Choledocholithiasis After Cholecystectomy in a Tertiary Care Center: A Retrospective Study in Nepal

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ABSTRACT

Background

Choledocholithiasis following cholecystectomy refers to the presence of gallstones within the common bile duct, which may result from stones retained at the time of surgery, arising from a residual gallbladder remnant, or forming de novo within the bile duct. While most cases are observed within three years postoperatively, this complication, though uncommon, may also manifest several years after the procedure.

Objective

To evaluate the clinical and demographic characteristics, type of initial surgery, current diagnostic modalities, interval from cholecystectomy to presentation, and treatment approaches in patients with post-cholecystectomy choledocholithiasis.

Method

A retrospective observational study was conducted by reviewing hospital records of patients who had a history of cholecystectomy and later diagnosed with choledocholithiasis between January 2023 and April 2024. The study was conducted after ethical approval from the Institutional Review Committee, Kathmandu University School of Medical Sciences (IRC, KUSMS), with an approval number of 154/24. Variables such as age, gender, type of past surgery, current diagnostic methods, CBD diameter, Stone size, time interval from cholecystectomy to presentation with choledocholithiasis, and treatment approaches were analyzed using descriptive statistical methods. Continuous variables were summarized as mean ± standard deviation (SD) and range, while categorical variables were presented as frequencies and percentages.

Result

Among 287 patients with post-cholecystectomy choledocholithiasis, there was a female predominance (61.67%). The mean age was 52.29 +/- 22.02 years (range: 11–87 years). The mean time from surgery to presentation was 103.6 months (range: 0.5–288 months). Most patients presented with jaundice, abdominal pain, and vomiting. Ultrasound was used mostly (n=203), followed by MRCP(n=77), for the diagnosis of choledocholithiasis. ERCP was the treatment for most of the patients (n=260), with a few cases (n=27) requiring surgical intervention.

Conclusion

Choledocholithiasis in post-cholecystectomy patients occured with female predominance and had a relatively long latency period in Nepalese population. Health professionals should maintain a high index of suspicion for choledocholithiasis in post-cholecystectomy patients to ensure timely diagnosis and management.

KEY WORDS

Calculus, Common bile duct, Choledocholithiasis, Post-cholecystectomy, Nepal

INTRODUCTION

Choledocholithiasis is the presence of stones within the common bile duct (CBD) of the biliary tree.[1] It occurs in 1–15% of patients presenting with cholelithiasis and has been identified in 4.6–18.8% of patients undergoing cholecystectomy.[1] It occurs due to residual stones or due to the formation of de-novo stone formation in the CBD itself. Residual stones are those missed during initial surgery, while de novo stones form later due to bile stasis, sphincter of Oddi dysfunction, or changes in bile composition.[2] Choledocholithiasis can lead to serious complications, including cholangitis, biliary obstruction, and pancreatitis.[1]

In the United States, the prevalence rates of choledocholithiasis per 100,000 hospital admissions rose steadily from 234.1 in 2005 to 286.3 by 2014.[3] One study from Australia showed that 43% have retained choledocholithiasis after cholecystectomy and the median time between the first surgery to remove the retained stones was 15 months (1 to 360 months).[4] One study from South Korea showed that the prevalence of clinically significant retained choledocholithiasis after laparoscopic cholecystectomy was 1.84% and the time from the surgery to clinical presentation ranged from 2 months to 2 years and 9 months.[5] In Nepal, a study shows the incidence of choledocholithiasis in patients with gallstone disease to be 4.04%.[6]

In Nepal, the prevalence of clinically significant retained stones following cholecystectomy remains poorly documented, as available studies either lack long-term data exploration to identify such cases or primarily address gallstone disease at initial presentation rather than post-surgical outcomes. Dhulikhel Hospital serves as a major referral center for interventional endoscopic procedures, including ERCP in Nepal, because of well-experienced interventional gastroenterologists and advanced technology to manage pancreato-biliary conditions, receiving patients from across the country. This study aims to assessclinical and demographic characteristics, type of initial surgery, current diagnostic modalities, interval from cholecystectomy to presentation, and treatment approaches in patients with post-cholecystectomy choledocholithiasis.

METHODS

A retrospective observational study was conducted using hospital records of patients who had a history of cholecystectomy and later presented to Dhulikhel Hospital for choledocholithiasis between January 2023 and April 2024. The study was conducted after obtaining ethical approval fromthe Institutional Review Committee, Kathmandu University School of Medical Sciences (IRC, KUSMS), with an approval number 154/24.

The inclusion criteria were patients who had documented evidence of choledocholithiasis via imaging (ultrasound, MRCP, or ERCP) and had a history of cholecystectomy in the past. Exclusion criteria included patients with incomplete records or missing data.All patients who presented to the department and met the inclusion criteria were enrolled.

Patient demographics, type of cholecystectomy, clinical presentation, diagnostic tests, treatment approaches, and recurrence rates were recorded from the hospital records. Data on age, gender, type of cholecystectomy, time from surgery to presentation, and clinical features were also collected based on hospital records. Data was entered in Microsoft Excel 2016 and was also analyzed using Microsoft Excel 2016. Total population sampling was done as all the patients diagnosed with choledocholithiasis with a history of cholecystectomy were included. Continuous variables were summarized as mean ± standard deviation (SD) and range, while categorical variables were presented as frequencies and percentages.

RESULTS

A total of 287 patients with choledocholithiasis following cholecystectomy were included in this study. The mean age was 52.29 ± 22.02 years, ranging from 11 to 87 years. Most patients were female (61.67%), while males comprised 38.33% and 74.56% of patients had undergone laparoscopic cholecystectomy, while 24.7% had undergone open cholecystectomy. Furthermore, one patient underwent an extended cholecystectomy, and one had undergone a radical cholecystectomy.

Table 1. Demographics and Clinical features of patients with choledocholithiasis after cholecystectomy

Characteristics	Number (%)
Gender	
Male	110 (38.33%)
Female	177 (61.67%)
Age Distribution	
0-20 years	9 (3.13%)
21-40 years	69 (24.04%)
41-60 years	116 (40.42%)
61- 80 years	82 (28.57%)
81-100 years	11 (3.83%)
Clinical Features	
Abdominal pain, Jaundice, vomiting	255 (88.85%)
Fever, Abdominal pain, and Jaundice	16 (5.57%)
Fever, Abdominal pain, and Vomiting	10 (3.48%)
Abdominal pain and Vomiting	5 (1.74%)
Jaundice	1 (0.35%)

The mean time interval from cholecystectomy to presentation with choledocholithiasis was 103.6 months (range: 0.5 to 288 months). The most common presenting

symptoms were abdominal pain (n = 287), vomiting (n = 270), and jaundice (n = 272). Fever was reported in 26 patients. Ultrasonography (USG) Abdomen and Pelvis (A+P) was the most used diagnostic tool (70.7%), followed by Magnetic Resonance Cholangiopancreatography (MRCP), 26.8%. The maximum diameter of the common bile duct (CBD) observed was 28 mm, and the minimum was 4 mm, with an average diameter of 11.94 mm. The smallest stone diameter was 2.3 mm, the largest was 24 mm, andthe average stone diameter was 9.55 mm.

Endoscopic Retrograde Cholangiopancreatography (ERCP) was the mainstay of treatment and was successfully performed in 260 (90.59%) patients. Surgical intervention was required in 27 patients, particularly in cases with complications or failed ERCP.

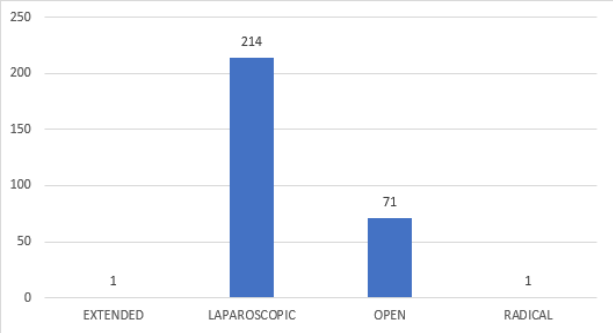

Figure 1. Mode of previous surgery in patients with choledocholithiasis after cholecystectomy

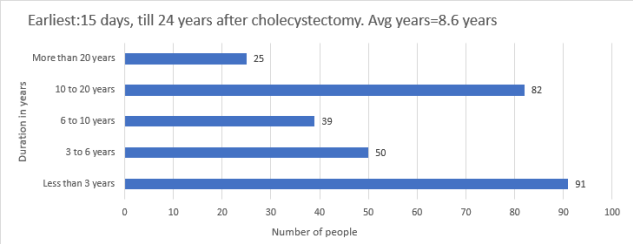

Figure 2. Time from cholecystectomy to the first diagnosis of choledocholithiasis

Table 2. Diagnostic and treatment modalities

Diagnostic Modalities	Number (%)
USG (A+P)	203 (70.73%)
MRCP	77 (26.83%)
CECT (A+P)	4 (1.39%)
ERCP	3 (1.05%)
Treatment for Choledocholithiasis	
ERCP	260 (90.59%)
Surgery	27 (9.41%)

DISCUSSIONS

In this study, the mean age of patients was 52.29 ± 22.02 years, which is comparable to a study done in Iceland reporting a similar age distribution among patients with post-cholecystectomy choledocholithiasis.[2] This suggests that advancing age remains a consistent risk factor across geographically and ethnically diverse populations. Age-related changes in biliary physiology, such as decreased bile flow and increased cholesterol saturation, may contribute to stone formation in older adults.[7] We also observed a female predominance consistent with global epidemiologic data, reflecting the higher lifetime risk of gallstone disease in women.[8] This sex predisposition is likely multifactorial, driven by hormonal influences, reproductive history, and oral contraception use.[8] As this pattern is consistent with international data, the national study also demonstrates a similar predominance among females.[9]

In our study, the mean interval between cholecystectomy and presentation with choledocholithiasis was 8.6 years. In contrast, Cox et al. reported a shorter mean interval of 4 years (6 days to 18 years).[10] Anotherstudy from Iceland showed shorter mean time from surgery to diagnosis of bile duct stones (374 ± 501 days).[2] This broad range of time gap between cholecystectomy and diagnosis of bile duct across studies (ranging from days to decades) underscores the heterogeneity in the pathogenesis of post-cholecystectomy bile duct stones. This prolonged interval supports the possibility that a significant proportion of cases represent de novo stone formation rather than retained stones. Due to a long latency period and non-availability of electronic medical records in our part of the world, we didn't have data regarding the pattern of liver injury prior to primary cholecystectomy. So, even though our findings suggest high de-novo stone formation, it could also be retained stones that accumulated and presented later in our patients.

Potential mechanisms for delayed post-cholecystectomy choledocholithiasis may include biliary stasis, alterations in bile composition, sphincter of Oddi dysfunction, and underlying metabolic risk factors.[11,12] These findings highlight that clinicians should maintain a high index of suspicion for choledocholithiasis in patients presenting with biliary symptoms, irrespective of the time interval since cholecystectomy, as biliary complications can occur many years or even decades after the initial surgery.

Abdominal pain was the most common presenting symptom in our study, consistent with prior studies, while associated features such as vomiting, jaundice, and fever suggested possible cholangitis.[10,13] Choledocholithiasis is the leading cause of cholangitis, and patients can also present with fever, right upper abdominal pain, and jaundice,and sometimes, in addition to that, patients may have altered mental status and sepsis.[13] So, recognition of these clinical warning signs is particularly important in resource-limited settings, where delays in diagnosis and referral may lead to rapid clinical deterioration. Early identification and timely management are therefore essential to prevent septic complications and improve outcomes.[13]

In our study, the diagnosis of choledocholithiasis was primarily based on clinical presentation, liver function tests (LFTs), and transabdominal ultrasonography

(USG), with only a small proportion of patients requiring additional imaging modalities such as MRCP, contrast-enhanced CT (abdomen and pelvis), or ERCP for diagnostic confirmation.[14,15] Ultrasonography (USG) was used as the initial diagnostic modality owing to its non-invasive nature, widespread availability, and low cost. However, its sensitivity for detecting common bile duct (CBD) stones is limited, particularly in the absence of significant ductal dilation, and stones smaller than 6 mm are frequently missed, despite the fact that choledocholithiasis can occur without any CBD dilatation.[13] In our cohort, CBD diameter ranged from 4 mm to 28 mm, while aligned with other studies showing a CBD diameter of 8-15 mm. This suggests that choledocholithiasis can occur even in non-dilated ducts, and in these cases, advanced imaging modalities such as magnetic resonance cholangiopancreatography (MRCP), endoscopic retrograde cholangiopancreatography (ERCP), and endoscopic ultrasound (EUS) are required for definitive diagnosis.[10,16] MRCP has emerged as a superior diagnostic modality, providing high specificity without radiation exposure. In resource-limited settings like Nepal, cholestatic liver injury in cases of cholelithiasis warrants MRCP before proceeding for cholecystectomy to avoid retained stones.

EUS can detect small stones even up to a size of less than 5 mm.[17,18] Both MRCP and EUS have very high accuracy for the diagnosis of choledocholithiasis.[18] While EUS and MRCP provide only diagnostic value, Endoscopic retrograde cholangiopancreatography (ERCP) provides both diagnostic as well as therapeutic value. Over the past several decades, ERCP has transitioned from a primarily diagnostic tool to a predominantly therapeutic procedure due to its 6-15% complication rates and the availability of other non-invasive diagnostic modalities.[19,20] Despite these risks, ERCP remains the primary treatment for choledocholithiasis because it is a minimally invasive procedure and provides immediate therapeutic benefit.[19,20] In contrast, CBD stones can also be diagnosed intraoperatively by intraoperative cholangiography (IOC) or intraoperative ultrasound (IUS). When choledocholithiasis is found intraoperatively, common bile duct exploration during surgery itself is preferred over post-operative ERCP.[21] In our study, most of the cases were successfully managed with ERCP, while only 9.41% of patientsrequired surgery due to failed ERCP or larger stone size. This aligns with the SAGES guidelines, which recommend ERCP as the treatment of choice for post-operative bile duct stone clearance.[22] This indicates that the relatively low requirement for surgical intervention supports the feasibility and effectiveness of ERCP, even in low-resource settings, although procedural outcomes may be varydepending on operator expertise, patient selection, and availability of institutional resources.

There are a few limitations in our study. The study is a retrospective and single-center study, which limits its generalizability. Furthermore, the lack of follow-up prevented evaluation of recurrence rates. Future prospective and multicentric studies should be done to provide a more comprehensive understanding of choledocholithiasis in post-cholecystectomy patients.

CONCLUSION

The study highlights the occurence of choledocholithiasis in post-cholecystectomy patients in Nepal with female predominance and has relatively long latency period in Nepalese population. Health professionals should maintain a high index of suspicion for choledocholithiasis in post-cholecystectomy patients to ensure timely diagnosis and management.

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