

Clinical Study of Cystic Duct Remnant Stone Disease and Its Management Options in a Tertiary Care Hospital

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Abstract

Background: Post-cholecystectomy syndrome (PCS), the term coined by Womack and Crider in 1947, is defined as the recurrence of symptoms similar to those experienced before the cholecystectomy. The incidence of which varies largely in different studies, ranging from 10% to 30% of the patients, and its onset may range from a few days to 20 years after surgery. The cystic duct remnant calculus is one of the causes of PCS.

Objectives: The objectives of the study were to assess the incidence cystic duct remnant stone in follow-up cases of cholecystectomy and its management options.

Materials and Methods: Patients presenting to surgical OPD or emergency in SMHS hospital with symptoms of pain right hypochondrium, recurrent biliary colics, epigastric pain, nausea, yellow discoloration of eyes, and with prior history of cholecystectomy (open/laparoscopic) were evaluated for cystic duct remnant calculi in following order. Patient having persistence of symptoms after cholecystectomy was subjected to ultrasonography (USG) abdomen pelvis with focus on hepatobiliary system using curvilinear probe of 3–5 MHz frequency after proper bowel preparation. Magnetic Resonance Cholangio Pancreaticography (MRCP): Being a non-invasive procedure, not requiring sedation or radiation exposure and being equally sensitive (96%) and specific (88%) as EUS, it becomes the investigation of choice. All patients were subjected to MRCP.

Results: Out of 1872 patients who presented as a follow-up case of cholecystectomy with symptoms of pain right upper abdomen, 39 patients were found to have cystic duct remnant stone. The mean age of the patients in our study was 42.9 ± 9.98 years with youngest patient being 17 years and 58 as the oldest one. Females outnumbered males. Mean duration of past surgery was 4.1 ± 2.21 years. Liver function test was done in all patients. Mean bilirubin was 1.82 ± 2.59 , mean ALP was 132.1 ± 51.07 , mean AST was 48.02 ± 15.05 , and mean ALT 46.36 ± 17.47 . On USG 82.1% patients were found to have stump calculus, 7.7% patients had stump calculus and calculus in common bile duct (CBD), and 10.3% had no stump calculus. On MRCP findings were suggestive of stump calculus in 87.17% patients and only 12.83% patients were found to have stump calculus and calculus in CBD. Therapeutic procedures including laparoscopic completion cholecystectomy were performed in 74.34% patients, open completion cholecystectomy was performed in 12.82% patients, and open completion cholecystectomy with choledocotomy was performed in 7.70% patients while as Endoscopic retrograde cholangiopancreatography (ERCP) followed by laparoscopic completion cholecystectomy was performed in 5.14% patients. Out of five patients whom ERCP was used for stone clearance, in 3 (60%) patients ERCP failed while stone was successfully cleared by ERCP in 2 (40%) attempts.

Conclusion: Laparoscopic re-intervention performed for cystic duct remnant calculi is safe, feasible and may be offered as the treatment of choice in centers performing advanced laparoscopic procedures.

Key words: Post-cholecystectomy syndrome, cystic duct remnant calculus, right hypochondrium, Magnetic Resonance Cholangio Pancreaticography

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INTRODUCTION

Post-cholecystectomy syndrome (PCS), the term coined by Womack and Crider in 1947,^[1] is defined as the recurrence of symptoms similar to those experienced before the cholecystectomy. This usually takes the form of upper abdominal pain (mainly right upper quadrant)

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and dyspepsia, pancreatitis with or without jaundice. The incidence of which varies largely in different studies,

Table 1: Incidence of cystic duct remnant stone in study population

Total number of follow-up patients of cholecystectomy=1872
Number of patients with cystic duct remnant calculi stone=39
Incidence of cystic duct remnant stone=39/1872=2.1%

Table 2: Age, gender, chief complaints, history of previous surgery, and duration of past surgery

Patient characteristics	Number of patients (%)
Age (years)	
<30	4 (10.3)
30–39	10 (25.6)
40–49	11 (28.2)
50–59	14 (35.9)
Mean±SD (range)	42.9±9.98 (17–58)
Gender	
Male	11 (28.2)
Female	28 (71.8)
Chief complaints	
Pain right upper abdomen	22 (56.4)
Pain epigastrium with nausea	9 (23.1)
Yellow discoloration of eyes	5 (12.8)
Pain epigastrium with fever	3 (7.7)
History of previous surgery	
Laparoscopic cholecystectomy	32 (82.1)
Open cholecystectomy	7 (17.9)
Duration of past surgery (years)	
1–3	13 (33.3)
3–6	18 (46.2)
6–9	5 (12.8)
≥9	3 (7.7)

SD: Standard deviation

Table 3: Ultrasonography, magnetic resonance cholangio pancreaticography findings, therapeutic and outcome of endoscopic procedure

Patient characteristics	Number of patients (%)
USG findings	
Cystic duct remnant calculus	30 (76.92)
Cystic duct remnant calculi and calculus in	5 (12.82)
Unremarkable	4 (10.26)
MRCP findings	
Cystic duct remnant calculi	34 (87.17)
Cystic duct remnant calculi and calculus in CBD	5 (12.83)
Therapeutic procedure	
Laparoscopic completion cholecystectomy	29 (74.34)
Open completion cholecystectomy	5 (12.82)
Open completion cholecystectomy with choledocotomy	3 (7.70)
ERCP followed by laparoscopic completion cholecystectomy	2 (5.14)
Outcome of endoscopic procedure	
Successful ERCP	2 (40)
Failed ERCP	3 (60)

USG: Ultrasonography, MRCP: Magnetic resonance cholangio pancreaticography, CBD: Common bile duct, ERCP: Endoscopic retrograde cholangiopancreatography

ranging from 10% to 30% of the patients, and its onset may range from a few days to 20 years after surgery.^[2-4]

The cystic duct remnant calculus is one of the causes of PCS. Florcken first reported the concept of “cystic duct remnant” in 1912; since then, many researchers have studied this ambiguous entity with varying theories.^[5]

The incidence of cystic duct remnant stone after cholecystectomy is <2.5%.^[6] There may also be gender-specific risk factors for developing symptoms after cholecystectomy. In one study, the incidence of recurrent symptoms among female patients was 43%, compared to 28% among male patients.^[7] This problem may arise as a result of improper dissection of Calot’s triangle especially at the hand of inexperienced surgeons, leaving too long a cystic duct to avoid injury to common bile duct (CBD) or a partial cholecystectomy in a patient with unclear anatomy, Mirizzi syndrome, inflammation at Calot’s triangle, low insertion of cystic duct, parallel cystic duct, tissue friability, cirrhotic liver, and junior/inexperienced surgeons carrying out the surgery.^[8-11]

Palanivelu *et al.*^[12] reported that the incidence of cystic duct stump stone in cases who underwent laparoscopic subtotal cholecystectomy was 4.19% and 0.02% in patients who underwent conventional cholecystectomy. Rozsos *et al.*^[13] found that the cause of PCS was cystic duct stump stone in 16% of the patients. In the era of laparoscopy, long cystic duct stump is increased, especially by inexperienced surgeons fearing BDI.^[9-11,14,15]

Conventionally, gallbladder or cystic duct remnant stone has been managed with open completion cholecystectomy. In view of the effects of the previous operation which results in considerable adhesions, performance of such procedures with laparoscopic approach was discouraged.^[13] Now, there are increasing reports in the treatment of this problem with laparoscopic approach.^[5,9,10,16,17] Since most of the patients could be treated laparoscopically but dissection in most situations is difficult, so safety-first strategy should hold the key and conversion to open should not be considered a failure.

Aims and Objectives

The main aims and objectives of this study are:

1. To assess the incidence of remnant cystic duct stone following cholecystectomy.
2. Various management options for cystic duct remnant stone.

MATERIALS AND METHODS

After obtaining the ethical clearance from the Institutional Ethical Committee, the present observational study was

conducted in the Postgraduate Department of Surgery, Government Medical College, Srinagar.

Inclusion Criteria

The following criteria included in the study:

- Sex – Both male and female
- Ultrasonography (USG)/Magnetic Resonance Cholangio Pancreaticography (MRCP) documented cystic duct remnant stone in cystic duct or GB remnant.

Patients presenting to surgical OPD or emergency in SMHS hospital with symptoms of pain right hypochondrium, recurrent biliary colics, epigastric pain, nausea, yellow discoloration of eyes, and with prior history of cholecystectomy (open/laparoscopic) were evaluated for cystic duct remnant stone with baseline investigations, USG, and MRCP.

Patients were subjected to completion laparoscopic cholecystectomy though some of them were amenable to open/CBD exploration.

RESULTS

In our study, out of 1872 patients who presented to as follow-up cases of cholecystectomy, 39 were found to have cystic duct remnant stone making it 2.1% incidence of cystic duct remnant in our study. The mean age of the patients in our study was 42.9 ± 9.98 years with youngest patient being 17 years and 58 as the oldest one. Females outnumbered males in our study with 71.8% females versus 28.2% males. Pain right upper abdomen was the most common presenting complaint in 56.4% followed by pain epigastrium with nausea in 23.1% patients. About 82.1% patients had undergone laparoscopic cholecystectomy while as 17.9% underwent open cholecystectomy. Mean duration of past surgery was 4.1 ± 2.21 years. Liver function test was done in all patients. Mean bilirubin was 1.82 ± 2.59 , mean ALP was 132.1 ± 51.07 , mean AST was 48.02 ± 15.05 , and mean ALT 46.36 ± 17.47 .

On USG, 76.92% patients were found to have cystic duct remnant calculi, 12.82% patients had cystic duct remnant calculi, and calculus in CBD and 10.26% unremarkable study. On MRCP findings were suggestive of cystic duct remnant calculi in 87.17% patients and only 12.83% patients were found to have cystic duct remnant calculi and calculus in CBD. Therapeutic procedures including laparoscopic completion cholecystectomy were performed in 74.34% patients, open completion cholecystectomy was performed in 12.82% patients, and open completion cholecystectomy with choledocotomy

was performed in 7.70% patients while as endoscopic retrograde cholangiopancreatography (ERCP) followed by laparoscopic completion cholecystectomy was performed in 5.14% patients. Out of five patients whom ERCP was used for stone clearance, in 3 (60%) patients ERCP failed while stone was successfully cleared by ERCP in 2 (40%) attempts.

In the present study, we did not encounter any complications which are common with the procedure like bile duct injury, bowel injury and wound infection. In laparoscopic group, the post-operative hospital stay was maximum of 1–2 day in comparison with the open group who stayed in hospital for maximum of 5 days. None of the patients in our study came with any post-operative complaints such as pain epigastrium, dyspepsia, and fever. Patients were followed up for maximum 1½ year duration [Tables 1-3].

DISCUSSION

A total of 1872 follow-up cases of cholecystectomy in which 39 were found to have cystic duct remnant calculi making it 2.1% incidence of cystic duct remnant calculi in our study. Demetriades *et al.*^[10] and El-Nakeeb *et al.*^[6] reported <2.5% incidence of cystic duct remnant calculi following cholecystectomy. Majority, that is, 14 (35.9%) of patients belonged to the age group of 50–59 years followed by 11 (28.2%) patients who belonged 40–49 years, 10 (25.6%) patients were aged 30–39 years while as only 4 (10.3%) patients were aged <30 years. The mean age of the patients in our study was 42.9 ± 9.98 years with youngest patient being 17 years and 58 as the oldest one. Females outnumbered males in our study with 71.8% females in comparison with 11 (28.2%) males. El-Nakeeb *et al.*^[6] conducted a study in which mean age of the patients was 50 ± 15.43 years (26–78 years) with 16 women and 5 men. Seven patients (5 women and 2 men) were seen with an average age of 43.4 years (age range 29–70 years) by Jayant and Kaushik.^[18] Chowbey *et al.*^[9] reviewed laparoscopic re-intervention for cystic duct remnant calculi over a period of 10 years. Mean age of the patients was 51 years (range 32–67 years). There were 10 males and 16 females. Pain right upper abdomen was the presenting complaint in 22 (56.4%), pain epigastrium with nausea in 9 (23.1%) patients, yellow discoloration of eyes was seen in 5 (12.8%) patients while as pain epigastrium with fever with the presenting complaint in 3 (7.7%) patients. Chowbey *et al.*^[9] reviewed laparoscopic re-intervention for cystic duct remnant calculi over a period of 10 years. The presenting complaints including recurrent biliary colic followed by jaundice. Similar findings were observed by El-Nakeeb *et al.*^[6] wherein recurrent biliary colic was the most common presenting complaints in 95.2% followed by

jaundice in 42.9% and fever in 23.9% patients. 32 (82.1%) patients underwent laparoscopic cholecystectomy while as open cholecystectomy was done in 7 (17.9%) patients in our study. El-Nakeeb *et al.*^[6] conducted a study in which majority of patients under laparoscopic cholecystectomy in comparison with open cholecystectomy (66.7% versus 33.3%). Chowbey *et al.*^[9] reviewed laparoscopic re-intervention for cystic duct remnant calculi over a period of 10 years.

Duration from past surgery was 3–6 years in majority of patients, that is, 18 (46.2%) followed 1–3 years in 13 (33.3%) patients, and 6–9 years in 5 (12.8%) patients while as the duration since last surgery was ≥ 9 years in 3 (7.7%) patients with a mean duration from past surgery was 4.1 ± 2.21 years. Gupta *et al.*^[19] reported the recurrence of symptoms after index operation after 3 years with most of the studies reported a median time interval in many years after the index operation.^[11,13,17,19-22] Liver function test was done in all patients. Mean bilirubin was 1.01 ± 0.78 , mean ALP was 121.5 ± 40.27 , mean AST was 46.3 ± 12.28 , and mean ALT 46.9 ± 14.45 . El-Nakeeb *et al.*^[6] conducted a study in which mean serum bilirubin (mg%) 1.7 ± 1.9 (0.4–7.9) and mean serum SGPT (IU) 84.23 ± 116.1 (20–470). Compared with cases with no GD, the GD group was characterized by a significantly higher AST/ALT ratio and lower ALT (mean ALT 51 ± 28 and AST/ALT 0.84 ± 0.4 in GD vs. 65 ± 40 and 0.71 ± 0.31 non GD) (Fracanzani *et al.*, 2012).^[20] All the 39 patients underwent USG in which 30 (76.91%) were found to have cystic duct remnant calculi, 5 (12.83%) patients had cystic duct remnant calculi and calculus in CBD and 4 (10.3%) had unremarkable study. All the 39 patients enrolled in this study underwent MRCP and findings were suggestive of cystic duct remnant calculi in 34 (87.17%) patients and only 5 (12.83%) patients were found to have stump calculus and calculus in CBD. The primary diagnosis in a study done by Mageed *et al.*^[21] was established by expert abdominal USG detection in 74.1%, or ERCP modality in 48.1%, but the gold standard of diagnosis was MRCP that was done nearly in all cases. Diagnosis was established by abdominal US or MRCP in the study of Parmar *et al.*,^[11] while Chowbey *et al.*^[22] reported that the primary diagnosis was established by abdominal US, MRCP, ERCP, and EUS, while Palanivelu *et al.*^[12] reported that abdominal US identified cystic duct remnant in nine patients, and MRCP identified calculus in all patients. The diagnoses of all case with cystic duct stump stone were carried out by using abdominal US and MRCP. MRCP was accurate in detecting cystic duct stump stone in all cases and US was accurate in 15 cases (71.4%). ERCP and papillotomy were carried out before completion of cholecystectomy in nine cases (42.9%) and CBD was cleared in all cases (El-Nakeeb *et al.*, 2016).^[6]

Laparoscopic cholecystectomy was done in majority of patients, that is, 29 (74.34%) because it is safe, feasible with small incision, less post-operative pain, better cosmesis, shorter hospital stay, and early resumption to daily routine work. Eight elderly patients who were not fit for laparoscopic procedure were operated by open method including open completion cholecystectomy in 5 (12.82%) patients and open completion cholecystectomy with choledocotomy in 3 (7.70%) patients. ERCP followed by laparoscopic completion cholecystectomy was performed in 2 (5.14%) patients. El-Nakeeb *et al.*^[6] conducted a study in which open completion cholecystectomy was performed in nine cases (42.9%) and laparoscopic completion cholecystectomy was completed successfully in 11 cases (52.4%). Tantaia *et al.*^[17] performed laparoscopic completion cholecystectomy for seven cases. Chowbey *et al.*^[9] studied 26 cases with remnant GB stone/cystic duct stump stone. Laparoscopic completion cholecystectomy was successful in all cases.

Out of five patients whom ERCP was used for stone clearance, in 3 (60%) patients ERCP failed while stone was successfully cleared by ERCP in 2 (40%) attempts. In a study done by El-Nakeeb *et al.*^[6] 9 cases (42.9%) were subjected to a preoperative ERCP, and CBD was cleared in all cases. ERCP is a valuable tool in the hands of surgeons for preoperative, intraoperative, and postoperative management of biliary obstruction. Open completion cholecystectomy was performed in nine cases (42.9%) and laparoscopic completion cholecystectomy was completed successfully in 11 cases (52.4%), and conversion was needed in one case due to marked adhesion and distorted anatomy (El-Nakeeb *et al.*, 2016).^[6] There Palanivelu *et al.*^[12] reported that the incidence of cystic duct stump stone in cases who underwent laparoscopic subtotal cholecystectomy was 4.19%, and 0.02% in patients who underwent conventional cholecystectomy. Rozsos *et al.*^[13] found that the cause of PCS was cystic duct stump stone in 16% of the patients. In the era of laparoscopy, long cystic duct stump is increased, especially by inexperienced surgeons fearing BDI.^[6-10] Partial cholecystectomy has received some criticism because of the risk for residual GB stone but the data on incidence of this complication are still unknown. In a study by Chowbey *et al.*,^[22] 59 patients who underwent partial cholecystectomy were reported to have developed recurrent or residual stones. Beldi and Glättli^[24] reported residual GB stones in six out of 46 patients who underwent partial cholecystectomy. In era of laparoscopy, laparoscopic partial cholecystectomy to manage difficult GB (acute cholecystitis, Mirazzi GB, cirrhotics) to reduce the incidence of conversion rate to open surgery will increase the number of cases of residual stones in GB remnant. The time interval between partial excision of GB and development of PCS symptoms varies largely from a few days to years.^[5,14,15,17,25]

CONCLUSION

Cystic duct remnant stone form a small percentage of treatable causes of PCS. A high index of suspicion should be maintained in patients with persistent biliary symptoms. Some of the patients may be amenable to open/CBD exploration but laparoscopic re-intervention performed for cystic duct remnant stone is safe, feasible and may be offered as the treatment of choice in centers performing advanced laparoscopic procedures.

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