGPT, Alkaline Phosphatase in pre-operative and post- operative patients of Common Bile Duct exploration

MATERIALS AND METHODS

Inclusion Criteria

1. Patients of either sex 2. Patients above 18 years of Age.

Exclusion Criteria

1. Medically unfit patients.
2. Patients below 18 years of age
3. Patient is suffering from HCV, HBV, and hepatocellular carcinoma and periampullary carcinoma

Operative Procedure

Standard laparoscopic or open common bile duct exploration procedure was followed. In our study, 25 patients were operated laparoscopically, and 25 patients were operated by open method. Pre-operative and post-operative measurements of various parameters (viz. type of CBD exploration and liver function tests) were done. The post-operative measurements of liver function tests were done at day 1, day 2, day 3, day 4, day 7 and day 30. Liver Function tests were performed for the estimation of total serum bilirubin, conjugated serum bilirubin, unconjugated serum bilirubin, SGOT, SGPT, and alkaline phosphatase. These findings were duly noted down on proforma and results were evaluated at the end of study.

RESULTS

Total serum bilirubin, there was increase in level on first day (3.121%) and more on day 2(3.641%). It started improving on day 3(0.68%) which continued to improve on post- operative day 7 (52.341%) and post-operative day 30 (70.546%). For conjugated serum bilirubin, the percentage in improvement was seen on postoperative day 4 (3.732%) which continued to improve on post-operative day 7 (53.568%) and post-operative day 30 (70.362%). For unconjugated serum bilirubin, the percentage in improvement was seen on post-operative day 4 (4.817%) which continued to improve on post-operative day 7 (51.669%) and post- operative day 30. For SGPT slight improvement was seen from the first post-operative day (0.239%). This improvement rose to 21.824% on post-operative day 7 and 42.182% on post-operative day 30. For alkaline phosphatase, slight improvement was seen from the fourth post-operative day (0.141%). This improvement rose to 47.092% on post-operative day 7 and 50.821% on post-operative day 30.

It was seen that there was slight improvement in the level of SGOT from the first post-operative day (0.335%). This

improvement rose to 20.450% on postoperative day 7 and 43.183% on post-operative day 30. In our study, pre-operatively, the alkaline phosphatase was 255.840± 40.823 IU/L. Post-operatively, at day 1, the alkaline phosphatase increased to 257.340± 40.331 IU/L, which was non-significant (p=0.135). The levels of alkaline phosphatase showed significant decrease to 135.360± 11.257 IU/L, and 125.820±4.592 IU/L on day 7 and day 30 respectively (p= 0.001 for both).

Table 1: Pre-Operative and Post-Operative Levels of Total Serum Bilirubin

DAYS	Total Serum Bilirubin (mg/dl)	Std. Deviation	Std. Error Mean	p value
Pre-Op	3.076	1.189	0.168	--
Post-Op Day 1	3.172	1.138	0.161	0.001
Post-Op Day 2	3.188	1.023	0.145	0.011
Post-Op Day 3	3.100	1.180	0.167	0.282
Post-Op Day 4	2.980	1.328	0.188	0.460
Post-Operative Day 7	1.466	1.052	0.149	0.001
Post- OperativeDay 30	0.906	0.154	0.022	0.001

Table 2: Pre-operative and post-operative levels of SGPT

Days	SGPT U/L	Std. Deviation	Std. Error Mean	p value
Pre-Operative	66.900	42.945	6.073	--
Post-Operative Day 1	66.740	42.759	6.047	0.088
Post-Operative Day 2	66.320	42.502	6.011	0.005
Post-Operative Day 3	65.740	42.671	6.035	0.004
Post-Operative Day 4	65.400	40.092	5.670	0.004
Post-Operative Day 7	52.300	33.578	4.749	0.001
Post-Operative Day 30	38.680	2.889	0.409	0.001

Table 3: Pre-operative and post-operative levels of SGOT

DAYS	SGOT (U/L)	Std. Deviation	Std. Error Mean	p value
Pre- Operative	65.720	30.487	4.311	--
Post- Operative Day 1	65.500	30.377	4.296	0.001
Post- Operative Day 2	65.720	29.946	4.235	1.000
Post- Operative Day 3	63.620	21.611	3.056	0.306
Post- Operative Day 4	65.320	28.029	3.964	0.413
Post- Operative Day 7	52.280	24.125	3.412	0.001
Post- Operative Day 30	37.340	3.268	0.462	0.001

Table 4: Pre-operative and post-operative levels of Alkaline Phosphatase

DAYS	Alk. Po4 (IU/L)	Std. Deviation	Std. Error Mean	p value
Pre-Operative	255.840	40.823	5.773	--
Postoperative Day 1	257.340	40.331	5.704	0.135
Postoperative Day 2	258.100	38.723	5.476	0.292
Postoperative Day 3	261.560	39.007	5.516	0.000
Postoperative Day 4	255.480	40.829	5.774	0.104
Postoperative Day 7	135.360	11.257	1.592	0.001
Postoperative Day 30	125.820	4.592	0.649	0.001

DISCUSSION

The present study was conducted on 50 patients with diagnosis of choledocholithiasis who underwent CBD exploration open and laparoscopically with the objectives to determine the trends in Liver Function Tests i.e., Serum bilirubin, SGOT, SGPT, Alkaline Phosphatase in preoperative and post operatively. The pre-operative and post-operative measurements of various parameters were done. The post-operative measurements of liver function tests were done at day 1, day 2, day 3, day 4, day 7 and day 30.

In the present study, pre-operatively, the total serum bilirubin was 3.076± 1.189 mg/dl. SGOT and SGPT were 65.720± 30.487 U/L and 66.900± 42.945U/L, respectively. Alkaline phosphatase was255.840± 40.823 IU/L. the level was elevated due to choledocholithiasis.

On post-operative day 1, there was significant increase in the levels of total serum bilirubin (3.172±1.138 mg/dl, p=0.001) and alkaline phosphatase (257.340± 40.331 IU/L, p=0.135). There was non- significant decrease in the levels of SGOT (65.500± 30.377U/L, p=0.971) and SGPT (66.740±42.759U/L, p=0.088). On post-operative day 4, the level of total serum bilirubin decreased to 2.980± 1.328 mg/dl (p- value 0.460; non-significant).), SGOT (65.320±28.029 U/L, p=0.971) and alkaline phosphatase was 255.480± 40.829 IU/L, p=0.104). Only SGPT showed a significant decrease (65.400± 40.092 U/L, p=0.004). On post-operative day 7, there was a significant decrease in the level of total serum bilirubin (1.466± 1.052 mg/dl, p=0.001), SGPT (52.300± 33.578 U/L; p=0.001), and alkaline phosphatase (135.360± 11.257 IU/L; p=0.001).Following the similar pattern, on post- operative day 30, there was a significant decrease in the level of total serum bilirubin (0.906± 0.154 mg/dl, p=0.001), SGPT (38.680± 2.889 U/L; p=0.001), and alkaline phosphatase (125.820± 4.592 IU/L; p=0.001). The results of the present study can be compared to study conducted by Xiao L-K et al (2018) which reported the postoperative LFT gradually returned to normal levels after postoperative 5 to 7 days[10] Wewelwala C et al reported that proportions of patient who had worsening LFTs on day 1 were not statistically different between two groups and they were statistically equal on equivalence testing. On day 2, proportions of patient were again not statistically different. Bilirubin and ALT were statistically equivalent (P=0.022 and P=0.025 respectively) but GGT and ALP failed to achieve statistical equivalence (P=0.062 and P=0.138 respectively) on day 2.[11]

SUMMARY

The present study revealed that in the patients undergoing Common bile duct exploration have abnormal levels of liver function test due to common bile duct stone which causes obstruction to outflow of bile. Post-Surgery there is improvement in liver function test. There may be a transient rise in levels of serum bilirubin and alkaline phosphatase post operatively. This may be due transient edema of common bile duct post operatively immediately due to exploration. and the improvement in the levels usually starts from post operative day 3 or 4 with complete normalization by post operative day 30 which is due to complete resolution of pathology.

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