

Original Research

A prospective study of incidence, classification and laparoscopic management of cystic duct stones in a tertiary care teaching hospital

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Abstract

Background: The cystic duct, which connects the gallbladder to the common hepatic duct, is a tortuous channel susceptible to obstruction by cystic duct stones (CDS). Hence; the present study was conducted for assessing the incidence, classification and laparoscopic management of cystic duct stones in a tertiary care teaching hospital.

Materials & methods: A prospective study was carried out for 60 patients one year from May 2022 to May 2023 by a single surgeon and his team. All the patients were subjected to laparoscopic cholecystectomy using standard 4-port technique after documentation of GB calculi using ultrasonography for diagnosis. The whole series of patients were followed for a period 6 months-1 year with history & clinical examination and USG & LFTs whenever need felt. All cases of symptomatic gall stone disease plan for laparoscopic cholecystectomy, which are having cystic duct stone detected intraoperatively of this study. Patients with cholelithiasis with CBD stone, Mirizzi syndrome and patients in whom subtotal cholecystectomy was done and cases which needed conversion into open cholecystectomy exclude of this study. All the results were recorded in Microsoft Excel sheet and were subjected to statistical analysis using SPSS software.

Results: We performed 60 laparoscopic cholecystectomy from May 2022 to May 2023. Out of them, 60% were female and 40% were males. 50% were between the age group of 40-50 years, 20% were between 30-40 years and 10% were between 50-60 years and 6% were less than 30 years and 14% more than 60 years old. We have 2 cases of sickle cell, a 28 year female and 21 year old male and one case 23 year old female with PCOD. 60% of patients were operated on for symptomatic cholelithiasis, whereas 30% were operated for Acute cholecystitis. We found cystic duct stones in 10% patients having impacted stones with proximal duct stones in 2 patients, distal stones in 2 patients, 1 patient had stones in the middle part of the cystic duct and 1 patient is having freely mobile stones. LFT was normal in all of the cases. Preexisting mild pain was there in all of the cases.

Conclusion: One important cause of PCS is the underreporting and underestimation of CD stone occurrence. Let us assume, however, that during a laparoscopic cholecystectomy, careful attention is paid to CD and that certain simple and safe manoeuvres are utilized.

Key words: Cystic duct stones, Laparoscopic

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Introduction

The cystic duct, which connects the gallbladder to the common hepatic duct, is a tortuous channel susceptible to obstruction by cystic duct stones (CDS). These stones typically form in the gallbladder and migrate into the cystic duct. CDS can cause a spectrum of disease, ranging from biliary colic to cholecystitis to Mirizzi's syndrome (MS), in which the common hepatic duct is obstructed by inflammation surrounding the gallbladder or cystic duct.¹⁻³ Laparoscopic cholecystectomy (LC) has favored the division of cystic duct closer to the gall

bladder. This is of paramount importance to avoid iatrogenic injury to the common bile duct. However, this renders the possibility of leaving a long cystic duct remnant. Frequently, even gall bladder remnants remain behind either because of performance of subtotal cholecystectomy or as a result of improper identification of the gall bladder—cystic duct junction, due to inadequate skeletonization of the cystic duct.⁴ ⁵As the rate of bile duct injury in the first years after the first laparoscopic cholecystectomy is increased compared to open cholecystectomy, the focus has

shifted to preventing those injuries, leading to the adoption of the Critical View of Safety (CVS) routine. The aim of safe cholecystectomy principles is to promote the recognition of gallbladder elements before resection to reduce the risk of the common bile duct and vascular injuries and avoid mistakes due to anatomical alterations and altered visual perception. Dissecting the entire infundibulum off the liver bed and exposing the elements of the Calot triangle before resection. Hence achieve CVS; the present study was conducted for assessing the incidence, classification and laparoscopic management of cystic duct stones in a tertiary care teaching hospital.

Materials & methods

The present study was conducted for assessing the incidence, classification and laparoscopic management of cystic duct stones in a tertiary care teaching hospital. A prospective study was carried out for 60 patients over one year from may 2022 to may 2023 by a single surgeon and his team. All the patients were subjected to laparoscopic cholecystectomy using standard 4- port technique after documentation of GB calculi using ultrasonography for diagnosis. Intraoperatively attention was focused on the cystic duct contour, dilation, unusual bulge, tactile feedback using Maryland forceps and any undue adhesions. Different manoeuvres were exploited to manipulate cystic duct stones whenever found near Gall Bladder, or CD-CBD junction was dissected, cystic duct ligated close to CBD or transverse/longitudinal incision over a cystic duct to extract the stones before clipping the cystic duct-CBD junction. The cystic duct stones were arbitrarily classified and managed accordingly. The whole series of patients were followed for a period 6 months-1 year with history & clinical examination and

USG & LFTs whenever need felt. All cases of symptomatic gall stone disease plan for laparoscopic cholecystectomy which are having cystic duct stone detected intraoperatively or preoperatively by ultrasound include of this study. Patients with cholelithiasis with CBD stone, Mirizzi syndrome and patients in whom subtotal cholecystectomy was done and cases which needed conversion into open cholecystectomy exclude of this study. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

Results

We performed 60 laparoscopic cholecystectomy from may 2022 to may 2023. Out of them, 60% were female and 40% were males. 50% were between the age group of 40-50 years, 20% were between 30-40 years and 10% were between 50-60 years and 6% were less than 30 years and 14% more than 60 years old. We have 2 cases of sickle cell, a 28 year female and 21 year old male and one case 23 year old female with PCOD. 60% of patients were operated for symptomatic cholelithiasis, whereas 30% were operated for Acute cholecystitis. We found cystic duct stones in 10% patients having impacted stones with proximal duct stones in 2 patients, distal stones in 2 patients, 1 patient had stones in the middle part of the cystic duct and 1 patients are having freely mobile stones (Table 2). 60% cases of these cystic duct stone patients are female and 40% cases are male, 53 were having multiple small stones in gall bladder in USG. Intraoperatively we had come across long cystic duct in 20% cases, visible stone in 20% cases, distal cystic duct adhesion to CBD in 10% cases, non-uniformity of duct / abnormal bulge in 50% cases (Table 2). LFT was normal in all of the cases. Preexisting mild pain was there in all of the cases.

Table 1: Classifications and management of Cystic duct stone

Cystic duct stone	Management
1. Mobile stones	Milking of the cystic duct by Maryland and non-toothed grasp and clipping distal to stone
1. Impacted stones	
• Proximal (a)	Clipped distally
• Middle (b)	Clipped distally-open cystic duct-remove stones- clipped proximally
• Distal (c)	Complete dissection of cystic duct up to CD-CBD junction-clip distally - transverse/longitudinal incision to remove the stone-clipped proximally

Table 2: Incidence and Predisposing Factors of Cystic duct stones

Cystic duct stones	Total (6)
Mobile stones	1
Proximal impacted	2
Middle impacted	1
Distal impacted	2
Factors	
USG finding of Small multiple stones in GB	53

Long cystic duct	2
Visible stone	2
Nonuniformity of duct	5
Distal adhesion	1

Discussion

Cystic duct stones (CDS) are occasionally encountered during laparoscopic cholecystectomy (LC). They may be noticed during the dissection of the cystic pedicle or seen to extrude from the cystic duct (CD) when it is divided or opened to perform the intraoperative cholangiogram (IOC). The procedures for dealing with CDS range from the simple removal of stones that fall out when the duct is opened to incising the duct over an impacted stone to facilitate its removal or converting to open surgery due to a large stone in a CD adherent to the bile duct.¹⁰

Cholecystectomy is the main surgical method for the treatment of cholelithiasis. Unfortunately, between 5% and 47% of patients present with recurrent gastrointestinal symptoms post-operatively, such as abdominal pain, dyspepsia, nausea, vomiting, fever, diarrhea, and jaundice. Residual gallstone in cystic duct is one of the causes of the above symptoms. The spiral valvular structure in the cystic duct protects choleliths from falling into the common bile duct and makes the small stones remain in the cystic duct, resulting in residual stones in the cystic duct, intractable pain, and the formation of a small gallbladder after laparoscopic cholecystectomy (LC).¹¹⁻¹³ Hence; the present study was conducted for assessing the incidence, classification and laparoscopic management of cystic duct stones in a tertiary care teaching hospital. We performed 60 laparoscopic cholecystectomies from May 2022 to May 2023. Out of them, 60% were female and 40% were males. 50% were between the age group of 40-50 years, 20% were between 30-40 years and 10% were between 50-60 years and 6% were less than 30 years and 14% more than 60 years old. We have 2 cases of sickle cell, a 28 year female and 21 year old male and one case 23 year old female with PCOD. Sixty six percent (66%) of patients were operated on for symptomatic cholelithiasis, whereas 26% were operated for Acute cholecystitis. In a similar study conducted by Sahoo R et al, authors studied 60 Laparoscopic Cholecystectomy. Patients detected to have cystic duct stones by noting abnormal bulge, adhesions, nonuniformity of duct and confirmed by tactile sensation by instrument. These patients were subjected to different intraoperative manoeuvres like milking of duct, complete dissection of CD-CBD junction and ligation of CD close to CBD, the opening of cystic duct over stone etc., were utilized. Results: We found cystic duct stones in 6 (10%) out of 60 Laparoscopic

cholecystectomies performed, which were managed laparoscopically. We have made some classifications according to the position of stone in the cystic duct and managed accordingly. Upon follow-up, we found that out of 10 patients with detected cystic duct stones, no patients had any complaints postoperatively until now.¹⁴ We found 60% of patients were operated for symptomatic cholelithiasis, whereas 30% were operated for Acute cholecystitis. We found cystic duct stones in 10% patients having impacted stones with proximal duct stones in 2 patients, distal stones in 2 patients, 1 patient had stones in the middle part of the cystic duct and 1 patient is having freely mobile stones (Table 2). 60% cases of these cystic duct stone patients are female and 40% cases are male, 53 were having multiple small stones in USG. Intraoperatively we had come across long cystic duct in 20% cases, visible stone in 20% cases, distal cystic duct adhesion to CBD in 10% cases, nonuniformity of duct /abnormal bulge in 50% cases. LFT was normal in all of the cases. Preexisting mild pain was there in all of the cases. Palanivelu, C et al presented their experience with the laparoscopic management of cystic duct remnant calculi. They managed 15 patients with cystic duct remnant calculi from 1996 to 2007 in our institute. All these patients had earlier undergone laparoscopic subtotal cholecystectomy at centre. They were successfully managed by laparoscopic excision of the remnant. The mean duration between first and second surgery was 8.35 months (range, 6–10.7 months). The mean operating time was 103.5 min (range, 75–132 min). Duration of hospital stay was 4–12 days. There was a higher incidence of remnant duct calculi following laparoscopic subtotal cholecystectomy than conventional laparoscopic cholecystectomy 13/310 (4.19%) versus 2/9590 (0.02%). The morbidity was 13.33%, while there were no conversions and no mortality. Leaving behind a cystic duct stump for too long predisposes stone formation, while dissecting too close to the common bile duct and right hepatic artery in acute inflammatory conditions is dangerous.¹⁵ As in other surgical disciplines, minimally invasive surgery has revolutionary in the management protocol of these patients, subject to availability of expertise. Many experts have successfully excised the cystic duct remnant laparoscopically, thus, leading to full recovery of the patient without significant postoperative morbidity. Though the techniques of LSC were standardized in our institute initially for cirrhotic patients, we have gradually incorporated it for the so-

called ‘difficult’ cholecystectomies even in non-cirrhotic patients.¹⁶⁻¹⁸

Conclusion

One important cause of PCS is the underreporting and underestimation of CD stone occurrence. Let us assume, however, that during a laparoscopic cholecystectomy, careful attention is paid to CD and that certain simple and safe manoeuvres are utilized.

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