

**A PROSPECTIVE ANALYTICAL STUDY ABOUT  
COMMON BILE DUCT STONES IN GOVERNMENT  
RAJAJI HOSPITAL MADURAI**

*Dissertation Submitted for*

**MS DEGREE (BRANCH I) GENERAL SURGERY**

**APRIL 2012**



**The Tamilnadu Dr.M.G.R Medical University**

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## **CERTIFICATE**

This is to certify that this dissertation titled “**A PROSPECTIVE ANALYTICAL STUDY ABOUT CBD STONES IN GOVERNMENT RAJAJI HOSPITAL**” submitted by **Dr. MOHAN.R** to the faculty of General Surgery, The TamilNadu Dr. M.G.R. Medical University, Chennai in partial fulfillment of the requirement for the award of MS degree Branch I General Surgery, is a bonafide research work carried out by him under our direct supervision and guidance from June 2009 to May 2011.

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## **DECLARATION**

I, **Dr. MOHAN . R** solemnly declare that the dissertation titled “**A PROSPECTIVE ANALYTICAL STUDY ABOUT CBD STONES IN GOVERNMENT RAJAJI HOSPITAL**” has been prepared by me. This is submitted to **The TamilNadu Dr. M.G.R. Medical University, Chennai**, in partial fulfillment of the regulations for the award of MS degree (Branch I) General Surgery.

**Place: Madurai**

**Dr. MOHAN . R**

**Date:**

## **ACKNOWLEDGEMENT**

At the outset, I wish to express my sincere gratitude to our unit chief **Prof. Dr.M.SEKARAN M.S**, for his expert supervision and valuable suggestions. I wish to express my whole hearted thanks to our assistant Professors **Dr.M.MANIKANDAN M.S., Dr. J.ANTO FERNANDO M.S.**, for their constant encouragement and excellent guidance.

My sincere thanks to Prof. **Dr. MUTHU KRISHNAN M.S.,Mch.,(Surgical Gastro Enterology)** for his valuable motivation and guidance to initiate this study.

I wish to thank **Prof.Dr. M.GOBINATH, M.S.**, Professor and Head of the Department of Surgery for his valuable guidance and advices. I am greatly indebted to **Prof.Dr. A.EDWIN JOE, M.D (FM), B.L.**, Dean, Madurai Medical College & Government Rajaji Hospital, Madurai for their kind permission to allow me to utilize the clinical material from the hospital.

I whole heartedly thank all the patients who willingly co-operated and rendered themselves for the study without which the study couldn't have been a reality.

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**TITLE:** A prospective analytical study about the CBD stones in GRH.

**ABSTRACT:**

Calculus disease of the biliary tract is one of the most common problems affecting the digestive tract .It accounts for more than 95% of calculus disease which include cholelithiasis and choledocholithiasis. Choledocholithiasis is associated in 10-15% of patients with cholelithiasis. Its incidence in india is increasing, due to the change in lifestyle and dietary modifications. Primary bile duct stones are of brown pigment type . Secondary bile duct stones are those migrating from the gall bladder and its major component is cholesterol variety.

Clinically CBD stones present as biliary colic,jaundice,fever due to cholangitis and pancreatitis.

**AIMS & OBJECTIVES:**

To evaluate age,sex, incidence, various clinical presentations,various modes of management in our institution.

**MATERIALS & METHODS:**

Patients admitted in various surgical units of GRH, Madurai between September 2010- Nov.2011 encompass the materials of this study.A total of 58 patients with CBD stones included. They were subjected to detailed history ,

clinical examination ,LFT,USG abdomen. In selected patients, CT& MRCP done.

Patients were managed surgically.They were followed for 6 months.

Keywords : Choledocholithiasis,CBDE,Endoscopic Sphincterotomy

## **CONCLUSION:**

The conclusions of our study.

1. Age incidence varies between 21 & 83 yrs and mean age of incidence is 45yrs, 4<sup>th</sup> and 5<sup>th</sup> decade were the commonest victims.
2. Slight Female preponderance was observed
3. Most of the CBD calculi cases were presented with obstructive symptoms i.e. jaundice, pain
4. USG had an accuracy rate of 70%
5. Mixed stones were the commonest variety (pigmented stones - dominant type).
6. Open CBD exploration with T tube drainage is commonest procedure adopted for CBD calculi
7. Endoscopic sphincterotomy with stenting was done in patients with poor risk, recurrent or retained stones.

## INTRODUCTION

Calculus disease of biliary tract is one of the most common problems affecting the digestive tract.

Among the calculus disease of the extra – hepatic biliary tract account for more than 95% which includes cholelithiasis and choledocholithiasis. Autopsy reports have shown a prevalence of gall stone disease in 11% - 36%. Calculus disease of the biliary tract once more common in the western world, the incidence is increasing noticeably in India, which can be attributed to the change in dietary habits and lifestyle modifications.

Although the exact incidence in India is not known ,there is an approximate of 4 % prevalence rate in Indian males & 6 % in Indian females. Thanks to the extensive studies of etiology of extrahepatic biliary calculi, better understanding of pathogenesis and technological advancements in past three decades, which have led to more appropriate and effective ways of management.

Continued research on minimal invasive surgery especially after 1988 with advent of laparoscopic cholecystectomy followed by laparoscopic CBD exploration, endoscopic management of CBD calculi, extra – corporeal shock wave lithotripsy has greatly improved and modernized the management of extra hepatic biliary calculi with minimal mortality and morbidity.

## **HISTORICAL ASPECTS**

Gallstones and CBD stones have been described long before the era of modern abdominal surgery. Numerous calculi were found in the mummy of a priestess of Amenemhat of the 21st Egyptian dynasty 1500BC. Vesalius and Fallopius in 16th century described gall stones in human bodies.

The first cholecystostomy was performed in 1867 by John Stough Hobbs and first cholecystectomy was performed by Carl Laugenbuch in 1882 in Berlin.

The first CBD exploration was carried out by Kurnmell in 1884 and first successful surgery done by Thornton in 1887.

The following are the various milestones in the management of Extra hepatic biliary calculi

1891 - Oskar Sprengel - choledochoduodenostomy

1890 - Harskeer - T-tube

1921 - Busckhardt and Mueller - Trans hepatic gallbladder puncture

1923 - Cole - Cholecystography

1924 - Cotte - Post surgical cholangiography

1974 - Kawaiet al - endoscopic sphincterotomy

1987 - Hourt - laparoscopic cholecystectomy

## **AIMS OF THE STUDY**

1. To evaluate age, sex incidence, most common etiological factors for common bile duct calculi.
2. To epitomize varying clinical presentation.
3. To study various modes of management adopted in our institution.
4. To analyze biochemical types of stones prevalent in this part of country.

## **MATERIALS AND METHODS**

Patients admitted in various surgical units of Government Rajaji Hospital, Madurai between June 2009 to May 2011 encompass the materials of this study.

All patients admitted with clinical diagnosis of CBD calculus and its complications were taken into account of this study. A total of 58 patients were studied.

A detailed history including dietary factors, life style habits, were elicited in all patients and thorough clinical examination was done in them.

All patients were subjected to basic blood, urine and biochemical evaluation including liver function test and USG abdomen. In selected patients CT scan abdomen, MRCP were pursued.

Patients were managed surgically. Operative findings were documented and analyzed. Epidemiological factors relevant to age, sex distribution were noted.

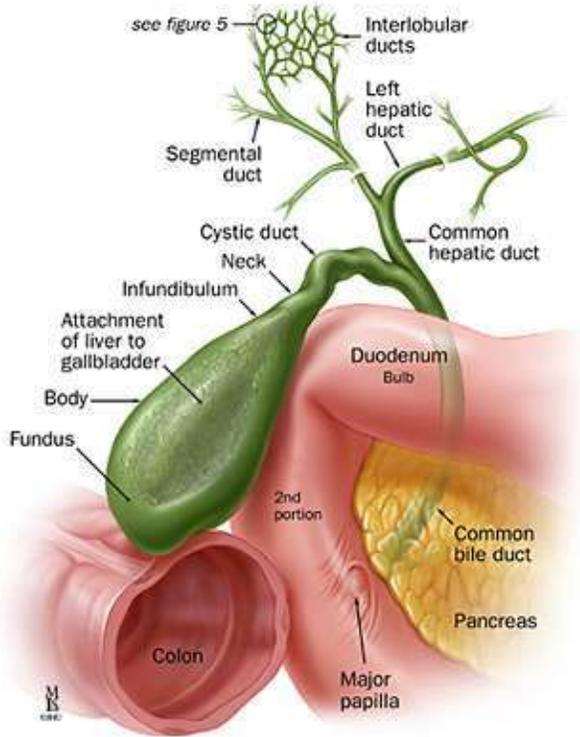
CBD calculi were subjected for biochemical analysis to look for their composition.

In icteric patients, prolonged prothrombin time was corrected by Vitamin K IM injection for 3 days prior to surgery.

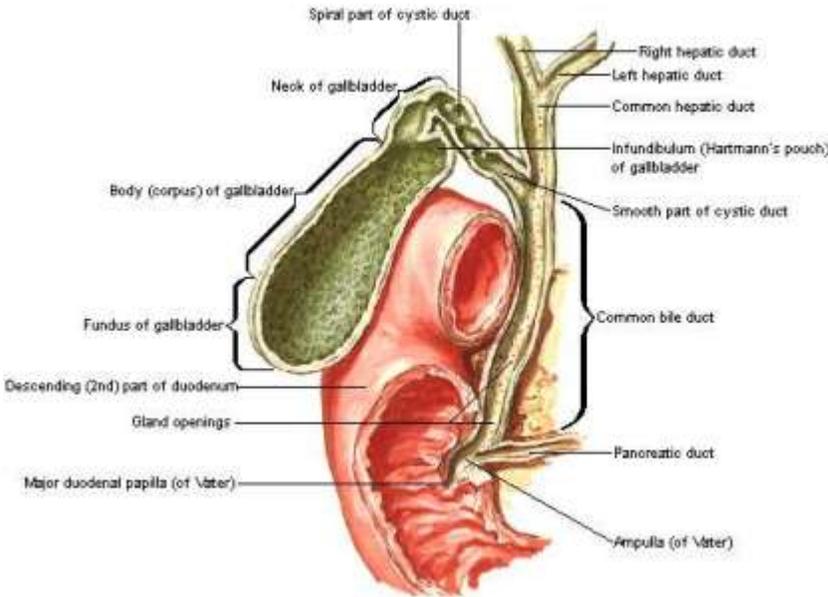
For CBD calculi, open CBD exploration was done and drainage procedure was done either in form of T tube or biliary enteric anastomosis. For those patients with associated gall stones, open cholecystectomy was performed.

All patients had received peri operative antibiotics. Those with CBD diameter of  $>1.5$  cms are subjected to biliary enteric anastomosis.

# SURGICAL ANATOMY



## Gallbladder and Extrahepatic Bile Ducts Sectioned



# **SURGICAL ANATOMY**

**Embryology :** At 4th week in development of human embryo, a projection appears in ventral wall of primitive foregut, cranial bud develops in to two lobes of liver whereas caudal bud becomes gallbladder and extra hepatic biliary tree.

## **EXTRAHEPATIC BILIARY TRACT**

Extra hepatic biliary tract consists of bifurcation of right and left hepatic duct, common hepatic duct, gallbladder, cystic duct and CBD.

Right and left lobes are drained by ducts originating as bile canaliculi in the lobules and the canaliculi empty in to canals of herring in interlobular triads, these canals are collected in to ducts and finally outside the liver, the right and left hepatic duct.

Left hepatic duct is formed by the ducts draining segments II, III, IV of liver and has longer extra hepatic length of > 2 cm with greater propensity for dilatation as a consequence of distal obstruction.

Right hepatic duct is formed by the right posterior (segments VI, VII) and right anterior (segments V, VIII) hepatic ducts and has a short extra hepatic length of 0.9 cm. Hepatic duct bifurcation is usually extra hepatic and anterior to portal vein bifurcation, with a length of 1-4 cm and diameter of 4 mm. Common hepatic

duct lies anteriorly in the hepato duodenal ligament and joins the cystic duct to form CBD.

### **Common bile duct:**

Common bile duct is about 7-11cm in length and 5-10mm in diameter and divided in to 4 portions namely

- Supra duodenal
- Retroduodenal
- Pancreatic
- Intramural.

Supraduodenal portion lies in the right free border of lesser omentum to the right of hepatic artery.

Retroduodenal portion descends behind the 1<sup>st</sup> part of duodenum and pancreatic portion tunnels the gland. Intramural portion takes an oblique path averaging 1.5cm through duodenal wall and receives main pancreatic duct inferiorly. Both end in Ampulla of Vater on postero-medial wall of 2<sup>nd</sup> part of duodenum 10cm distal to pylorus and is guarded by sphincter of Oddi.

### **Blood supply of extra hepatic biliary tract :**

The extra hepatic bile ducts are supplied by right hepatic and cystic artery above and branches of gastroduodenal artery below with major trunk running along the medial and lateral walls of common bile duct referred to as 3'O clock / 9'O clock position.

# **SURGICAL PHYSIOLOGY**

## **BILIARY SECRETION:**

Bile is secreted continuously by the liver cells (hepatocytes) into the biliary canaliculi. Daily secretion is about 500 - 1000 ml per day. Bile is secreted at a pressure of 150 - 250 mm of water. If obstruction occurs, liver continues to secrete up to the pressure of 300 mm of water, thereafter secretion ceases.

Hepatic bile is slightly alkaline and gallbladder bile is more acidic due to transport of hydrogen ions by gallbladder epithelium.

The primary bile salts are cholate and chenodeoxycholate, conjugated with taurine and glycine and excreted into the bile. 98% is reabsorbed by enterohepatic circulation. In the intestine gut bacteria de-conjugates the primary bile salts and forms secondary bile salts namely deoxycholate and lithocholate.

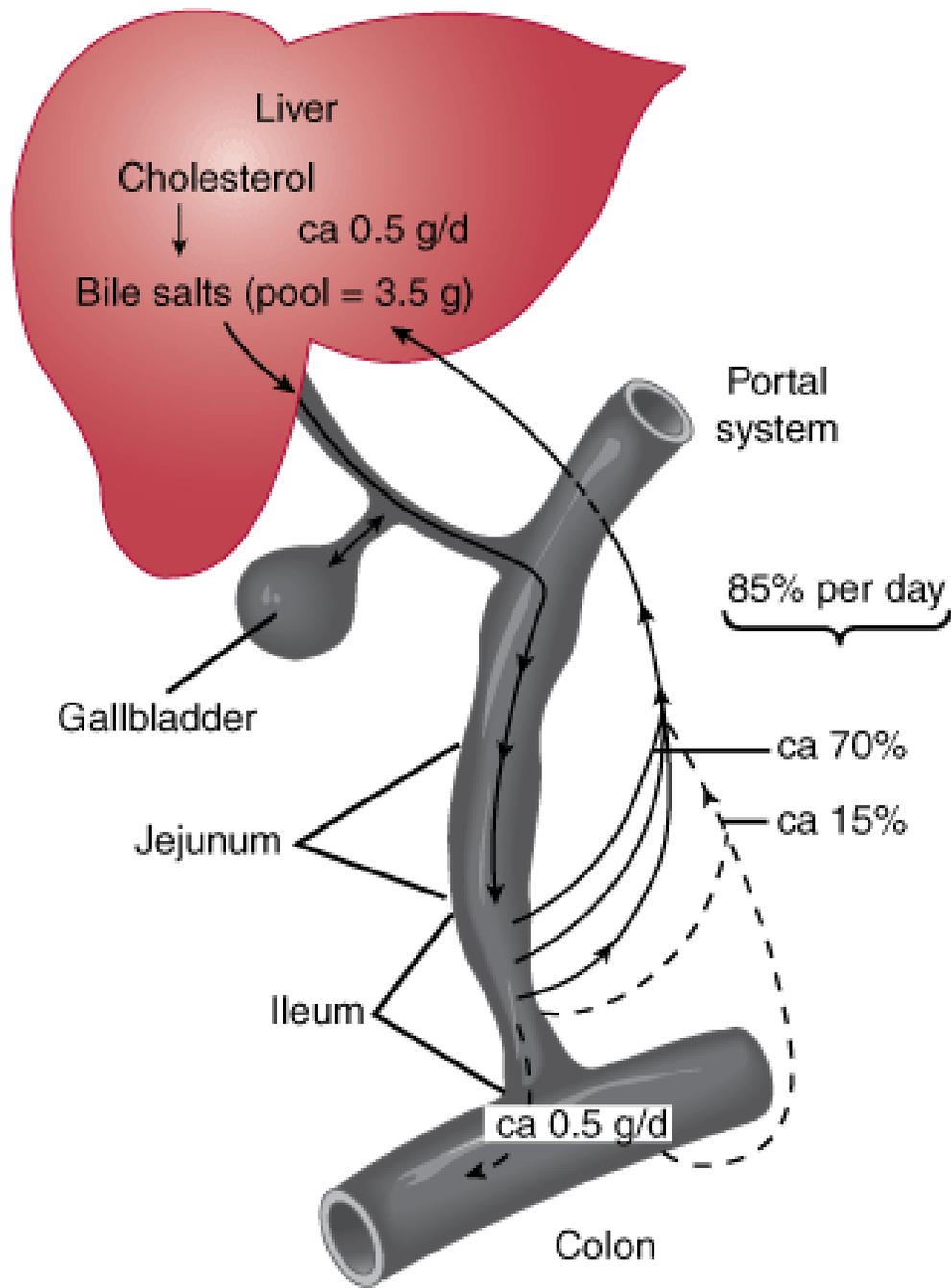
Two important functions of Bile salts are

1. Formation of water soluble complexes with cholesterol, fatty acids and fat soluble vitamins and their absorption.
2. Reduction of surface tension and emulsification of fat.

Bile salts are powerful cholerectic which increases hepatic bile production.

Cholesterol and Phospholipids synthesized in the liver are the principal lipids

**SURGICAL PHYSIOLOGY**  
**ENTERO HEPATIC CIRCULATION**



found in bile. The color of the bile is due to the presence of pigment bilirubin diglucoronide, which is the metabolic product of breakdown of hemoglobin in the reticuloendothelial system. In the intestine, bacteria convert it in to urobilinogen which is absorbed and excreted in urine.

### **CONTROL OF BILE FLOW:**

It is under control of neurogenic, humoral, and chemical stimuli. Vagal stimulation increases the secretion of bile, while splanchnic nerve stimulation results in decreased bile flow. Hydrochloric acid, partly digested proteins and fatty acids in the duodenum stimulate the release of secretion from the duodenum that in turn increases bile production and bile flow.

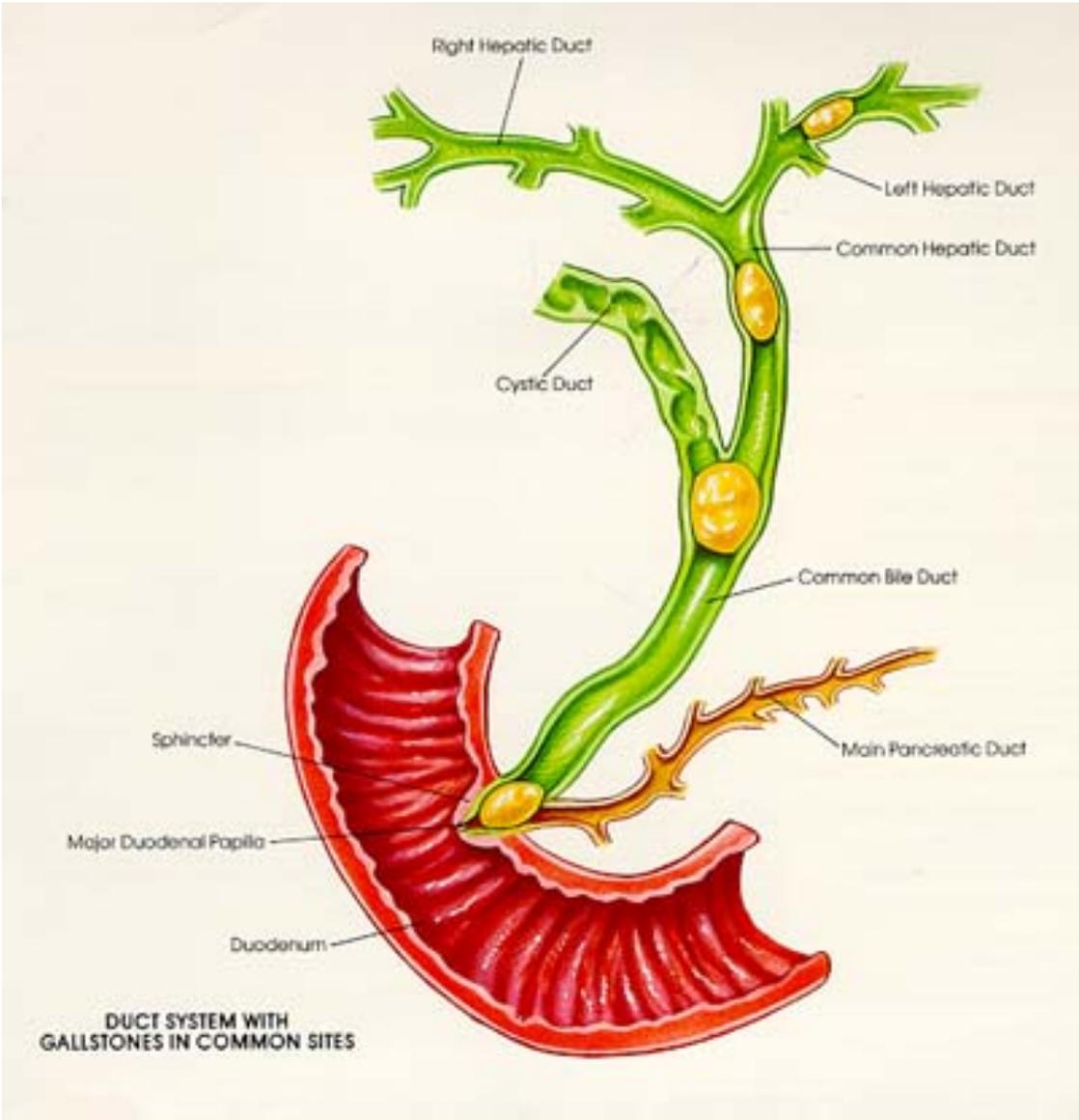
Cholecystokinin also increases the hepatic secretion of bile. Other substances which have effect on biliary secretion are VIP and GASTRIN.

In between meals, when sphincter of Oddi is closed, gallbladder fills up when the CBD pressure is high.

Substances which contract the gallbladder are:

1. Cholecystokinin
2. Cholinergic hormones
3. Motilin

**PICTURE SHOWING LOCATION OF STONES IN EXTRA- HEPATIC BILIARY APPARATUS AND HEPATIC DUCTS**



# REVIEW OF LITERATURE

## CLINICAL CLASSIFICATION OF GALL STONES:

1. Pure cholesterol stone : 10%
2. Pigment stone : 15%
3. Cholesterol pigment mixed stone : 75 - 80%

These can be analysed by color chromatography, thin layer chromatography and X-ray diffraction. In 1924, Aschoff classified the stones in to 4 categories:

1. Inflammatory.
2. Metabolic:
  - Pure pigment (calcium Bilirubinate)
  - Pure cholesterol.
3. Combination stones:
  - Primary - metabolic
  - Secondary- Inflammatory
4. Stasis stones

Primary stones of CBD

## Cholesterol Stones:

Cholesterol is usually present as single crystal mainly as cholesterol monohydrate.

### **Pure Pigment Stones (Calcium Bilirubinate):**

1. Calcium Bilirubinate stones are common in oriental countries which are associated with Ascariasis or E.coli.

2. Pure pigment stones occur without any infection but at times with hemolysis.

These stones are dark or reddish brown and fragile. Some stones are black or dark green.

### **Mixed stones:**

These form the majority of the stones (75-80%) which are multiple and multifaceted. The central portion of the stones which denote the events occurring during initial stages of stone formation. They contain cholesterol, pigments, protein and sometimes parasites.

## **RISK FACTORS FOR PIGMENT STONES:**

### **DEMOGRAPHY:**

Western world is less affected than the Oriental countries. Mixed stones are the predominant type of stones in India as per the studies at Aligarh (Vijay Pal et al., 1980). But it is found that cholesterol stones are the commonest variety in Kashmir.

Japan records the highest prevalence of pigment stones among the Oriental countries. Rural people are more severely affected than the Urban people, This is attributed to the fact that parasitic infestation of the biliary tract is more prevalent in rural areas of Japan but there is not much evidences contributing these findings.

Brown pigment stones are common among Asian population, which are frequently associated with E.coli infected bile. The main stay house of pigment stones are the gall bladder and the common bile duct.

### **HEMOLYTIC ANAEMIA:**

Conditions with reduced life span of red blood cells including hemolysis from prosthetic heart valves, infections like malaria, and membrane defects like hereditary spherocytosis and hemoglobinopathies are associated with formation of pigment stones but there is lack of evidence.

## **ALCOHOLIC CIRRHOSIS:**

Pigment stones are more common among patients with cirrhosis than normal population. The mechanism underlying this association is still not known.

## **INFECTED BILE:**

There is a famous quote “No infection - No stone.”

“Gallstone is a tomb stone erected to the memory of organism within it” was described by Moynihan . *Escherichia coli*, a producer of Beta Glucuronidase is the commonest infecting organism. The mechanism by which it increases bile saturation is by increasing unconjugated water insoluble bilirubin.

It is found in vitro that Parasites like *Ascaris lumbricoides*, Round worm eggs are effective nucleating agents for the precipitation of calcium bilirubinate and believed to play the similar role in vivo. Japanese studies reveal half of the stones contain ova of *Ascaris*.

Parasitic infestation causes inflammation of the gallbladder as well as local chemical changes favorable to the precipitation of calcium salts. The various changes produced by inflammation in gall bladder are

1. Reduction in the gallbladder motility
2. Interference with the concentrating ability of the gallbladder and impairment of the cholesterol dissolving capacity of gallbladder bile.

## VARIOUS TYPES OF GALL STONES



3. Distortion the intrahepatic bile ducts.

**AGE:**

The frequency of pigment stones increases with age like that of the cholesterol stones .They are predominantly seen during the 5th to 7th decade of life. The pigments stones have been rarely reported in cases of congenital hemolytic diseases before the first decade.

**SEX:**

Indian studies show increased incidence of pigment stone in female sex. (Vijaya pal et al., 1980; Gupta, 1967).

Female sex is not a risk factor for the pigment stone formation according to western studies.

**OBESITY:**

Has no definite role in the pigment stone formation. Total parenteral nutrition ,the conditions like pancreatitis ,primary hyperparathyroidism have association with pigment stones.

**RISK FACTORS FOR CHOLESTEROL STONES**

**DEMOGRAPHY:**

The prevalence rate of cholesterol stones is higher in Northern India especially Kashmir has the highest prevalence rate .

## **AGE AND SEX:**

The greatest incidence occurs between the 5th and 8th decade and it is very rare below 20 years old.

In females gall stones tend to occur more than male irrespective of age, race. The incidence ratio between male and female to male is 1:3 to 1:4 after puberty.

The postulated hypothesis for this occurrence are

1. Estrogen and its effects.
2. Progesterone and its effects.

## **EFFECTS OF ESTROGEN:**

### **EXOGENOUS CAUSES**

Many studies have confirmed that an association between gall stone and use of exogenous estrogens, either as oral contraceptives, post menopausal estrogen replacement or estrogen per se administered to men.

### **ENDOGENOUS CAUSES**

Many studies around the world had documented that there is definitely higher prevalence of gallstones in the female population. This sex difference appears during the period of puberty and disappears around menopause. Endogenous estrogen reduces bile acid pool and increases cholesterol secretion and the saturation leading to increased gallstone formation. It is similar in action to the oral contraceptive pills. Multiparity also has an effect on gallstones formation.

## **EFFECTS OF PROGESTERONE:**

- Impairs gall bladder emptying
- Relaxes smooth muscle
- Saturates bile

## **PARITY:**

Multiparity has its effect on the gallstones formation. The gall stones are more common in the young women with increasing parity, probable postulated mechanism may be due to repeated attacks on gallbladder by altered physiology of estrogen or progesterone on the biliary composition and smooth muscle function of the biliary apparatus.

## **OBESITY:**

There is a definite role of obesity in gall stone formation. There is increased incidence of gall stones – 1.7 % and 1.8 % in obese men and women of 5<sup>th</sup> decade respectively. This is confirmed by a study conducted in a obese population of 1006 people. The various mechanisms hypothesized in the obese individuals are

1. Due to excessive biliary secretion of cholesterol leading to increased saturation of bile in obesity
2. HMG CO A enzyme is related to cholesterol synthesis. This enzyme production is related to plasma insulin which is of higher concentration in obese persons. Also the high dietary fat intake increases this enzyme level.

The other factors associated with gall stones formation are

- Drugs – Bile acid sequestrants (Cholestyramine, Colestipol)
- Surgeries – Ileal resection, Ileal bypass surgeries, Truncal Vagotomy

## **CLASSIFICATION OF COMMON BILE DUCT STONES:**

Biliary stones, in general, may be classified as predominantly cholesterol or predominantly pigment in composition.

- Cholesterol stones – 95%
- Pigment Stones - 5%

## **PRIMARY COMMON BILE DUCT STONES:**

The stones that are formed primary in the common bile duct are called primary stones and those originating in the gallbladder are secondary stones. Almost all primary stones are of pigment stones.

There are two types of pigment stones - black and brown. Both types have calcium bilirubinate as their principal compound. Brown pigment stones occur primarily in the common bile duct and are closely associated with bacteria. Black pigment stones are found chiefly in gallbladder.

## **SECONDARY (RETAINED) COMMON BILE DUCT STONES:**

Secondary common bile duct stones are those that have migrated into the biliary system from the gallbladder, Approximately 11% of patients with gallbladder stones will have associated common duct stones at the time of operation.

Retained common bile duct stones are those that present after cholecystectomy, with or without concomitant bile duct exploration, and are secondary rather than primary stones.

Recurrent biliary stones are those which are diagnosed more than 2 years after cholecystectomy.

## **NATURAL HISTORY:**

### **CBD CALCULI:**

The presentation of choledocholithiasis is unpredictable. Small stones may pass spontaneously into the duodenum without causing symptoms or they may temporarily obstruct the pancreatic duct, induce an episode of pancreatitis and then pass into the duodenum with relief of symptoms, stones that do not pass spontaneously may reside in the bile duct for long symptom free period and then suddenly precipitate an episode of jaundice or cholangitis.

Choledocholithiasis may appear as either :

- i) Without symptoms
- ii) Biliary colic
- iii) Jaundice
- iv) Cholangitis (intermittent pain, fever, jaundice - **CHARCOT TRIAD**)
- v) Pancreatitis

The last four of these may appear in all possible combination.

## **CLINICAL FEATURES OF CHOLEDOCHOLITHIASIS AND ITS**

### **DIAGNOSIS:**

In the common bile duct if the stone passes without obstruction it will produce only mild pain. But if it is obstructed, intermittent pain, fever, jaundice may ensue. It is called Charcot's triad. It is due to transient attacks of cholangitis. If this is accompanied by CNS disturbances and shock, it is called Reynauld's pentad.

The various presentations of Choledocholithiasis:

1. Charcot's triad.
2. Obstructive jaundice.
3. Associated Pancreatitis.

## **INVESTIGATIONS:**

### **IMAGING STUDIES:**

#### **1. Plain abdominal Radiographs:**

- i. Only 10% of Gallstones are radio-opaque. It is useful in diagnosing gall stones. The role of radiograph abdomen in choledocholithiasis is very minimal.

#### **2. USG abdomen:**

- a. USG is the baseline investigation of choice of any patient suspected of biliary tract disease
  - i. It is non invasive investigation with no radiation exposure, easily available and also relatively inexpensive. But it is highly operator dependent
  - ii. It detects gallstones with sensitivity and specificity of >90% and accuracy of 95% .
  - iii. CBD is well visualized except for its Retroduodenal portion.
- b. Normal CBD diameter is 4-8mm
- c. Any CBD duct > 6mm in symptomatic patients needs further evaluation.

Condition	USG Findings
Acute Cholecystitis	Thickened gallbladder wall and local probe tenderness with pericholecystic fluid collection
Chronic Cholecystitis	Contracted thick walled gall bladder
Extrahepatic obstruction	Dillated CBD /IHBR associated with Jaundice

d. In obstructive jaundice USG is useful in detecting site and cause of obstruction. Things to be seen:

- i. CBD status [ size, dilatation, presence of stone, level of obstruction with presence of pneumobilia]
- ii. Pancreatic status [evidence of pancreatitis]

### 3. CT Abdomen:

- a. The major advantages are it is less operator dependent and can be easily reproducible but it also carries risk of exposure to radiation
- b. But it is lower to USG in diagnosis of gallstones.
- c. Its major application is to define the course and status of biliary tree and adjacent anatomical structures.

**USG PICTURE SHOWING DILATED CBD WITH STONES**



#### **4. Biliary Radio nucleotide scanning (HIDA Scan):**

- a.  $^{99m}\text{Tc}$  — labeled derivatives of dimethyl iminodiacetic acid (HIDA) are injected intravenously .
- b. 80% excreted in bile. In the fasting state biliary tract is visualized within 60 minutes.
- c. Useful in diagnosis of acute cholecystitis

#### **Blood tests:**

- Liver function tests.
  - Serum Bilirubin
    - Total Bilirubin, Conjugated , Unconjugated
  - Serum Transaminases – SGOT,SGPT
  - Serum Alkaline Phosphatase
- Complete Hemogram

In cholangitis – Leucocytosis with hyperbilirubinemia, raised ALP levels

Serum Bilirubin has the highest predictive value 28 % - 50 % for the presence of choledocholithiasis. These lab values can be unremarkable in 1/3<sup>rd</sup> patients of CBD calculi.

Conjugated hyperbilirubinemia with raised ALP suggest cholestasis due to obstruction.

## **INVASIVE TESTS:**

### **1 . PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY (PTC)**

Using Chiba's or Okuda's needle and Fluoroscopic guidance, the needle is inserted into the 8<sup>th</sup> or 9<sup>th</sup> intercostal space in the right mid axillary line and entered into the biliary tree.

The indications are :

- Obstruction in Biliary tract especially in the common hepatic duct
- In failure of ultra sonogram and CT imaging in showing dilated ducts in obstructive jaundice case,
- To know the site of obstruction

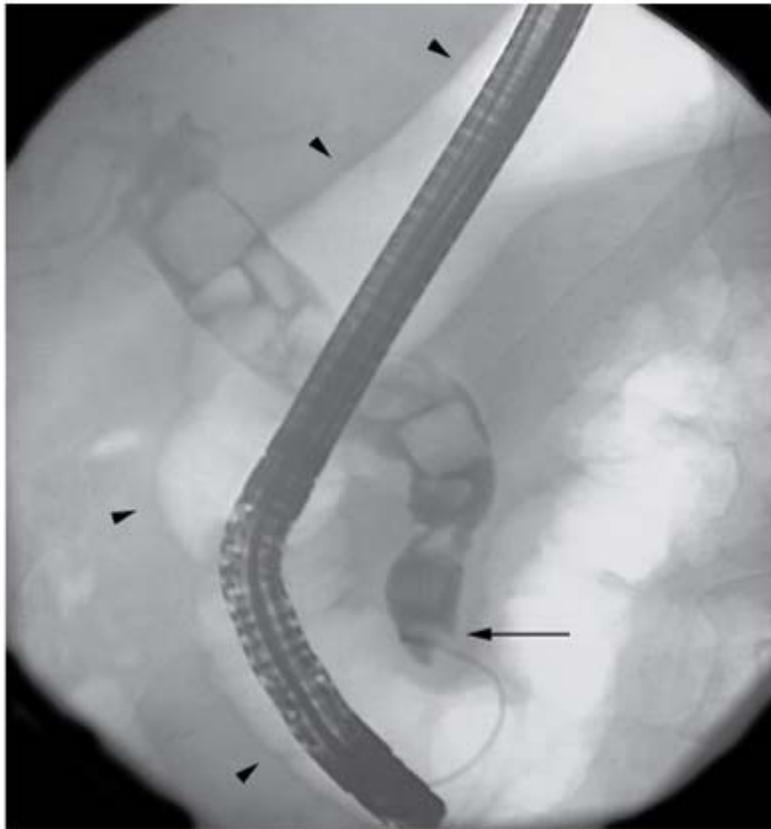
Complications:

Sepsis (most common)	3%
Hemorrhage	2%
Biliary leak and peritonitis	1-2%

Interpretation:

In a normal study common bile ducts , right and left hepatic ducts are visualized but not gall bladder and the cystic duct. In a distal CBD obstruction absence of the gall bladder indicates either cystic duct obstruction or post

**ERCP PICTURE SHOWING CBD STONES**



cholecystectomy. The site of obstruction will be delineated clearly. Filling defects in the lumen indicates gallstones.

## **2.ENDOSCOPIC RETROGRADE CHOLANGIO**

### **PANCREATICOGRAPHY (ERCP)**

Since because of accurate delineation of the anatomy of biliary and pancreatic ducts , ERCP is far superior than CT scan and ultra sonogram. The normal cholangiogram shows biliary system with a smooth outline of the CBD. A normal CBD measure within 7 to 10 mm. Filling defects indicates gallstones.

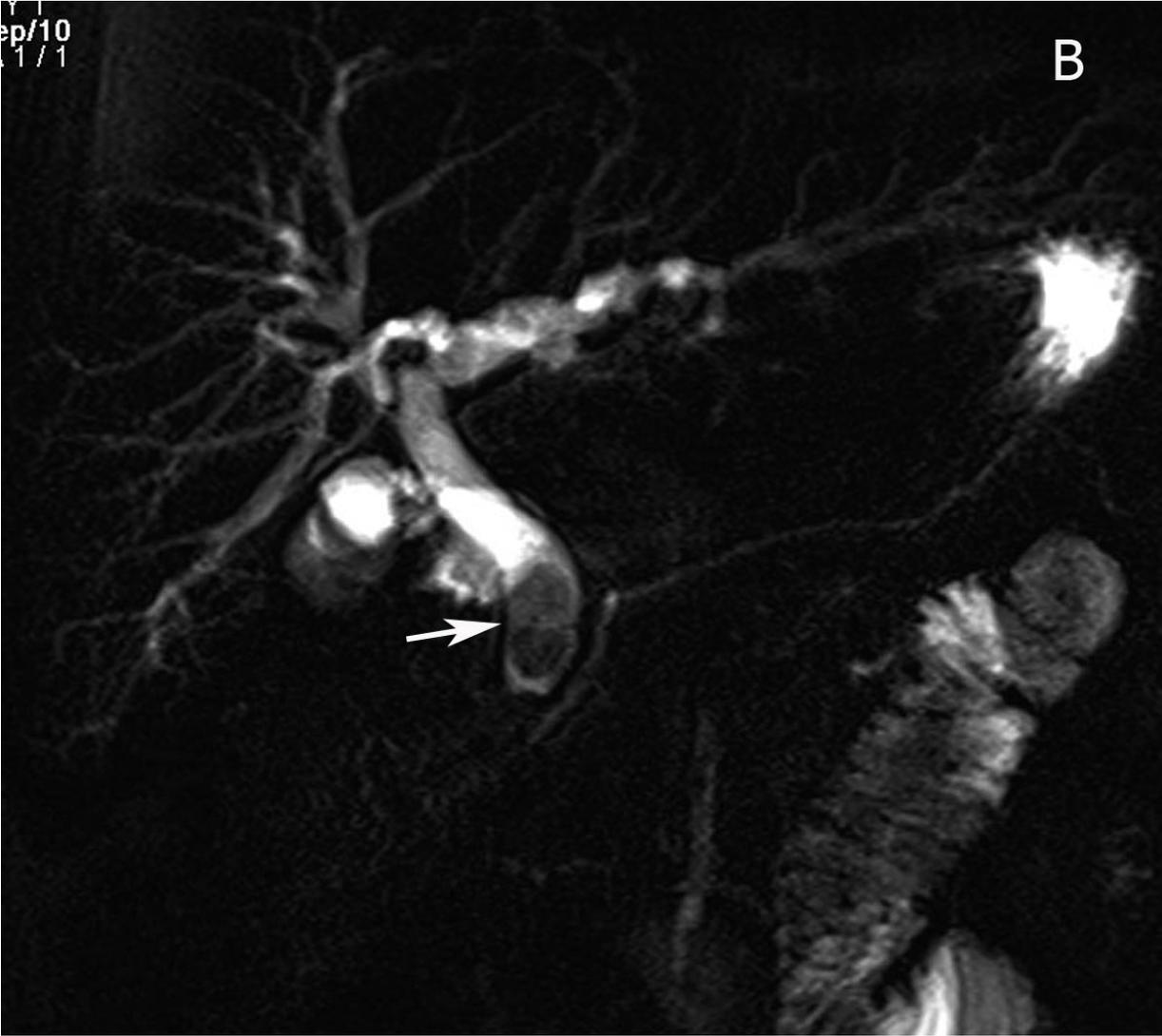
Indications:

- **Diagnostic uses**
  - To know the level of obstruction.
  - As a pre-therapeutic procedure before removing CBD stones.
  - To diagnose retained CBD stones in post cholecystectomy cases.
  - For sampling of biliary and pancreatic juices
- **Therapeutic Uses:**
  - Stone extraction
  - Naso biliary drainage
  - Stenting of tumor in the CBD or in the pancreas
  - Dilatation of biliary stricture
  - Endoscopic papillotomy

**Complications:**

- Pancreatitis (0.7 to 8 %)

**MRCP PICTURE SHOWING CBD STONES**



- Duodenal injury
- Cholangitis (0.8%)
- Haemorrhage

**Interpretation:**

It is done under C arm guidance using side viewing gastroduodenoscope.

Stones in the CBD can be detected as filling defects in the ducts.

**3. MAGNETIC RESONANCE CHOLANGIO PANCREATICO GRAPHY (MRCP):**

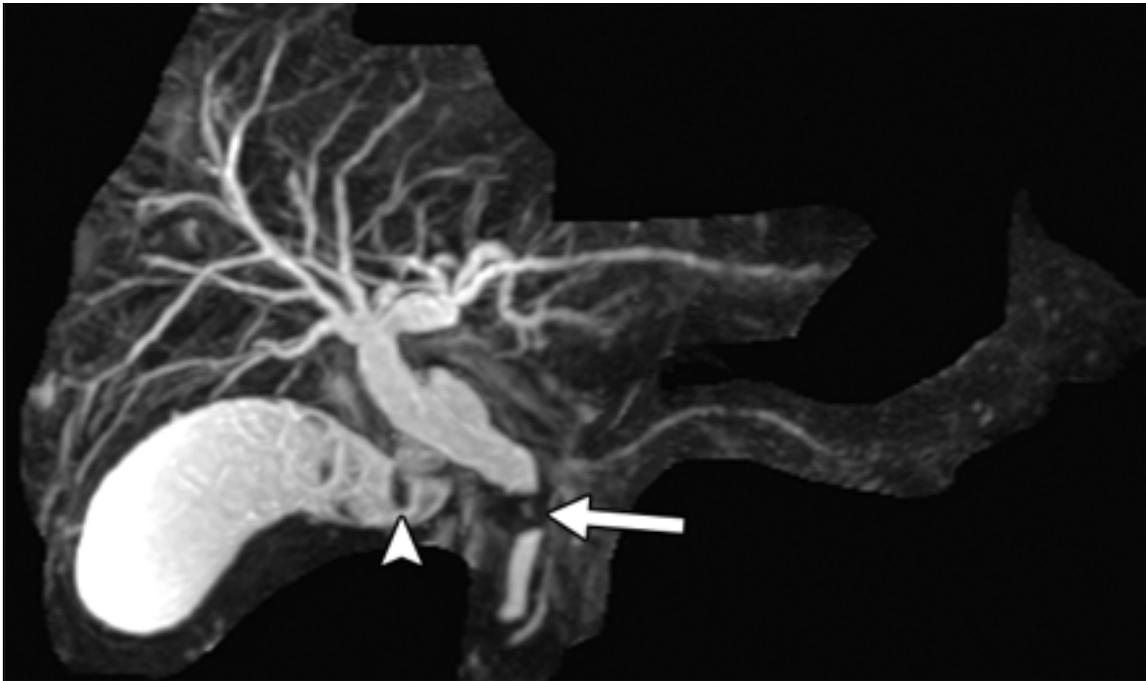
- a. Expensive procedure
- b. It is considered accurate, non invasive technique for evaluation of biliary tree before therapeutic intervention or surgery .Hence MRCP has replaced conventional ERCP or PTC
- c. It uses T2 weighted sequences to show bile ducts as hyper intense structures
- d. Sensitivity and specificity in diagnosis of CBD calculi - 95% and 90% respectively.

**4 . ENDOSCOPIC ULTRASOUND :**

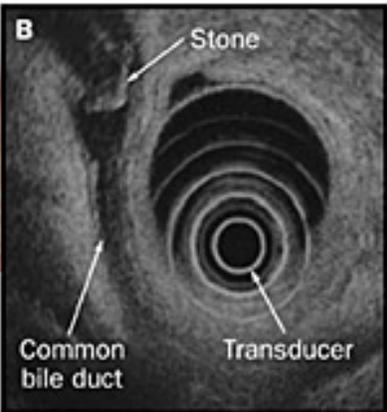
It is most useful in situations like

- In evaluating patients who are at moderate risk for harboring bile duct stones

**MRCP PICTURE SHOWING CBD STONES**



**ENDO – ULTRA SOUND SHOWING CBD STONES**



- In those patients where a diagnostic ERCP might pose a greater risk of pancreatitis.

EUS can be immediately followed by therapeutic ERCP during the same endoscopic session

- Sensitivity - 84-100%
- Specificity - 95-100%

## **TREATMENT OF CBD CALCULI**

### **1, CBD stone associated with gallbladder stone.**

The various treatment options are

- Open cholecystectomy with CBD exploration followed by T tube drainage or biliary enteric anastomosis .
- Laparoscopic Cholecystectomy / Laparoscopic CBD exploration
- ERCP stone extraction - Laparoscopic cholecystectomy

### **2. CBD stones presenting after cholecystectomy.**

- If “T” tube is present , choledochoscopic stone removal via T tube tract should be done
- If T tube not present,then ERCP stone removal is the option

## **OPEN CBD EXPLORATION:**

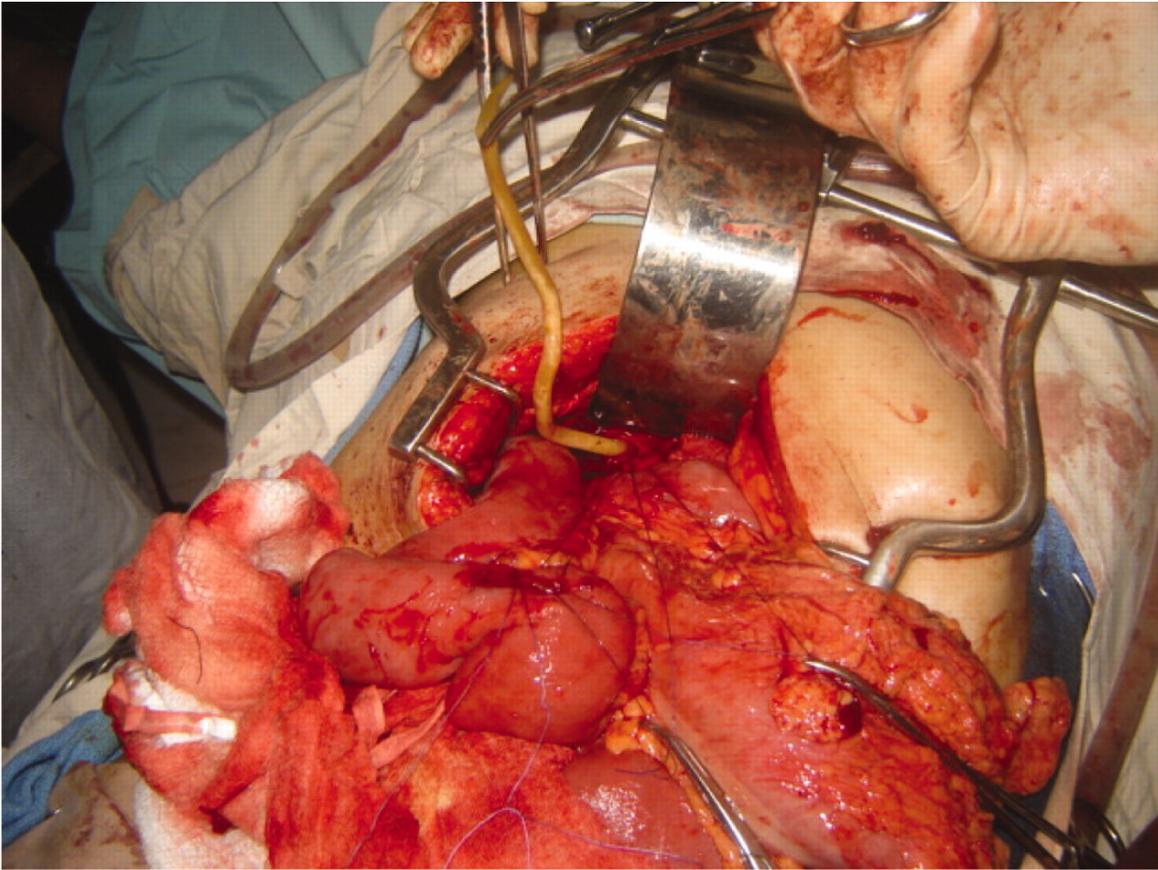
### **Technical considerations of this procedure are:**

The decision to explore the common duct having been made, the area of the free edge of the lesser omentum is exposed.

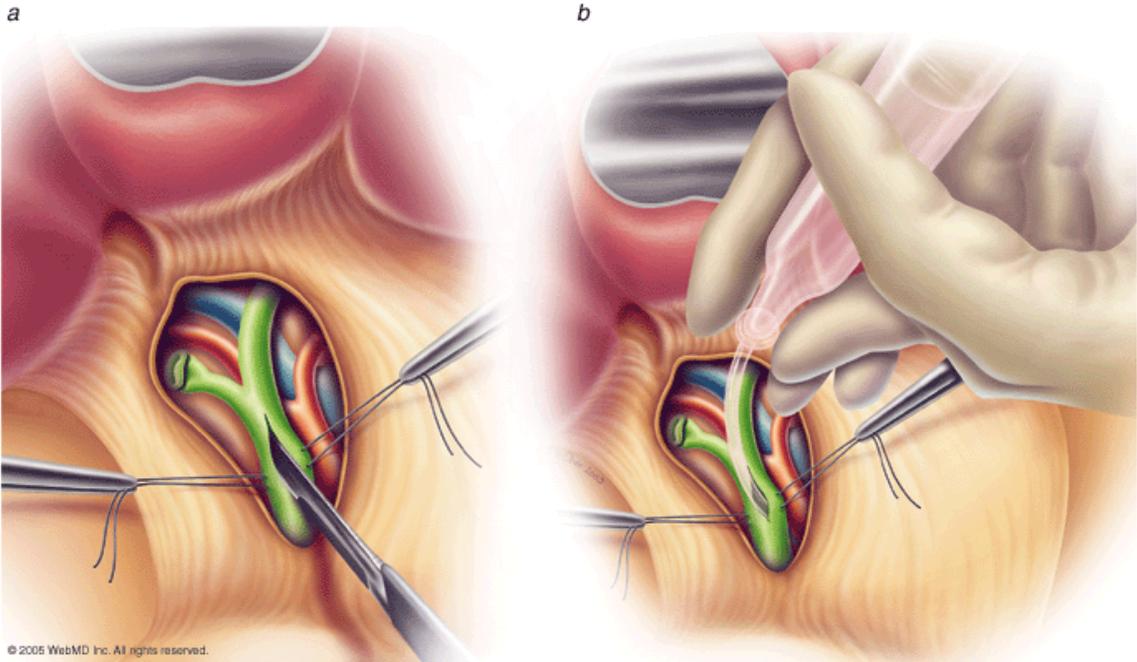
The essential steps are the retraction of the right lobe of the liver upward and displacement of the duodenum down ward and retraction of the stomach to the left. The peritoneum over the anterolateral surface of the common bile duct divided and the duct is exposed.

Before the duct is opened a sample of bile is taken by needle aspiration and is sent for bacteriological examination. Two 3.0 stay sutures using coated vicryl or

**CBD EXPLORATION WITH 'T' TUBE DRAINAGE**



**PICTORIAL REPRESENTATION OF CBDE WITH 'T' TUBE DRAINAGE**



PDS are placed on the anterior surface of the duct approximately 1 to 2 cm above the superior border of the duodenum and the duct opened longitudinally between them with a scalpel. The incision initially is enlarged to about 1.5cm.

Proximal exploration is carried out first. The catheter is passed sequentially into the common hepatic and the right and left hepatic ducts.

### **Completion choledochoscopy:**

This procedure is nowadays considered an essential step in the exploration of the common bile duct. Its regular use reduces the incidence of retained or missed stones to meagre levels.

After establishing that the lower ductal system is clear, the choledochoscope is withdrawn and reinserted proximally to inspect the hepatic ducts after the clearance of stones in the distal CBD.

Throughout the inspection, any stones that are identified are extracted under vision using a Dormia basket system which is introduced through the operating channel of the choledochoscope. The basket is positioned distal to the stone before the wires are opened. The stone is trapped with the right amount of closure to secure the stone without crushing it and removed by withdrawing the instrument and basket “en masse”.

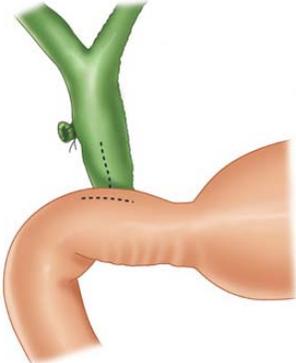
### **Drainage of common bile duct and closure of choledochotomy:**

The practice of choledochostomy wound without drainage is unwise since the tissue edema and obstruction at the lower end of the CBD is common. It leads to biliary leak. Hence it is safe to close the choledochostomy wound with T tube drain.

### **REMOVAL OF DIFFICULT STONES:**

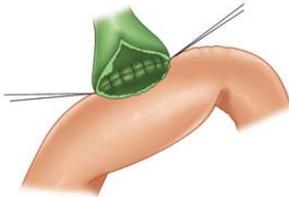
1. Kocherisation of the duodenum and head of the pancreas and massage of the lower duct and impacted stone with two fingers. One placed behind the head of the pancreas and other anteriorly. This procedure may require simultaneous grasping of the stone with a Desjardin's forceps introduced through the choledochotomy.
2. Transduodenal sphincteroplasty.
3. Disintegration of the stone either by electro hydraulic lithotripsy using a probe attached to a spark generator or dye laser.

# PICTURES SHOWING VARIOUS STEPS IN BILIARY ANASTAMOSIS



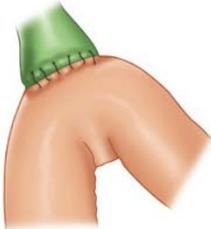
A

Source: Brunicaardi FC, Andersen DK, Billiar TR, Dunn DL, Hunter JG, Matthews JB, Pollock RE: *Schwartz's Principles of Surgery, 9th Edition*: <http://www.accessmedicine.com>  
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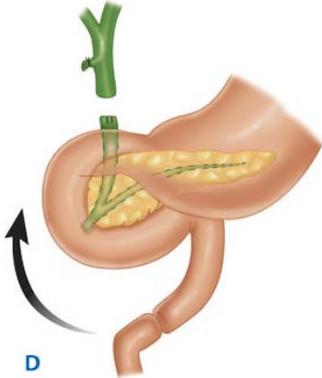
B

Source: Brunicaardi FC, Andersen DK, Billiar TR, Dunn DL, Hunter JG, Matthews JB, Pollock RE: *Schwartz's Principles of Surgery, 9th Edition*: <http://www.accessmedicine.com>  
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C

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D

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## **SURGICAL DRAINAGE OF THE COMMON BILE DUCT:**

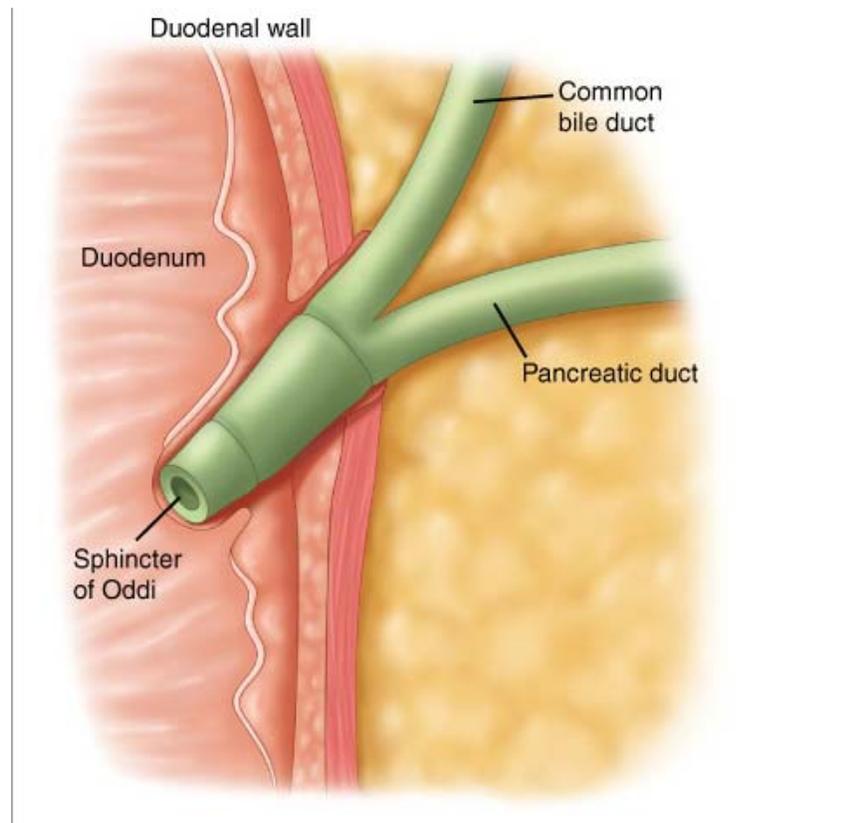
For patients having stenotic disease of the lower choledochal sphincter, the ductal clearance of stones is an inadequate procedure. Hence these patients should be managed by a ductal drainage with removal of stones. This subgroup of patients have the following features.

1. Grossly dilated duct (>2 cm).
2. Multiple, large pigment stones occupying the common bile duct.

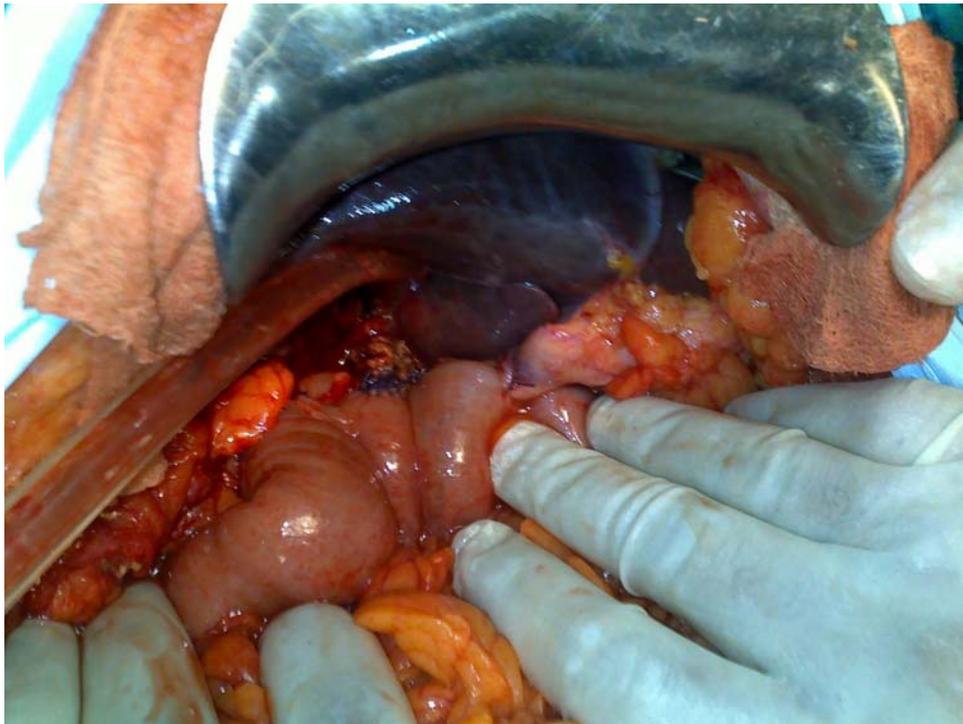
The other indications for choledochoduodenostomy are

1. One or several large stones within a dilated duct.
2. . An impacted ampullary stone.
3. Multiple duct stones, in dilated ducts in elderly patients.
4. Strictures from stone impaction.
5. Stricture associated with chronic pancreatitis - SNAPE'S SYNDROME.
6. Iatrogenic stricture.

## ANATOMY OF THE PERIAMPULLARY REGION



## BILIARY – ENTERIC ANASTAMOSIS



## **Technique:**

### **1. Side to side anastomosis:**

It is the procedure of choice in all indications except iatrogenic injuries and in malignant obstruction. The duodenum and pancreas are mobilized by Kocher maneuver. The CBD is incised longitudinally beginning at point at which it traverses the duodenum posteriorly and extends proximally for a distance of 2.5cm.

After incising the duodenum longitudinally at its superior border for a distance of 1.5cm, a single layer anastomosis using 4-0 polypropylene is accomplished. The anastomosis should be initiated posteriorly and the knots should be positioned on the outer side of the anastomosis. The anterior anastomosis is performed by simple interrupted sutures and the knots should be on the inner side of the anastomosis. T tube is not needed; although it can be inserted proximally if the anastomosis is narrow.

### **2. End to side anastomosis:**

This technique is followed in two situations

1. In iatrogenic injuries to CBD or hepatic ducts
2. In malignant obstruction.

The distal portion of the transected duct is closed with interrupted 4-0 polypropylene. After making a 1 cm longitudinal incision in the superior portion of duodenum using cautery, the anastomosis should be performed in the posterior aspect initially using interrupted 4-0 polypropylene sutures. The sutures are placed 1-2 mm apart.

### **Complications of choledochoduodenostomy:**

#### **I) Bile leak:**

Leakage of bile from the suture lines occur in a small number of cases. The closed - suction drain should not be removed if the drainage is bile stained. All such leaks will eventually close with conservative management. In rare case of a persistent leak, a carefully placed transhepatic stent will hasten the closure by diverting bile through the stent.

#### **II) Stricture:**

All biliary - enteric anastomoses are subject to stricture. ERCP is done to confirm the presence of stricture.

In strictures,ballon dilatation should be done.If it fails,surgery is the only option

### **III) The Sump Syndrome:**

Food and debris may collect in the portion of the bile duct distal to side to side choledochoduodenostomy, which is said to serve as a sump.

The mechanism by which debris in the bile duct distal to the anastomosis could produce symptoms is not clear.

### **Choledochojejunostomy:**

Choledochojejunostomy is indicated in

- Iatrogenic injuries to CBD, at or proximal to the entrance of cystic duct with CBD stones.

### **Transduodenal sphincteroplasty:**

Transduodenal sphincteroplasty is a good alternative to choledochoduodenostomy.

The duodenum is mobilized by extensive Kocher maneuver. The duodenum is opened in a transverse plane opposite the papilla. Silk sutures are preplaced at either end of the incision, i). to elevate the duodenum and ii). to limit the duodenostomy, iii). to keep it from extending too close to the pancreas for safe closure.

The orifice of the major papilla is cannulated with lacrimal duct probes. If ampullary obstruction is caused by an impacted stone, it is easy to cut down on its anterosuperior aspect of the papilla (11'O clock position) opposite the pancreatic duct orifice (5'O clock position) and therefore, not endangering that structure.

The entire length of the musculature (lower, middle and upper choledochal sphincters) surrounding the lower end of the common bile duct is divided and the mucosal approximation at the cut edges done by interrupted sutures.

### **Laparoscopic clearance of ductal calculi:**

Laparoscopic clearance of ductal calculi usually is undertaken in patients undergoing laparoscopic cholecystectomy.

### **Transcystic clearance:**

Transcystic duct clearance is applicable to small calculi up to 1 cm in the distal common duct. It is unsuitable for proximal stones and multiple large occluding calculi where laparoscopic supraduodenal bile duct exploration is indicated. Cystic duct clearance can be performed under radiological control or by direct visual guidance. Irrespective of technique, the procedure must be performed before the cystic duct continuity is disrupted and before dissection of the gall bladder from the liver bed is commenced.

### **Radiologically controlled technique:**

This technique is quicker than the endoscopically guided method and avoids the need for dilation of the cystic duct. It has the further advantage of Multiple stone evacuation per single passage.

The Various steps in this procedure:

1. Initial cholangiogram
2. Insertion of dormia basket and stone capture.
3. Trawling and extraction of the stones.
4. Flushing with fluit and completion cholangiography.
5. Insertion of cystic duct drainage cannula.

### **Visually Guided Technique:**

This procedure varies with radiological technique by dilatation of cystic duct followed by the introduction of a narrow flexible operating endoscope, attached to a camera for visually guided transcystic extraction of ductal calculi.

The steps of this procedure are:

1. Initial cholangiogram
2. Insertion of guide wire.
3. Dilatation by ballon catheter.
4. Insertion of endoscope and removal of stones through dormia basket.

## **Laparoscopic exploration and closure of the common bile duct:**

This procedure is done in the following conditions

- a. If the CBD diameter is larger than 1 cm
- b. In the presence of a large or occluding stone load.
- c. In proximal duct stones

The technique is indicated if the common duct diameter is larger than 1cm and in the presence of a large or occluding stone load, and in patients with proximal stones.

1. Dissection of the common bile duct and choledochotomy.
2. Suction extraction.
3. Duct massage.
4. Extraction by biliary balloon.
5. Visually guided extraction with choledochoscope.

Common duct drainage:

It is advisable after supraduodenal bile duct exploration. it is mandatory because obstruction due to edema is more common after several days of this procedure. Secondly, the drainage tube provides an easy access for post operative cholangiography in order to rule out retained stones. There are two types of techniques for biliary drainage insertion of a 'T' tube and cystic duct drainage.

### **Suture closure of the common bile duct:**

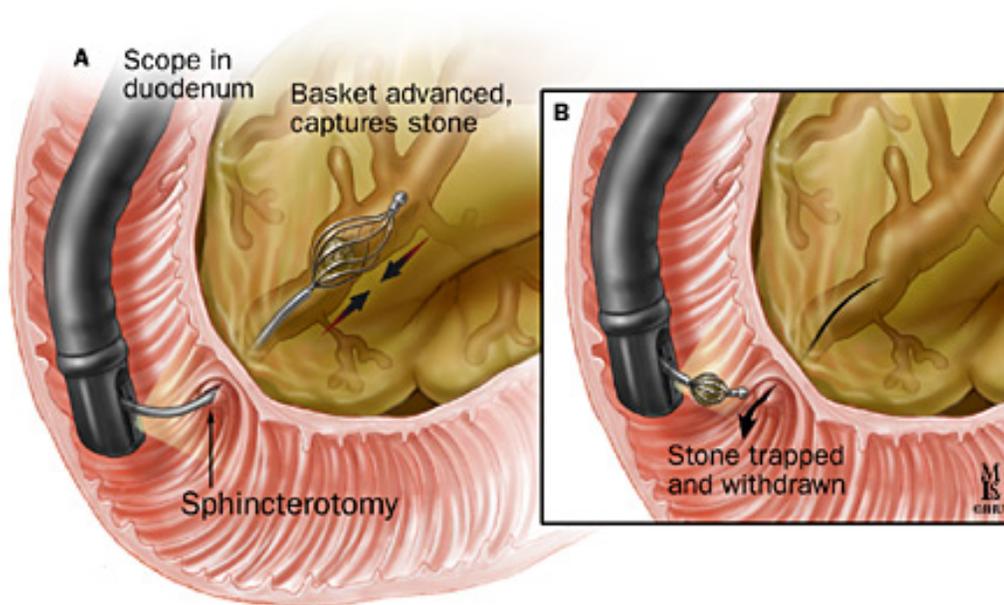
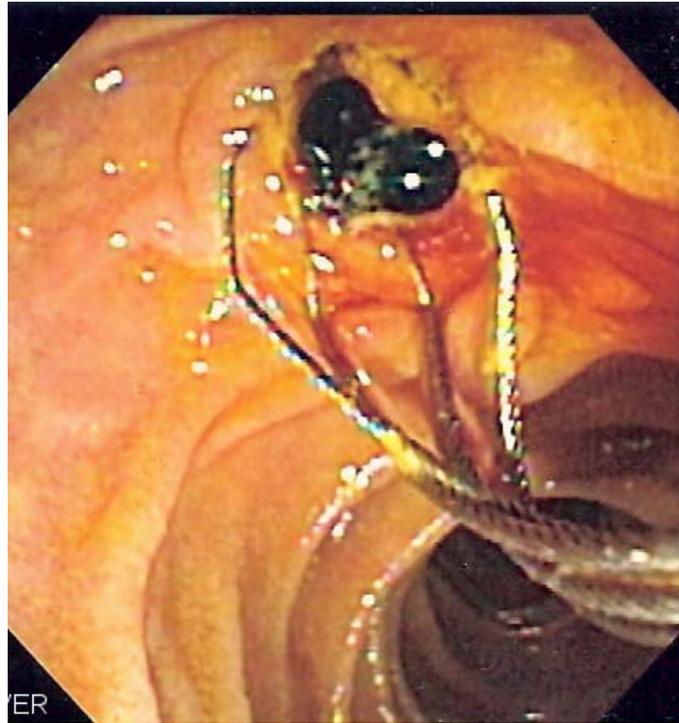
The incision in the common bile duct is closed by 2 to 3 interrupted 4-0 absorbable sutures. If a T tube is placed, the choledochotomy is closed above the tube which then comes to lie at the bottom of the closed incision. If cystic duct cannula drainage is used, primary complete closure of the choledochotomy is performed. In either case, when the suturing has been completed, saline is injected through the cystic duct cannula or T-tube to ensure a water tight seal.

### **Management of patient with T-tube:**

A Post operative cholangiogram is done after 4 to 5 days of surgery until then 'T' tube is left on free closed drainage. If this is satisfactory and the patient is fully ambulant with return of bowel function, the T-tube is spigoted and covered with a occlusive dressing and the patient is allowed to go home. This stage is usually reached 4 days after laparoscopic common bile duct exploration and 8 days after equivalent open procedure.

A sufficient period of time must be allowed for maturation of the T-tube tract (minimum of 10 days) and T tube cholangiogram is performed before the T-tube is removed. In elderly, immunosuppressed or diabetic patients, a long period is advisable (3 weeks) before T — tube removal.

# STONE EXTRACTION BY DORMIA BASKET



## **Management of Post Operative Complications:**

The clinical features that require medical attention and investigations during the postoperative period are

1. Persistent fever and leucocytes.
2. Persistent pain - beyond 24 hours
3. Biliary leakage through the drain.
4. Jaundice and rigors.

### **Biliary complications:**

Biliary leakage and bile duct injury declare themselves in the postoperative period by pain and fever, with or without abnormal liver function tests and jaundice. Other manifestations include external discharge of bile. The initial investigation includes USG or CT for the detection of fluid collections. Biliary scintigraphy is useful in detection of biliary leakage.

Minor collections in the presence of an intact extrahepatic biliary tract can be treated by percutaneous drainage under radiological guidance. If the patient improves, no action needed. However in the presence of major leak, ERCP is mandatory.

If the ERCP demonstrates bile duct leakage, owing to slipped titanium clip this patients are managed endoscopically by involving nasobiliary stenting or endoscopic sphincterotomy or both.

### **Endoscopic sphincterotomy and stone extraction:**

The current treatment for ductal calculi is by endoscopic sphincterotomy and stone extraction. In patients requiring choledochotomy for symptomatic gall stone disease, endoscopic stone extraction is performed before the operation. Now the single stage laparoscopic surgical treatment is gaining favor.

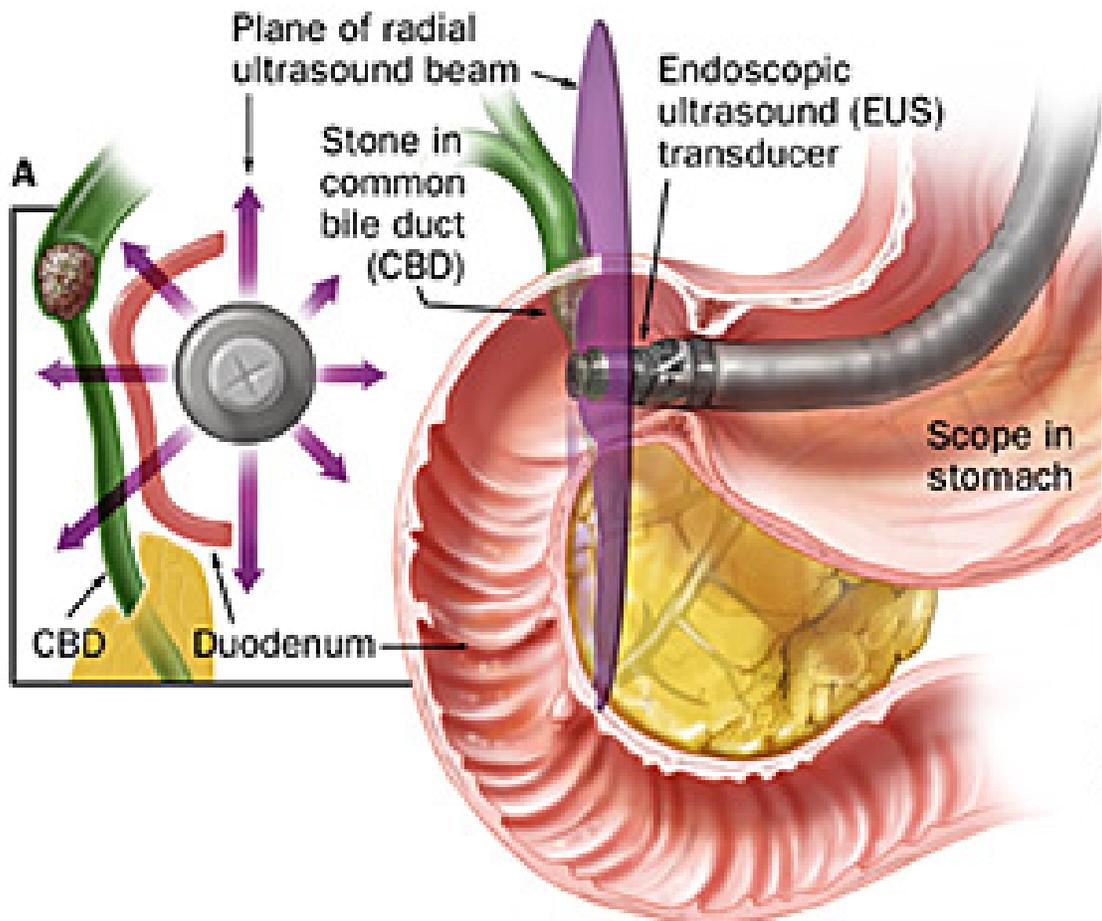
Indications for endoscopic sphincterotomy are:

1. Poor risk patients.
2. Patients with cholangitis.
3. Patients with severe pancreatitis.
4. Some patients with failed laparoscopic stone extraction as an alternative to conversion
5. Retained or recurrent stone after cholecystectomy.

### **Difficulties in stone removal in endoscopic approaches are:**

1. Prior surgery such as Bilioth II or Roux en Y reconstruction.

**PICTURE SHOWING ENDO ULTRASOUND**



2. Inaccessibility of the papilla.
3. The factors that hinder stone extraction are size of the stone, number, consistency, shape and location of stones and ductal factors such as contour, diameters at the level of and distal to the stone (s) and the presence of co-existing pathology such as stricture or tumor.

Adjuvant techniques for removal of difficult stones are:

1. Mechanical lithotripsy.
2. Extracorporeal shock wave lithotripsy.
3. Intra corporeal lithotripsy with laser.
4. Chemical contact dissolution therapy.

**Complications of endoscopic sphincterotomy are:**

1. Acute hemorrhage - 2 to 29%
2. Acute pancreatitis - 1.5 to 5.4%
3. Recurrence of common duct stones - 11%
4. Stenosis of papilla
5. Cholangitis -1 to 2.7%

## Mechanical lithotripsy

It is one of the commonly used technique, commonly followed in western world, simplest means of fragmenting large bile duct stones. A large stone basket is used to trap the stones.

### **THE VARIOUS TYPES OF LITHORIPSY:**

1. Intracluctal shock wave lithotripsy
2. Extracorporeal shock wave lithotripsy (ESWL)

Large balloon dilatation offers an alternative in managing difficult large ductal stones.

### **Management of CBD stones presenting after cholecystectomy:**

#### **Residual calculi:**

Incidence of residual, missed or retained calculi varies from 2 to 15 % and averages 8%. Hence routine completion choledochoscopy / cholangiography done to abolish these complications. Retained ductal calculi following biliary tract surgery are diagnosed in the immediate post operative period by the post-operative T-tube cholangiogram or by the recurrent symptoms usually within 2 years of surgery. Urgent intervention is not indicated,

- i. If the liver biochemistry is normal,

ii. If the patient is asymptomatic and

iii. The T — tube cholangiogram shows no organic disease or significant dilatation.

Spontaneous passage is likely if the calculi are small (<3 mm) and may be aided by simple measures such as T-tube clamping. If the patient tolerates clamping and provided no untoward complication develops, such a conservative approach can be continued for a few weeks, at the end of which time the situation viewed radiologically.

The various methods available for the non-surgical management of retained stones are:

1. Flushing

2. Dissolution

3, Percutaneous stone extraction via the T-tube tract.

4. Endoscopic sphincterotomy and stones extraction.

Surgical management of missed stones is reserved for those patients in whom the above methods have failed or complications have developed during or after attempted endoscopic or percutaneous stone extraction.

## **Recurrent ductal calculi:**

Ductal calculi presenting 2 years or more after an operation are generally regarded to be primary or recurrent. One study has identified suture material in 30% of cases. This finding stresses the importance of avoiding non-absorbable material during operation on the biliary tract. Internalization of metal clips used to secure the medial end of the cystic duct during laparoscopic cholecystectomy is now a well-recognized complication of this procedure. The exact pathology remains unclear. The internalized clip becomes covered with calcium bilirubinate to form a brown pigment stone.

The patients who develop this condition present between 6 and 12 months after the procedure with jaundice and or cholangitis. The condition is easily diagnosed on the ERCP films as the stone has a characteristic cat's eye appearance.

The management of patients with recurrent ductal calculi depends on their age and general condition. Endoscopic sphincterotomy and stone extraction is the first line of treatment for recurrent ductal calculi and surgery either open or laparoscopic reserved if this approach fails.

In some situations, recurrent ductal calculi are often multiple and associated with gross dilatation of the bile duct and in some cases obvious distal duct stenosis. This may be primary (papillary stenosis) or be secondary to iatrogenic trauma to the sphincter.

In patients with multiple ductal calculi, grossly dilated bile duct (>2 cm) or papillary stenosis, a drainage operation is indicated.

# OBSERVATIONS AND RESULTS

## 1. Number and sex:

Total number of cases studied - 58

Male – 28

Female - 30

## 2. Location of stone:

Associated GB calculi - 7

CBD calculi - 58

## 3. Age distribution: The peak age of incidence of

CBD calculi - 41 - 50 years

## 4. Clinical presentation:

CBD calculi:

Pain:54(93%)

Obstructive jaundice:46(79.3%)

Cholangitis : (Fever)15(25.86%)

Pancreatitis : 5(8.6%)

5. Accuracy of preoperative ultrasound – 70%

Other doubtful cases were investigated using CT Scan and MRCP.

6. Surgical procedures performed:

1. CBD exploration with T tube drainage - 37

2. CBDE + Choledochoduodenostomy - 4

3. CBDE +choledochojejunostomy –1

4. CBD exploration with cholecystectomy –7

5. a . Endoscopic Sphincterotomy with stenting - 8

b. Endoscopic Sphincterotomy with Balloon dilatation - 2

**No of Stones:**

**CBD calculi:**

Single stone - 19 (32.75%)

Multiple stone - 39 (66.25%)

## **Biochemical analysis of stone:**

### **CBD cacculi**

Cholesterol stone	- 3	(5.18%)
Pigment stone	- 7	(12.07%)
Mixed stone	- 48	(82.75%)

Post operatively during second week T tube cholangiogram was performed in all Cases. after 14 days after clamping the 't' tube and observed for pain. In one patients, retained stone was found who was managed endoscopically.

### **Complications:**

- Postoperative biliary leak occurred in 4 cases after open CBD exploration which was of low output type and managed conservatively.

- Wound infection occurred in 3 cases Pus let out and sent for culture and sensitivity. Parenteral antibiotics administered according to culture and sensitivity report. Secondary suturing performed later.

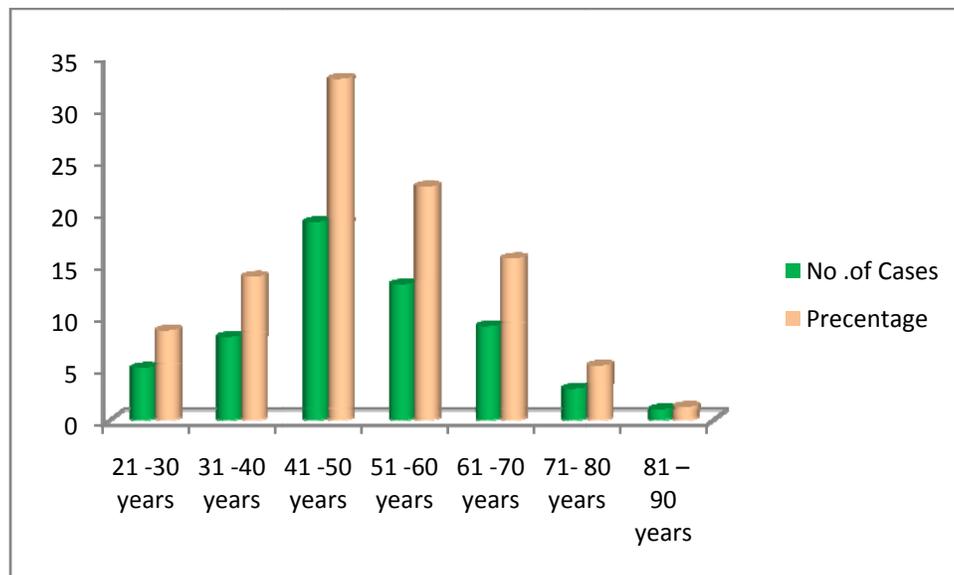
- No mortality in our series.

## TABLES AND FIGURES

Table – 1 : Age Incidence

Age in years	No .of Cases	Precentage
21 -30 years	5	8.621
31 -40 years	8	13.8
41 -50 years	19	32.76
51 -60 years	13	22.42
61 -70 years	9	15.52
71- 80 years	3	5.17
81 – 90 years	1	1.22

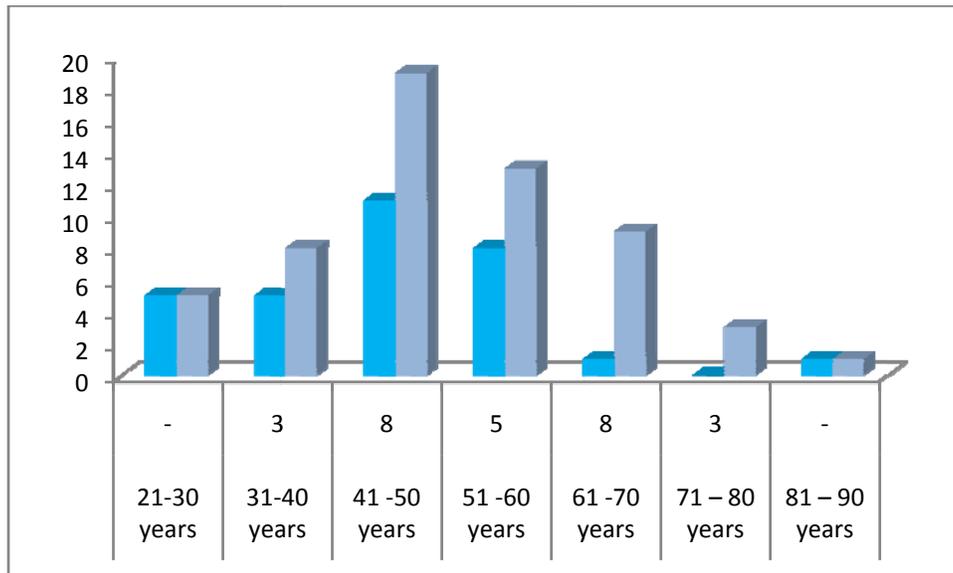
In my study, increased incidence of CBD stone disease was between 41-50 years.



**Table -2: Sex Incidence**

Sex Incidence	Male	Female	Total
21-30 years	-	5	5
31-40 years	3	5	8
41 -50 years	8	11	19
51 -60 years	5	8	13
61 -70 years	8	1	9
71 – 80 years	3	-	3
81 – 90 years	-	1	1
Total	28	30	58

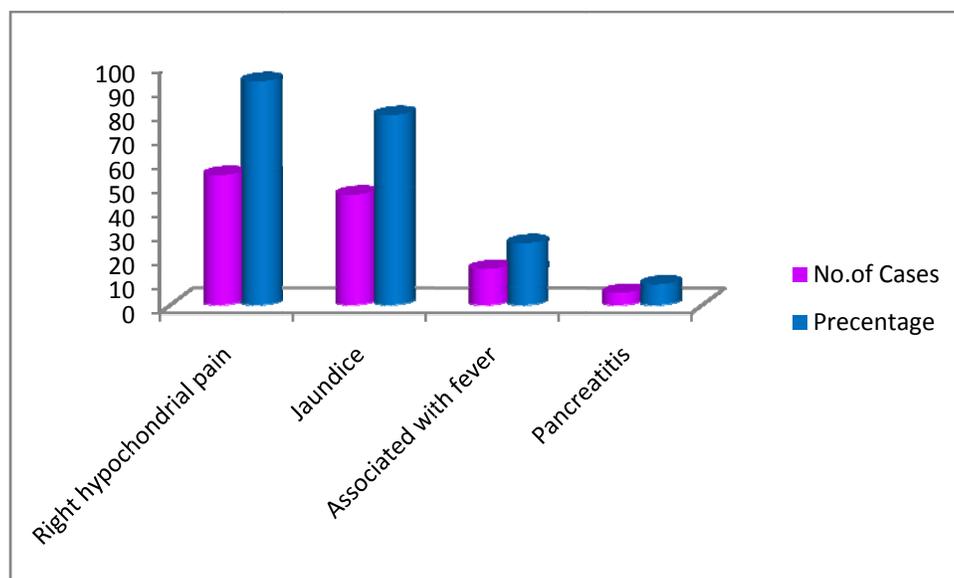
Females have increased incidence to have CBD stone disease.



**Table - 3: Clinical Presentation**

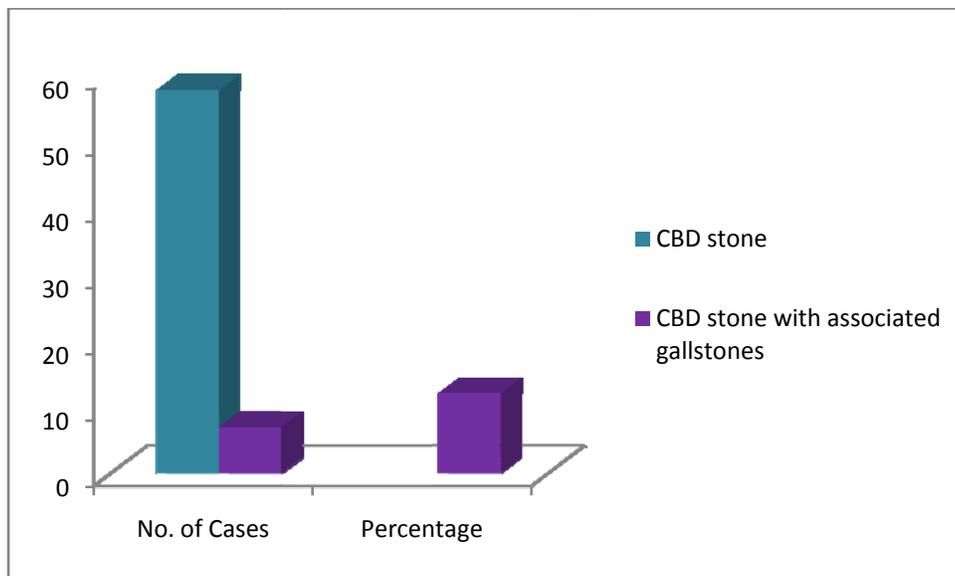
S.No	Clinical Presentation	No.of Cases	Precentage
1	Right hypochondrial pain	54	93.1
2	Jaundice	46	79.3
3	Associated with fever	15	25.86
4	Pancreatitis	5	8.6

In my study, almost all the patients have right hypochondrial pain and right hypochondrial tenderness.



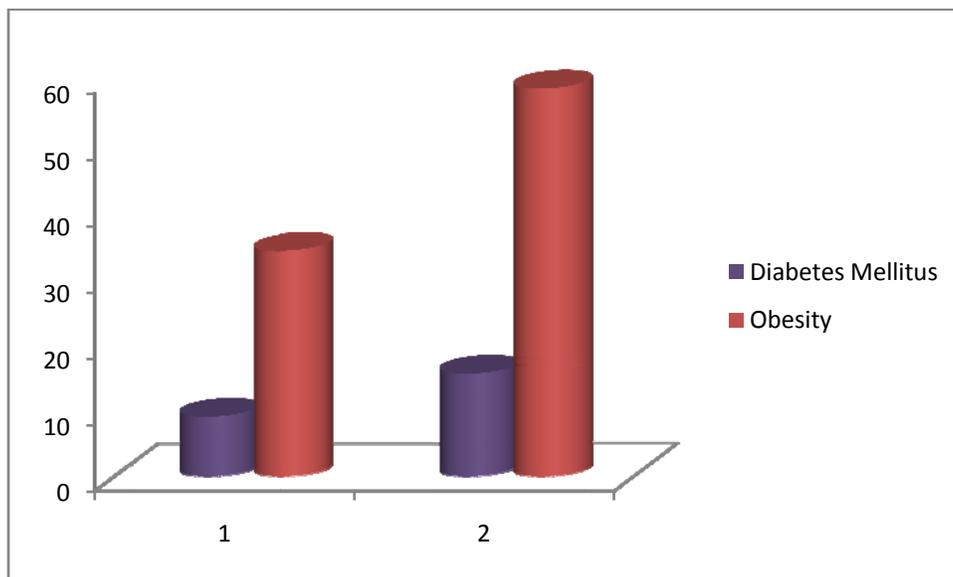
**Table – 4: Pathology**

Pathology associated with	No. of Cases	Percentage
CBD stone	58	
CBD stone with associated gallstones	7	12.06



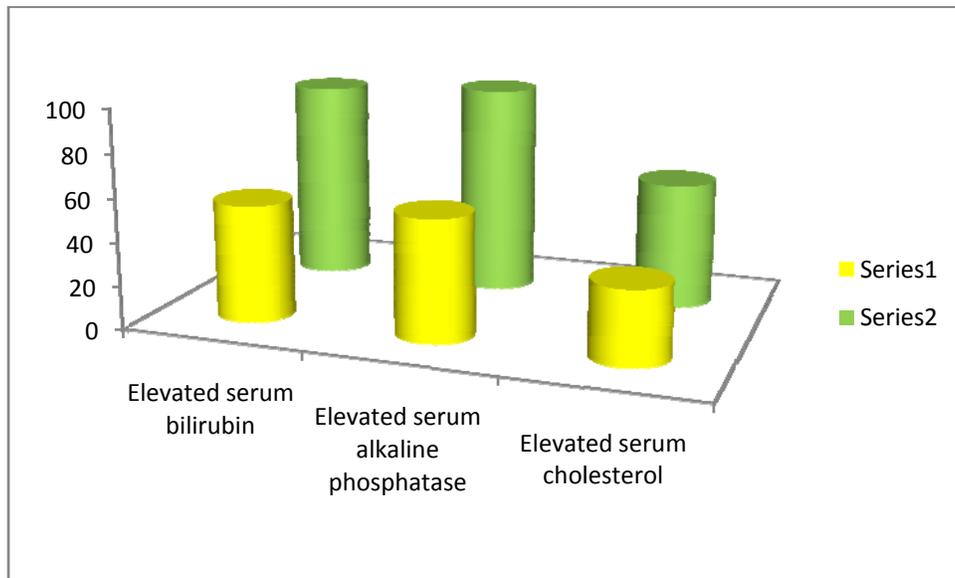
**Table – 5 : Associated Diseases**

Associated Diseases	No. of cases	Percentage
Diabetes Mellitus	9	15.5
Obesity	34	58.6



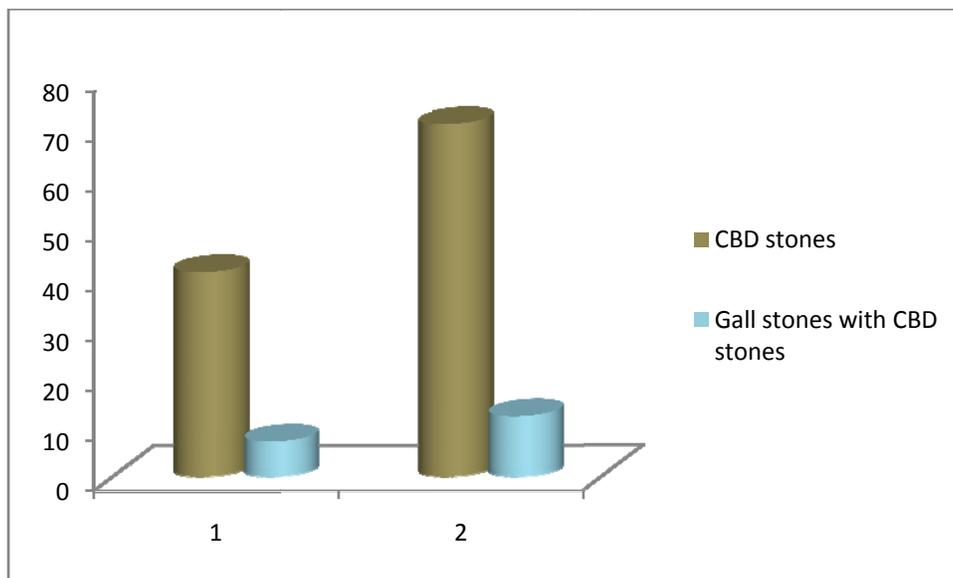
**Table – 6 : Investigations**

Investigations	No. of cases	Percentage
Elevated serum bilirubin	54	93.1
Elevated serum alkaline phosphatase	56	96.5
Elevated serum cholesterol	34	58



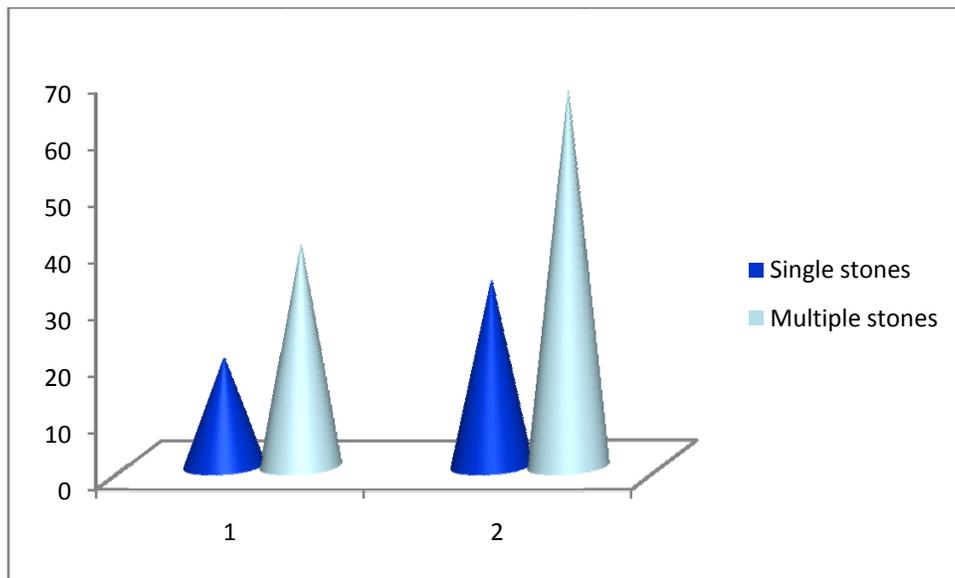
**Table – 7: Ultrasonogram Findings**

Findings	No. of cases	Percentage
CBD stones	41	70.6
Gall stones with CBD stones	7	12.06



**Table – 8:**

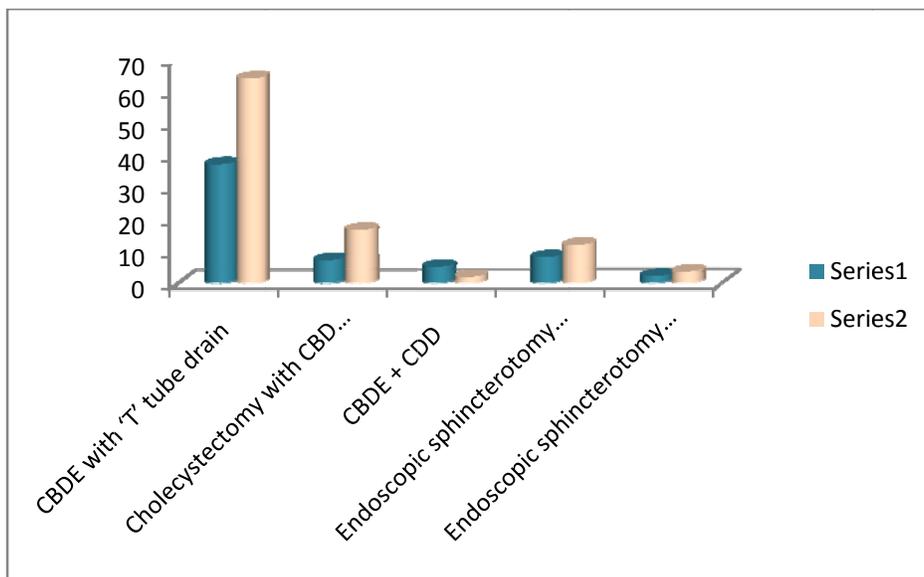
No. of stones	No.of cases	Percentage
Single stones	19	32.75
Multiple stones	39	66.25



**Table – 9: Management**

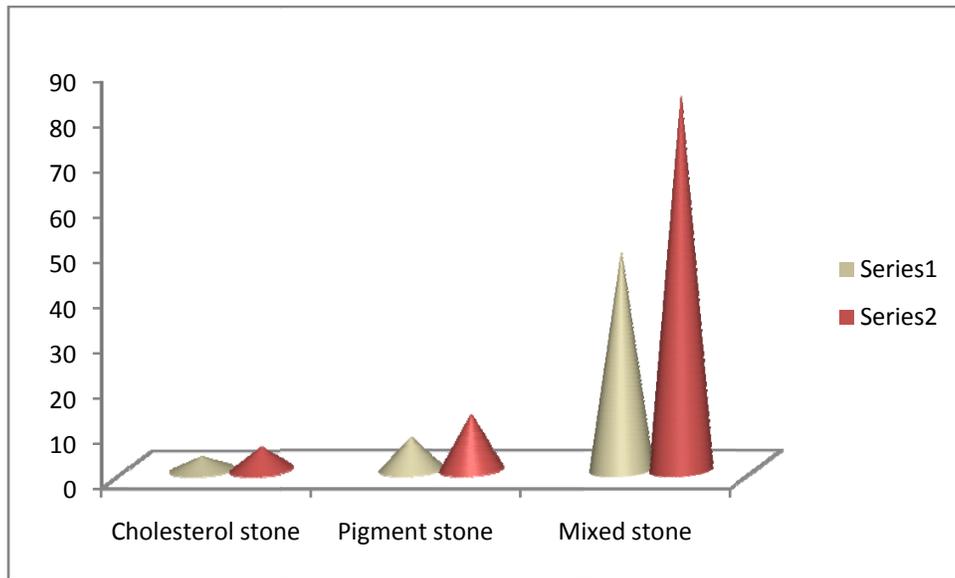
Management	No. of cases	Percentage
CBDE with 'T' tube drain	37	63.79
Cholecystectomy with CBD explo	7	16.41
CBDE + CDD	5	1.84
Endoscopic sphincterotomy with stenting	8	11.7
Endoscopic sphincterotomy with balloon dilatation	2	3.4

Out of this 58 cases, one patient presented with hepatolithiasis with post stented states who was managed with choledochoduodenostomy.

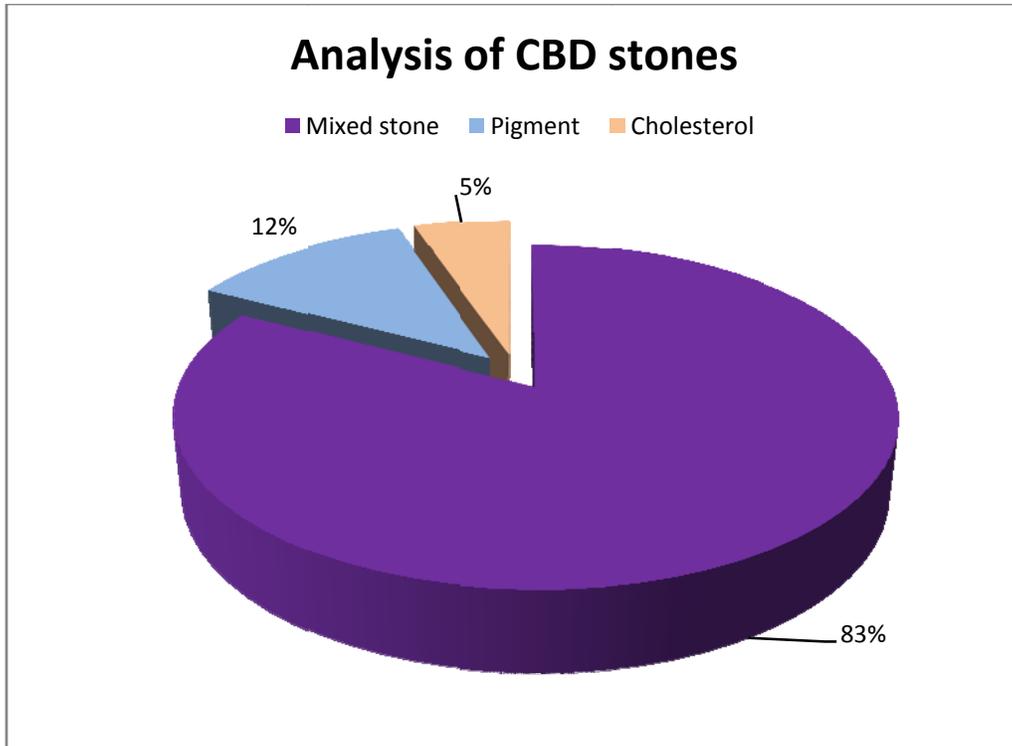


**Table – 10 Biochemical Analysis**

Type of Stone	No of cases	Percentage
Cholesterol stone	3	5.18
Pigment stone	7	12.07
Mixed stone	48	82.75



## ANALYSIS OF CBD STONES



## DISCUSSION

58 Patients with CBD calculi were included in this study, 7 patients (12.06%) patients had associated gall stones with CBD stones.

The incidence of CBD calculi increases with increasing age, and higher incidence were found in 4th and 5th decade. Maximum incidence in 4<sup>th</sup> and 5<sup>th</sup> decades were also observed in Gupta et al (1967)/Vijaypal et al (1980)/ Tyagi et al (1992) series.

Varying female preponderance from 2:1 to 4.5:1 has been observed in several studies. In our series, there is only slight female preponderance.

Among all patients reported abdominal pain at sometime during the course of illness the location is Right hypochondrium being (93% ) in our series, which is comparable to 84% in Vijay Pal et al (1980).

Majority of CBD calculi patients presented with Obstructive jaundice (79.3% ). 5 patients presented as gall stone pancreatitis, 15 patients presented with cholangitis.

The accuracy of Pre-op USG was 70% in our series as compared to Mesherry et al (1989) 90%, Schwartz et al (1990) 100%. Also CT scan abdomen and MRCP done in doubtful cases.

Majority of cases showed multiple calculi (66.25%) as compared to Farzaneh et al (2007) (62.5%).

### **Management:**

Out of 58 patients with CBD calculi,

CBD exploration with T tube drainage – 37

Biliary enteric anastomosis – 5, [CDD -4, CDJ – 1]

CBD exploration with Cholecystectomy – 7

4.a..Endoscopic sphincterotomy with stenting - 8

b. Sphincterotomy with balloon dilatation - 2.

These Endoscopic procedure done in patients with poor risk, in retained or recurrent stones cases and in severe pancreatitis.

As compared to Girard RM et al with CBD exploration and T tube drainage rate of 92.8%

Biliary enteric anastomosis was done because of large CBD diameter and presence of multiple CBD calculi.

Right flank drain was kept in all cases of CBD exploration.

Post Operative Course:

In case of CBD exploration, oral started once ileus gets relieved.

At the end of 14 days, 'T' -tube cholangiogram was done after clamping and observed for pain after that 't' - tube removed.

4 patients had post operative biliary leak both after CBD exploration, Presented with bilious fluid in drainage tube, which was of low volume and settled with conservative management.

Post operative wound infection was noticed in 3 cases with CBD exploration . Pus let out and sent for culture and sensitivity. Managed with appropriate antibiotics. Secondary suturing was done later.

No iatrogenic bile duct injury in our series as compared to 0-0.7% injury in various large studies.

No mortality in our series as compared to Mc sherry (1989) -0.6 -4%, Ganey et al (1996) 0.5%, passas et al (1990) 0% and Girard et al (2000) 0.3 – 1.6%.

In our series 82.75% of stones were of mixed type as compared to Ganey et al (70%) Vijay pal et al (91.3%), Bansali (86%).

## SUMMARY AND CONCLUSION

CBD calculi is one of the most common disease affecting the digestive tract. About 10- 15% of patients with CBD stones are associated with cholelithiasis. They are detected with greater frequencies with advent of USG and CT scan. 58 cases of well documented CBD stones in GOvt.Rajaji Hospital during the period between June 2009 to May 2011 were studied in depth.

The following conclusions were made in our study.

1. Age incidence varies between 21 & 83 yrs and mean age of incidence is 45yrs. Patients of 4<sup>th</sup> and 5<sup>th</sup> decade were the commonest victims.
2. Slight female preponderance was observed in our study .
3. Most of the CBD calculi cases were presented with obstructive symptoms i.e. jaundice, pain
4. USG had an accuracy rate of 70% in our series.
5. Mixed stones were the commonest variety in our study of which pigmented stones is the dominant type.
6. Open CBD exploration with T tube drainage is commonest procedure adopted for CBD calculi in our series.
7. Endoscopic sphincterotomy with stenting was done in patients with poor risk, recurrent or retained stones.
8. Mortality rate in our series is 0%.

9. Endoscopic sphincterotomy with stenting and ballon dilatation were done in patients with poor risk, retained and recurrent stones.

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# PROFORMA

S.No.

Ward

Address

Name

Age/sex

IP No.

Date of admission

Date of surgery

Date of discharge

## **Complaints**

- Right hypochondrial pain
- Nausea / vomiting
- Flatulent dyspepsia
- Fever
- Jaundice

## **Past history**

- Diabetes mellitus / hypertension / asthma

- H/o ileal disease / resection / bypass surgery

### **Drug History**

- H/o Oral contraceptive pills
- H/o cholestyramine therapy
- H/o clofibrate
- H/oTPN

### **Personal History**

- Mixed diet
- High fat

### **Menstrual History**

### **Marital History**

### **General Examination**

- Height
- Weight
- Pulse rate
- Blood pressure
- Jaundice
- Anemia

## **Clinical Examination**

### Inspection

- Abdomen shape
- Moves with respiration
- Visible lump

### **Palpation**

- Warmth
- Tenderness
- Guarding / Rigidity
- Palpable gall bladder
- Associated signs of pancreatitis

### **Investigations**

- Urine
  - Albumin
  - Sugar, deposit
- Total count
- Differential count
- ESR

Haemoglobin

- Blood urea, sugar, creatinine
- LFT
- Lipid profile
- X-ray abdomen erect
- Ultrasound abdomen and pelvis
- Upper GI Endoscopy
- CT Abdomen
- MRCP

## **Treatment**

- Surgery
  - CBD exploration with 'T' tube drainage
  - CBDE with Choledochoduodenostomy
  - CBDE with Cholecystectomy
  - Endoscopic Sphincterotomy with stenting
  
- Operative findings
- Biopsy report
- Biochemical analysis of stone

## **Follow up**

## **ABBREVIATION**

1. CBD - Common Bile Duct
2. USG - Ultrasonogram
3. Sr.ALP - Serum Alkaline Phosphatase
4. ERCP - Endoscopic Retrograde Cholangio Pancreaticography
5. MRCP - Magnetic Resonance Cholangio Pancreaticography
6. PTC - Percutaneous Transhepatic Cholangiography
7. CBDE - Common bile duct exploration
8. CDD - Choledochoduodenostomy
9. CJD - Choledochojejunostomy
10. EUS - Endo Ultrasound
- 11.ESWL - Extra corporeal shockwave lithotripsy

## MASTER CHART

Sl. No	NAME	AGE /SEX	IP.NO	CLINICAL FEATURES			ASSOC GALL STONES	INVESTIGATION		USG FINDINGS	MANAGEMENT	COMPLICATION	TYPE OF STONE
				FEVER	PAIN	JAUNDICE		S.Br	ALP				
1.	Jamsuth Nisha	40/F	75171	-	+	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
2.	Dhavamani	60/M	65529	-	+	+	-	?	?	-	CBD Exploration	-	Mixed
3.	Durai Pandi	58/M	53499	-	+	+	+	?	?	CBD stones + Gall stones	CBD Exploration+ Cholecystectomy +CDJ	-	Mixed
4	Malathi	21/F	053130	-	+	+	-				Endoscopic sphincterotomy with stenting	-	Mixed
5.	Chidambaram	62/M	28472	+	+	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
6.	Seeniammal	69/F	28596	+	+	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
7	Arjunan	50/M	83357	+	+	+	-	?	?	CBD stones+ Hepatolithiasis	CBD Exploration + CDD	-	Mixed
8	Selvi	32/F	53120	-	+	+	-	?	?	CBD stones	CBD Exploration	-	Pigment
9.	Rosari	50/M	077371	-	+	+					Endoscopic sphincterotomy with balloon dilatation		Cholesterol
10	Padmavathy	83/F	00974	-	+	+	+	?	?	CBD stones + Gall stones	CBD Exploration+ Cholecystectomy + CDD	-	Mixed

11	Rajalingam	43/ F	59276	-	-	+	-	?	?	-	CBD Exploration	-	Pigme nt
12.	Jawahar nisha	38/ F	29987	+	-	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
13.	Mookaiyan	52/ M	38920	-	+	+	-	?	?	-	CBD Exploration	-	Mixed
14	Backiyam	44/ F	65221	+	-	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
15	Suganthi	28/ F	93039	+	+	+	+	?	?	CBD stones + Gall stones	CBD Exploration+ Cholecystectomy	-	Mixed
16	Gowri	50/ F	13512	-	+	+	+	?	?	CBD stones	CDD	Post Op Wound Infection	Mixed
17	Armugam	70/ M	77373	-	+	+	-	?	?	CBD stones	CBD Exploration	-	Pigme nt
18	Shanmuga Sundaram	77/ M	90150		+	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
19	Shanmuga Thayammal	57/ F	57040	+	+	+	-	?	?	CBD stones	CBD Exploration	-	Choles terol
20	Patchimuth u	35/ M	08677 2			+		?	?		Sphincterotom y with stenting		Mixed
21	Sathya	22/ F	02839 6			+		?	?		Sphincterotom y with stenting	Mixed	
22	Saraswathy	48/ F	59571	-	-	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
23	Pothiraja	66/ M	35019	-	+	+	-	?	?	-	CBD Exploration	-	Mixed
24	Muthumano har	44/ M	71183	-	+	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
25	Saroja	40/ F	35196	+	+	+	-	?	?	CBD stones +	CBD Exploration+	-	Mixed

										Gall stones	Cholecystectomy		
26	Manjula	50/ F	19530	-	+	+	+	?	?	CBD stones + Gall stones	Cholecystectomy + CDD with T tube drainage		pigment
27	Rajendran	45/ M	038448					?			Sphincterotomy with stenting		Mixed
28	Parameshwari	43/ F	15722	-	+	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
29	Muniyandi	66/ M	32679	-	-	+	-	?	?	-	CBD Exploration	-	Mixed
30	Sundarammal	56/ F	5161	-	-	+	-	?	?	-	CBD Exploration	-	Mixed
31	Dhanabackiyam	55/ F	38843	-	+	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
32	Sivabagyam	45/ F	66738	-	+	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
33	Mayandi	40/ M	56593	-	+	+	-	?	?	CBD dilatation > 7 mm	CBD Exploration	Bile leak-	Mixed
34	Shanthi	43/ F	041545			+		?			Endoscopic spincterotomy with stenting		Mixed
35	Karupaiah	45/ M	34953	-	+	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
36	Balaguru	36/ M	11550	-	+	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
37	Maruthan	49/ M	77835	-	+	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
38	Meeran Mustafa	60/ M	38925	+	+	+	-	?	?	-	CBD Exploration	Bile leak	-
39	Pandiselvam	75/ M	42773	-	+	+	-	?	?	CBD stones	CBD Exploration	-	-

40	Pavalam	46/ F	94017	-	+	+	-	?	?	CBD stones	CBD Exploration	-	-
41	Kalaiarasi	58/ F	80502	-	+	+	-	?	?	-	CBD Exploration	-	Chole estaro l
42	Muthaiyan	72/ M	09321 7			+		?	?		Sphincterotom y with stenting		Mixed
43	Janagi	60/ F	05189 3			+		?	?		Sphincterotom y with stenting		Mixed
44	Asiribi	40/ F	10029	-	+	+	-	?	?	CBD stones	CBD Exploration	-	Pigme nt
45	Malaichamy	64/ M	95803	-	-	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
46	Thenattu Singam	48/ M	70524	-	+	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
47	Palpandi	68/ M	50069	-	+	+	-	?	?	CBD stones	CBD Exploration	Bile leak	Mixed
48	Sokkan	53/ M	60981	+	+	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
49	Eswari	43/ F	92507	-	-	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
50	Vilvakani	57/ F	19805	-	+	+	-	?	?	CBD stones	CBD Exploration with T tube drainage	-	Pigme nt
51	Karuthan	60/ M	04475 8		+	+		?	?		Sphincterotom y with stenting		Mixed
52	Chellammal	65/ F	78019	+	+	+	-	?	?	CBD stones	CBD Exploration	Post Op Wound Infection	Mixed
53	Krishnasam y	69/ M	35196	-	+	+	-	?	?	CBD stones	CBD Exploration	-	Mixed
54	Renukambal	49/ F	41153	+	+	+	-	?	?	CBD stones	CBD Exploration	-	Mixed

55	Palpandi	65/ M	05807 1		+	+		?	?		CBD Exploration with T tube drainage		Mixed
56	Indhumathi	26/ F	05988 7		+	+		?	?		Sphincterotom y with stenting	Mixed	
57.	Raju	50/ F	83835	-	+	+	-	?	?	CBD dilatation > 7 mm	CBD Exploration	-	Mixed
58	Sumathi	30/ F	23953	+	+	+	-	?	?	CBD stones	CBD Exploration	-	Mixed