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# A Study on Management of Post Cholecystectomy Bile Duct Injury by Endoscopy

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**ABSTRACT**
Bile duct injuries following cholecystectomy surgery were followed up after undergoing ERCP procedure . Total 34 patients were taken , out of which 10 patients expired or were lost to follow up, so 24 patients were taken. 14 patients had only bile duct leaks and rest were having leaks with stricture. Success of ercp in patients with only leaks was 13/ 14(93%) .Out of stricture only 5 patients could be cannulated and 2 were successful, 2 out of 5 (40%). So ERCP is more successful if there is leak rather than leak with stricture

**Keyword:** 1 Bileduct Injury 2 Cholecystectomy 3 Endoscopic Retrograde Cholangiopancreatography (ERCP)

## INTRODUCTION

Laparoscopic cholecystectomy was first introduced in the late 1980s and has become the gold standard for the management of benign gallbladder disease. Laparoscopic cholecystectomy has been associated with less morbidity, shorter hospital stay, earlier return to normal activity, less postoperative pain, and better cosmesis compared with open cholecystectomy. It is estimated that more than 750,000 laparoscopic cholecystectomy procedures are performed annually in the United States; making it the most frequently performed abdominal procedure(1). Despite the clear benefits of laparoscopic cholecystectomy, the rate of iatrogenic bile duct injury has increased from a rate of 0.1% to 0.2% during the era of open cholecystectomy( 2,3) to between 0.4% and 0.6% during the era of laparoscopic Cholecystectomy( 1,4-6) .

The commonest reported cause of common bile duct injury is misidentification of the biliary anatomy (70 to 80% of injuries)(12,13)

However, given that the majority of injuries will not be diagnosed during surgery(14), a high index of suspicion is required in patients who become unwell in the early postoperative period. Postoperative presentations are influenced by the type of injury and whether a drain has been left at operation. Bile leakage can lead to a collection (biloma), a biliary fistula or bile ascites; biliary obstruction can be partial or complete and sepsis will complicate any presentation(15). The typical presenting features are abdominal pain with or without jaundice due to biliary peritonitis, or progressive jaundice.

Features of late presentation include recurrent cholangitis and secondary biliary cirrhosis, and are typically due to ischaemic stricture of the common bile duct. The median delay in diagnosis is 1 to 2 we-

eks, but for biliary stricture it may be months or years.(16)
Gall bladder disease is more prevalent in North India(17) .No institution based study have done in this part of country to evaluate the spectrum of bile duct injury.

## REVIEW OF LITERATURE

A multidisciplinary approach including internal medicine, surgery, endoscopy and interventional radiology specialists is required to properly manage this complex disease.

**1. Strasburg's Classification (1995)**

1. Cystic duct leaks or leaks from small ducts in the liver bed
2. Occlusion of a part of the biliary tree, almost invariably the aberrant right hepatic ducts
3. Transection without ligation of the aberrant right hepatic ducts
4. Lateral injuries to major bile ducts
5. Subdivided as per Bismuth's classification into E1 to E51.

**Bismuth's classification (1982)**

1. Low CHD stricture, with a length of the common hepatic duct stump of >2 cm
2. Proximal CHD stricture-hepatic duct stump <2 cm
3. Hilar stricture, no residual CHD, but the hepatic ductal confluence is preserved
4. Hilar stricture, with involvement of confluence and loss of communication between right and left hepatic duct
5. Involvement of aberrant right sectorial hepatic duct alone or with concomitant stricture of the CHD

## AIMS AND OBJECTIVES

### PRIMARY OBJECTIVE

Evaluate the outcome of endoscopic therapy in the management of post cholecystectomy bile duct leaks

### SECONDARY OBJECTIVES

Pre-endoscopic predictors of success or failure of endoscopic therapy of bile duct leaks

## MATERIALS AND METHODS

### STUDY AREA

ERCP OT of SDLD, SSKM Hospital,Kolkata

### STUDY DESIGN

Prospective observational study

### TIME FRAME

JUNE 2017 To DECEMBER 2018

### STUDY POPULATION

All patient who will be referred for Endoscopic therapy of suspected or proven bile duct leaks following cholecystectomy.

**SAMPLE SIZE**
24 PATIENTS

**INCLUSION CRITERIA-**
All patients who will present with biliary complications after laparoscopic or open cholecystectomy done here or outside

**EXCLUSION CRITERIA**
1. Known case of carcinoma GB or biliary tract
2. HIV
3. Pregnancy
4. Severe Co-morbid illnesses like AMI, CCF, Decompensated Cirrhosis, CKD, CVA
5. Did not give consent
6. Refused or lost to follow up
7. Age <18years

**Study tools**
**Clinical :** Proper History & thorough Clinical examination.
**Pathology and Biochemical:**
Complete Hemogram,
**Liver function test, Prothrombin Time/INR, Renal function test**
**Imaging Studies to be Used:**
- **Transabdominal USG,**
- **CECT**
- **MRI/MRCP**

**Endoscopic retrograde cholangio pancreatography**
**Cannulation**
**Cholangiogram**
**Site of leak and stricture**
**Stents used**
**Follow up**

**Plan for Conducting the Study**
- Patients with post cholecystectomy bile duct injury that were referred for ERCP were enrolled for this study.
- These cholecystectomies were performed in various government and private hospitals in the state of West Bengal.
- Following enlistment detailed history and physical examination was done.
- Presence of bile duct injury was established in presence of stricture or bile leak in the background history of cholecystectomy.
- Presence of jaundice following cholecystectomy in the absence of CBD calculus was suggestive of stricture that was further confirmed by MRCP.
- Presence of persistent bile in the drain was suggestive of bile leak .

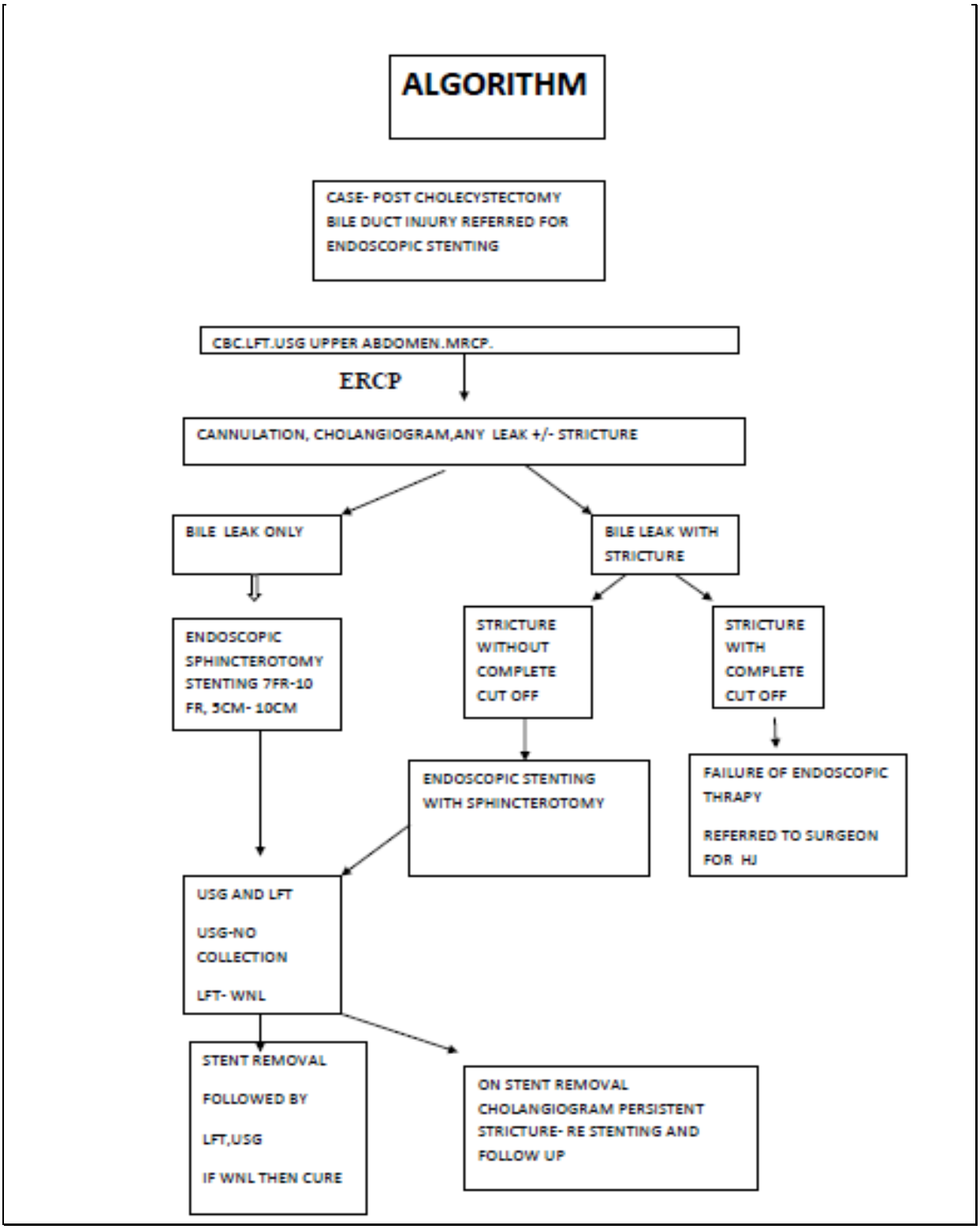
- Patient often had complains of abdominal distension with pain abdomen +/- fever and USG showed collection in gall bladder fossa or localized collection in hepato renal pouch or ascites.
- Appropriate and relevant investigations including MRCP were advised.
- MRCP could not be afforded by many patients due to financial reasons .
- Accordingly ERCP dates were given
- During ERCP, either wire guided cannulation or precut sphincteromy/ needle knife fistulotomy were done.
- cholangiograms were taken and leaks +/- strictures were documented.

**If on cholangiogram there was complete cut off ,they were adviced for surgery.**

- In the presence of leak or stricture double pigtail stents were deployed with diameters ranging from 10Fr to 7 Fr and lengths ranging between 5cm to 10 cm.
- In case there was evidence of bile leak clinically or by usg ,without any evidence on cholangiogram then a stent was deployed in CBD to lower the pressure gradient and increase bile flow .
- Patients underwent ERCP by various faculties of this institute ranging from Senior Resident to Professor.
- Often patients were too unstable due to cholangitis and sepsis for which ERCP were delayed.
- Some patients expired due to sepsis.
- Following ERCP they were followed up on outpatient basis.
- USG and LFT were ordered and resolution of leak and stricture were documented.
- Patients were adviced stent removal dates at least 6 weeks after initial ERCP.
- During stent removal need for cholangiogram was based on the discretion of the operator.
- If on cholangiogram there was persistence of the previous stricture then repeat stenting was done.
- After stent removal patients were again seen on outpatient basis and adviced USG and LFT to document re stenosis or any leak.
- Success was defined as absence of any collection or stenosis on USG and normal bilirubin in LFT.
- Subsequently patients were followed up by telephonic calls and outpatient visits.

**End points of Study**

- Resolution of the bile leak as evidenced on USG by no localized or intra abdominal collection after stent removal.
- Successful endoscopic management of stricture as evidenced by absence of deranged LFT after stent removal.
- Death
- Compete cut off –no passage of contrast beyond the stricture and failure of deep cannulation.
- Persistence of stricture on stent removal cholangiogram needing stent exchange till end of study period




**RESULTS**

There were total 34 patients who were referred for Endoscopic Retrograde CholangioPancreatography (ERCP) following post cholecystectomy bile leaks between June 2017 to December 2018.These surgeries were done in various government and private hospitals (both secondary and tertiary health care levels).The follow up was done for 1 year to 2months.

Among these 34 patients 6 patients expired. One among these had carcinoma gall bladder (detected later from biopsy report).5 patients did not come for follow up after initial ERCP or were treated subsequently in some other institute. Among these, in 10 patients baseline data were not available or were lost to follow up(5 expired patients , 4 patients with stricture and leak and 1 patient with leak only). Total 24 patients who underwent ERCP in our institute were followed up .

The patients median age was 45 years (range 21 to 67).

Among the 34 patients there were 26 female (76.4%)and 8 male patients(23.6%) .

Patients were diagnosed after a median 7 days (range 4 to 14 days) after there was persistent high abdominal drain output(13/24, 54%) or developed abdominal discomfort ( 11/24 , 46%).

The types of cholecystectomy- open ( 7 / 24 ,29%) ,laparoscopic (15/24, 63%),laparoscopic converted to open (2 out of 24,8%)

Cholecystectomies were performed in Government secondary level healthcare facilities (8/24, 33 %),Government tertiary level health care institutions (6/24, 25 %) as well as in Private Nursing homes (8 / 24,33 %) ,Corporate multispeciality hospitals (2/24,9 %)

Common bile duct exploration was not performed in any of the patients as pre-operative ultrasound and LFT reports were not suggestive of extra hepatic biliary pathology.

14 patients did not spend anything out-of-pocket for cholecystectomy as they were done in government hospitals while remainder had incurred a median expenditure of 20,000 INR (range 15,000 to 25,000)

Among the symptoms preceding cholecystectomy ,most common was pain with a median duration of 6 months(range 2 to 8)prior to surgery. Anorexia was next common. Jaundice or fever was not the present in any of the patients prior to cholecystectomy.

Before cholecystectomy blood reports showed median Hemoglobin of 11 gm/dl(range 10 to 15) with medianWBC count 7200/cc (4400 to 8500) and platelet count of 2.1lacs/cmm (0.9 to 2.7 ). Among the LFT reports median bilirubin was 0.7 mg/dl (range 0.3 to 2.9) and ALT was 37 IU/ml (20 to 352 ) .

After surgery single abdominal drain were inserted with a median daily output of 300ml .(range 0 ml to 700 ml) . In those who underwent successful ERCP and stenting these drains were removed after a median duration of 7days(range 2 to 120 ).

Post cholecystectomy blood reports showed median Hb 10.5( range 6 to 15 ), WBC 12,800 /cmm (range 5000 to 33000), platelet count 2.2 lacs/cmm(range 1.3 to 5.6) and LFT showed median bilirubin values of 1.2mg/dl( 0.2 to 14) and median ALT value 60 IU/ml(19 to 333 ). Both WBC count and LFT parameters (bilirubin and ALT) show increase in values after cholecystectomy biliary injury

All patients underwent transabdominal USG evaluation after cholecystectomy. Among the 24 patients, collections either in gall bladder fossa were seen in 14 patients ,ascites in 1patient and both seen in 10 patents.

12 out of 24 patients underwent MRCP evaluation for delineation of biliary anatomy which revealed dilated intra hepatic biliary radicles in 7 out of 12 patients, confluence was formed in all patients with hilar stricture .

All patients underwent ERCP in our institute.

ERCP stenting was done after a median duration of 21 days(range 10 to 70 days) and stents were removed a mean duration of 130 days ( range 33 to 430 days)after cholecystectomy .

Strictures with leak were present in 10 patients out of total 24 patients. Among these 10, 5 patients had complete cut off on cholangiogram. Out of these 5 patients 1 patient expired due to cholangitis and sepsis within 1 week of ERCP. The other 4 underwent surgery (hepatico jejunostomy ).

Successful deep cannulation was achieved in 19 patients.Among them there were 16 patients with only leak whereas 6 patients had leak with stricture.

Leak could not be demonstrated in 4 patients (4/22 , 18.2% ) where it was suspected from liver bed . In these 4 patients stent was deployed in common bile duct to decrease the pressure gradient and augmented biliary drainage.

Leak could be demonstrated in common hepatic duct in 4 patients (4/21, 19%) ,proximal CBD in 11 patients(11/21 48%) and mid CBD in 3 patients(3/21, 14%).

These 19 patients were divided into 2 groups with bile leaks only(14 patients) and bile leaks +stricture(5 patients).Among 14 patients with bile leak only ,all

patients could be stented ,1 patient had surgery after 1 year due to stricture during follow up. So success was 13/14 (93%)

Out of 10 patients with bile leak with CBD stricture, 5 patients could be successfully stented.Out of the 5 patients with strictures who were stented successfully 3 patients were failures due to development of benign biliary stricture,2 needed surgery(2 /3) after 1 year of ERCP and 1 patient on stent exchange schedule(1/3) till the end of this study. So the success in this group was 2/5, 40%

There was no ERCP related complication, 2 patients who had inadvertent Pancreatic Duct cannulation underwent prophylactic Pancreatic Duct stenting which were subsequently removed

**CONCLUSIONS**

There were total 34 patients who were referred for Endoscopic Retrograde CholangioPancreatography (ERCP) following post cholecystectomy bile leaks between June 2017 to December 2018

Among these, in 10 patients baseline data were not available or were lost to follow up(5 expired patients , 4 patients with stricture and leak and 1 patient with leak only).

Total 24 patients who underwent ERCP in our institute were followed up .

Strictures with leak were present in 10 patients out of total 24 patients. Among these 10, 5 patients had complete cut off on cholangiogram.

Successful deep cannulation was achieved in 19 patients.Among them there were 16 patients with only leak whereas 6 patients had leak with stricture

Leak could be demonstrated in common hepatic duct in 4 patients (4/21, 19% ) ,proximal CBD in 11 patients(11/21 48%) and mid CBD in 3 patients(3/21, 14 %) and could not be demonstrated in 4 patients(4/21 48%)

These 19 patients were divided into 2 groups with bile leaks only(14 patients) and bile leaks +stricture(5 patients).Among 14 patients with bile leak only, 1 patient had surgery after 1 year due to stricture during follow up. So success was 13/14 (93%)

Out of 10 patients with bile leak with CBD stricture, 5 patients could be successfully stented.Out of the 5 patients with strictures who were stented successfully 3 patients were failures due to development of benign biliary stricture,2 needed surgery(2 /3) after 1 year of ERCP and 1 patient on stent exchange schedule(1/3) till the end of this study. So the success in this group was 2/5, 40%.

So the success of endoscopic methods were much more for only bile leaks than leaks with strictures. Presence of stricture was the main pre endoscopic factor for failure of endoscopic methods in bile leak.

## DRAWBACK

Main drawbacks of this study were

1. Small number of study population
2. High number of patients with complete cut off and high mortality
3. Small duration of study with short follow up.

## DECLARATION OF PATIENT CONSENT

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal.

The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity.

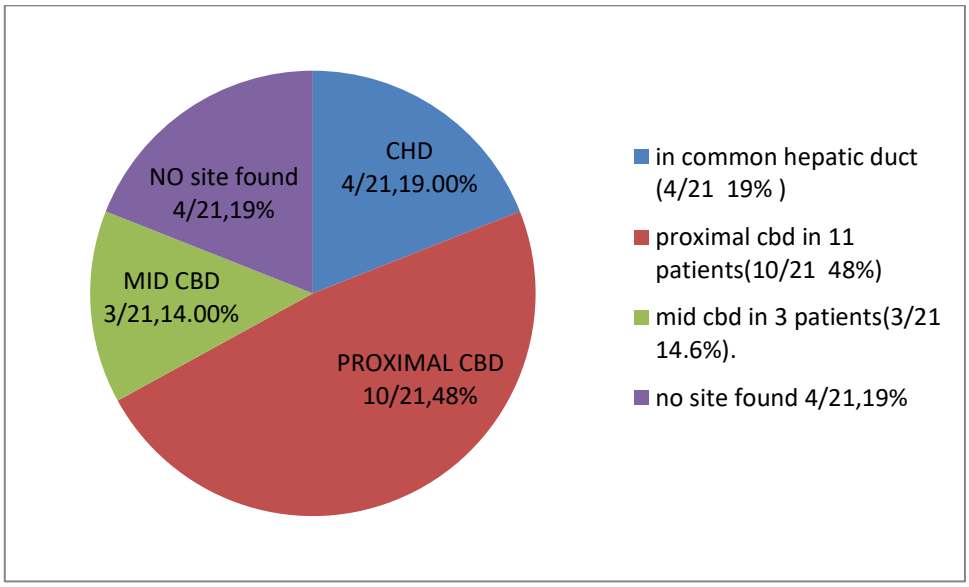
**Tables**

**PATIENTS CHARACTERISTICS**

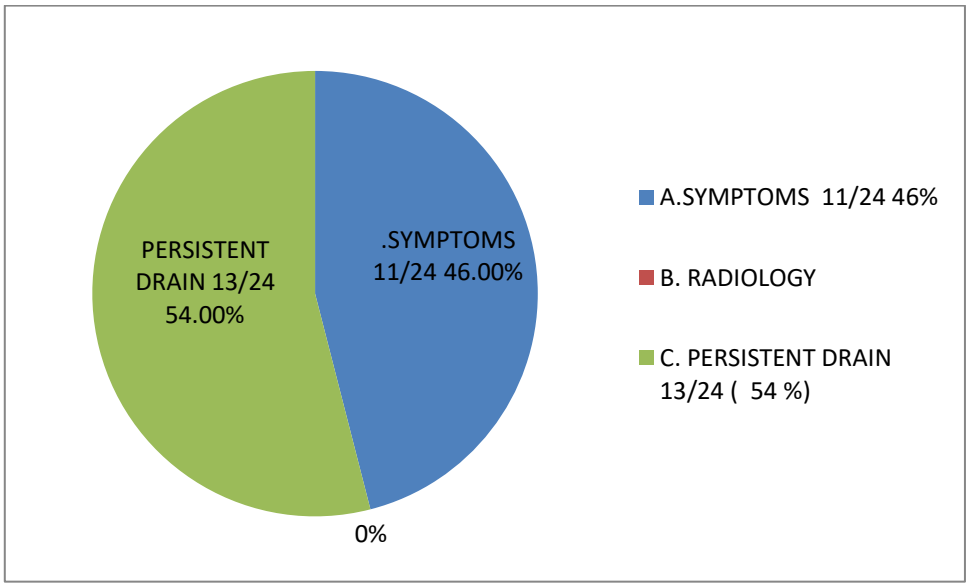
| | |
|---|---|
| **TOTAL NUMBER OF PATIENTS** | **24** |
| **FOLLOW UP** | **2 MONTHS TO 1 YEAR** |
| **MEDIAN AGE,YEARS** | **45 (RANGE 21 TO 67).** |
| **DURATION FROM CHOLECYSTECTOMY TO DIAGNOSIS OF BILE LEAK,DAYS** | **7 (RANGE 4 TO 14)** |
| **MEDIAN DURATION FROM CHOLECYSTECTOMY TO STENTING,DAYS** | **21 (RANGE 10 TO 70 )** |
| **MEDIAN DAILY OUTPUT FROM DRAIN,ML** | **300(RANGE 0 TO 700)** |
| **MEDIAN DURATION FROM STENT INSERTION TO REMOVAL,DAYS** | **130 ( RANGE 33 TO 430)** |
| **MEDIAN DURATION OF DRAIN REMOVAL AFTER STENTING,DAYS** | **7 (RANGE 2 TO 120).** |

| **PARAMETERS** | **MEDIAN VALUES BEFORE CHOLECYSTECTOMY** | **MEDIAN VALUES AFTER CHOLECYSTECTOMY** |
|---|---|---|
| **HEMOGLOBIN,GM/DL** | **11 (range 10 to 15)** | **10.5( range 6 to 15)** |
| **TLC,PER CC** | **7200(4400 to 8500)** | **12,800 (range 5000 to 33000)** |
| **PLATELET(in lacs/ml)** | **2.1 (0.9 to 2.7 )** | **2.2 (range 1.3 to 5.6)** |
| **Bilirubin MG/DL** | **0.7 (range 0.3 to 2.9)** | **1.2 ( 0.2 to 14)** |
| **ALT , IU/ML** | **37 (20 to 352)** | **60 (19 to 333 )** |

**Site Of Leak**

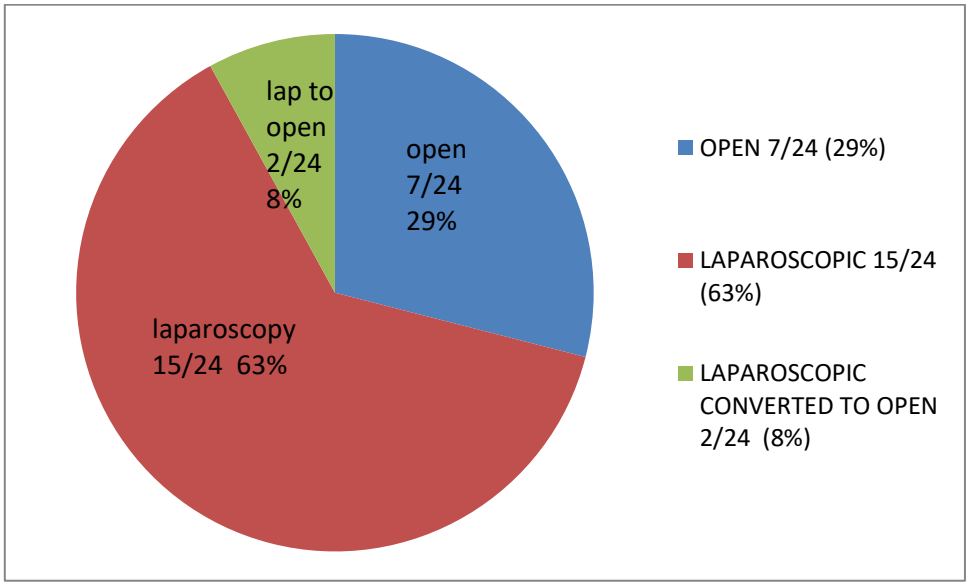



| n | 34 | PERCENTAGE |
|---|---|---|
| Males | 08 | 23.6% |
| Females | 26 | 76.4% |

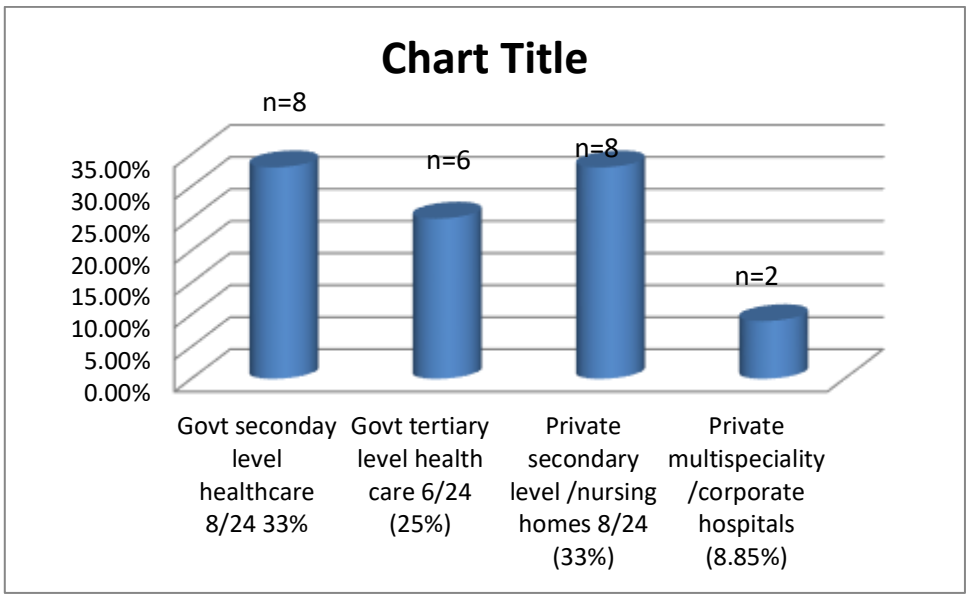


## HOW LEAK WAS DIAGNOSED

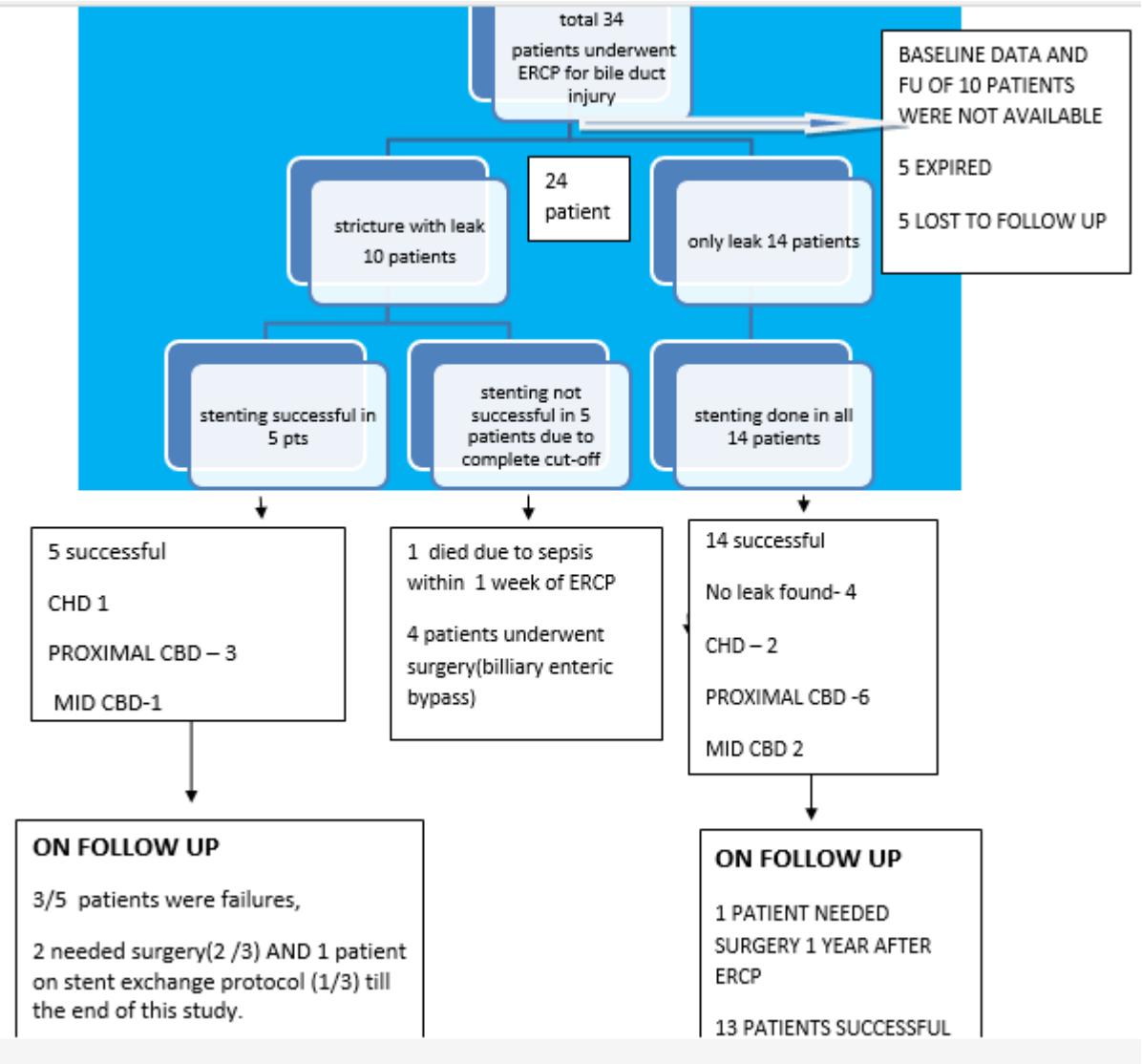
### Types of cholecystectomy




## INSTITUTION WHERE CHOLECYSTECTOMY WERE DONE




| Symptoms prior to cholecystectomy | duration |
|---|---|
| Pain | 6 months (Range 2 to 8 months) |
| anorexia | 2 months( range 1 to 3 months) |

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