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ORIGINAL ARTICLE

Impact of Common Bile Duct stenting versus non-stenting for patients with choledocholethiasis prior cholecystectomy

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ABSTRACT

Background: In ERCP for treatment of Choledocholithiasis, stent insertion after CBD clearance may be beneficial in lowering the pressure in the bile ducts and provide better bile drainage, However, CBD stenting is accused to be of unfavorable outcomes.

Aim: To compare between CBD stenting and non-stenting regarding of recurrence rate of CBD stones, complications such as CBD leakage and blockage.

Methods: This randomized clinical trial study was conducted at Gastro-Intestinal Endoscopic unit of Internal Medicine Department, Faculty of Medicine, Zagazig University Hospitals, on 60 patients with diagnosis of small CBD stones <15 mm by abdominal ultra-sonography or MRCP. Patients were divided into two groups: group (A): 30 patients who were scheduled for ERCP and underwent CBD clearance and stone retrieval with plastic CBD stent insertion and group (B): 30 patients who were scheduled for ERCP and underwent CBD clearance and stone retrieval without plastic CBD stent insertion.

Results: There was significant difference between both groups regarding to recurrence that was higher in group B than group A.

Conclusions: Biliary stenting after CBD stone removal reduces the likelihood of stone recurrence.

Keywords: Common Bile Duct, Stenting Endoscopic Retrograde Cholangiopancreatography, Magnetic RetrogradeCholangiopancreatography, Choledocholithiasis.

INTRODUCTION

The incidence and prevalence of choledocholithiasis vary greatly throughout the world; in the majority of patients in Western nations, choledocholithiasis is a subsequent condition to cholelithiasis. In contrast, Asian nations have been found to have greater rates of primary choledocholithiasis**[1].**

One of the main reasons patients are admitted to hospitals for gastrointestinal issues is gallstone disease **[2].**

Of the population, 10% of females and 6% of males suffer from cholelithiasis. Regarding Incidence is four times greater in women than in men, and it is most common in younger people (20–30 years old) **[3].**

Between 10% and 18% of patients undergoing cholecystectomy for gallstones have been found to have common bile duct stones (CBDS), and the prevalence rises with age in patients with symptoms suggestive of choledocholithiasis **[4].**

Even now, there is disagreement on the best way to treat CBD stones. Cholangiopancreatography (ERCP) and surgical interference (open or laparoscopic) are part of the treatment for CBD stones. When cholecystectomy and CBD exploration are done simultaneously, the sphincter's architecture is not altered. On the other side, there is a risk of bile leakage and long-term CBD stricture issues associated with surgical CBD exploration **[5].**

For the majority of facilities, the preferred approach in treating patients with suspected CBD stones is still ERCP, either before or after surgery. Large size (20 mm) stone, difficult multiple (> or = 3) stones, and a contraindication to ERCP (such as failed balloon, Dormia basket extraction, and mechanical lithotripsy), which is necessary in conjunction with surgical exploration **[4].**

There are numerous benefits of CBD Biliary Stenting surgery. It improves quality of life, necessitates a brief hospital stay, and has a reduced rate of morbidity and mortality. Consequently, no more endoscopic procedures or surgeries will be required to remove any remaining stones **[6].**

METHODS

This randomized clinical trial study was conducted at Gastro-Intestinal Endoscopic unitof Internal Medicine Department, Faculty of Medicine, Zagazig University Hospitals**,** on 60 patients with diagnosis of small CBD stones <15 mm by abdominal ultra-sonography or MRCP. Patients gave their informed consent. An IRB approval (number 10633) was obtainedby the Zagazig University Faculty of Medicine Ethics Committee.

Sixty patients were randomly divided into two groups: group (A): 30 patients who were scheduled for ERCP and underwent CBD clearance and stone retrieval with plastic CBD stent insertion and group (B): 30 patients who were scheduled for ERCP and underwent CBD clearance and stone retrieval without plastic CBD stent insertion.

Inclusion criteria included patients with diagnosis of small CBD stones) <15 mm) by abdominal ultra-sonography or MRCP, age > 18 years old, patients with of obstructive jaundice due to CBD stones, naïve papilla and patients with multiple tiny gall bladder stones.

Exclusion criteria included age < 18 years old, CBD stones sized > 20 mm by abdominal ultra-sonography or MRCP and CBD stones that required mechanical lithotripsy for removal, patients with other causes of jaundice including hemolytic , hepatocellular & obstructive jaundice due to causes other than choledocolethiasis as in-(patient of hepatocellular carcinoma , pancreatic masses , strictures ,cholangio carcinoma, patients with previous ERCP for recurrent stones or Patients underwent lithotripsy, patients who had undergone hepato-biliary surgery or Endoscopic sphincterotomy (EST), intrahepatic duct (IHD) stones, pregnancy, patients with large impacted stone at sphincter that is difficult to extract where is the stenting is necessary, patients with more than 3 stones, patients with Cystic duct stone (mirizzi syndrome) and patients with cholidecholithiasis complicated with cholangitis or biliary-pancreatitis.

All patients were subjected to full history taking, general and local examination, laboratory examinations including: WBCs, liver function test, serum amylase and serum lipase. Cardio-pulmonary assessment was

done including: cardiological examination and electrocardiogram and chest examination and chest X- ray. Radiological investigations was done including: abdominal ultrasound, abdominal CT scan or MRCP.

Procedure:

Patient preparation:

Before the procedure, the patient was kept NPO for six hours prior to ERCP. Insulin was administered to diabetics by infusion. Prophylactic use of broad-spectrum antibiotic prior to ERCP to reduce risk of bacteremia**[7].** General anesthesia with endotracheal tube by using Isotan® (Isofurane) which is known to be safe in such patients. Patients were placed on the x-ray (C-arm), everyone was first inspected in the prone position, then in the left lateral position with the left arm behind their backs. Blood pressure, heart rate, and pulse oximetry are examples of appropriate monitoring. We administered 20–40 mg of Buscopan® (hyoscine butyl bromide) intravenously to reduce duodenal peristalsis as soon as the endoscope was inside the duodenum.

The ERCP technique:

The endoscope was introduced gradually and passed softly into the stomach through the esophagus. There are situations when using the side-viewing endoscope makes it challenging to navigate the stomach and locate the pylorus. In the end, successful maneuvering was achieved . The endoscope was passed through the pylorus and into the proximal duodenum using gentle rotation and pressure. Here the patient was turned to prone position. To visualize the papilla both “up, down” and “right, left” dials were turned to complete up and complete right then the endoscope was shortened by its pulling back.

Selective cannulation of the common bile duct was performed.

The cannula was introduced into the orifice of the ampulla of Vater then we injected 1 to 2 mL of Telebrix® Apply a light coloring agent to outline the biliary tree, noting if intrahepatic and extrahepatic biliary dilatation and stones are present in the CBD.

Endoscopic sphincterotomy and further endoscopic interference:

1) Bile duct cannulation that is selective.

2) Sphincterotome positioning: The sphincterotome was positioned in the papilla orifice, with the "cutting" wire making contact with the papilla at 11 or 12 o'clock. This was done to prevent damage to the pancreatic duct, since the pancreatic duct's origin is at 1 o'clock, and the common bile duct's origin is at 11 o'clock. Pancreatitis and bleeding are decreased while cutting in this position. The sphincterotome was placed over a guidewire during a wire-guided sphincterotomy procedure.

3) Cutting the papilla: The ampullary sphincter cutting gradually through the sphincterotome wire between 11 and 12 o'clock to facilitate elimination of biliary duct stones.

Following a sufficient sphincterolysis, endoscopic stone removal via the ampulla was carried out. Because forcing a stone through an intact ampullary sphincter might be excessively stressful, edema following the treatment can clog it and make cholangitis or pancreatitis worse. Subsequent treatments were carried out, which involved either balloon stone extraction for stones with a diameter of less than 1 cm or Dormia basket stone extraction for larger stones. Group A underwent this procedure with stenting, while

group B did not. Biliary stents were then removed 4 weeks after ERCP when liver function normalized.

Follow up:

Clinical evaluations and laboratory tests have been conducted on patients before and after procedure.Postoperatively the patients were followed up for development of biliary complications such as pancreatitis, recurrent obstructive jaundice with subsequent need for emergency ERCP and stent-related complications such as stent occlusion, migration, and intestinal perforation. Following discharge, the patients have been monitored for the first 45 days after ERCP (followed by a clinical assessment and a liver function test, s.amylase, s.lipase and CBC). To rule out biliary stenosis and ERCP complication.

ERCP Difficulty Grading:

ERCP difficulty was graded from 1 to 3 scale according to American Society for Gastrointestinal Endoscopy (ASGE) committee **[8].**

- Grade 1: Removal of a bile duct stone smaller than 10-mm-diameter.
- Grade 2: Removal of a bile duct stone with a diameter of at least 10 mm.
- Grade 3: Any size pancreatic duct stone removal.

Stone Extraction Difficulty:

For patients who are deemed suitable for the procedure, the European Society of Gastrointestinal Endoscopy (ESGE) suggests stone extraction for all patients with common bile duct stones. Unfortunately, the search results that are displayed do not provide a precise grading for the level of stone extraction difficulties. The location, quantity, and size of the stones, the patient's health, and the endoscopist's experience can all affect how difficult the procedure is. **[9].**

STATISTICAL ANALYSIS

IBM Inc., Chicago, IL, USA used SPSS v26 for statistical analysis. The quantitative variables were compared between the two groups using the unpaired Student's t-test. They were provided as mean, standard deviation (SD), and range. When appropriate, the Fisher's exact test or the Chi-square test were used to examine the frequency and percentage (%) of the qualitative variables. A statistically significant value was defined as a two-tailed P value ≤ 0.05.

RESULTS

Age and sex were insignificantly different between both groups. [Table 1]. There was no significant difference between both groups regarding ooperative time[Table **1**2]. The Pre-ERCP laboratory investigations were insignificantly different between both groups **[Table 3].** The laboratory investigations (total bilirubin, direct bilirubin, alkaline phosphatase,GGT, ALT and AST) were significantly lower in group A than group B at 48 hours after ERCP **[Table 4].** The Post-ERCPlaboratory investigations (ALT andAST) were significantly lower in group A than group B at 2 weeks **[Table 5**]. All laboratory investigations (TLC, total bilirubin, direct bilirubin, alkaline phosphatase,GGT, ALT and AST) after ERCP by 45 days were insignificantly different between both groups. There was significant difference between both groups regarding to recurrence of CBD stones that was higher in group B than group A **[Only** 2 patients in group A had stent block at 48 hours after ERCP and were treated by removal of old stent and using another one

and after 5 days of using 2nd stent, 2 patients were completely improved. Only 2 patients in group B had bile leakage at time of cholecystectomy and was treated by ERCP and using a stent. **[Table 17]**

6]. Only 2 patients in group A had stent block at 48 hours after ERCP and were treated by removal of old stent and using another one and after 5 days of using 2nd stent, 2 patients were completely improved. Only 2 patients in group B had bile leakage at time of cholecystectomy and was treated by ERCP and using a stent. **[Table 17]**

Table 1: Demographics of the studied groups:

		Group (A) (n=30)	Group (B) (n=30)	P value
Age (years)	**Mean ± SD**	35.3 ± 6.48	33.9 ± 7.5	0.44
	Range	20 - 60	22 - 57	
Sex	**Male**	6 (20%)	8 (26.7%)	0.54
	Female	24 (80%)	22 (73.3%)	

Table 2: Operative time and hospital stay of the studied groups:

		Group (A) (n=30)	Group (B) (n=30)	P value
Operative time (min)	**Mean ± SD**	22.4 ± 4.17	23.3 ± 4.67	0.43
	Range	16 - 28	17 - 29	

Table 3: Pre-ERCP laboratory investigations of the studied groups:

		Group (A) (n=30)	Group (B) (n=30)	P value
TLC (× 10^9/L)	**Mean ± SD**	8.1 ± 2.78	7.7 ± 2.09	0.53
	Range	5 - 11.2	4.9 - 11	
Total bilirubin (µmol/L)	**Mean ± SD**	7.8 ± 5.93	6.9 ± 3.38	0.47
	Range	1.9 - 19.7	2.5 - 15.4	
Direct bilirubin	**Mean ± SD**	5.9 ± 1.51	5.5 ± 1.4	0.29

		Group (A) (n=30)	Group (B) (n=30)	P value
(µmol/L)	Range	1.8 – 7.9	2.3 - 7.2	
Alkaline phosphatase (IU/L)	Mean ± SD	312.6 ± 82.25	329.7 ± 77.08	0.40
	Range	139 - 517	76 - 557	
GGT (IU/L)	Mean ± SD	373.1 ± 69.34	353.3 ± 64.87	0.25
	Range	46 - 741	40 - 763	
ALT (U/L)	Mean ± SD	184.4 ± 39.46	169.7 ± 33.95	0.12
	Range	17 - 693	20 - 421	
AST (U/L)	Mean ± SD	209.4 ± 47.5	200.9 ± 44.7	0.47
	Range	23 - 485	24 - 465	
	Range	18 - 238	26 - 229	

ERCP: Endoscopic retrograde cholangiopancreatography, TLC: Total Leucocyte Count, GGT: Gamma-Glutamyl Transpeptidase, ALT: Alanine transaminase, AST: Aspartate Transaminase. *significant as P-value ≤ 0.05.

Table 4: Post-ERCP laboratory investigations of the studied groups (48 hours):

		Group (A) (n=30)	Group (B) (n=30)	P value
TLC (× 10^9/L)	Mean ± SD	8.3 ± 2.56	7.9 ± 1.72	0.48
	Range	5 - 14	5 - 10.6	
Total bilirubin (µmol/L)	Mean ± SD	4.6 ± 1.2	5.5 ± 1.4	**0.009**
	Range	1.2 - 15.6	2 - 11.6	
Direct bilirubin (µmol/L)	Mean ± SD	3.1 ± 0.86	3.6 ± 1.06	**0.04**
	Range	0.3 - 10.6	1 - 8.4	
Alkaline phosphatase (IU/L)	Mean ± SD	253.3 ± 60.86	288.5 ± 70.82	**0.04**
	Range	105 - 460	124 - 550	
GGT (IU/L)	Mean ± SD	245.3 ± 50.31	283.4 ± 64.67	**0.013**

		Group (A) (n=30)	Group (B) (n=30)	P value
	Range	32 - 495	40 - 585	
ALT (U/L)	**Mean ± SD**	139.6 ± 28.23	157.9 ± 36.99	**0.035**
	Range	20 - 512	44 - 376	
AST (U/L)	**Mean ± SD**	147.1 ± 38.09	173.1 ± 46.98	**0.02**
	Range	26 - 540	41 - 505	
	Range	20 - 270	52 - 210	

ERCP: Endoscopic retrograde cholangiopancreatography, TLC: Total Leucocyte Count, GGT: Gamma-Glutamyl Transpeptidase, ALT: Alanine transaminase, AST: Aspartate Transaminase. *significant as P-value ≤ 0.05.

Table 5: Post-ERCP laboratory investigations of the studied groups (2 weeks):

		Group (A) (n=30)	Group (B) (n=30)	P value
TLC (× 10^9/L)	**Mean ± SD**	8.2 ± 1.22	8.4 ± 1.35	0.54
	Range	4 - 10.1	5 - 9	
Total bilirubin (µmol/L)	**Mean ± SD**	1.3 ± 0.85	1.2 ± 0.16	0.52
	Range	0.8 - 1.6	0.9 - 1.5	
Direct bilirubin (µmol/L)	**Mean ± SD**	0.5 ± 0.17	0.45 ± 0.19	0.28
	Range	0.1 - 0.8	0.2 - 0.7	
Alkaline phosphatase (IU/L)	**Mean ± SD**	82.2 ± 16.48	85.1 ± 14.09	0.46
	Range	60 - 105	58 - 119	
GGT (IU/L)	**Mean ± SD**	77.7 ± 15.2	82.3 ± 17.4	0.28
	Range	26 - 111	38 - 130	
ALT (U/L)	**Mean ± SD**	50.7 ± 10.2	73.3 ± 13.1	**0.001**
	Range	25 - 210	35 - 77	
AST (U/L)	**Mean ± SD**	48.2 ±9.6	69.7 ± 12.3	**0.001**

	Range	22 - 67	25 - 87	
	Range	19-66	27 - 76	

ERCP: Endoscopic retrograde cholangiopancreatography, TLC: Total Leucocyte Count, GGT: Gamma-Glutamyl Transpeptidase, ALT: Alanine transaminase, AST: Aspartate Transaminase. *significant as P-value ≤ 0.05.

Table 6: Post-ERCP laboratory investigations of the studied groups (45 days):

		Group (A) (n=32)	**Group (B) (n=28)**	**P value**
TLC (× 10^9/L)	**Mean ± SD**	7.7 ± 2.1	7.24 ± 1.78	0.36
	Range	4.9 - 9.3	5 - 9.2	
Total bilirubin (µmol/L)	**Mean ± SD**	0.8 ± 0.09	0.75 ± 0.11	0.05
	Range	0.4 – 0.9	0.3 – 0.9	
Direct bilirubin (µmol/L)	**Mean ± SD**	0.2 ± 0.03	0.21 ± 0.02	0.14
	Range	0.1 - 0.2	0.1 – 0.2	
Alkaline phosphatase (IU/L)	**Mean ± SD**	52.8 ± 9.1	54.2 ± 8.8	0.54
	Range	35 - 66	50 - 67	
GGT (IU/L)	**Mean ± SD**	61.7 ± 9.4	58.9 ± 10.3	0.27
	Range	30 - 89	31 - 85	
ALT (U/L)	**Mean ± SD**	33.9 ± 6.8	31.7 ± 6.6	0.21
	Range	20 - 43	22 - 40	
AST (U/L)	**Mean ± SD**	25.4 ± 6.7	23.8 ± 6.1	0.34
	Range	17 - 35	16 - 32	
Recurrence	**N (%)**	1 (3.12%)	7 (25%)	**0.001**

ERCP: Endoscopic retrograde cholangiopancreatography, TLC: Total Leucocyte Count, GGT: Gamma-Glutamyl Transpeptidase, ALT: Alanine transaminase, AST: Aspartate Transaminase.

Table 7: Stent block among group A (at 48 hours after ERCP) and bile leakage among group B (at time of cholecystectomy):

Group (A) (n=30)

Stent block	**N (%)**	2 (13.4%)
Group (B) (n=30)		
Bile leakage	**N (%)**	2 (6.7%)

DISCUSSION

In this study, age and sex were insignificantly different between both groups. However, as it is known from previous studies, gallbladder stones are more common in females than in males.

Chaudhary et al. [3] revealed that of the population, 10% of females and 6% of males suffer from cholelithiasis. Regarding Incidence is four times greater in women than in men, and it is most common in younger people (20–30 years old)

Regarding operative time, there was no significant difference between the two groups in our study. Not in accordance with our research, **Choi et al. [10]** who aimed to determine the effect of biliary stenting following CBD stone removal on the frequency of the recurrence of CBD stones, found that the mean total operative time in non-stenting group was 14.7 minutes, while in the stenting group was 19.2 minutes (p = 0.001).

In our study, the post-ERCP laboratory investigations, At 48 hours following ERCP, several biomarkers, such as total bilirubin, direct bilirubin, alkaline phosphatase, GGT, ALT, AST, lipase, and amylase, were considerably lower in Group A than in Group B. Furthermore, at two weeks, ALT, AST, lipase, and amylase levels in group A were noticeably lower than those of group B. After 45 days following ERCP, these laboratory measurements did not differ between the two groups. These findings suggest that the biliary stent may help facilitate the drainage of bile and reduce the biochemical markers of cholestasis in the early post-ERCP period. However, the long-term effects on these laboratory parameters appear to be similar between the two groups.

Even if the results of stented and non-stented procedures are equal after 45 days, stenting can have a number of benefits in the context of ERCP for patients with CBD stones. The following are some possible advantages of stenting: 1. Reduction in Stone Size: Stenting may cause the stones to become smaller, which will make them simpler to remove during follow-up treatments. 2. Stone Fragmentation: The ability to break up stones into smaller pieces makes them easier to remove when a stent is present. 3. Bridge to Secondary Intervention: Stenting acts as a treatment bridge to secondary therapies, giving the patient time to heal and to schedule additional stone removal procedures **[11].** 4. Easier Stone Removal: Because of the changes in stone size and consistency following stenting, subsequent ERCP operations may be simpler and more effective **[12].** 5. Safety and Efficacy: Stenting has been demonstrated to be a safe and effective substitute when total stone clearance is not achievable in a single session, particularly in elderly, fragile, and high-risk patients 1 **[13].**

Kitagawa et al. [14] found that

although there was no significant difference in the two groups' incidence of procedure-related adverse events (AEs), the EBS group's incidence of AEs tended to be slightly greater. This result could be explained by the fact that some high-risk patients in the EBS group had lengthy procedures done, or who were scheduled to have stones removed but had it changed to palliative stenting in the middle of the surgery.

Terada et al. [15] sought to evaluate prospectively the contribution of biliary stent deployment on the natural excretion of tiny common bile duct stones. According to their findings, 18.8% of patients had stent migration without any symptoms.

Chopra et al. [16] discovered that in a randomized comparison between ductal clearance and long-term biliary stenting, ductal clearance was consistently linked to a greater rate of procedural adverse events (AEs) (16% vs. 7%). But there was a decreased frequency of long-term biliary adverse events (14% vs. 36%).

Terada et al. [15] showed that, 56% of common bile duct stones with a diameter of less than 5 mm in diameter resolved following planned biliary stenting. They demonstrated a stone clearance rate that was higher than that of earlier studies, in which untreated bile duct stones naturally cleared at 19.3-22.7 percent. **[17].** According to this research, bile duct stenting is probably going to help increase the rates at which stones are cleared.

In a study carried out by **Chan et al. [18]** For 46 patients, whose CBD stones could not be removed during the initial ERCP session, plastic biliary stents were implanted. On the other hand, 28 (60.9%) of these patients had effective stone removal during the subsequent ERCP session.

Rates of recurrence of CBD stones in our study showed a significant difference between the two groups, with Group B having a greater recurrence rate (25%) than Group A (3.12%). This research indicates a major clinical benefit: if CBD stones are cleared, biliary stent may help prevent their recurrence.

This is in line with **Choi et al. [10]** stated that, despite the bigger stone size and increased frequency of EML, the stenting group had a reduced rate of CBD stone recurrence. Stated differently, long-term stone recurrence may be avoided with stent implantation.

Terada et al. [15] revealed that 3 (16.7%) of the 18 patients whose stones disappeared following scheduled stenting experienced a recurrence of their stones throughout the one-year follow-up period. A plausible explanation for the recurrence of stones could be that, during bile duct stenting, tiny stones concealed in the hilar bile duct or behind the stent are overlooked by EUS. A biliary infection brought on by the biliary sludge may have contributed to the recurrence of common bile duct stones in one patient whose EUS revealed biliary sludge.

Certain data indicate that older patients with choledocholithiasis who are at high risk may benefit from long-term stenting **[19, 20].**

Yasui et al. [21] demonstrated that after endoscopic treatment for choledocholithiasis in older patients, the risk of recurrence did not rise, even if the gallbladder containing gallstones was maintained.

The following are causes of recurrence of stones: 1. Anatomy and Physiology: It has been determined that certain anatomical characteristics, such as a periampullary

diverticulum and a dilated bile duct with a diameter of at least 15 mm, are independent risk factors for choledochal problems, such as stone recurrence **[22].** 2. Recurrent common bile duct stone formation following ERCP is primarily caused by biliary reflux **[23].** 3. Incomplete Clearance: Recurrence is possible if not all stones are removed during the initial ERCP. 4. Biliary Stasis: Stone formation may be exacerbated by conditions that lead to biliary stasis, such as strictures or malfunction of the sphincter of Oddi. 5. Other Risk Factors: A history of many stones, a history of prior biliary surgery, stricture of the bile duct, and stenosis of the duodenum are other risk factors **[24].**

In our study, only 2 Bile leakage occurred in Group B patients during the cholecystectomy procedure. While this complication was rare, it highlights the potential role of biliary stents in preventing bile leakage after CBD stone clearance. Two patients in Group A experienced stent blockage at 48 hours after ERCP. This complication was managed by removing the obstructed stent and placing a new one. After 5 days, both patients were completely improved.

Kitagawa et al. [14] revealed that the EBS group had a case of stent-stone complicated. **Kaneko et al. [25]** demonstrated that the danger of a stent-stone complex is increased by prolonged EBS. The creation of a stent-stone complex can make it more difficult to remove outdated stents using traditional endoscopic techniques. Therefore, individuals with malignancies who have a poor prognosis may benefit from palliative EBS. However, the indications should be limited. Even when it was not possible to avoid biliary stenting during the initial course of therapy, it can be required to repeat the surgery after the patient's overall health improves in order to remove the stone completely or to take planned stent replacement into consideration **[26].**

The study has several limitations. Firstly, the study sample size was relatively small, which may limit the generalizability of the findings. Secondly, the study only looked at patients with small CBD stones (less than 15 mm), so the findings might not apply to patients with larger stones. Thirdly, the study was conducted at a single center, which may introduce potential biases and limit the external validity of the results. Fourthly, the 45-day follow-up period might not be long enough to capture long-term recurrence rates. Finally, the study did not examine the effects of biliary stenting on quality of life measures or patient-reported outcomes, which could be important considerations in future research.

CONCLUSIONS

In conclusion, the presence of a stent in the common bile duct following endoscopic retrograde cholangiopancreatography (ERCP) and removal of common bile duct (CBD) stones significantly reduces the possibility of stones recurrence from the gallbladder during cholecystectomy compared to non-stenting. Our collective results indicate that biliary stenting following CBD stone extraction enhances outcomes and reduces the likelihood of stone recurrence.

Declaration of interest

The authors report no conflicts of interest. The authors along are responsible for the content and writing of the paper.

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