



A CLINICAL STUDY OF POST CHOLECYSTECTOMY COMPLICATIONS- LAPAROSCOPIC VERSUS OPEN

General Surgery

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ABSTRACT

Introduction: With introduction of laparoscopic cholecystectomy the incidence of the post cholecystectomy bile duct injury has increased. In this study we reviewed post cholecystectomy complications following open and laparoscopic cholecystectomy on the following complications: 1.Post cholecystectomy biliary stricture and external biliary fistula.2. Post cholecystectomy retained stone.3.Post cholecystectomy wound infection.

Material and methods: A total of 534 cholecystectomy were studied during this period. Among this, 210 cases were open cholecystectomy and 324 cases undergone laparoscopic cholecystectomy. Incidence of Post cholecystectomy biliary stricture and external biliary fistula, retained stone and wound infection was studied.

Results: Total 4 cases of retained stone have been documented. The incidence of wound infection in open cholecystectomy was 3.8% and in laparoscopic cholecystectomy was 0.3%. 3 cases of bile duct injury cases were noted.

Conclusion: Incidence of bile duct injury was less in Open cholecystectomy as compared to Laparoscopic cholecystectomy. Postoperative wound infection and postoperative hospital stay following laparoscopic surgery is very less as compare to the open procedure.

KEYWORDS

Retained stone, Bile duct injury, Wound infection, Laparoscopic cholecystectomy, Open cholecystectomy.

INTRODUCTION

Cholecystectomy is one of the most frequently performed procedure in the Hepatobiliary system. Preparation and indication for cholecystectomy are the same whether it is performed by laparoscopy or by open technique. However procedure and skill required are different for both these procedures. Perfect knowledge of the anatomy of the bile duct and its possible variation is necessary to perform safe cholecystectomy operation. Cholecystectomy is commonly performed for symptomatic cholelithiasis.

Following the introduction of the laparoscopic cholecystectomy the incidence of the post cholecystectomy bile duct injury has increased; it is approximately twice than that of open cholecystectomy. Also, the incidence of intra peritoneal bile collection or biliary peritonitis is quite higher in laparoscopic cholecystectomy. More than 90% of benign stricture of biliary tract occurs after injury to bile duct during the course of cholecystectomy operation with or without bile duct exploration. It is the most troublesome complication associated with cholecystectomy. The management of this injury is very difficult and often satisfactory results are not always obtained.

Common duct stones usually occur in association with cholelithiasis but may also be found in patients who undergone cholecystectomy. Stone become symptomatic within 2 years of previous surgery is termed as a retained stone. Incidence of common bile duct stone following cholecystectomy without CBD exploration is 1-4% of patients and 4-15% when patient had undergone surgical exploration of the CBD. After repeat exploration recurrence rate is approximately 20%. It is diagnosed in the immediate postoperative T-Tube cholangiogram or when USG abdomen is done for post cholecystectomy biliary pain, jaundice or deranged liver function.

Causes of Retained Stone:

- (1) Lodged inextricably in the intrahepatic duct
- (2) Overlooked because of technically inadequate post exploratory cholangiography.
- (3) Not visualized despite good quality post exploratory cholangiography.
- (4) Misinterpreted as air bubble or post exploratory cholangiography.

Prevention of the wound infection should be an important surgical treatment. Patients who developed infection have not only increase in

morbidity but also increased mortality as well as substantial healthcare cost and patient inconvenience and dissatisfaction

In this clinical study attempt has been made to study few common post cholecystectomy complications (post cholecystectomy biliary stricture and external biliary fistula, retained stone, wound infection) in patients undergoing Laparoscopic Cholecystectomy and Open Cholecystectomy.

MATERIALS AND METHODS

It was an institution based, observational study conducted in General Surgery department of R.G.Kar Medical College and Hospital, Kolkata.

As per previous year statistics, it is estimated that about 500 such cases will comprise the total

sample size.

- Group 1 –Patients undergoing Open Cholecystectomy
Group 2 – Patients undergoing Laparoscopic Cholecystectomy

Inclusion criteria:

1. Patients with symptomatic gall stone disease.

Exclusion criteria:

1. Patients with immunogenic diseases or immunosuppressive therapy.
2. Pediatric patients.
3. Patient undergoing cholecystectomy as a part of some primary operations E.g. Whipple's operation, biliary enteric anastomosis, gall bladder carcinoma.
4. Stones becoming symptomatic more than two years following previous cholecystectomy.

Study design

It is a cross-sectional prospective observational study where 500 consecutive patients undergoing cholecystectomy for symptomatic gall stone disease were recruited for study using inclusion and exclusion criteria. Prospective observations were made and Post cholecystectomy biliary stricture and external biliary fistula, retained stone and wound infection were studied in patients undergoing Open and Laparoscopic Cholecystectomy. Written informed consent was

taken from all cases. Approval was taken from institutional ethical committee.

Study tools:-

1. Pretested and predesigned Proforma.
2. CLINICAL ASSESSMENT: Detail history, General Examination, systemic examination
3. BIOCHEMICAL INVESTIGATION: Complete hemogram, Coagulation profile, Electrolytes, Liver function test.
4. RADIOLOGICAL EVALUATION: USG whole abdomen, MRCP if indicated

STUDY TECHNIQUE:-

The principal investigator collected data by use of questionnaires and direct observation of the patient in the pre, peri-operative and postoperative periods.

We compared the results of the Open cholecystectomy with Laparoscopic Cholecystectomy for Post cholecystectomy biliary stricture and external biliary fistula, retained stone and wound infection.

Statistical Analysis

Statistical Analysis was performed with help of Epi Info (TM) 7.2.2.2. EPI INFO is a trademark of the Centers for Disease Control and Prevention (CDC).

Basic cross-tabulation and frequency distributions were prepared. t-test was used to test the significant difference between means. Odds ratio (OR) with 95% Confidence Interval (CI) was calculated to measure the different risk factor. $p \leq 0.05$ was considered statistically significant.

RESULTS

The present study was conducted in R.G.KAR Medical college and hospital, Kolkata during the time period of January 2017 to august 2018. Total 534 cholecystectomy were performed during this period. Among this, 210 cases were open cholecystectomy and 324 cases undergone laparoscopic cholecystectomy.

- Total number of Cholecystectomy =534
- Total number of open Cholecystectomy =210(39.32%)
- Total number of laparoscopic Cholecystectomy =324(60.67%)

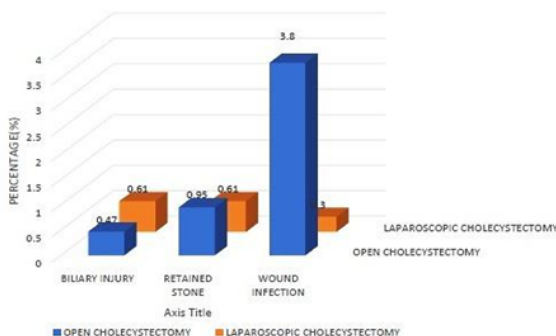
3 cases of bile duct injury, 4 cases of retained stones and 9 cases of wound infection were documented during this period. The cases distributions are shown in the table 1.

Table 1 Showing total number of cases developed post cholecystectomy complications according to the type of procedure.

Operative Procedure	Total Number Of Cases	Number Of Cases Of Bile Duct Injury	Number Of Cases Of Retained Stone	Number Of Cases Of Wound Infection
Open cholecystectomy	210	1(0.47%)	2(0.95%)	8(3.8%)
Lap. cholecystectomy	324	2(0.61%)	2(0.61%)	1(0.3%)

Figure 1

SHOWING TOTAL NUMBER OF CASES DEVELOPED POST CHOLECYSTECTOMY COMPLICATIONS ACCORDING TO THE TYPE OF PROCEDURE



Three cases of bile duct injuries occurred in this hospital during the 10 months study period. One injury was following open Cholecystectomy and two following laparoscopic Cholecystectomy.

One male patient was post-operative bile leak through drain site for 20 days, initial 3 days drain was 400ml to 500ml then gradually decreases and completely stopped on 19th day.

One female patient was diagnosed intra-operatively with partial transection of proximal common bile duct. Two female patients present with jaundice and cholangitis within 2 months of initial operation.

MRCP showed dilated biliary radicles with abrupt tapering CBD in one female patient.

There was history of contracted gallbladder in one case with adhesion in one patient and history of intraoperative bleeding in two patients.

5 cases of bile duct injuries were referred to this hospital from peripheral hospitals for further management during this period which was not included in the study.

Initial Assessment of the Referred patients: Of the 5 referred cases 2 have undergone open cholecystectomy for symptomatic gall stones and 3 had undergone laparoscopic cholecystectomy for early acute cholecystitis.

One of patient had uncontrolled fistula converted to external controlled biliary fistula, on one day it came more than 1200 ml from then it had daily amount of bile drainage ranging from 200 to 700ml. Drain bile showed E.coli on culture sensitivity.

All patient underwent routine blood examination and liver function tests. Other investigation done on the patients included ultrasonography of abdomen including hepatobiliary system, and MRCP. Due to non-availability of facilities, we could not go for HIDA, PTC.

On the basis of the above investigation, one patient showed partial transection of CBD, one showed stricture in distal CHD.

The following observations are seen in the present study:

1. **Incidence:** Of the native cases of bile duct injury, one was following open cholecystectomy and two was following laparoscopic cholecystectomy.
2. **Age distribution:** Of the 3 bile duct injuries, two of patients were in age group of 25-40 years and one in age group of 41-55 yrs. so the mean age was 37.83 years. Age distribution is shown in Table-2
3. **Sex ratio:** In this present study, out of 3 cases there were 2 females and 1 male. The female to male ratio of biliary injuries are 2:1. Sex ratio is shown in Table-3.
4. **Number of biliary injuries recognized during the operation:** out of total of 3 biliary injuries the only one injury was recognized intra operatively and this case was repaired immediately in the same sitting.

Table 2 :showing The Mode Of Treatment For Biliary Injury

Management	Number Of Cases	Percentage(%)
• Conservative	1	33.33
• T-tube	1	33.33
• Choledochoduodenostomy	1	33.33

Total 4 cases of retained stone have been documented in the 10 months period. These 4 cases were included in the series to study management. The presence of retained stone was diagnosed initially on ultrasonography of hepatobiliary system in all the four cases which was later confirmed on MRCP.

In this present study 9 post-cholecystectomy wound infection cases were recorded, during the 10 months time period. Post-operative wound infections patients referred from other hospitals were not included in the study.

2 Cases were Empyema Gallbladder. 2 cases of wound infections were associated with Diabetes mellitus.

The common causative organism cultured from the post-operative infective wound were Coagulase positive Staphylococcus aureus followed by mixed Infections.

Three patients required Secondary closure as they developed wound dehiscence, two were obese and one had Diabetes Mellitus.

One patient who underwent Laparoscopic Cholecystectomy, developed port site infection. Biopsy from the wound swab showed Atypical Mycobacterium and the wound Healed with Macrolides and Fluoroquinolones.

The other six patients were treated with antiseptic dressing and antibiotics depending on culture and sensitivity reports.

The average hospital stay of the infective cases was 14 days from the operation days.

DISCUSSION

Post Cholecystectomy Biliary Stricture And External Biliary Fistula:

In this study, 0.47% of biliary injury has been found following open cholecystectomy and 0.61% following laparoscopic cholecystectomy during the period from January 2017 to August 2018 in this hospital. In a study conducted by Borgstrom S. *et al*¹, 1959, on 5656 open cholecystectomy cases, the incidence of biliary injury was 0.09 % and 0.4 to 1.3% (Adamsen *et al*², 1997) following laparoscopic cholecystectomy. Few incidences of biliary injuries from different series are given in the following Table-3:

Table-3 Showing The Incidence Of Biliary Injuries In Different Series (open Cholecystectomy)

Series	Number Of Operation	Number Of Injury	Percentage (%)
Borgstrom S. <i>et al</i> (1959) ¹	5656	5	0.09
Rosenquist <i>et al</i> (1960) ³	1000	2	0.20
Morgenstern <i>et al</i> (1992)	1200	2	0.17
Czako T; Ptri I <i>et al</i> (1995)	3757	8	0.20
Escarce J.J. Shea J.A. <i>et al</i> (1995)	21,000	84	0.40
Present Series	210	1	0.47

Ductal injury may be recognized during the Operation. In this present study, one (33.33%) ductal injury was recognized during Laparoscopic cholecystectomy and repaired. No ductal injury cases detected during Open cholecystectomy. It may be due to the fact that our study is limited to a small group of patients and the duration of study is short.

In a series of 78 post cholecystectomy biliary stricture cases, 19% patients with biliary injury were detected during cholecystectomy (L.H.Blumgart, C]. Kelley, 1984). William C. Chapman *et al* (1995) also reported that 23 (1800) biliary injury cases were recognized during operation out of 130 biliary stricture cases. The present study is comparable to the series of Blumgart L.H. *et al* (1984) and William C. Chapman *et al* (1995).

However, in the immediate post-operative period or later, the first indication for biliary damage is bile drainage from the wound or drainage site. Post-operative fistula of the biliary tract develops in approximately one-third of the patients and 41% patients eventually required additional surgical treatment for recurrent stricture formation (Sandberg A.A., Johnson B. *et al*, 1985). Results from other studies report re-structure in upto 50% of patients after early repair (Kune GA. and Sali, 1981).

In this study, 33.33% (1 case) of biliary injury cases presented with a biliary fistula (external fistula). Below, Table-4 shows the different Series with patients presenting with external biliary fistula.

Table-4

Series	Number Of Biliary Injury Cases	Number Of Cases Presenting With Biliary Fistula	Percentage (%)
L.H. Blumgart <i>et al</i> (1984)	78	14	18.00
Abraham czernaik <i>et al</i> (1988)	123	12	10.00

William C. Chapman <i>et al</i> (1995)	135	9	7.00
Present series(2018)	3	1	33.33

There should not be a single approach to the patient with bile duct stricture. Mucosa-to-mucosa biliary-enteric anastomosis is the ideal and is associated with excellent results (Bismuth H, Franco D, *et al*, 1978). In this study, 1 patient underwent mucosa-to-mucosa anastomosis. But these Patients could not to be followed up for a long period to study the outcome.

Retained Stone

Careful CBD exploration along with the proper use of intra-operative cholangiography (Gupta N.M and Tolwar B.L, 1977), choledochoscopy (Rattner D.W. *et al*, 1981) and biliary manometry during the biliary operation can, to a large extent minimize the incidence of retained stones. Sometimes operative Cholangiography can also miss a CBD stone. “The longer the period between onset of symptoms and elective cholecystectomy, the smaller the chance of finding stones on operative cholangiography” (Surgery of the Liver and Biliary Tract, by L.H. Blumgart-4th Edition).

Since 1974, endoscopic sphincterotomy has been utilized for the removal of retained and recurrent calculi. After a successful sphincterotomy, the stones are allowed to pass spontaneously or they can be extracted using a dormia basket catheter (Cotton RB. and Vallen AG, 1981). About 10% of patients have residual stones after endoscopic sphincterotomy. Haemorrhage, perforation, acute pancreatitis and acute cholangitis are the frequent complications of endoscopic sphincterotomy.

Post cholecystectomy wound infection:

The present study is almost similar with Lee J. *et al* (1998). A comparative study of present series for open procedure with other workers is made in Table- 5 (clean/ contaminated wound).

Table-5

Authors	Number Of Patients	Number Of Operative Infections
Richard A. <i>et al</i> (1991) ³	1009	81(8%)
Cruse (1992)	14018	879(6.3%)
Lee J. <i>et al</i> (1998)	9150	210(2.3%)
Present series (2018)	534	8(1.49%)

According to this study highest percentage is associated with jaundice. Obesity is also found to a important cause of infection. Shukla *et al* (1986) also reported the similar results.

Diabetic patients have been appreciated as having increased rate of surgical site of infection. Control of glucose level in peri-operative period and upto 48 hours post operatively in both diabetic and non-diabetic patients can reduce the rate of infection (Sabiston Text Book, 2017).

Garibaldi *et al* (1991) noted similar finding in their series, 35% of their infection were caused by Staph. aureus, 17% by Enterococci, 15% by E.Coli, 13% by Enterobacter, 8% by pseudomonas. Similar results are also comparable with the finding of PHLC report (1960) and Davis *et al* (1973). Mc.Garry SA *et al* (2002) reported that surgical site infection with Staph. aureus in elderly patient is independently associated with increased mortality and morbidity and also increase hospital stay by 2.5 fold and hospital charge by 2 folds.

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Conflict of Interest: None

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