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A Study of Biliary Tract Complications after Cholecystectomy

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Original Research Article

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Abstract: The study was conducted in the Department of Surgery, J.A. Group of Hospitals and G.R. Medical College, Gwalior from September 2016 to August 2017. It was a prospective observational study. To find out the incidence of complications according to age and sex and also evaluate the symptoms of various biliary tract complications after cholecystectomy, to recognise the etiology of complications. Total 277 patients undergone cholecytectomy. 209 operated by open cholecystectomy. 30 patients were diagnosed as a biliary complications following cholecystectomy. All these patients were divided into 4 groups. There groups are biliary leak, retained stone, benign biliary structure, intraoperative bile duct injury. 19 patients were of biliary leak, 5 of retained stone, 2 of biliary structure, and 4 of intraoperative bile duct injury. All the data were collected and then processed and analysed. Epical 2000 info software were used for calculation χ^2 value and p value 277 patients were enrolled cholecytsectomy out of this 19 were of biliary, 3 were male (15.29%) and 16 were females (8.21%). Average age of patients was 20-65 years and maximum belonged to 20-30 years of age group. 51.89% patients were presented within 5 days and 84.22% patients with 40 days. The retained stone group. 51 (16.6%) patients biliary structure group have 2 cases present in 3 months.
Keywords: Biliary tract, conventional cholecystectomy, laparoscopic cholecystectomy.

INTRODUCTION

Archaeological excavations demonstrating the presence of gall stones in young Egyptian women have confirmed that cholelethiasis has plagued mankind for over 2000 years. During the last several centuries, numerous innovative and creative techniques have been introduced in an effort to manage these patients with symptomatic gall stone diseases.

The treatment for symptomatic gall stone disease remained relatively primitive and ineffective until the late 1800s. As surgical technique began to evolve, John Bobbs, an Indiana surgeon and other attempted to peform cholecystolithotomy, removing the stone from gall bladder and leaving the organ in situ. While this proved to be effective in ameliorating acute symptoms, physicians were disappointed by the recurrence of symptoms in many of these patients.

The management of patients with gall bladder disease has been revolutionized during the last several years with the introduction and evolution of laparoscopic cholecystectomy. This technique is rapidly emerging as the gold standard for the treatment of patients with symptomatic gall stone disease and is now available throughout most parts of the world. This technique has several advantages as compared to conventional surgery including improved patients compliance, satisfaction and reduced cost.

Common bile duct exploration is embarked upon to remove all calculi within the biliary system, both intra and extra hepatic. It is the definitive procedure in the treatment of CBD stones. 15 to 20 percent adults have calculus biliary tract disease. CBD exploration is combined with cholecystectomy in 20-50% of cases. The frequency of CBD exploration at the primary varies from clinic to clinic reflects the attitude and experience of the surgeons.

At present cholecystectomy is probably the most commonly performed elective abdominal operation and has a high degree of safety. The surgical mortality rate is <0.5% patients younger than 65 years of age, although it is higher un elderly patients undergoing emergency operation and in patients with coincident disease. When exploration of CBD is required the mortality rate in higher specially in the presence of jaundice or cholangitis.

Major complication of the cholecystectomy as we define them includes the total number of complications which are considered as the recognized complication of conventional cholecystectomy. These include biliary duct injury or leakage, hemorrhage or infection and other direct complication of laparoscopic cholecystectomy such as trocar and Verses needle injury and indirect complications such as major system morbidity (primarily cardiac and respiratory)

The best management of bile duct injuries require early recognition, prompt referral, accurate repair, regular review and sometimes re-operation. Only about 20% of the bile duct injuries are recognized at the time of cholecystectomy, Major ductal injuries recognized at the time of operation usually present whitin a matter of days while deepening jaundice, bile ascites or profound biliary fistula often complicated by subhepatic abscess and fever. Incomplete duct injuries may be present later with attacks of jaundice, recurrent cholangitis and rigors. Indeed some unfortunate patients are allowed to continue with subacute biliary obstruction until secondary biliary cirrhosis ensues.

The estimated incidence of retained calculus or calculi in biliary ductal system following cholecystectomy with or without exploration of CBD is 0.5 to 8% and is indicative of incomplete success.

AIMS & OBJECTIVES

The Basic aim of this prospective study was to evaluate the biliary tract complications following open as well as laparoscopic cholecystectomy.

This prospective study was designed with following specific objectives:

- To find out the incidence of complications according to age and sex.
- To evaluate the symptoms of various biliary tract complications after cholecystectomy.
- To recognize the etiology of complications.
- Hospital stays due to complications.
- To evaluate the out come of patients in terms of morbidity, mortality, retained stones, stricture, persistent problems during follow up.

MATERIALS AND METHODS

This prospective study was planned to analyse and review biliary complications (i.e. bile leak, retained stone and biliary stricture following cholecystectomy) following both open and laparoscopic cholecystectomy performed at our centre outside and assessing their management at our setup.

This prospective study was of 1 and 1/2 year duration from March 2015 to September 2016. The study included all the patients with proven biliary complication following cholecystectomy as diagnosed by history, clinical examination followed by relevant haemolotological and ultrasonographic findings, admitted or refer J.A. Hospitals Group of G.R.M.C. during the conduction of study period, provided they fulfilled the selection criteria. The selection criteria for this study were prefixed and are as follows:

1. Cases with perioperative recognition (during cholecystectomy) of bile duct injury.
2. Patients with proven cholecystectomy having or with the history of:
   - Biliary fistula
     - From drain side
     - From main wound
   - Biliary ascites/Peritonitis
   - Jaundice
   - Tenderness with pain in right hypochondrium
   - Charcot's biliary traid consisting of pain, jaundice and fever and is present in cases of cholangitis.
3. Previous cholecystectomy patients with direct or indirect evidence of biliary complications in ultrasonography viz.
   - Biliary ascites
   - Bilioma
   - Demonstration of stone in biliary tree.
   - Air in biliary tree
   - Dilated common bile duct (>10 mm in diameter).
   - Intrahepatic and extrahepatic biliary radicles dilatation
4. Retained CBD stone in an operated case of cholecystectomy with a T tube in situ.
   - Clinically symptomatic on clamping of T tube
   - Stone visualisation in T tube cholangiogram

Exclusion Criteria

- Patients with biliary complication arising out of procedure other than cholecystectomy.
- Following cholecystectomy if histopathlogy revealed it to be malignancy of gall bladder.
- Primary CBD stones following cholecystectomy.
- Malignant stricture/obstruction of biliary tract following cholecystectomy.

Management Strategy

A detailed history and clinical examination followed by relevant hematological and ultrasonographic study were performed on the cases suspected to have biliary complications following cholecystectomy. Ultrasonography of abdomen was performed in all patients. USG was done in morning after full level preparation with overnight fasting that hepatobiliary system could be evaluated with minimal interruption of the overlapping bowel gas. Peritoneal cavity was then evaluated for:

- Intraperitoneal collection
- Stone in biliary tract
- Dilatation of CBD>10mm
- Air in biliary tract
- Dilated intrahepatic and extrahepatic radicals

Along with other complains, the patients were investigated for any other associated pathology of the hepatobiliary system like perimpullary growth and secondaries liver.

Based on above criteria, the patients with suspected/proved biliary complications were selected for the study.

These selected patients with suspected/proved biliary complications were divided into 4 groups:

- Patients with perioperative recognition of biliary tract injury.
- Patients with postoperative recognition of biliary tract injury.
- Post cholecystectomy patients with retained CBD stones with or without a T tube in situ.
- Patients with benign biliary stricture following cholecystectomy.

Group One: Definitive repair was done at the time of primary operation.

Group Two: Patients were sent for ERCP if the general condition of the patient permitted and if facility was available.

Group Three: One or more of the following modalities applied in patients according to facilities available:

- Removal of stone by ERCP
- Exploratory laparotomy with cholecystectomy
- Removal of stone by choledochoscope through T-tube

Group Four: These patients were managed by definite repair (hepaticojejunostomy)

OBSERVATIONS

This prospective study was 1½ years duration from March 2005 to September 2006 included 277 patients undergone cholecystectomy (209 open cholecystectomy 68 Lap. cholecystectomy) out of these patients 30 patients diagnosed as a biliary complications following cholecystectomy. Complication rate 1.08% diagnosed according to the prefixed selection criteria. All these patients were divided into four groups according to the major complications (as diagnosed by detailed history and clinical examination followed by relevant haematological and ultrasonographic study).

These groups are: Patients with

- Biliary leak
- Retained stones
- Benign biliary stricture
- Intra-operative bile duct injury

Number of patients in various groups was as follows:

Table-1: Distribution of Patients developing biliary complication following cholecystectomy in various groups (n=30)

Group	Number of Patients	Percentage
Biliary leak	19	63.33%
Retained stone	5	16.6%
Biliary stricture	2	6.67%
Intra-operative bile duct injury	4	13.33%

BILIARY LEAK GROUP

This group included 19 patients, out of which 16 underwent open cholecstectomy and three laparoscopic cholecystectomy.

Male: female ratio in our study was 3:16 Maximum number of patients belonged to 20-30 years age group.
Average age of presentation

39.4 year Average
41.0 year Male
34.4 year Female

In our study group, minimum age of male patient was 26 year and for female patient it was 20years. Maximum age of male patient in this study was 65 years and for females it was 60 years.

TIME OF PRESENTATION IN BILIARY LEAK GROUP

Table-2

Age (yrs)	Male		Female		Total	
	No.	%age	No.	%age	No.	%age
20-30	1	33.33	7	43.75	8	42.11
31-40	1	33.33	3	18.75	4	21.05
41-50	-	-	4	25.1	4	22.05
51-60	-	-	2	12.50	2	10.53
≥ 61	1	33.33	0	0.00	1	5.26

Table-3: Distribution of Patients developing biliary complication following cholecystectomy according to the Time of Presentation to our Institute (n=19)

Presentation (Days)	Number of patients	Percentage
0-5	11	57.89
6-10	5	26.33
11-15	1	05.26
16-20	-	-
21-25	-	-
26-30	1	05.26
31-35	-	-
36-40	1	05.26

Majority (about 58%) of the patients presented to us within 5 days and about 84% of patients presented with 10 days following detection of biliary complications after cholecystectomy. Maximum duration of presentation was 40 days after operation. Mean duration of presentation was 7.59 days. . Most of these patients diagnosed primarily by Bile more than 70 ml per 24 hours by drain / wound site, later on they were confirmed by ultrasonography and Post-Operative T-tube Cholangiogram.

FIRST SYMPTOM

OUTCOME/RESULTS

Table-4: Distribution of patients according to their Outcome/Results (n=19)

Outcome/Results	Number	Percentage
Cured	13	68.42
Expired	4	21.05
Lost to follow up	2	10.53

Two patients lost of follow up within few days so they were not included in the management section, 13 out of 19 patients were clinically, biochemically and radiologically improved.

RETAINED STONES GROUP

Five patients came to us weeks to months after cholecystectomy with the complaints related to biliary tract.

Table-5: Distribution of Patients with developing Retained Stones after cholecystectomy (n=5)

Range	Male	Percent	Female	Percent
20-30	-	-	1	25
31-40	-	-	2	50
41-50	-	-	-	-
51-60	1	100.0	-	-
61-70	-	-	1	25

Male female ratio in this group was 1:4 i.e. 20.0% were males and 80% were females. Average age of presentation in males as 55 years and in females it was 41.7 years. Mean age was 45 years in this group. Minimum age of patient was 28 years and maximum was 65 years.

RESULTS

Table-6: Distribution of patients according to outcome/results (n=5)

Outcome/Results	Number	Percentage
Cured	5	100.00
Retained stone	-	-
Expiry	-	-

All the four patents were cured by the above mentioned management. They showed clinical and biochemical improvement and postoperative radiological investigations showed clearance of the biliary channel.

BILIARY STRICTURE GROUP

2 patients were included in this group. Both had undergone open cholecystectomy. Among these two, 1 patient had history of biliary leak following cholecystectomy.

In this group 4 patients were diagnosed intra operatively out of these 3 underwent open cholecystectomy and one lap cholecystectomy

Table-7: Intra operative biliary tract injury group

Age (yrs)	Male		Female		Total	
	No.	%age	No.	%age	No.	%age
20-30	2	50%	1	25%	3	75%
30-40	1	25%	-	-	1	25.00

Male female ratio was 3:1 Maximum complication occur between 20 to 30 years age group.

In our study group, both the patients were female and the mean age of their presentation was 46.5 years.

Management of Intra operative biliary tract injury group

In this group all 4 patients were diagnosed perioperatively out of these in 1 patient complete transection of CBD found. So choledochodeobenostomy was done. In two other patients partial transection of CBD found in these 2 patients primary repair of CBD with T-tube placement done. In one patient there were cystic duct stump leak which manage by religation of cystic duct stump. Cure rate 100% in intraoperative biliary tarct injury group. Out of these 2 patients were discharge with 10 days and 2 other with T-tube which was removed on follow up after T-tube cholangiogram.

Table-8: Distribution of patients according to their age and sex (n=2)

Range	Male	Percent	Female	Percent
20-30	-	-	-	-
31-40	-	-	1	50.0
41-50	-	-	-	-
51-60	-	-	1	50.0

DISCUSSION

This prospective study was conducted in our department to analyse and review the biliary tarct complication following both open cholecystectomy and laparoscopic cholecystectomy performed either at our centre or outside and assessing their management at our setup.

These patients were divided into 4 groups:

- Bile leakage group
- Peri operative biliary tract injury group
- Retained stones
- Benign biliary stricture

BILE LEAKAGE & PERIOPERATIVE BILIARY TRACT INJURY GROUP

This group included 19 patients out of which 3 were males (15.79%) and 16 were females (84.21%)

In these patients only 3 patients underwent laparoscopic chelecystectomy. In 16 patients conventional cholecystectomy was done.

Age of patients ranged from 20-65 years with the mean of 39.4 years. In this study maximum number of patients belonged to 20-30 years age group. As M Johnston [1] stated that these injuries commonly occur in young women.

About half (57.89.%) of these patients presented within 5 days of detection of biliary injury and 84.22% patients within 10 days. Maximum duration was 40 days after operation and mean duration of presentation was 7.59 days. 4 patients (13.33%) were diagnosed preoperatively (20% preoperative recognition of bile duct injury in series of G.W. Johnston *et al*.)

First and commonest symptom in our study was biliary fistula (63.84%) and fistula output in these patients varied from 70-500ml-day. Bile duct injuries usually present early in the postoperative period, obstructive jaundice or evidence of a bile leak being the most common mode of presentation as also stated by Lillemoe KD[2].

Thomas Ringgs *et al*.[7] reported that most common presentation in their series was biliary cutaneous fistula but progressively deepening jaundice was commonest symptom in series of M. Raute *et al*.[4].

Biochemical parameters were deranged in about 73.69% patients. 47.37% patients had leukocytosis, 73.69% patients have raised serum bilirubin level and 57.89% patients had raised S. alkaline phosphate. Renal functions were impaired in 21.05% patients and electrolyte imbalance was present in 31.58% cases. In short, most of the patients were clinically and biochemically not stable and needed early resuscitative measures.

Ponsky JL[5] states that optimal management of such problems depends upon early recognition and strategic planning of a therapeutic approach and high index of suspicion is mandatory in patients complaining of discompfort servel days after surgery and use of

ultrasound imaging helps identifying bile leaks before peritonitis is severe.

All the 19 patients who presented in postperative period were sent for ultrasonography abdomen. USG was able to detect intra-abdominal collection in 89.47% cases (17/19 cases). Thus USG was very sensitive in detecting intrabdominal collection. It was also very helpful in assessing the outcome of management (by seeing site and amount of intraperitoneal collection).

Optimal management of bile duct injuries requires the cooperation of hepatobiliary experts in surgery, endoscopy and radiology using state of the art technology [8].

Vecchio R *et al*.[7] suggested that lesions detected during cholecystectomy should be repaired immediately, preferably with an end to side billiary enteric anastomosis, a roux-en-Y bilio-enteric anastomosis or by insertion of a T-tube.

Intraoperative recognised major injuries (6 patients) were repaired either by bilio-biliary anastomose or hepatico-jejunostomy.

In 3 patients exploratory laparotomy was done because:

- In one patient rent was found in 2nd part duodenum and CBD. Rent in CBD was primarily closed with T-tube drainage. Duodenum was primarily closed and gastrojejunostomy with feeding jejunostomy was done. Drains were put in both right and left hepatic duct and taken out in duodenum. Postoperative course in these patients was uneventful.
- In one patient with ileal peforation and bile leak from CBD ileostomy with T-tube placement done patient into with complaint of fever.
- One patient with bile leak, which did not improve by conservative treatment, explored and rent in CBD was closed with T-tube drainage. Patients improved significantly.

In 9 patients conservative management was applied for the following reasons:

- In three patients, bile output was 300ml/day though the drain. USG abdomen showed insignificant intraperitoneal collection so a patient was manged conservatively. Bile output reduced gardually and stopped in one week.
- Six patients were in every poor general condition with sepitication and decreased urine output. They were managed conservatively but other three kept on deteriorating and ultimately expired.

In our study, 4 patients expired in this group. Among 4, one had undergone laparoscopic cholecystectomy and other 3 open cholecystectomy. These patients presented to us after an average of 14 days following cholecystectomy (double the mean time period of other patients). They had multiple associated injuries/complications at the time of presentation. As 1 patient were in septicaemia and 1 in acute renal failure with 1enteric perforamation at the time of presentation & other 2 patient expired due to MI.

RETAINED STONE CROUP

The retained stone rate is 16.6% which is almost equal to 15.5% in 1987 study by Oshodi to *et al*. [8].

In our study 5 patients were included in this group. All 5 had undergone open cholecystectomy. Choledochotomy was done in one patient. Average time of presentation after operation was 3.5 months (range 14-182 days).

The median time interval between surgery and presentation was 28 days as reported by Hansell DT *et al*.[9].

In our study, one patient was diagnosed by postoperative T-tube cholangiogram. In other patients recurrent pain in right hypochondrium was most common presentation. About 80% patients were having features of cholangitis.

Leukocytosis was present in 80% of patients. All 5 were having raised serum bilirubin (>1 mg%) 4 patients were having serum bilirubin > 2.5mg% Maximum level of serum bilirubin found was 8.2 mg%. Serum alkaline phosphatases were raised in 4 patients.

All the three patients diagnosed in later stage were sent for USG abdomen. USG was very sensitive and specific (upto 100%) in diagnosing number and site of stone and dilatation of intra and extra hepatic biliary radicles.

Over 85% of CBD stones can be diagnosed preoperatively by USG abdomen and liver function tests with USG as done by Sharma A.K et al.

In 4 patients open choledocholithotomy was done. One patient was managed by open choledocholithotomy with choledocho-deodinostomy (as CBD was found to be 17 mm in diameter at porta hepatis) and other three by open choledocholithotomy with T-tube drainage.

BILIARY STRICTURE GROUP

Bile duct strictures are an uncommon but serious complication of primary operations on the gall bladder or biliary tree. Most strictures occur as a result of injury to the bile duct during choelcycstectomy by Lillemore KD *et al*.[9].

In our study, 2 cases were included in this group. One patient presented after 3 months and other one after one year following cholecystectomy. Mean time of presentation was 7.5 months.

Patients development strictures after an uneventful postoperative course within intervals varying from 3 months to 23 years as reported by Raute M *et al*.[9]

In our study both the patients presented with pain and jundice Fever was present in one patient and history of bile leak following cholecystectomy was present in one patient which was managed conservatively. In patients presenting with a postoperative bile duct stricture months to years after surgery, cholangitis is the most common symptom (Lillimore KD)[9].

The gold standard for bile duct strictures in cholangiography as reported by Lillimoe KD, 1997[9]. In our study both the patients were managed by Roux-en-Y hepaticojejunostomy. Postoperative course was uneventful and patients improved significantly.

The most commonly employed surgical procedure with overall best results for the treatment of bile duct strictures is a Roux-en-Y hepatico-jejunostomy [9].

SUMMARY AND CONCLUSION

277 patients operated in Department of Surgery, G.R. Medical College & J.A. Group of Hospitals, Gwalior (M.P.) out of these patients 30 patients develop biliary tract complications following cholecystectomy were included in this study in the period ranging from March 2018 to September 2016.

Following conclusion have been drawn from the present study

- In 30 cases, only 4 patients had complications following laparoscopic cholecystectomy. Rest 26 patients underwent open cholecystectomy.
- Most of the patients of these complications are young and in prime of their life. In this study, approximately 1/3 of these patients were below 30 years age and approximately 2/3 patients were below 40 years.
- Bile leaks appear to be most common biliary complications following cholecystectomy. Among 30 patients, 19 presented to us as biliary leak.
- Biliary leaks present early in postoperative period, so about 57% patients presented within 5 days and about 84% within 10 days. Mean duration of presentation was 7.59 days.
- In our study, biochemical parameters were deranged in most of the patients and required early diagnosis and management.
- Delay in proper management of these patients can significantly increase morbidity and mortality as patients who expired presented to us after an average period of 14 days following detection of injury while other patients presented after 7.59 days.
- In our study average hospital stay of such patients in our institute was 19.96 day. If we add average presentation time to our institute (i.e. 7.59 days) then a patient of biliary tract complication following cholecystectomy had to stay about 27.55 day more in hospital after primary surgery. Thus we feel really indicates significantly morbidity and economic burden on patients and society. This factor is relevant.

More so today, when in era of laparoscopic surgery, cholecystectomy is considered a one day procedure.

- In our study, 4 out of 30 patients expired which indicates 13.33% (4/30) mortality. Such high values of mortality would come as a shock when we consider cholecystectomy a very safe prodcedure.

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