Case Series

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Choledocholithiasis Post-cholecystectomy: A Decade Later

Surgery Section

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ABSTRACT

Choledocholithiasis, the presence of stones in the Common Bile Duct (CBD), is a rare occurrence years after cholecystectomy. This case series documents four instances of choledocholithiasis identified over a decade after cholecystectomy, exploring their clinical presentations, diagnostic methods and treatment approaches. Diagnostic imaging, including ultrasonography and Magnetic Resonance Cholangiopancreatography (MRCP), confirmed CBD stones in all patients. Therapeutic interventions, such as Endoscopic Retrograde Cholangiopancreatography (ERCP) with sphincterotomy and stenting, successfully addressed the condition. Potential contributing factors, including Remnant Cystic Duct Lithiasis (RCDL) and surgical clip migration, are discussed in relation to these cases. This series highlights the need for awareness of delayed choledocholithiasis as a possible late complication after cholecystectomy and warrants further investigation into its risk factors and preventive strategies.

Keywords: Biliary obstruction, Delayed stone formation, Remnant cystic duct lithiasis, Surgical clip migration

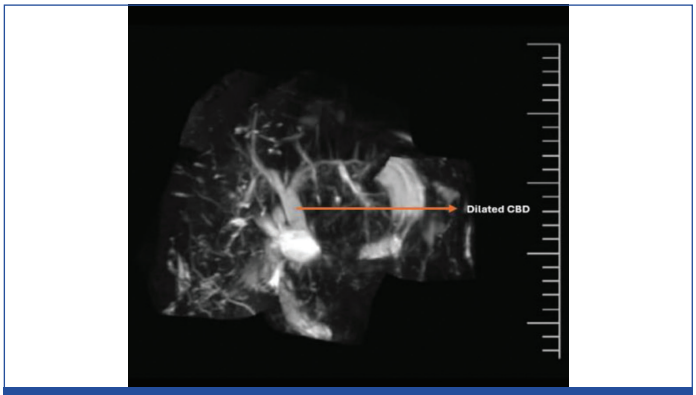
INTRODUCTION

Cholelithiasis is the most common disease of the gallbladder and biliary tree, affecting 10-15% of the population. Choledocholithiasis, or CBD stones, is often asymptomatic and detected in up to 10% of patients undergoing biliary imaging [1,2]. Primary CBD stones originate directly within the bile duct, while secondary CBD stones pass from the gallbladder into the bile duct [3]. Although MRCP is highly sensitive (>90%) and specific (>99%) for identifying CBD stones, it is a diagnostic test and a treatment procedure, such as ERCP or CBD exploration, must still be performed after diagnosis [3].

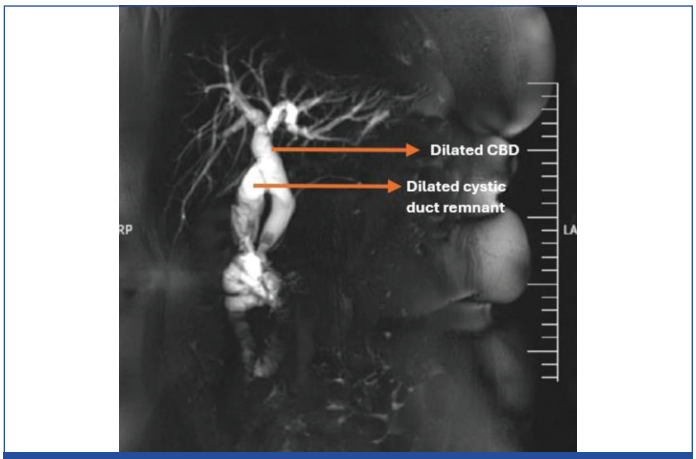
CASE SERIES

From October 2022 to January 2024, four cases (three females, one male; aged 42-56 years) of bile duct obstruction after cholecystectomy were analysed. All patients presented with upper abdominal pain and jaundice, with pruritus in one patient and vomiting in another. Three patients had no co-morbidities; one had type 2 diabetes mellitus and systemic hypertension. Two patients had undergone open cholecystectomy, one had laparoscopic cholecystectomy and another had laparoscopic subtotal cholecystectomy 10-12 years prior. Imaging (ultrasound and MRCP) confirmed bile duct dilation and stones (choledocholithiasis) in all cases, with Case 1 [Table/Fig-1] showing dilation of the Common Hepatic Duct (CHD) and CBD to their full extent on MRCP; Case 2 [Table/Fig-2] showing dilation of the CHD and CBD with a filling defect in the distal CBD, along with a dilated cystic duct remnant and its low joining with the CBD; Case 3 [Table/Fig-3] MRCP images revealing marked dilation of the CBD, CHD, and Intrahepatic Biliary Radicles (IHBR), with filling defects visible in the distal and terminal CBD; Case 4 [Table/Fig-4] MRCP image displaying a fluid-filled, elongated cystic structure continuous with the cystic duct, likely representing a gallbladder remnant, containing filling defects. Additional hypointense filling defects are observed in the dilated distal CBD.

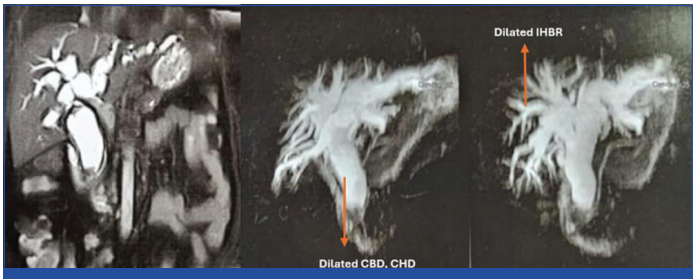
ERCP confirmed bile duct stones in all cases, with sphincterotomy and CBD clearance performed; three patients received stents (10 Fr in Cases 1 and 3, 7 Fr in Case 4). Case 1 ([Table/Fig-5] showing CBD stones and biliary sphincterotomy on ERCP), Case 2 ([Table/Fig-6] ERCP showing sphincterotomy and CBD clearance), Case 3 ([Table/Fig-7] ERCP image demonstrating biliary sphincterotomy and clearance of the CBD, along with the placement of a pigtail stent), and Case 4 ([Table/Fig-8] ERCP image showing biliary sphincterotomy,



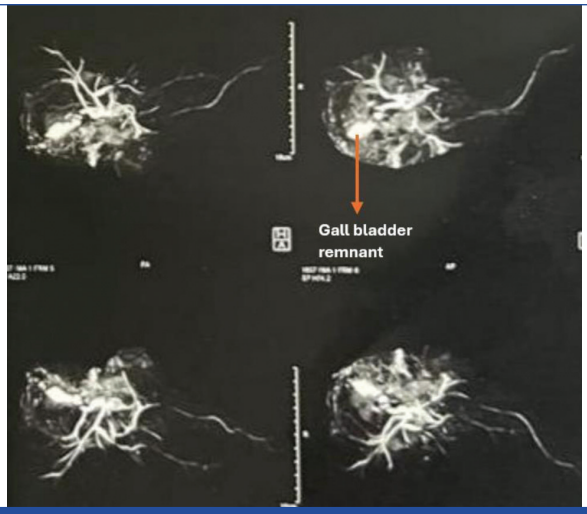
[Table/Fig-1]: MRCP of case 1 showing dilatation of CHD and CBD to its full extent.



[Table/Fig-2]: MRCP of case 2 showing dilated CHD and CBD with filling defect in distal CBD, along with dilated cystic duct remnant and its low joining with CBD.

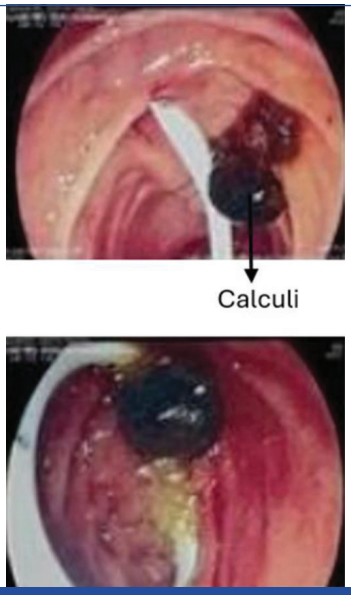


[Table/Fig-3]: MRCP of case 3 showing gross dilatation of CBD, CHD, and IHBR with filling defects in the terminal and distal CBD.

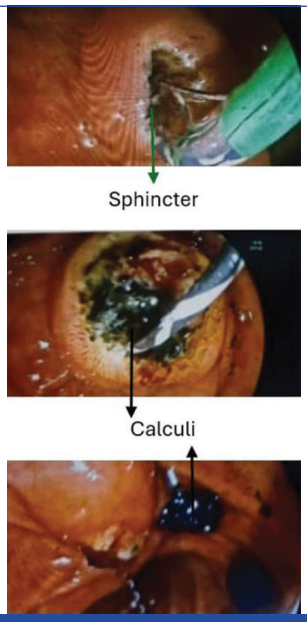


[Table/Fig-4]: MRCP of case 4 showing a fluid-filled oblong cystic structure continuous with the cystic duct- likely remains of GB with filling defects inside the GB remnant. Few hypointense filling defects noted in distal CBD, which appears dilated.

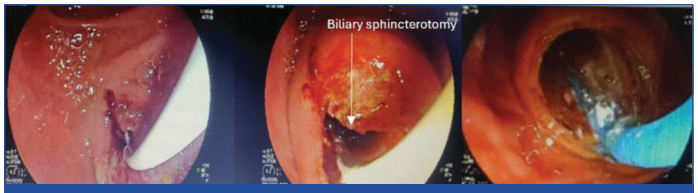
stenting of the CBD, and presence of periampullary diverticula). [Table/Fig-9] describes the clinical profiles, laboratory data, imaging findings and ERCP outcomes of four post-cholecystectomy patients presenting with biliary symptoms.



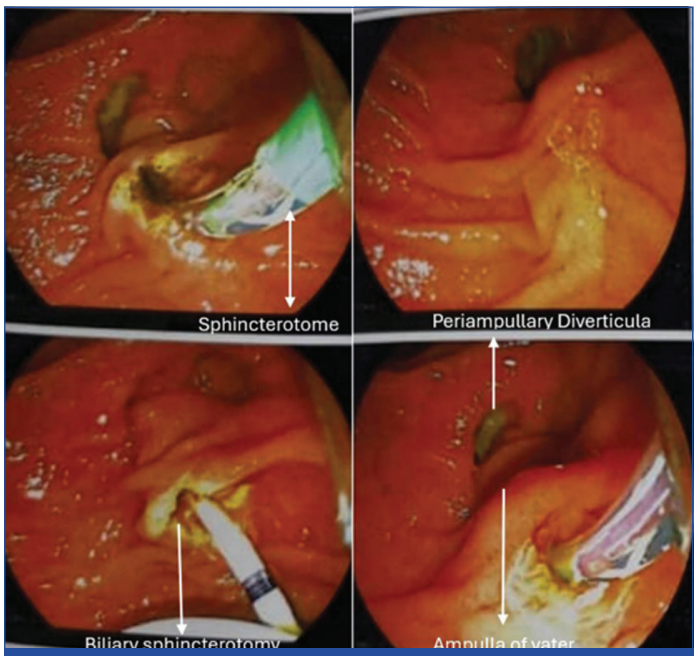
[Table/Fig-5]: ERCP of case 1 showing stones in CBD, CBD clearance being done following biliary sphincterotomy.



[Table/Fig-6]: ERCP of case 2 showing sphincterotomy with CBD clearance.



[Table/Fig-7]: ERCP of case 3 showing biliary sphincterotomy and CBD clearance with placement of pigtail stent.



[Table/Fig-8]: ERCP of case 4 demonstrating biliary sphincterotomy, CBD stenting and periampullary diverticula.

DISCUSSION

Present case series highlighted four cases of post-cholecystectomy CBD stones occurring 10 years after surgery. The various causes of CBD stones after cholecystectomy include surgical clip migration and RCDL [4-6]. Surgical clip migration was first described as a potential cause in 1979 by Walker WE et al., in his study [7]. Non absorbable suture materials have been shown to serve as a focal point for bile stone formation when they come into contact with the bile duct lumen [8,9]. The exact mechanism behind clip migration is not fully understood, but it is believed that prolonged compression of the clipped cystic duct stump by surrounding structures may cause the cystic duct and clips to invaginate into the CBD [10]. It is thought that the inverted cystic duct stump eventually becomes necrotic, possibly due to local pressure effects, which allows the clips to migrate into the CBD lumen and creates a nidus for gallstone formation [10]. It is important to note that biliary clip migration is not limited to intraluminal CBD migration; poor clip placement on the cystic duct and a short cystic duct stump, with clips applied near the cystic duct/CBD junction, can also result in clip migration [11].

Furthermore, long cystic duct remnants contribute to the possibility of RCDL, probably due to the increased area over which remnant lithiasis may have been missed during the original operation [12]. Hall RJ et al., studied the occurrence of stones and periampullary diverticula after cholecystectomy, revealing a strong correlation between CBD stones and the presence of a diverticulum, with stones observed in 43% of patients with a diverticulum compared to 18% in those without one. They also found that cholecystectomy did not prevent choledocholithiasis in the presence of a diverticulum [13].

Proper skeletonisation of the cystic duct and limiting the use of surgical clips or ligatures to the essential minimum are measures that may help reduce the risk of clip migration [14]. Similar late presentations of choledocholithiasis have been reported. A study by Cookson NE et al., highlighted acute cholangitis due to clip migration a decade after laparoscopic cholecystectomy, reinforcing

Characteristics	Case 1	Case 2	Case 3	Case 4
Age (years)/sex	42/Female	50/Female	56/Female	52/Male
Clinical presentation	Pain in the right upper abdomen and yellowish discoloration of the sclera for eight days	Pain in the right upper abdomen and yellowish discoloration of the sclera and urine and vomiting for one month	Pain in the right upper abdomen and yellowish discoloration of sclera for one month	Pruritus since 1 month and icterus since 10-12 days. Pain abdomen for two days
Co-morbidities	None	None	None	DM and HTN for four years on medication
Past surgical history	Open Cholecystectomy 10 years ago	Laparoscopic cholecystectomy 10 years ago	Open cholecystectomy 12 years ago	Laparoscopic subtotal cholecystectomy 11 years ago
Presence of cholangitis	No	No	No	Yes
TLC count (4000-10,000/µL)	12,700	4900	9800	20,420
Total bilirubin (0.22-1.20 mg/dL)	4.97	12.30	6.89	17.52
SGOT (AST) (8-48 U/L)	210	54	219	74
SGPT (ALT) (7-55 U/L)	274	25	284	77
Ultrasonography	13 mm hyperechoic obstructive calculus causing dilatation of Common Bile Duct (CBD) measuring 14.4 mm and mild Intrahepatic Biliary Radicles (IHBR) dilatation	Dilated CBD measuring 15 mm, with mild IHBR dilatation	Dilated CBD measuring 25 mm with IHBR dilatation	CBD calculi with inflammatory changes
MRCP	Dilatation of Intrahepatic Biliary Radicles (IHBR) in both right and left lobes. Common hepatic and bile ducts are dilated. CBD at porta measures 9.8 mm. CBD was dilated entirely and showed a well-defined hypointense filling defect measuring 5×4×9 mm in the pancreatic portion suggestive of calculus, of about 6.9 mm proximal to ampulla	Dilatation of IHBR noted. Right and left hepatic ducts dilated 10 mm and 9 mm respectively. Common hepatic and bile ducts dilated 16 mm and 19 mm respectively. Two T2 hypointense filling defects noted in distal CBD just before its opening in duodenum measuring 8 mm and 10 mm, suggestive of choledocholithiasis. Cystic duct remnant is dilated and measures 8 mm and has a low joining with CBD	Dilatation of IHBR noted. Right and left hepatic ducts dilated. Common Hepatic Duct (CHD) and bile duct (27 mm) dilated. A 2×1.5 cm calculus within terminal CBD and 1.5×1 cm calculus within distal CBD causing proximal obstructive changes. Features suggestive of choledocholithiasis with biliopathy, status post cholecystectomy. Main pancreatic duct was not dilated	Fluid filled oblong cystic structure of 21×11×9 mm at gallbladder bed continuous with cystic duct, likely remains of gallbladder. Few hypointense filling defect was seen inside gallbladder remnant. Right and left hepatic ducts measure 2.3 mm and 4 mm respectively. Common Hepatic Duct (CHD)- 4.8 mm, Proximal cystic duct-5 mm, distal cystic duct- 10 mm. Proximal CBD-10 mm, rest of the CBD-2 mm. Distal cystic duct appears dilated 10 mm and shows well defined T2 hyperintense filling defect of size approx. 14×7 mm extending to proximal CBD, which measure 10 mm. The rest of the CBD appears normal (2 mm) without any filling defect
ERCP	The presence of stones in the bile duct was confirmed, and a CBD sphincterotomy was performed, followed by CBD clearance and placement of a 10 Fr 10 cm double pigtail stent	Confirmed the presence of stones within the bile duct. CBD sphincterotomy with CBD clearance done	The presence of stones in the bile duct was confirmed, and a CBD sphincterotomy was performed, followed by CBD clearance and placement of a 10 Fr 10 cm double pigtail stent	Biliary sphincterotomy was done, 7 Fr, 7 cm double pigtail stent deployed draining bile, Cystic duct remnant noted CBD stented

[Table/Fig-9]: Table outlining clinical, laboratory, imaging and endoscopic findings from four post-cholecystectomy patients with biliary symptoms.
TLC: Total leukocyte count; SGOT: Serum glutamic oxaloacetic transaminase; SGPT: Serum glutamic pyruvic transaminase; DM: Diabetes mellitus; HTN: Hypertension

the importance of long-term vigilance [14]. A recent case series by Elimam A et al., presented five patients with choledocholithiasis diagnosed more than 25 years post-cholecystectomy. The study highlighted similar aetiologies, including RCDL and surgical clip migration, as seen in present series. Their patients, aged 49-68 years, also presented with recurrent abdominal pain, jaundice, and in two cases, episodes of cholangitis. Imaging with MRCP revealed bile duct dilation and intraductal filling defects, while ERCP confirmed the presence of retained stones and allowed for effective management through sphincterotomy and stone extraction [15]. The findings corroborate that choledocholithiasis can occur decades after surgery and may remain asymptomatic until complications arise. This reinforces the importance of long-term follow-up and imaging in symptomatic post-cholecystectomy patients.

CONCLUSION(S)

It is imperative to acknowledge the potential for such late presentations of choledocholithiasis, even years after cholecystectomy. This case series highlights potential causes for the delayed presentation of choledocholithiasis, such as surgical clip migration, RCDL and primary choledocholithiasis. Further research is essential to deepen our understanding of the risk factors and underlying mechanisms contributing to choledocholithiasis after cholecystectomy and to proactively address them.

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