

**“INCIDENCE OF PERSISTENT
SYMPTOMS AFTER LAPAROSCOPIC
CHOLECYSTECTOMY”**

Dissertation submitted

To

**THE TAMILNADU DR. M.G.R.
MEDICAL UNIVERSITY, CHENNAI**

With partial fulfillment of the regulations for the award of the degree of

M.S (General Surgery)

Branch-I



Government Kilpauk Medical College

Chennai- April -2016

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation titled '**INCIDENCE OF PERSISTENT SYMPTOMS AFTER LAPAROSCOPIC CHOLECYSTECTOMY**' is a bonafide and genuine research work carried out by me under the guidance of Prof. K.K.VIJAYAKUMAR MS, Department of General Surgery, Kilpauk Medical College, Chennai-10.

This dissertation is submitted to **THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY CHENNAI** in partial fulfillment of the degree of M.S. General Surgery examination to be held in **April 2016**.

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This is to certify that this dissertation is the bonafide work of

DR M.ARAVIND

On

**“INCIDENCE OF PERSISTENT SYMPTOMS AFTER
LAPAROSCOPIC CHOLECYSTECTOMY”**

*During his course in M.S. General Surgery from
January 2015 to September 2015
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INCIDENCE OF PERSISTENT SYMPTOMS AFTER LAPAROSCOPIC CHOLECYSTECTOMY

Aim:Laprosopic cholecyctectomy has become mainstay of treatment for gallstone related pathologies.Many studies have reported varying results.This studies will strive to find the percentage and also symptom profiles suffered by patients after laparoscopic cholecystectomy

Materials and methods:This study was done among 70 patients attending surgical department in kilpauk medical college,chennai.After consent and ethical commitee clearence,Patients were asked to fill Questionnaires regarding their symptoms 6 months before and after surgery.

Results:Only 58 patients completed the study.13 % of them suffered from their preoperative symptoms.6 of them were females.Colonic symptoms such as bloating and constipation showed poor cure rates.Dyspeptic symptoms showed better cure rates of around 90% suggesting that some of them could be due to gallstones whereas those noncured had other pathologies.Hence dyspepsia is not indication for cholecystectomy unless other pathologies are ruled out .Few of symptomatic patients had history of psychiatric treatment suggesting that it could be a contributive factor

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**INCIDENCE OF
PERSISTENT
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CHOLECYSTECTOMY**

Introduction

Gallstones are common in the west(6). Gallstones even though most are asymptomatic sometimes end up with life threatening complications. In united states more than 750 gallbladder removal surgeries are performed each year (7). It costs in excess than 4.5 billion dollar, each year in the United states for hospitalization and treatment gall bladder calculi and its complications. The presence of gall bladder calculi differ between people of age,various ethnicity, and gender

It is known well that various mechanisms also influence the gall bladder removal surgeries rates since there is a minimal correlation to prevalence. The rate of gall bladder surgeries varies upon the instituiton,protocols regarding severity and surgeons attitude .In the late 1980s several reports showed an rise in cholecystectomy rates of around 22% due to introduction of minimally invasive techniques like laproscopy and become in some places as a day care surgery. As a result, even minor changes in indications for gall bladder removal surgeries have a major impact on health care costs (11). cholecystectomy benefits most of symptomatic patients (15,

16).Symptoms does not change in a certain number of patients and therefore, it is important to find these patients to avoid the so called post- cholecystectomy syndrome. Gallstone disease complications such as acute or chronic cholecystitis,Pancreatitis, obstruction of the common bile duct (CBD) contribute substantially patients comfort, as well economic costs.

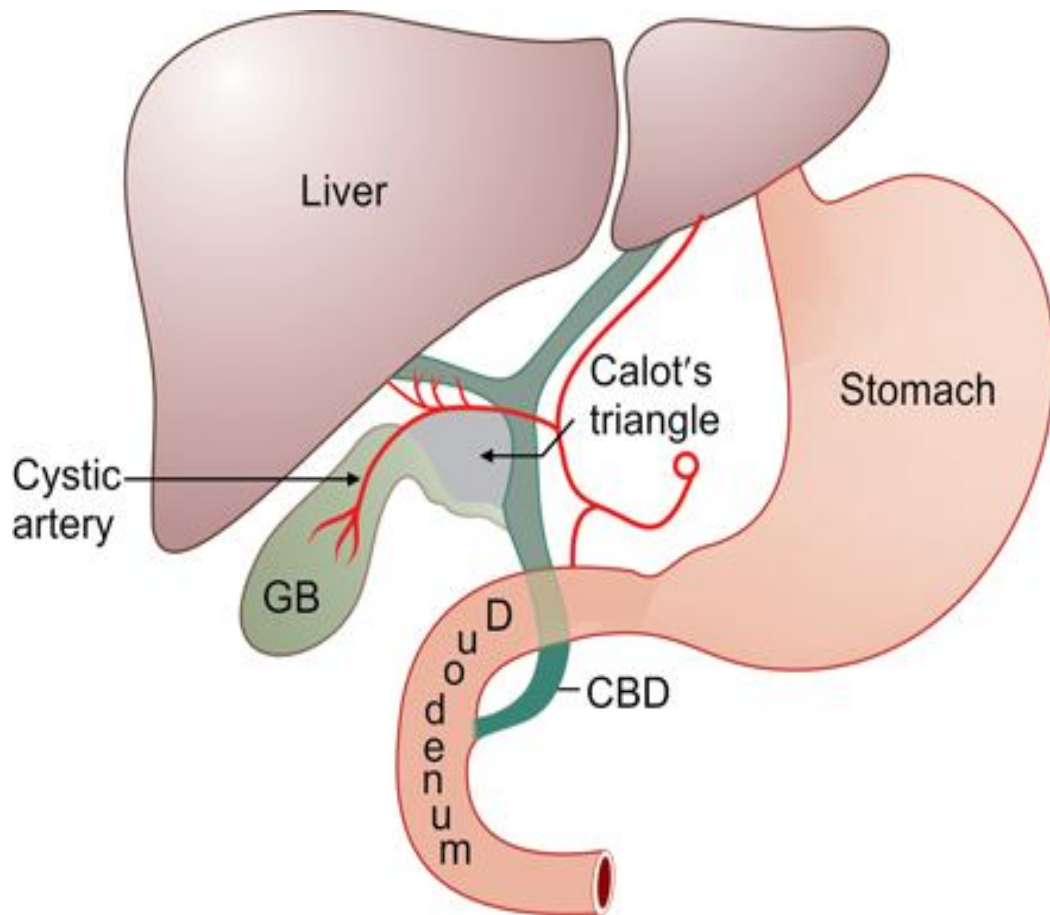
Since the advent of Laparoscopy, many have discussed and high-lighted the need for proper surgical practice and technique for improvement of the outcome of the surgery. Comparisons to open surgeries, using smaller incision, have also been highlighted (12-14).

AIMS & OBJECTIVES

Laparoscopic cholecystectomy has become the mainstay of treatment for gallstones since its introduction in 1987. The advantages of laparoscopic cholecystectomy compared to open surgery is well documented. However some patients complain of symptoms even after complete removal of gallbladder with calculi which lasts even years after the procedure. The term 'persistent postcholecystectomy symptoms' is a more accurate description. There is wide variation in number of patients with symptoms after surgery. Many have reported relief in symptoms upto 95% (67) but there is poor description of patients who have reported relief . Moreover, the symptoms before and after the procedure was never analyzed

The aim of this study is to assess the effect of surgery on various symptoms.

Anatomy

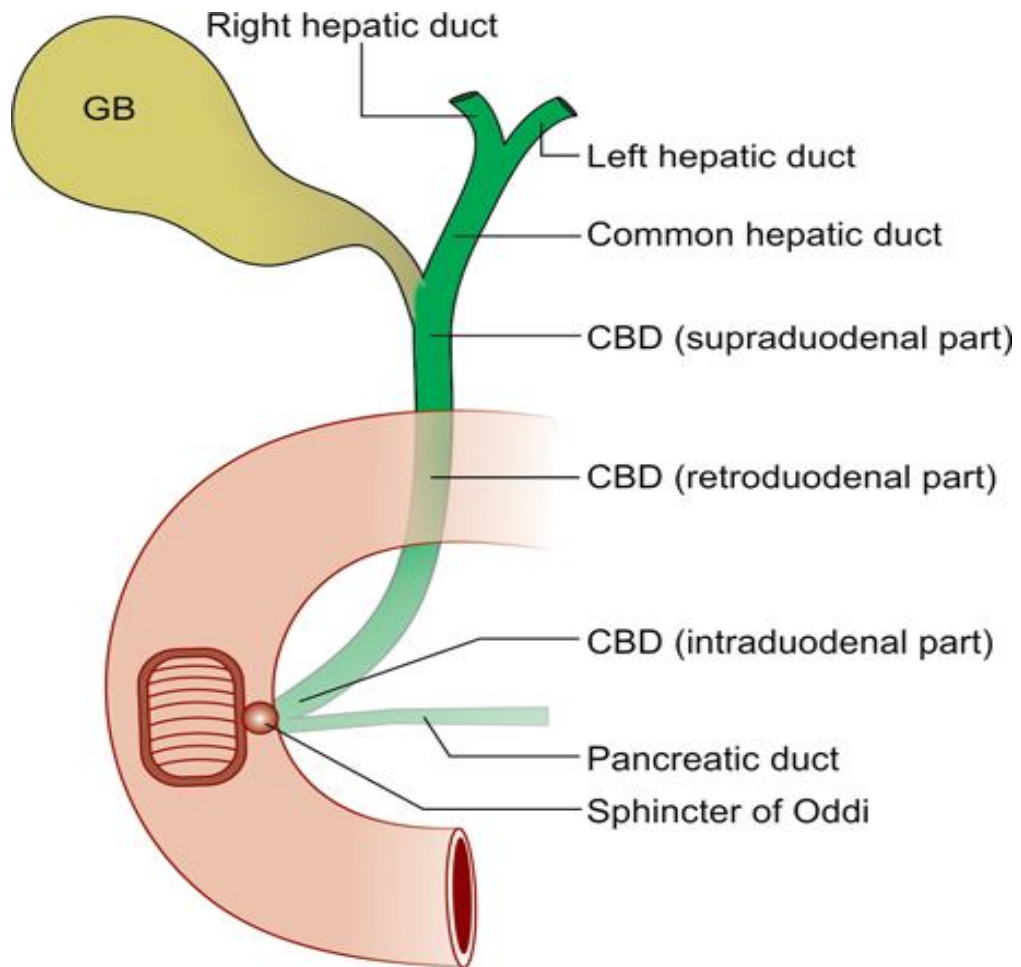


The gallbladder(GB) is situated under the segments IVB and V of the liver. The upper surface is related close to the gallbladder fossa in liver and lower part is covered by peritoneum. Fundus is the projecting part of gall bladder that is visible beyond liver anteriorly, and it continues to form the rest of the gall bladder that is present in the gallbladder fossa. On CT, the neck of GB is visualized in more superior cuts than the body. The infundibulum is the part that

continuous to form the cystic duct.. The outpouching of this infundibulum forms what is called the Hartmann pouch. The triangle is surrounded by the liver above, cystic duct below and common hepatic duct medially. Cystic artery is and impotent component.

The duodenum and lesser curvature of stomach is connected by lesser omentum and free edge of the lesser omentum is called hepatoduodenal ligament. Epiploic foramen or foramen of Winslow behind the hepatoduodenal ligament leads to omental bursa.

Common bile duct which is around 7mm in diameter is formed by confluence of cystic duct and common hepatic duct. The common hepatic duct is formed by confluence of right and left hepatic duct. The common bile duct runs through the hepatoduodenal ligament



The CBD has 5 parts ;

- supraduodenal.
- retroduodenal
- infra/intraduodenal or retropancreatic
- intraduodenal (intramural) parts.

The distal common bile duct then join with the main pancreatic duct in the head of pancreas to form a common pathway. It then continues in the duodenal walls medial aspect and opens finally into middle of second part of duodenum in the ampulla of vater in the medial aspect

A semicircular fold of mucous membrane closes the papilla in the upper aspect. The sphincter of oddi prevent the reflux of duodenal juices into common bile and pancreatic duct. It is made up of smooth muscle. Other sphincters include sphincter of Boyden.

The Common hepatic artery is main supply of the biliary system. It starts from celiac artery at it origin and runs over upper aspect of pancreatic body and divides terminally into right and left hepatic artery. Gastroduodenal artery is a branch of hepatic artery. Common bile duct receives vascular supply through the common hepatic artery & its branches, gastric vessels and superior pancreaticoduodenal arteries.

Cystic artery is a branch of right hepatic artery and is given is divides behind the common bile duct. It is part of calot's triangle and supplies the gall bladder. Sometimes vascular supple can come

directly from liver through the gallbladder fossa. Venous drainage of GB occurs to the portal vein branches in segment 4 & 5 of liver.

The gallbladder drain into the Lymph node of Lund. It is present near cystic artery in triangle of calot major lymphatic flow is to right of hepaticoduodenal

The sentinel lymph node of gall bladder is not the node of lund. Malignancy of Gall bladder may go directly porta hepatic nodes of the hepatoduodenal ligament. Subserosal lymph drainage can go to subcapsular lymphatic of liver

Right vagus is the main parasympathetic supply of the gallbladder via it hepatic branch. Sympathetic supply is from T 7-9 via the celiac plexus.

The gallbladder is around 40 ml and can expand generously. When occluded it can become several times its size. If the occlusion is at level of cystic duct, The bile gets absorbed and remaining mucous forms mucocele. However if occlusion is at bile duct by for example ca head of pancreas ,bile is main constituent

History

Babylonians were the first to describe biliary system and gallstones. Gallstones were found in preserved mummified bodies from 3000 years ago. Gentile de Foligna from Italy was the first to suggest the presence of calculi in gall bladder. Thomas Bartholinus in 17th century who said that pain due to passage of calculi through common bile duct is called biliary colic (11). Fourcroy in 18th century described the constituents of the gall bladder calculi. Enemas and mineral water were considered as treatment for gall bladder calculi

John hobbs did the first open surgery where he removed only calculi from GB in 1867 in united states(17). Other surgeons adopted this operation.

Carl Langenbuch was a pioneer who did first open cholecystectomy, i.e. removal of the gallbladder with the stones in Germany in late 19th century(18, 19) as he thought that just removing stones was not a curative operation since stones would recur. This operation became ideal treatment since.

Eric Mühe did the first laparoscopic removal of gall bladder in 1986(20). After Philippe Mouret ,a French surgeon performed a Lap

cholecystectomy that it started to become widespread (21).In India ,first laparoscopic cholecystectomy was performed in 1990 in Mumbai.

The proof of presence of gall bladder calculi is essential before surgery in current scenario. Earlier plain x ray was only investigation to detect cholelithiasis. However, for this calcified stones were required and its seen not more than 15 % of calculus .Oral cholecystography introduced in 1924 by graham & Cole (24). This became the “Gold standard” until 1970s when ultrasonography (USG) replaced it. Non-invasiveness, ability to detect all kinds of stones and possibility to examine other organs in the abdomen are advantages of Ultrasonography. Except 6 hours of fasting are needed ,Hence suitable for emergency situations.

EPIDEMIOLOGY

The prevalence among adults is 20% for women and 10-15% for men in Europe and North America (Caucasians). Age, gender and ethnicity are the most important factors affecting prevalence (2).

India is included along with countries with a low incidence of gallstones from many texts and journals published in the west. The prevalence of gallstone disease varies in different parts of India. In 1966 an epidemiological study in Indian railway employees done by malhotra showed that compared to South Indian employees, north Indians had seven times higher prevalence of gallstones.

A very high and increasing prevalence were reported in epidemiological studies done in northern states such as Kashmir (7-11). Khuroo from Kashmir reported a prevalence of 6.12% (male 3% and females 9.9%) the prevalence increasing progressively to reach a peak in the sixty's(10).Multiparous women have a much higher prevalence than nulliparous (10). Nil relation was found with diet, ,socioeconomic status or obesity(8)

With high prevalence of gallstones, high number of gall bladder carcinoma was also observed (11). The pathogenesis of gallbladder

cancer albeit only in a small number of patients with gallstone disease is not well understood. The duration of cholelithiasis and A high concentration of glucourso deoxycholate are postulated. However the incidence of malignancy in gallbladder with calculi over years remains a rare event (12) as proved by a recent prospective study. Migrants from India to the other countries have a higher incidence of mortality from gallbladder malignancy as compared to native populations of the areas (13).

Sharma and associates from BHU said there was an about 84 times higher risk of developing gallbladder carcinoma in patients who were bile culture positive for typhoid bacilli in their study of 390 patients (15). The role of prophylactic cholecystectomy in patients (with gallstones) from high risk areas for gallbladder cancer is not clear, but should be individualized (13). factors like age, geography, race, size of stone help to identify suitable cases for prophylactic cholecystectomy.

PATHOGENESIS

The size of gall bladder calculi can vary from as small as few millimeters to as large a few centimeters . Not more than 15% of people have stones which have migrated to common bile duct (30).

Depending on composition ,Gallstones are classified as :

1. Cholesterol stones
2. Pigment stones-Either brown or black
3. Mixed stones

Cholesterol is most common type of gallstone, which comprises 55-97 % of the dried component of the calculi. Other constituents may include fatty acids, triglycerides, proteins, polysaccharides, as well as calcium bilirubinate, calcium bicarbonate and calcium carbonate.

The major components of bile are :

1. bile acids (salts),
2. phospholipids
- 3.cholesterol.

Bile salts synthesized from cholesterol are the two primary bile acids – cholic and chenodeoxycholic acid. As Cholesterol is only slightly soluble in aqueous solutions, a bile salt micelle makes it soluble along with phospholipids and lecithin

Bile salts are secreted into the duodenum and reabsorbed through the ileum. Enterohepatic circulation of bile acids along with adequate daily production of bile acids in the liver from cholesterol is sufficient to keep the cholesterol in solution.

There are at least four separate mechanisms in the genesis of cholesterol gallstones:

1. Supersaturation of bile with cholesterol.
2. Nucleation of cholesterol monohydrate with subsequent crystallization and stone growth.
3. Gallbladder stasis – delayed emptying.
4. Decreased Enterohepatic circulation –increased loss of bile acids (eg: ileal resection / Crohns disease).

Cholesterol gallstones form as a result of changes in the composition of bile. Increase in the composition of a normal biliary

component bilirubin or cholesterol which overwhelms the solubility, a decrease in the solubilizing component or both leads to gallstones. An added pathogenetic factor could be dysmotility of the gallbladder. All these produce a nidus, an insoluble becomes sequestered and aggregate to form a calculus. Cholesterol stones are the most common and contribute to more than 80% of the stones. Cholesterol with cholesterol monohydrate crystals agglutinated by a mucin glycoprotein matrix, unconjugated bilirubin and small amounts of calcium phosphate are components of these stones.

Gallbladder sludge is probably the early part of creation of gallstones. Suspension of cholesterol monohydrate crystals, calcium carbonate, calcium bilirubinate and calcium phosphate form the sludge. It may either go on and form stones or just disappear. The Cholesterol in the body is acquired both from diet and liver synthesis. Mucin secreted by the gallbladder epithelium is an important factor as supersaturated bile alone does not lead to gallstones. Although crystals develop in supersaturated bile need for a pronucleating agent to form gallstone which is the mucin.

Brown pigment stones are often caused by stasis and infection in the biliary system. Black pigment stones are more common among

patients with hemolytic diseases (hereditary spherocytosis, sickle cell anemia, and Thalassaemia) and liver cirrhosis (25-29). Other constituents may include fatty acids, triglycerides, proteins, polysaccharides, as well as calcium bilirubinate, calcium bicarbonate and calcium carbonate.

RISK FACTORS

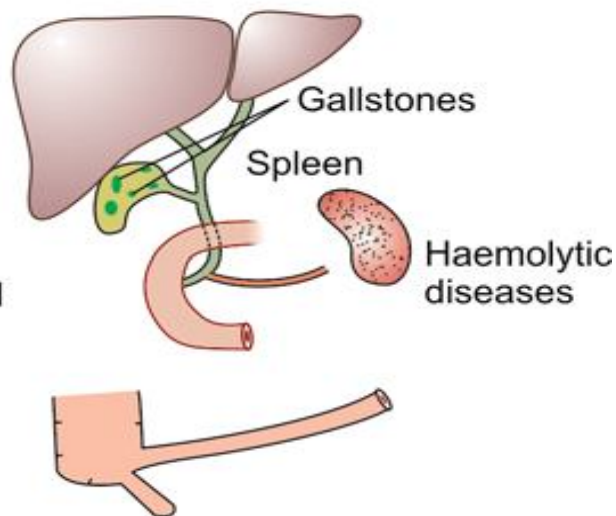
Altered GB function

- Stasis
- Poor emptying
- Poor absorption
- Infection

Supersaturated bile

- Female
- Fertile
- Fat
- Forty
- High calorie

Cholesterol
nucleation
factors



Altered enterohepatic circulation

- Ileal resection
- Ileal diseases
- Altered bowel transit time
- Altered bowel flora
- Cholestyramine
- Deoxycholate

Hormones

Jorgensen et al proved that estrogen therapy and parity (43) was an important factor for variation in presence of gallstones between males and female. Scragg et al found OCP as dependent factor due to age 45, the greatest risk in females less than 30 years of age. The enhancing effect of hormonal therapy on gall bladder calculi development found in a large study involving 22000 people (46). The chance of surgery was almost double in the people with estrogen intake as with the those who are placebo.

Parity

Even though some studies one europe could not verify this finding (49),(50), many say than higher risk with number of pregnancy and child-bearing,(42-44),(47),(48)

BMI

This relation is usually more in women than men. Many studies have proved than this is an important factor (7, 42, 43,51-54) .Obesity increases cholesterol secretion in bile, which is an major factor in gall bladder calculi formation. The prophylactic removal of gall bladder after bariatric surgery such as gastric bypass since there is an high

chance gall bladder calculi formation because to sudden weight loss 53, as around 45% of the patients form calculi.

Genetic

The connection between gall bladder calculi occurrence in a family is shown in many studies (5, 55, 56,). In India, People in north are more prone for gall bladder calculi. This may also be an reason for the large occurrence among Indians (48). A report done in south America proved that cholesterol lithogenic genes are present in native population of chile and people of spanish origin in that country. But many factors were represented high in these patients. For example, the women/men ratio is more .The frequency of obesity and parity were also similar.

Age

Uncommon <20(exception: Mexican American girls)

Gender

female/male ratio highest in the youngest; narrows to 2:1 after age 50

Socioeconomic factors

The Italian MICOL report(51) showed that male with higher income and education had higher rates of gall bladder calculi

formation. However in a english report ,lower strata people had more chance of gall bladder calculi formation. An North american study showed that women of mexicans emigrating to USA had higher incidence of gall bladder calculi than white women. However , after controlling for factors the presence among females inversely (47).

Family history

Higher risk in first-degree relatives of gallstone patients

Alcohol

The Consumption of alcohol was also related inverse to the risk of gall bladder calculi (78). Lesser presence of gall bladder calculi (54, 60, 76, 77) with symptoms (48) and no symptoms (75) are related with intake of alcohol. But, the relation was absent when intake was not more than 2 days in a week (79). A European report said there s no relation of gall bladder calculi with alcohol (80).

Tobacco

There are varying studies regarding as smoking is factor or is it not. The reduced production of prostaglandin and more production of mucus are the reason in people who smoke (59) is considered as the main reason. Stampfer et al. said that in females who consume

cigarettes in large amounts (>30 cigarettes/24 hrs) it is an independent risk factor (60). In a large english study, cigarettes consumption was considered as an important factor for formation gall bladder calculi (58).

In an Australian study, they said that even early smokers had an increase in risk of developing gall bladder calculi with symptoms.

Metabolic disorders

Diabetes mellitus, overweight and increased cholesterol are with high risk for gall bladder calculi formation which shows that gall bladder calculi is component of metabolic syndrome (62, 63) The increased secretion of cholesterol in bile which oversaturated it is an reason. Insulin resistance is cause for such secretion. Large number of reports have proved this theory (51, 64-67), However it is still controversial since many other reports had not found this conclusion (63, 68, 69).

Diet

Association with high consumption of simple sugars low prevalence in vegetarians

Spinal Cord Injury

Abnormal gallbladder motility may be a factor

Inflammatory bowel disorder-Chron's disease

The decreased absorption of bile acid from the affected or removed ileum which in turn affects Enterohepatic circulation. This cause excreted of cholesterol in a bile which is oversaturated leading to increased gallstone formation. Another one also showed a connection between gall bladder calculi and Chron's disease in relation to site, number of affected segments(73)

However the rate of gall bladder removal surgeries have not increased after removal of affected ileum which is surprising (74).

Hence, gall bladder removal in asymptomatic cases is not justified.

Non steroidal anti-inflammatory agents

21 years ago in a study it was concluded that gall bladder calculi formation could be reduced by the intake of non steroidal anti-inflammatory agents (70). This however could not be proved in a large study with intake aminosalicylic acid of more than 1g/24 hrs (71).

Exercise

The effect of exercise in reducing the formation of gall bladder calculi is unknown. The effect of physical activity in a reducing the time for movement of food in colon is associated with a less dehydroxylation of bile salts and an higher contraction of gallbladder (81). Many studies found no such relation. (82-84). Leitzman et al,found no relation between gall bladder calculi in males (80).In a study > 55 000 females that physical activity reduces the incidence of gall bladder calculi surgeries (86).

Miscellaneous

Celiac disease, vagotomy, duodenal diverticula are rare associations.No significant relationship with hyperlipoproteinemia

SYMPTOMS

We recognize four types of gallbladder disease:

1. Asymptomatic gallstone disease
2. Symptomatic gallstone disease
3. Pain abdomen from another etiology such as peptic ulcer, with asymptomatic gallstones
4. Cholecystitis with no gallstones

Asymptomatic gallstone disease

Only 20 % patients actually develop symptoms after follow up over a period of twenty years. Gall bladder calculi which do not cause symptoms do not require surgery except in certain situations.

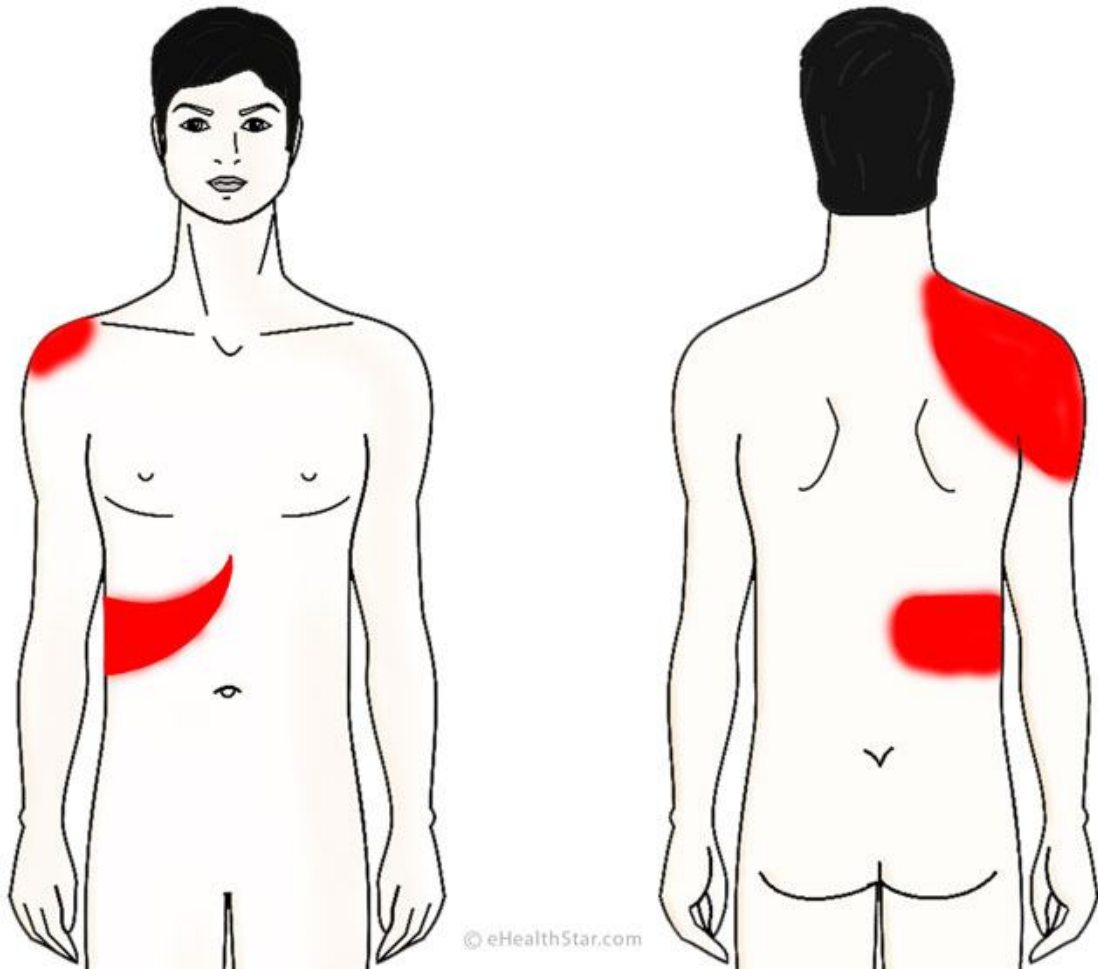
GREPCO-group in Europe (77) found that cholecystectomies caused no difference in minor dyspeptic symptoms. Only In less than 2 % per year of patients with gallstones with no symptoms developed serious complications. In a study of 120 people with no symptoms due to gall bladder calculi followed up for 11 years and the chance of forming complication is no more than 3%. Biliary colic is an important symptoms and patients rarely develop complications

without it appearing before. Other complications such CBD obstruction due to calculi or malignancy are not seen frequently. Ransohof et al. saw no reason for gall bladder removal in patients with no symptomatic stones (78).

Since gall bladder calculi without symptoms are benign in nature watchful waiting is justified

Symptomatic Gallstone Disease

Gallbladder Pain Location



Biliary colic is the most reliable symptom for gallstones. It has a high negative predictive value or absence of pain makes the patient less operable. Biliary colic is defined as discomfort in upper abdomen either in epigastric or right hypochondrial regions, ranging from minutes to up to 5 hours with radiation of pain to the tip of right shoulder (102). Even though sleep of the patient is disturbed, he will still be ambulant. Exacerbation of pain after food is present. There is absence of elevated temperature or local tenderness as in acute cholecystitis. Vomiting and nausea may be reported.

Acute Cholecystitis patients will often have history of biliary pain in acute cholecystitis, lasting for > 3 hours, associated with fever and right upper quadrant tenderness (Murphy's sign). Chronic Cholecystitis patients will have episodic epigastric, right upper quadrant pain lasting for more than 30 minutes. Patients may present with complications of gallstones-pancreatitis, choledocholithiasis and cholangitis. Choledocholithiasis: Maybe asymptomatic or present with biliary colic, acute cholangitis or pancreatitis. Acute Cholangitis: is a medical emergency. Patients may present with Charcot's triad- right upper quadrant pain, fever and jaundice. With advances in clinical

chemistry, imaging studies the diagnosis can be made before the classic triad develops.

The chance of symptomatic cure after surgery is low for patients with preoperative dyspeptic symptoms. However, 72% of patients will feel improved after the procedure. This suggests that gall bladder calculi could have caused those dyspeptic symptoms (7-9). If the pain is of biliary type then 95% chance of cure were reported after follow up of up to a year (10,11).

Borly et al (12) studied whether factors present before surgery could be used to predict postop symptomatic over a period of 24 months. Of the Only 78 patients completed the study out of 100, and of them 70 were females. 20 patients continued to complain of pain abdomen after the surgery and were found to have by high dyspepsia score before surgery,

Lorusso et al (13) studied whether poor outcome after surgery in patients with gallstones without any complication could be due to psychological causes and symptoms of dyspepsia. 52 (42 women, 10 men) patients were studied 2 weeks before the surgery and a year after surgery.

Pediatric gallstones

The distribution of gallstone types in children differs from the adult population, with cholesterol stones being the most common type of stone in adults and black pigment stones being the most common type in children.

Black pigment stones make up 48% of gallstones in children. They are formed when bile becomes supersaturated with calcium bilirubinate, the calcium salt of unconjugated bilirubin. Black pigment stones are commonly formed in hemolytic disorders and can also develop with parenteral nutrition.

Calcium carbonate stones, which are rare in adults, are more common in children, accounting for 24% of gallstones in children .

Cholesterol stones are formed from cholesterol supersaturation of bile and are composed of 70-100% cholesterol with an admixture of protein, bilirubin, and carbonate. These account for most gallstones in adults but make up only about 21% of stones in children.

Brown pigment stones are rare, accounting for only 3% of gallstones in children, and form in the presence of biliary stasis and bacterial infection. They are composed of calcium bilirubinate and the

calcium salts of fatty acids and occur more often in the bile ducts than in the gallbladder.

The remaining portion of gallstones in children consists of protein-dominant stones, which make up about 5% of gallstones in these patients.

Microliths are gallstones smaller than 3 mm; can form within the intrahepatic and extrahepatic biliary tree; may lead to biliary colic, cholecystitis, and pancreatitis; can persist after cholecystectomy; and are difficult to diagnose as they are often missed on ultrasonography. Biliary sludge is made up of precipitates of cholesterol monohydrate crystals, calcium bilirubinate, calcium phosphate, calcium carbonate, and calcium salts of fatty acids, which are embedded in biliary mucin to form sludge.

Treatment for simple cholelithiasis is symptomatic. Surgical removal of asymptomatic gallstones is currently not standard practice.

DIAGNOSIS

Abdominal Ultrasonography:	Single most useful test to evaluate gallstones, CBD size and stones
Endoscopic Ultrasound (EUS)	Excellent to evaluate CBD stone, size. Expensive. Not easily available.
ERCP	Solely a diagnostic test it has lost its value. Can be used to do sphincterotomy, therapeutically
HIDA, DIDA, Radioisotope Scans	Accurate identification of cystic duct obstruction. Diagnosis of acute cholecystitis
CT Scan Abdomen	Not ideal. radiation. Not useful in pregnancy
MRI/MRCP	MRCP does not require contrast. It can be safely used in 2nd/3rd trimester of pregnancy. reduces the number of invasive ERCPs

Oral Cholecystogram (OCG; Graham-Cole Test)

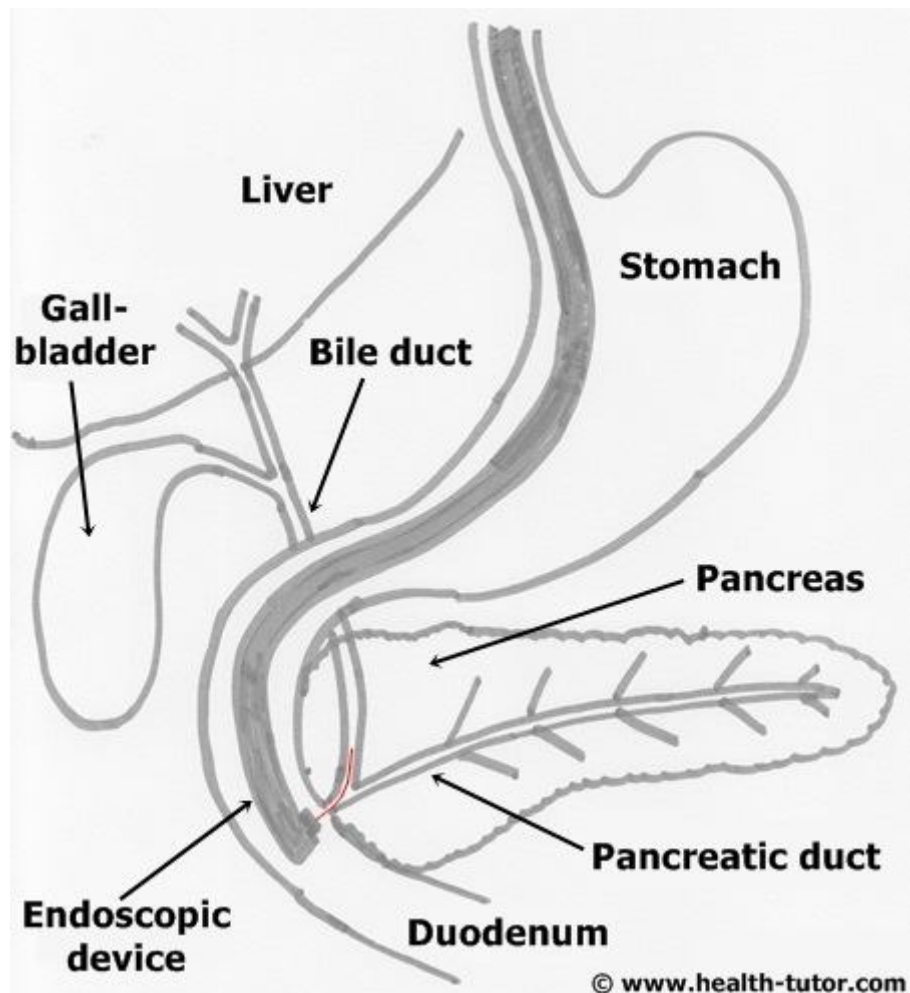
- To study gallbladder function
- Patient should not have fatty diet for 3 days.
- Previous night 6 tablets of *iopanoic acid* (Telepaque) is given orally
- On the day of OCG, plain X-ray abdomen in erect posture, is taken to visualize the gallbladder.
- Later X-ray taken after giving fatty meal.
- Size of gallbladder which should be lower than that of before due to contraction.

Iv cholangiogram

- X-Ray taken after IV Meglumine is injected to check biliary tree
- Usually combined with OCP
- Drug reaction and poor visualization is a problem

Endoscopic Retrograde Cholangiopancreatography (ERCP)

- Sphincter of oddi is cannulated with side viewing endoscope when patient is under sedation and 3 ml iodinated contrast is pushed through
- Using C-arm both biliary and pancreatic ducts are seen
- It has both diagnostic and therapeutic uses.



Therapeutic uses
Stone removal from CBD
Bile drainage
Stenting of CBD or Pancreas
CBD dilatation
Sphincterotomy

Magnetic Resonance Cholangiopancreatography (MRCP)

- It is better than ERCP for diagnostic purposes as it is noninvasive and does not use dye

Radioisotope Scan Study

I^{131} , Tc^{99} labeled iminodiacetic acid used in cases like acute cholecystitis.

Percutaneous Transhepatic Cholangiography (PTC)

- Done in cases of biliary obstruction after correction of coagulopathy

- Done in failure of ERCP, Klatskin tumor, High tumors
- Chiba or Okuda needle passed through 8th Intercostal space in midaxillary line and iodine dye injected
- C-arm is used to visualize.

RADIOLOGICAL ASSESMENT

Conventional radiography

Some radiopaque gallstones may be seen on plain film:

- gallstones are radio-opaque only in 15-20% of cases ³
- may have a laminated appearance
- may have a faceted outline
- may show a Mercedes-Benz sign: radio-opaque outline with lucent center

Ultrasound

Ultrasound is considered the gold standard for detecting cholelithiasis ⁶:

- greyscale ultrasound
 - highly reflective echogenic focus within gallbladder lumen, normally with prominent posterior acoustic shadowing
 - gravity dependent movement is often seen with change of patient position (the rolling stone sign)
- color Doppler

- may demonstrate a twinkle artefact and is particularly useful for identification of small stones

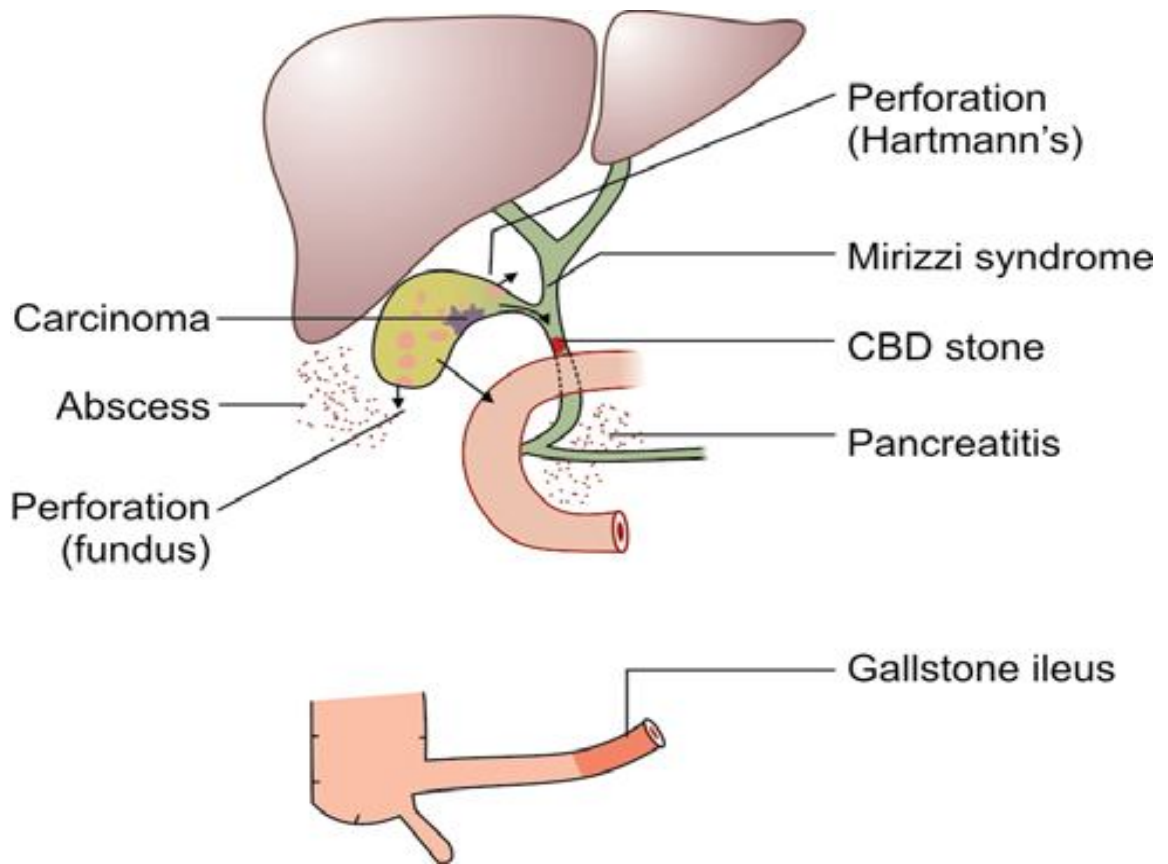
CT

Pure cholesterol stones are hypoattenuating to bile and calcified gallstones are hyperattenuating to bile. Some gallstones may be isodense to bile and may therefore be missed by CT.

MRI

- **T2:** signal void or low signal outlined by markedly hyperintense bile within gallbladder
- **MRCP:** focus of signal void inside gallbladder

COMPLICATIONS



Acute cholecystitis

An acute inflammation occurs when there is occlusion to bile flow from gall bladder for a long time. The patients suffers from toxic symptoms like elevated temperature and localized right hypochondrial tenderness. Blood investigations show an elevated total count. The presence of gall bladder pathology should be confirmed using USG or

CT after clinical diagnosis. Imaging shows gallbladder with edema and thickening suggestive of acute inflammation. Mild jaundice may be seen due to edema. Mirizzi's syndrome or CBD calculi should be considered if jaundice becomes severe (79) . Surgery should be considered immediately in such situations without delay of more than six hours (80).

Jaundice

Gallbladder calculi can cause occlusion to flow of bile if they migrate into CBD and cause obstruction. Such cases will not have palpable gall bladder according to Courvoisier's law. Rarely, a stone in the Hartman's pouch may compress the common bile duct. In the above mentioned cases, the patient has jaundice. Cholangitis presence is variable. Such cholangitis has a mortality rate pretty high unless the biliary drainage is done. Age, neurological disease and peripapillary diverticula are all identified as risk factors in these scenarios (81).

Chronic cholecystitis

It is a shrunken, chronically inflamed gall bladder which is not distending and non functioning. It has Rokitansky-Aschoff sinuses which are nothing but mucosal clefts

Mucocele

Collection of sterile mucous after all bile is absorbed forms mucocele. It occurs due to obstruction of gall bladder in Hartman's pouch.

Empyema

It is a type of acute cholecystitis where the gall bladder is filled with pus. More common in diabetics and immunosuppressed individuals. Preexisting Mucocele could turn into empyema. Patient will be toxic with fever and localized tenderness. Requires urgent treatment.

Acute pancreatitis

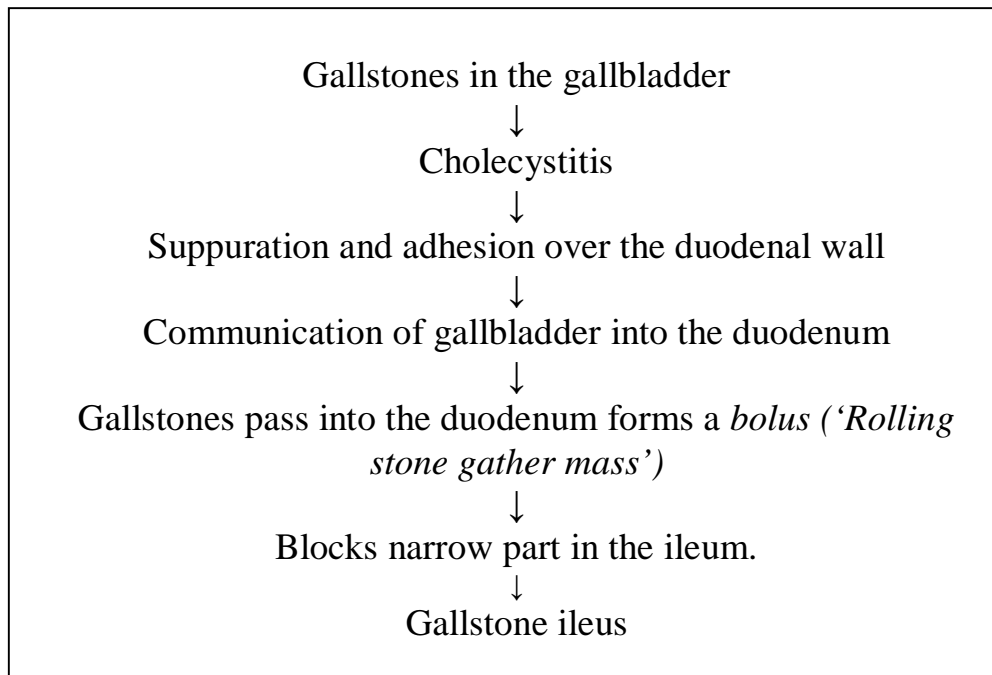
Calculi of smaller sizes or microlithiasis, are major cause of acute gallstone pancreatitis. Majority of patients (around 90%) have a mild form that is treated with IV fluids. Not more than 5 days is required for recovery. The rest 10% develop the necrotising pancreatitis which is more aggressive and has chance of translocation of microorganisms from gut to which was before an no septic inflammation . Such patients require intensive care. Unfortunately, no causative treatment is available for the already developed pancreatitis .

If there is cholangitis due to occlusion by calculi, Emergency ERCP with sphincterotomy must be performed (82). If not, prophylactic cholecystectomy should take place as soon as possible after the acute episode (83).

Gallstone ileus

A fistulous connection can develop between gallbladder and small intestine or stomach.. If its big, then calculi can occlude the small intestine causing obstruction. This causes no more than 4% of all causes with small intestine obstruction (81).

This incidence of gallstone ileus is more in people >60 years of age and more seen in females.(82).It's a diagnosis that is hard to arrive. The patient presents with symptoms of small intestine obstruction. Sometimes air in the biliary tract is seen along with signs of intestinal obstruction and rarely calculi that is calcified in the small intestine. Very rarely, a stone penetrates into the stomach, where it is trapped, causing the so called Bouveret's syndrome(154, 155),with signs of intermittent GOO.



Gallbladder carcinoma

Gallbladder calculi is an important risk factor in development of malignancy (81). Cholangiocarcinoma has a high mortality in later stages (82). Therefore, some suggest prophylactic removal of asymptomatic gallbladder with calculi. But, one few people with calculi (0.25 %) develop this carcinoma. Hence, there is a general consensus not to treat asymptomatic gallstones, since the mortality associated with surgery is at least at the same level as that of gallbladder carcinoma (83).

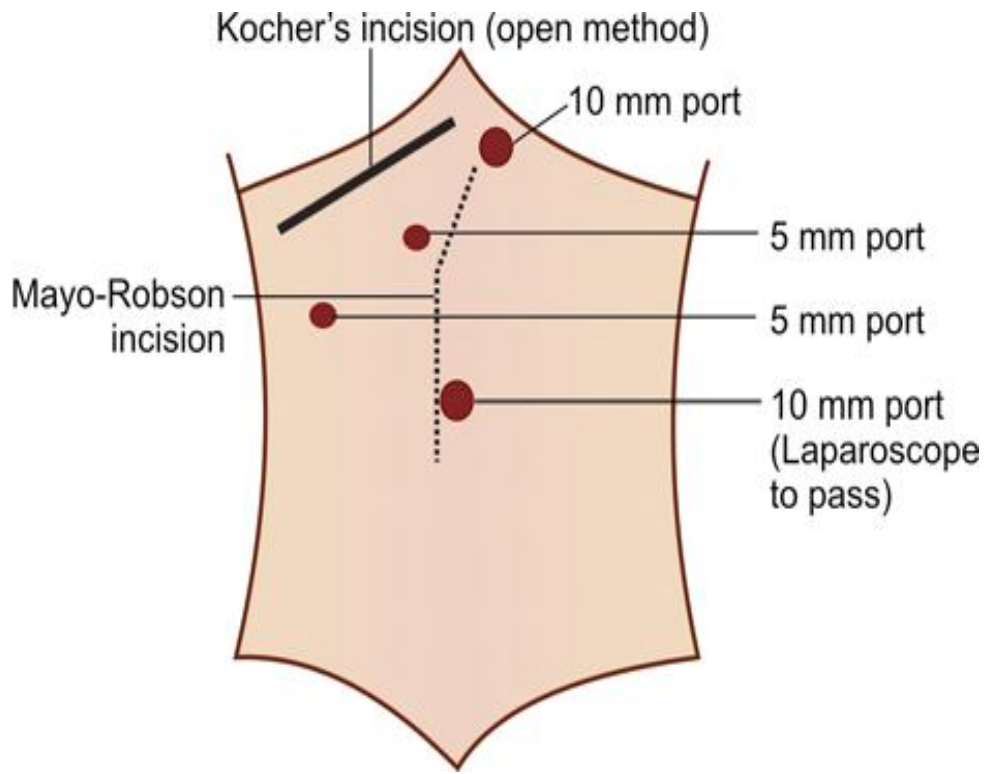
TREATMENT

OPTION	STONE CLEARENCE	COMMENT
Laparoscopic Cholecystectomy	100 %	Standard of care, Invasive, General anesthesia
ERCP/ Sphincterotomy	70 %	In selected cases. Advanced age & pregnancy
ESWL	70%	Rarely helpful
Oral bile acid dissolution		Not ideal in symptomatic cases

Laparoscopic Cholecystectomy

Under general anesthesia and patient is placed in supine position. 4 trocars are inserted into the peritoneum. CO₂ is used to insufflate the abdomen by either closed method (Verres needle) or open method. Incision then made near umbilicus for ten millimeter trocar. The camera is passed through the umbilical port. 3 more ports (epigastrium, mid-clavicular line, and flank) are inserted under vision. The operation is performed and visualized through a monitor with magnified images.

The flank or lateral port is used for an atraumatic grasper to grasp the fundus and retract it upward. The epigastric port is used for the dissection by a dissector, hook or scissors. The mid clavicular port is used to hold the infundibulum with an atraumatic grasper, and pull towards the right lower quadrant. The cystic duct and artery are identified and separated after hepatoduodenal ligament dissection. Both of them are then clipped and cut. The GB is then separated off the gallbladder fossa. The GB is then brought out through the umbilical incision. (18).



Single incision laparoscopic Surgery (SILS) in cholecystectomy

SILS is an advanced technique in which surgeon uses an single umbilical port for access hence it is also called as one port umbilical surgery (OPUS).

It is done using general anesthesia and requires advanced umbilical trocars which is large but should also allow harmonic scalpel, working instruments, flexible scope, rotatory instruments, handles, 2.4 cm umbilical incision made vertically and dissection is done by open method to enter peritoneal cavity. Port through which a 10 mm telescope is passed and 2 instruments of 5 mm for work is used. Instruments are angled and flexible to meet the ergonomic principles to certain extent. Dissection of gallbladder is done in similar fashion like four port technique. Specimen is easily retrieved through umbilical port as it is wide enough. If difficulty arises any time one can add additional ports as required.

Open Cholecystectomy

The patient under a general anesthesia and is supine position and draped under aseptic precautions. Two types of incision can be used: Either an subcostal or Kocher's incision or upper midline incision. The dissection of GB is similar as done in laparoscopy.

Advantages of laparoscopy is there is less postoperative pain, Early recovery and early discharge. But there is higher chance of surrounding biliary system injuries as compared to open procedures
(26)

INDICATIONS FOR CHOLECYSTECTOMY

The risk of developing complications to gallstone disease must be included during the evaluation of cholecystectomy (55), chance of complication and, obviously, the relief from preoperative symptoms(85), the cost for society must also be taken into consideration. Rates of gall bladder removal surgeries differs among various countries

In screening studies there is an relation between biliary colic (upper right abdominal quadrant pain) and occurrence of gallbladder calculi (86), making biliary colic the important indicator for gallbladder calculi (87). But, various studies denote that single event of pain may not be succeeded by more events in a reasonably span of time. So waitful watching is required in cases with just single episodes

Therefore guidelines suggest surgery to patients with multiple episodes of symptoms or a complication resulting from calculi (86). When the stones are symptomatic, some even recommend operation without delay in order to minimize costs and complications.

**Prophylactic Cholecystectomy Considered for
Patients with Silent Gallstones**

High risk for gallbladder cancer

Gallstones larger than 3 cm in diameter

Porcelain gallbladder (calcification in the wall)

Gallbladder polyps larger than 12 mm

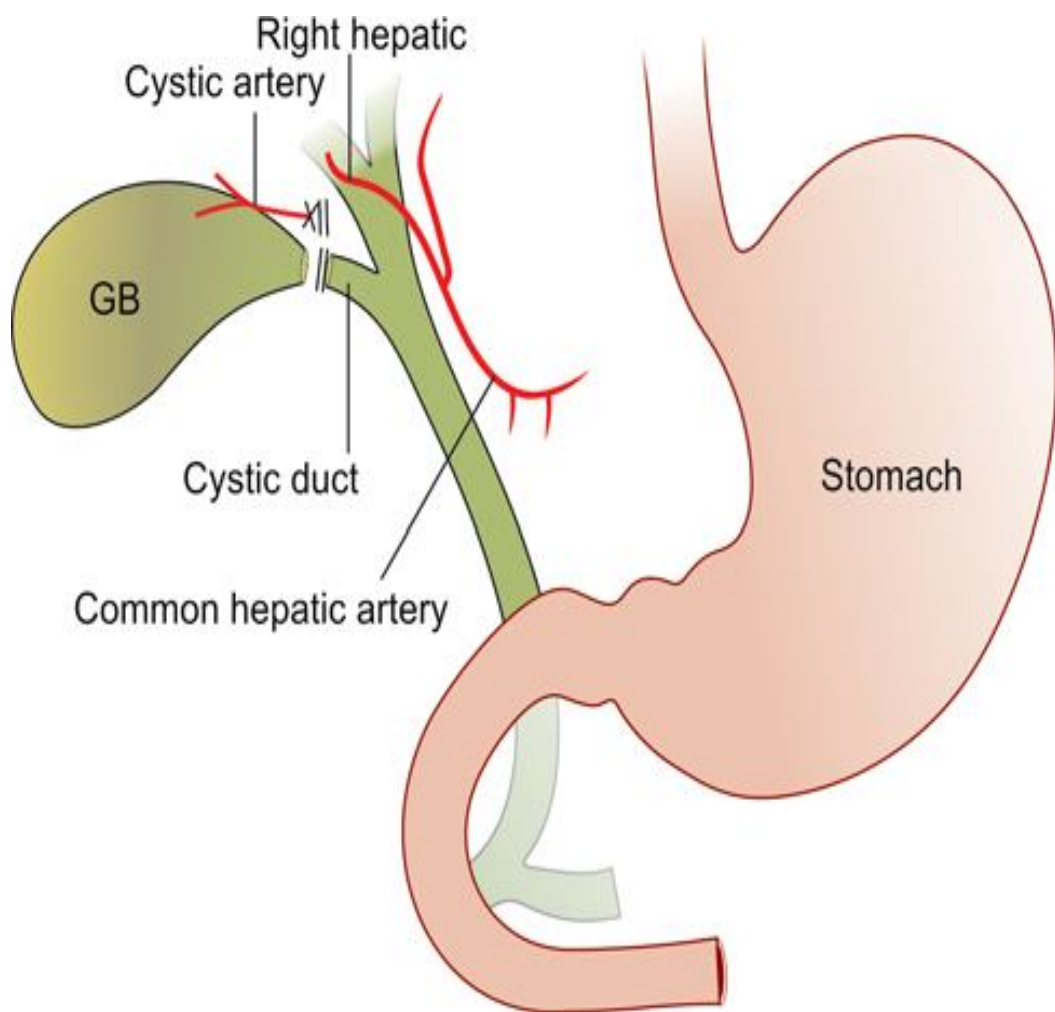
Carriers of *Salmonella typhi*

Working for prolonged periods in remote parts of the world

with

poor medical facilities

COMPLICATIONS OF CHOLECYSTECTOMY



As with any invasive surgery, cholecystectomy carries certain risks. Operation-specific complications include surgical site infection,

bile duct and bowel injury, Bile leak, vascular injury and vascular-biliary injuries. Medical complications include myocardial infarction, pneumonia, urinary tract infection and venous thromboembolism. While rare, death may result from any of these or other rarer complications.

The frequency of surgical site infection ranges from 1% to 10% and the risk is related to surgical approach (laparoscopic or open cholecystectomy) and the degree of contamination (e.g. gangrenous cholecystitis, leakage of infected bile, occurrence of a bile duct or bowel injury) (37) More specifically, when characterized according to the Center for Disease Control's levels of 14 surgical site infection, the frequency of infection is 1% - 5%, 0.1% - 1% and 0.3% - 2.5% for superficial incisional surgical site infection, deep incisional surgical site infection and organ space surgical site infection respectively (37,38). Appropriate management is usually based on the nature and severity of infection. Antibiotics or simply opening the surgical wound will treat a superficial surgical site infection. Percutaneous drainage or re-operation and washout are required for more extensive or deep organ-space infections.

Bile leaks and bile duct injuries represent a spectrum of injury to the biliary tract. Strasberg et al. proposed a classification system most applicable to the laparoscopic era that classifies injuries based on the length, circumference and level of the injury involved and whether the main duct (common hepatic and common bile duct) versus an accessory or the cystic duct are injured (39). With respect to associated morbidity and impact on quality of life, injury to the biliary tract can be considered in two broad categories : bile leaks and bile duct injuries requiring operative intervention. Leaks may result from injury to a side branch of the biliary tree, the cystic duct stump or a non-circumferential injury to the main ductal system. These may be managed with endoscopic cholangiopancreatography and stent placement, possibly in association with percutaneous drainage (40). Major bile duct injuries require operative repair or reconstruction of the biliary tract and are therefore associated with the greatest morbidity (40). In fact bile duct injuries are associated with reduced long term survival and are a major cause of litigation against general surgeons (40-43). Leaks occur in approximately 1-3% of laparoscopic cholecystectomies whereas injuries complicate only 0.3-0.5% of cholecystectomies (41,44-48). In addition, vasculo- biliary injuries have recently received greater attention and refer to an extreme case

of major bile duct injury that occurs in conjunction with injury to a hepatic artery and/or portal vein (49,50). This devastating injury accounts for only 2% of major bile duct injuries (51). The frequency of bowel injuries is not well characterized but results from dissection of the colon, small bowel or duodenum adhered to an inflamed gallbladder or from inadvertent cautery burn. Primary repair is generally possible if recognized early; otherwise, patients will present later with peritonitis necessitating a return visit to the operating room. A small proportion of cholecystectomies for symptomatic gallstones lead to medical complications. Based on data from the National Surgery Quality Improvement Program (NSQIP) of the American College of Surgeons, a procedure-specific registry, medical complications such as myocardial infarction, pneumonia, urinary tract infection and venous thromboembolism respectively occur in 0.2%-1%, 0.4%-4%, 0.7%-2% and 0.2%-1% patients respectively (37). The frequency of such complications might reasonably be expected to be higher in patients operated on for acute cholecystitis.

POSTCHOLECYSTECTOMY SYNDROME

Post cholecystectomy syndrome (PCS) is nothing but failure of relief of preoperative symptoms after cholecystectomy. These symptoms can just be continuation of old or newly started ones. PCS also be due the absence of gallbladder after surgical removal (eg, gastritis and diarrhea).

In general, PCS is a diagnosis of exclusion and should be considered with respect to the disease identified by an adequate workup. It rises due to bile flow changes as there is a decrease in the reservoir function. Two types of difficulties can arise. One there is always more flow of bile than normal into the upper gastrointestinal (GI) tract, which can lead to gastric and esophageal inflammation. The other is due to the lower GI tract, where loose stools and colicky lower abdominal pain may occur.

PCS reportedly occurs in around 10-15% of patients. The cause of the mild GI symptoms is due to bile. Loss of this reservoir function of the gallbladder changes flow of bile and the Enterohepatic circulation of bile. This pathogenesis however is fully not understood.

Early reports on PCS was mainly on changes in anatomy that were grossly or at least microscopically seen during exploratory surgery. Improvements in technology and imaging studies have yielded an improved understanding of biliary tract disorders.

This has affected the preoperative workup of patients with suspected gallbladder disease as well as those with PCS, making functional disorders of the biliary tract (including irritable sphincter).

The most common causes are:

Anatomy	Etiology
Gall bladder remnant and cystic duct	Residual or reformed gallbladder Stump cholelithiasis Neuroma
Liver	Fatty infiltration of liver Hepatitis Hydrohepatosis Cirrhosis Chronic idiopathic jaundice Gilbert disease Dubin-Johnson syndrome Hepatolithiasis Sclerosing cholangitis Cyst
Biliary tract	Cholangitis Adhesions Strictures Trauma Cyst

	<p>Malignancy and cholangiocarcinoma</p> <p>Obstruction</p> <p>Choledocholithiasis</p> <p>Fistula</p> <p>Dilation without obstruction</p> <p>Hypertension or nonspecific dilation</p> <p>Dyskinesia</p>
Periampullary	<p>Sphincter of Oddi dyskinesia, spasm, or hypertrophy</p> <p>Sphincter of Oddi stricture</p> <p>Papilloma</p> <p>Cancer</p>
Pancreas	<p>Pancreatitis</p> <p>Pancreatic stone</p> <p>Pancreatic cancer</p> <p>Pancreatic cysts</p> <p>Benign tumors</p>
Esophagus	<p>Aerophagia</p> <p>Diaphragmatic hernia</p> <p>Hiatal hernia</p> <p>Achalasia</p>
Stomach	<p>Bile gastritis</p> <p>Peptic ulcer disease</p> <p>Gastric cancer</p>
Duodenum	<p>Adhesions</p> <p>Duodenal diverticula</p> <p>Irritable bowel disease</p>
Small bowel	<p>Adhesions</p> <p>Incisional hernia</p> <p>Irritable bowel disease</p>
Colon	<p>Constipation</p> <p>Diarrhea</p> <p>Incisional hernia</p>

	Irritable bowel disease
Vascular	intestinal angina Coronary angina
Bone	arthritis
Other	Adrenal cancer Thyrotoxicosis 20% organ other than hepatobiliary or pancreatic Foreign bodies, including gallstones and surgical clips

MATERIALS & METHODS

Period of Study

January 2015 to September 2015

Place of Study

Department of General surgery

Govt. Kilpauk medical college

Chennai-10

Inclusion Criteria :

- Patient underwent elective lap-cholecystectomy after proper assessment or Emergency situations for acute gallstone related complications
- All cholelithiasis cases diagnosed by imaging.

Exclusion criteria :

- Open cholecystectomy
- A Standard questionnaire examined characteristics of pain, Dyspepsia and colonic symptoms

- Patients will be followed up after a period of 6 months with a questionnaire by op or telephone review
- Patients will be reviewed about post op morbidity, complications and gall bladder histology
- Patients with abnormal LFT's,Dilated CBD,Pancreatitis will undergo pre-op ERCP and sphincterotomy

Size Of Study : 70

Study methodology :

Seventy patients were evaluated for laparoscopic cholecystectomy between January 2015 to September 2015 . All of them were planned to undergo laparoscopic cholecystectomy electively or underwent urgent surgery after admission to hospital for acute emergency relating to gallstones. USG was done in all patients to confirm the diagnosis of cholelithiasis .The patients were excluded from the study if they underwent open procedure or not able to fill the proforma. Cholecystectomy indications and investigations done for surgery were obtained .

Questionnaires

The symptom profile of patients were evaluated before surgery. A standard proforma regarding characteristics of pain (site,duration,frequency, quality, periodicity, and precipitating and relieving factors), other symptoms of dyspepsia (nausea, vomiting, heartburn,food intolerance, and early satiety), and colonic symptoms (bloating, constipation, diarrhea). Proforma were given to patients before the procedure and 6-12 months after procedure. Follow-up of patients done by telephone or outpatient basis. Laparoscopic cholecystectomy was carried out as a four trocars technique with electrocautery dissection. Patients with a previous episodes of jaundice, altered LFT 's, dilated common bile duct, and pancreatitis underwent preoperative MRCP and if there was a preop CBD calculi/Dilation ,Patients underwent endoscopic retrograde cholangiopancreatography (ERCP) and sphincterotomy or open CBD Exploration depending upon surgeons preference.

PROFORMA

Name :

age/sex:

IP no:

Date Of Admission :

Date of procedure :

Date Of Discharge :

Address :

Contact number (Main):

Contact number (Alternative):

Occupation:

Past history :

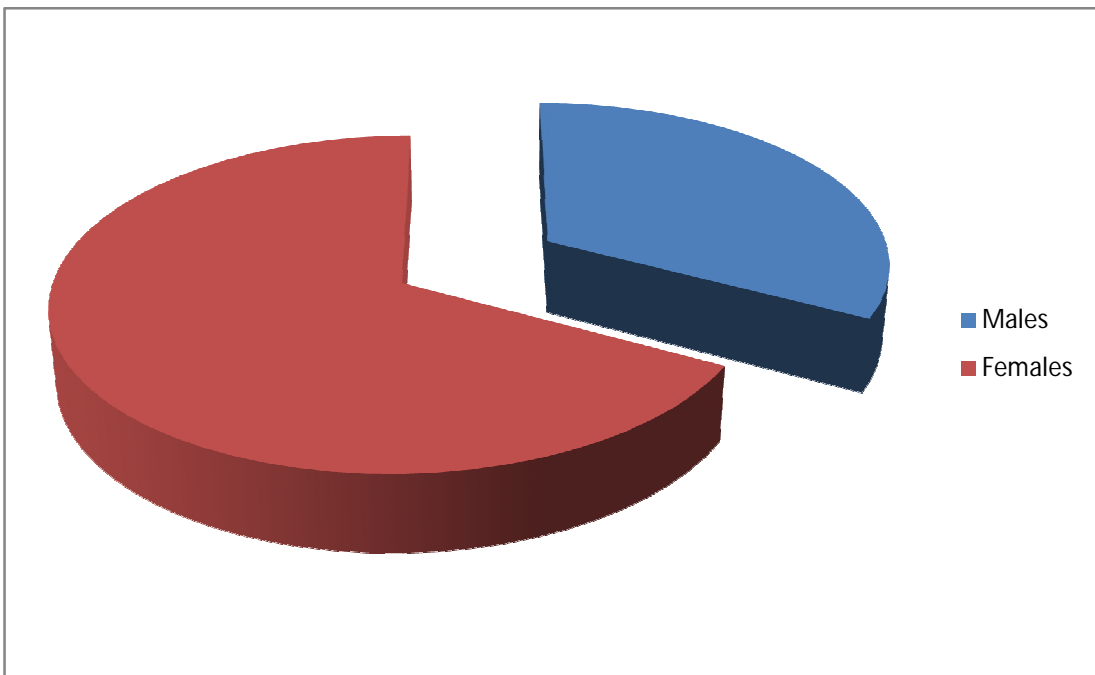
Pre-op diagnosis:

Symptom	Preop	Postop
Pain Upper abdomen Lower abdomen Radiation to back Quality: Sharp Cramp Burning Crushing Dull Periodicity: Constant Colic Duration (min): <30 >30 Frequency(per week): >1 attack <1 attack		
Nausea		
Vomiting		
Heartburn		
Early satiety		
Bloating		
Constipation		
Diarrhea		

RESULTS

- Seventy patients were taken up for the study .Out of them four patients were excluded since they were converted to open cholecystectomy.Eight patients were lost during follow up. Hence finally fifty eight patients underwent this study.
- There were Thirty nine females and nineteen males with median age of 46(Chart 1).
- Eight patients reported pain similar to that of before the surgery

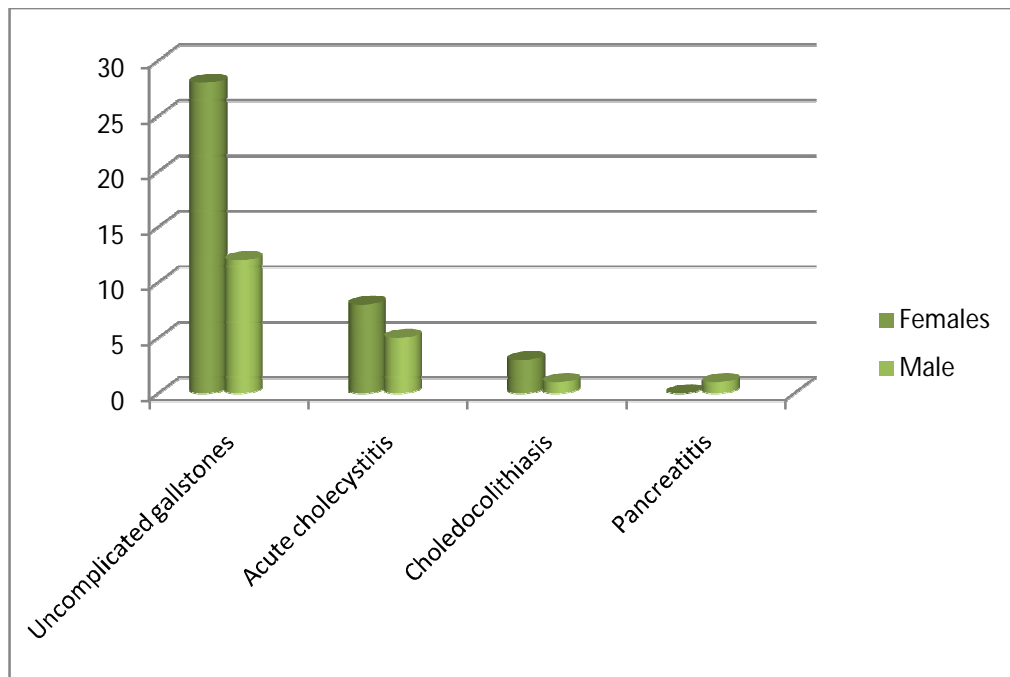
Chart 1



- Patients who became free of symptoms were classified as asymptomatic group.

- All the postoperative patients had normal LFT's.
- Postoperative complication of biliary leak was seen in one patient.

Column 1



- Out of fifty eight patient who underwent laparoscopic cholecystectomy, Twenty eight females and twelve males underwent for uncomplicated symptomatic gallbladder disease (Column 1 & table 1)
- Eleven females and seven males underwent the procedure for complicated disease . (Column 1 & table 1)

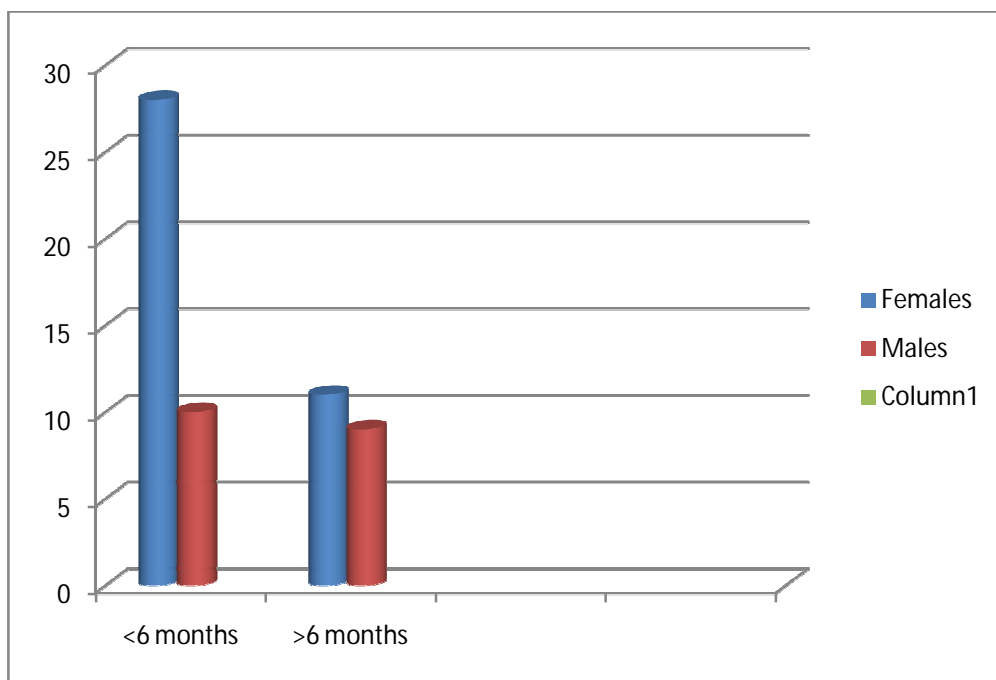
- Eight females and five males had acute cholecystitis (Column & table 1)
- Three females and one male had common bile duct calculi (Column & table 1)
- One male had pancreatitis complicated by CBD calculi. This patient underwent ERCP postoperatively .(Column & table 1)

Table 1

Baseline Characteristics	Female	Male
Uncomplicated disease	28	12
Complicated disease		
Acute cholecystitis	8	5
Choledocolithiasis	3	1
Pancreatitis	0	1

<u>Duration of symptoms</u>		
<6 months	28	10
>6 months	11	9

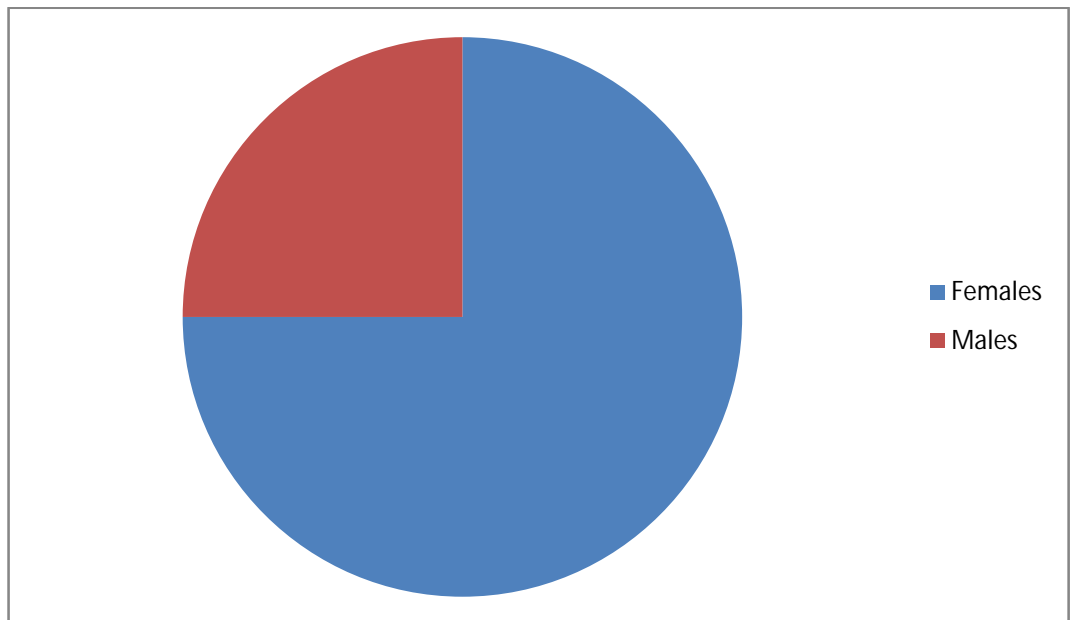
Table 2



- Twenty eight females and ten males had these symptoms for less than six months (table 2)

- Eleven females and nine males had their symptoms for more than 6 months (table 2)
- Postoperatively Eight patients complained of symptoms after period of 6-10 months
- Of these six were females and two were males (Chart 2)

Chart 2



Symptom	Asymptomatic(50)	Symptomatic(8)
<u>Pain</u>		
Upper abdomen	46(92)	8(100)
Lower abdomen	5(8)	0
<u>Radiation to back</u>	29(58)	6(75)
<u>Quality:</u>		
Sharp	19(38)	4(50)
Cramp	11(21)	0
Burning	4(7)	1(12)
Crushing	3(5)	0
Dull	15(29)	2(25)

<u>Periodicity:</u>		
Constant	34(67)	6(75)
Colic	17(33)	1(12)
<u>Duration (min):</u>		
<30	30(59)	6(75)
>30	21(41)	2(37)
<u>Frequency(per week):</u>		
>1 attack	22(45)	5(62)
<1 attack	27(55)	3(37)

- Most of the patients complained of pain in the upper abdomen. Almost all the symptomatic group had upper abdominal pain with many complaining of pain radiating to back.

- Most patients complained of constant type of pain than colicky type.
- Duration of pain were short(<30 mines) in majority of symptomatic than asymptomatic group.
- Most of other variables are equally distributed on both sides.

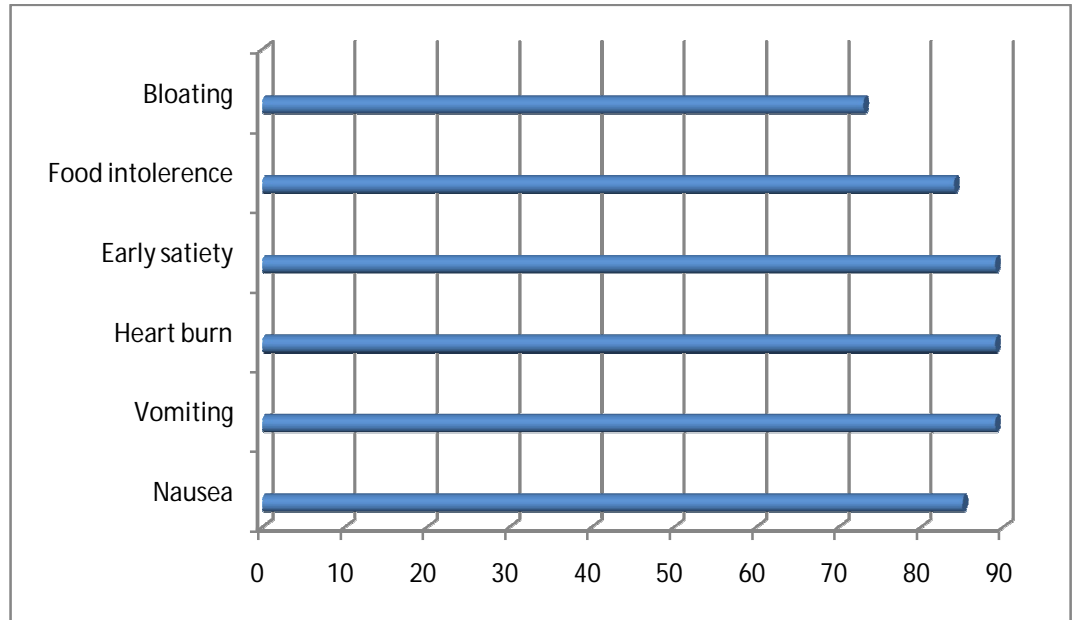
Symptom	No of patients(%)		McNemer test (P<0.05 significant)
	Asymptomatic	symptomatic	
Nausea	35(60)	5(62)	.0001
Vomiting	19(33)	2 (25)	.0001
Heartburn	19(33)	2(25)	1.000(NS)
Early satiety	10(17)	2 (25)	0.031
Food intolerance	30(52)	2 (25)	.0001
Bloating	23(40)	7 (87)	Not applicable
Constipation	5(8)	6 (75)	0.008

- The statistical significance of the result was done by McNemer test and reported in the table above.
- The most common dyspeptic symptoms preoperatively is nausea followed by food intolerance. Heartburn and vomiting are also seen frequently. In colonic symptoms, bloating is most common.

Symptom	No of patients		Cure rate
	Asymptomatic	symptomatic	
Nausea	35	5	85
Vomiting	19	2	89
Heart burn	19	2	89
Early satiety	10	2	80
Food intolerance	13	2	84
Bloating	23	7	73
Constipation	5	6	0

- The success of surgery is determined by cure of preoperative symptoms.
- In this study, vomiting and heartburn had high success rates followed by food intolerance and early satiety (Column 2)

- Colonic symptoms like bloating, constipation were showed lower or no success rates.(Column 2)



Conclusion

- The incidence of post cholecystectomy in this study which was 13% was similar to many studies reported before
- Two patients had persistent upper GI symptoms were found to have duodenal ulcer and upper GI symptoms showed cure rates around 80% suggesting some of upper GI symptoms could be due to biliary pathology that can be cleared by cholecystectomy.
- Hence Heartburn, Non specific dyspepsia are not adequate reason for cholecystectomy
- Colonic symptoms showed poor cure rates
- People with persistent colonic symptoms had history of psychiatric disorders like depression and history of drug intake such as antidepressants.
- Hence those who have used psychotropic drugs they may have asymptomatic gall bladder calculi and irritable bowel syndrome. Such patients are unlikely to benefit from laparoscopic cholecystectomy

REVIEW OF LITERATURE

In this study of symptoms after laparoscopic cholecystectomy, the incidence of persistent symptoms was 13%. Many studies have given varying results regarding the persistent symptoms after cholecystectomy. Ros and Gambon evaluated 92 subjects for 24 months after surgery (90) Only 52 people were cured of symptoms.

Konsten et al (91) found postoperative symptoms in 17%. Gilliland and Traverso reported that 87% of their patients had cure after surgery. In that study, 1% of patients reported Loose stools & dyspepsia was the most common residual symptom after surgery seen in 30%. Only small number of studies have examined this after laparoscopic cholecystectomy (91).

Peters 'et al said that 76% of patients thought that their symptoms to have been cured by the surgery(93). Wilson and Macintyre said that over 90 % of patients in both open and laparoscopic surgeries considered the procedures resulted in symptomatic relief(92) McMahon et al also reported that over 90% of patients were improved by the operation. The incidence of persistent postcholecystectomy symptoms reported in this series is similar to that

reported for open cholecystectomy but is higher than that reported by Wilson and Macintyre(94) Velpen et al reported that he found symptomatic relief for heartburn,Early satiety in his study(95).McMahon et al showed that patients with the 'postcholecystectomy syndrome' were more anxious and depressed and it is well known that patients with irritable bowel syndrome and 'functional dyspepsia' tend to be neurotic, anxious, and depressed(98)

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MASTER CHART

Sno	Age	Sex	Ip no	Diagnosis	Preoperative symptoms												
					Pain abdomen						Nausea	Vomiting	Heartburn	Early satiety	Food intolerance	Bloating	Constipation
					Site	Radiation	Quality	Periodicity	Duration	Frequency							
1	47	F	58321	GS	Upper	to back	Cramping	colicky		>1	Positive				Positive	Positive	
2	52	M	56743	GS	Upper	to back	Dull	Constant		>1	Positive				Positive		
3	52	F	54121	GS	Upper	to back	Sharp		<30	>1					Positive	Positive	Positive
4	54	F	55134	AC	Upper		Cramping	colicky		<1					Positive	Positive	
5	38	F	55170	GS	Upper			Constant		<1	Positive						
6	43	M	57326	GS	Upper	to back	Sharp	Constant		<1							
7	48	F	58213	GS	Upper	to back	Sharp	colicky		>1	Positive				Positive	Positive	
8	52	M	63121	GS	Lower		Burning	Constant		<1	Positive	Positive	Positive	Positive			
9	40	F	65146	GS	Upper	to back	Sharp	Constant		<1	Positive						
10	44	M	66132	GS	Upper	to back	Cramping	colicky		>1					Positive	Positive	
11	54	F	66152	GS	Upper	to back	Sharp	Constant	<30	>1	Positive					Positive	Positive
12	47	F	66398	CL	Upper	to back	Sharp	Colicky		<1	Positive						
13	43	M	69752	AC	Upper		Dull	Constant							Positive		
14	49	M	72875	GS	Upper			Constant		>1					Positive	Positive	
15	50	F	73985	AC	Upper	to back	crushing	colicky		>1	Positive	Positive	Positive	Positive			
16	52	F	79790	GS	Upper		Dull	Constant		<1					Positive		
17	51	M	79823	AC	Upper		Sharp	Constant		<1	Positive					Positive	
18	45	F	81231	GS	Upper	to back	Cramping	colicky		>1	Positive				Positive	Positive	
19	45	M	82002	AC	Lower		Dull	Constant		<1					Positive		
20	42	F	83561	GS	Upper	to back	Sharp	Constant		<1	Positive	Positive	Positive	Positive			

21	50	F	84210	AC	Upper	to back	Cramping	colicky		>1	Positive				Positive	Positive	
22	51	F	85901	GS	Upper	to back	Sharp	Constant	>30	<1	Positive						
23	57	F	85907	GS	Upper		Sharp	Constant			Positive	Positive	Positive				
24	46	F	87327	AC	Upper	to back	Dull	Constant	<30	<1					Positive		Positive
25	43	M	89101	AC	Upper		Sharp	Constant		<1	Positive						
26	47	F	89340	GS	Upper	to back	Dull	Constant		<1					Positive	Positive	
27	44	M	92301	GS	Upper			colicky		>1	Positive	Positive	Positive	Positive	Positive	Positive	
28	41	F	93459	GS	Upper		Burning	Constant		<1	Positive	Positive	Positive	Positive			
29	39	F	93462	GS	Upper	to back	Dull	Constant		<1					Positive	Positive	
30	53	F	94012	CL	Upper	to back	Sharp	colicky		<1							
31	55	F	94072	GS	Upper	to back	Cramping	constant		>1	Positive	Positive	Positive		Positive	Positive	
32	45	M	95027	GS	Upper	to back	Burning		<30	>1	Positive	Positive	Positive	Positive			
33	49	F	95101	GS	Upper		crushing	colicky		>1	Positive	Positive	Positive		Positive	Positive	
34	41	M	92103	GS	lower		Sharp	Constant		<1					Positive		
35	39	F	90100	AC	Upper	to back	Sharp			<1	Positive				Positive		
36	53	F	100009	GS	Upper		Burning	Constant		>1	Positive	Positive	Positive	Positive			
37	55	F	100013	GS	Upper	to back	Dull			<1					Positive	Positive	
38	51	F	100101	CL	Upper		Cramping	colicky		>1	Positive	Positive	Positive		Positive	Positive	
39	45	F	100672	GS	Upper	to back	Dull	Constant	<30	<1						Positive	Positive
40	44	M	100702	GS	Upper		Dull	Constant									
41	48	F	100798	AC	Upper		Cramping	colicky		>1	Positive	Positive	Positive	Positive	Positive	Positive	
42	52	M	110126	GS	Upper	to back	Sharp	Constant		<1	Positive	Positive	Positive	Positive			
43	53	F	110156	GS	Upper	to back	Dull	Constant		<1					Positive		
44	49	F	120002	AC	Upper		Dull	Constant		<1					Positive		
45	50	F	120017	GS	Upper		Cramping	colicky	<30	>1	Positive					Positive	Positive

46	51	M	120134	AC	Upper		Dull	Constant			Positive				Positive		
47	40	F	120289	GS	Upper		Sharp	Constant		<1	Positive				Positive		
48	42	F	120324	AC	Upper		Sharp	Constant		<1							
49	47	F	120997	GS	lower	to back	Cramping	colicky		>1	Positive	Positive	Positive		Positive	Positive	
50	43	F	120192	GS	Upper		Dull	Constant									
51	44	M	120942	CL	Upper		Dull	Constant									
52	51	M	121003	GS	Upper		Sharp	Constant	>30	>1	Positive	Positive	Positive	Positive			Positive
53	59	F	110854	GS	Upper		Cramping	colicky		>1	Positive	Positive	Positive		Positive	Positive	
54	52	F	111298	GS	Upper	to back	Sharp	Constant		<1							
55	42	F	115670	GS	Upper		crushing	colicky		>1	Positive	Positive	Positive				
56	44	M	115892	GS	upper						Positive	Positive	Positive	Positive			
57	57	F	117230	GS	upper	to back					Positive						
58	43	F	117562	GS	upper						Positive	Positive	Positive	Positive			

Sno	Age	Sex	Ip no	Diagnosis	Postoperative symptoms												
					Pain abdomen						Nausea	Vomiting	Heartburn	Early satiety	Food intolerance	Bloating	Constipation
					Site	Radiation	Quality	Periodicity	Duration	Frequency							
1	47	F	58321	GS													
2	52	M	56743	GS													
3	52	F	54121	GS	Upper	to back	Sharp		<30	>1					Positive	Positive	Positive
4	54	F	55134	AC													
5	38	F	55170	GS													
6	43	M	57326	GS													
7	48	F	58213	GS													
8	52	M	63121	GS													
9	40	F	65146	GS													
10	44	M	66132	GS													
11	54	F	66152	GS	Upper	to back	Sharp	Constant	<30	>1	Positive					Positive	Positive
12	47	F	66398	CL													
13	43	M	69752	AC													
14	49	M	72875	GS													
15	50	F	73985	AC													
16	52	F	79790	GS													
17	51	M	79823	AC													
18	45	F	81231	GS													
19	45	M	82002	AC													
20	42	F	83561	GS													
21	50	F	84210	AC													
22	51	F	85901	GS	Upper	to back	Sharp	Constant	>30	<1	Positive						Positive

Abbreviations

CBD – Common bile duct

LC – Laparoscopic cholecystectomy

GB- Gall bladder

GS-Gallstones

USG-Ultrasonography

ERCP-Endoscopic retrograde cholangiopancreatography

MRCP-Magnetic resonance cholangiopancreatography

MRI-Magnetic resonance imaging

PCS-Post-cholecystectomy syndrome

AC-Acute Cholecystitis

CL-Choledocolithiasis

