ACCIDENTAL GALLBLADDER PERFORATION DURING LAPAROSCOPIC CHOLECYSTECTOMY: INCIDENCE, RISK AND EFFECT ON THE CLINICAL OUTCOME FOR PATIENTS ADMITTED AT KLE PRABHAKAR KORE HOSPITAL AND MEDICAL RESEARCH CENTRE, BELAGAVI: A PROSPECTIVE STUDY "

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LIST OF ABBREVATIONS USED

CHD	Common Hepatic Duct
CBD	Common Bile Duct
LC	Laparoscopic Cholecystectomy
TPN	Total parenteral nutrition
TLC	Total leucocyte count
USG	Ultrasonography
RHA	Right Hepatic Artery
GB	Gall Bladder
ERCP	Endoscopic Retrograde Cholangiopancreatography
BMI	Body Mass Index
CT	Computed Tomography
HS	Highly significant
VS	Very significant
NS	Not significant
SBP	Systolic blood pressure
DBP	Diastolic blood pressure

ABSTRACT

Background

Gall stone disease is one of the most common surgical diseases. Laparoscopic cholecystectomy is the gold standard for cholelithiasis**.** Laparoscopic cholecystectomy is associated with higher incidence of accidental perforation of gallbladder than open cholecystectomy. (varying between 16 to 40%)

Objectives

This study is aimed to evaluate the incidence, risk factors and postoperative outcomes of accidental gallbladder perforation during laparoscopic cholecystectomy.

Methods

This current prospective observational study was conducted in the department of General Surgery at KLES Dr. Prabhakar Kore Hospital and Medical Research centre, Jawaharlal Nehru Medical College, Belagavi. All eligible patients satisfying the inclusion criteria with consent, undergoing laparoscopic cholecystectomy between time period of January 2020 to June 2021 was included as study population. This study excluded the patients with neoplasia of gallbladder, presence of stones in CBD or CHD, or with liver diseases and immunocompromised individuals. After analysing all the blood parameters and documenting the findings of gallbladder through ultrasonography patients were taken up for laparoscopic cholecystectomy by a well-established team. Intraoperative findings were documented at the end of each procedure. Clinical outcome was measured in terms of operative time, duration of hospital stay, post operative drain requirement in group accidental gallbladder perforated v/s non perforated group.

Finally, the risk factors for each group were obtained and tabulated. P value of < 0.05 was considered significant. SPSS GraphPad prism version 9 was used for statistical analysis.

Results

Multiple logistic regression tests were performed over 100 patients who were included in the analysis, with mean age of 47.3, with 30 (40%) males and 45 (60%) females. The incidence of accidental perforation was 25% in this study of which 7 (28%) was due to energy source, 3 (22%) was while traction or grasping of the gallbladder, 10 (40%) was due to difficulty in calots triangle dissection, 5 (20%) was due to technical snag and 3 (22%) was due to assistant's mistake.

Out of 25, the gall stone spillage varied with 17 (68%) of bile spillage. The two groups have similar outcomes measured in terms of postoperative wound infection, postoperative pain, but the requirement of drain 9 (36%) and postoperative stay 4.57+/- 2.8 with a mean duration of operation 72.71 was significantly higher in perforated gallbladder group.

Conclusion

In our study it was analysed that serious complications of intraoperative gallbladder perforation were low adding to the age old method of saline irrigation and aspiration as the, main stay of management of post spillage along with antibiotic coverage. The evident risk factors found in ultra-sonographic examination was oedematous gallbladder and pericholecystic collection having higher incidence of gallbladder perforation intraoperatively. Also, there is increase requirement of drain and increase hospital stay with prolonged surgical duration in the perforated group.

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INTRODUCTION

Cholecystitis can be defined as gallbladder inflammation which is secondary to blockage of cystic duct or due to impaired gall bladder motility leading to its delayed emptying. Cholelithiasis is the most common biliary pathology identified in the past decades. More than 80% individuals presenting with gall stones in the west are usually asymptomatic. Among the asymptomatic patients approximately around 2% individuals develop symptoms annually and require cholecystectomy.

Cholelithiasis is rare in the first 2 decades. Incidence gradually increases after 21 years and reaches its peak in 5^{th} and 6^{th} decade. Female preponderance is observed for gallstone disease compared to males in a ratio of 4:1[1]. In Indian scenario the incidence of gallstone disease is found to be 4%.

According to NIH (National institute of health) 1992, laparoscopic cholecystectomy is the main stay of treatment in patients with asymptomatic gall stones[2]. In the present era, laparoscopic cholecystectomy has become the gold standard treatment over open surgeries for all cases of cholelithiasis.

As laparoscopic surgery rates are increasing with time, the complications associated with is also noticeably increased. Two notable complications over time includes, bile duct injuries and complications secondary to spillage of bile or stones into the abdominal cavity.

The advantages of laparoscopic cholecystectomy over open includes, decrease in post operative pain, bowel movements return quickly, scars are almost invisible, hence return to the regular activities is quicker and therefore reduces the overall cost. [3,4,5]

The incidence of bile and gall stone spillage during laparoscopic cholecystectomy varies between 10 to 40%. [6.] Various complications one should also keep in mind secondary to gallstone spillage as recorded in various studies include, various abscesses in the abdominal cavity, cutaneous fistula, less commonly obstruction of the small bowel and septicaemia.[7]

Therefore it is necessary to compare the clinical outcomes of patients who had bile spillage secondary to gall bladder perforation to those who did not, in order to discover the most leading cause for intraoperative gallbladder perforation and the methods to avoid the spillage. Hence this study was conducted, to enhance the knowledge about minimizing post operative complications and improve the benefit of laparoscopic surgery.

OBJECTIVES

1) **PRIMARY OBJECTIVE:** To study and evaluate postoperative outcomes that occur during laparoscopic cholecystectomy with intra operative gallbladder perforation and spillage.

2) **SECONDARY OBJECTIVE:**

a) The incidence of Gall Bladder perforation during laparoscopic cholecystectomy.

b) Also to study and evaluate the risk factors causing intra operative gall bladder perforation with bile spillage during laparoscopic cholecystectomy

REVIEW OF LITERATURE

In patients with symptomatic gallstones, the gold standard treatment at present is laparoscopic cholecystectomy.

HISTORICAL ASPECTS:

In 1909, the Museum of Royal College of Surgeons in London had presented a mummy with gallbladder containing 30 gall stones.[8,9]

The general surgical topics including concept of gallbladder was described by Rhazes of Persia and Abicenna around AD 850 to 1037 but did not have understanding of Common bile duct.[10]

In 1562, stones in both gall bladder and common bile duct were described by Falloppio[10].

Fernell in 1588, put forward that the predisposing factor for gall stone formation was stasis. Also proposed that jaundice, faeces white and dark urine.[10]

In 1769, Morgagni analysed disease titled Seats and Causes of Disease, which also included liver and biliary tract.[10]

July 15, 1867 was the year when biliary surgery began in a place called Indiana, when a woman with a large tumour was believed to be an ovarian cyst, when operated turned out to be a huge gallbladder with stones.[11]

Kocher in the year 1878, performed a two stage cholecystectomy. Wound was first packed using gauze till the underneath of gall bladder, further after 8 days , the residual stones in the gall bladder were removed.[12,13,14]

Then in 1885, first cholecystectomy for stones within the gall bladder was performed by Tait in a single stage.[15]

In the year 1897, a rubber tube through cystic duct was passed into common bilge duct by Kehr as a method of biliary intubation.[16]

Common bile duct stones were removed first by Thornton in 1898.[17]

Also, for impacted calculus in periampullary region, Mac Burney described his experience of performing papillotomy with Duodenostomy.[18]

Langenbuch described regarding gall stones in late19th century., first to perform elective cholecystectomy.[19]

1912, was the year of introduction of T tube for biliary drainage.[20]

Later in the year 1924, choledochoscopy was developed by Bakes.[21]

Mirizzi introduced post operative cholangiography in the year 1932, also extended his discovery with introduction of intra operative cholangiography in the year 1937.[22]

1983 marked the year of laparoscopic cholecystectomy as described by Lukichev and his co-workers in case of acute cholecystitis.[23]

EMBRYOLOGY

3rd week of intrauterine life: liver primordium develops, near the distal end of foregut, outgrowth from endodermal epithelium.

Hepatic diverticulum, contains cells that rapidly divide to pierce the septum transversum, (this is a mesodermal plate contained in between stalk of yolk sac and pericardial cavity.

A link can be identified between foregut and hepatic diverticulum, this tapers down and forms bile ducts.

Day 26, a well-defined thickened endoderm appears on duodenum over the ventral side below the hepatic diverticulum base and buds into ventral mesentery called cystic diverticulum. This forms gall bladder with the cystic duct. The cells at the junction between the two forms common bile duct.

10th week of intrauterine life, liver weights about 10 of the body weight containing large number of sinusoids with nest cells, producing red blood and white blood cells.

12th week of intrauterine life, liver starts to generate dark green colour bile. [24]

SURGICAL ANATOMY

Only 50% of individuals have a normal biliary anatomy.

GALL BLADDER:

Gall bladder sits on cystic plate on the under surface of the liver in the midline by a connective tissue. A flask shaped organ with a blind ending diverticulum attaching to the common bile duct through cystic duct.

Gall bladder lies in fossa of liver parenchyma. It measures about 7 to 10 cm in length in adult, having a capacity of 50 cc[25], lined by peritoneum which continues from the liver surface. Gall bladder can have *intraparenchymal pattern* with burying within in the liver parenchyma and in absence of peritoneal lining or can have *mesenteric pattern* connected by a short mesentery having two layers of peritoneum divided by connective tissue and small vessels.

The attachment of cystic plate is directly to the anterior surface of right portal pedicle. Deeper to the cystic plate is the hepatic parenchyma from which small bile duct pierce the gall bladder. When dissection is carried deeper to the cystic plate, it might breach the right portal pedicle causing its injury and to the right hepatic duct.

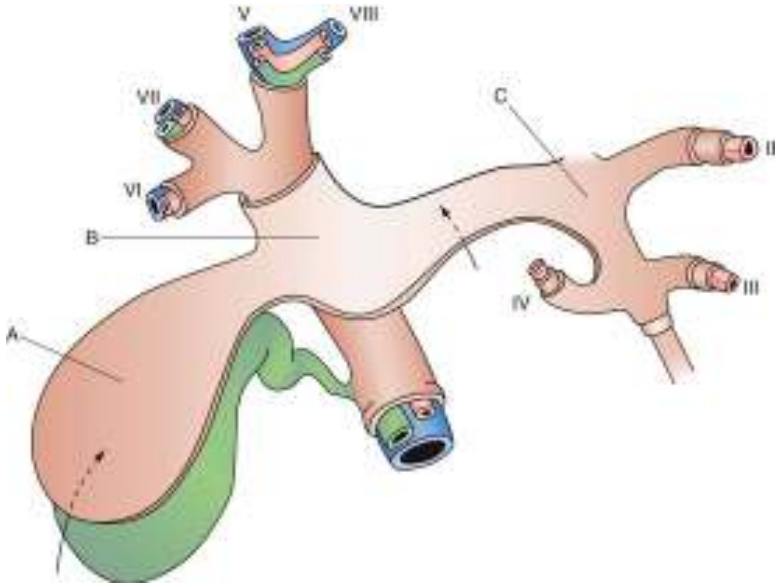


FIGURE 1: CYSTIC PLATE

A) Cystic plate between gall bladder and liver at the base of liver segment IV ,

B) At the confluence of biliary tree, hilar plate

C) Above the umbilical portion of portal vein and umbilical plate

Arrows shows the plane of dissection, left upward arrow, showing cystic plate for cholecystectomy; right upward arrow showing hilar plate to expose hepatic duct confluence.[26]

Parts of Gall Bladder:

1. Fundus

2. Body

3. Neck

4. Infundibulum

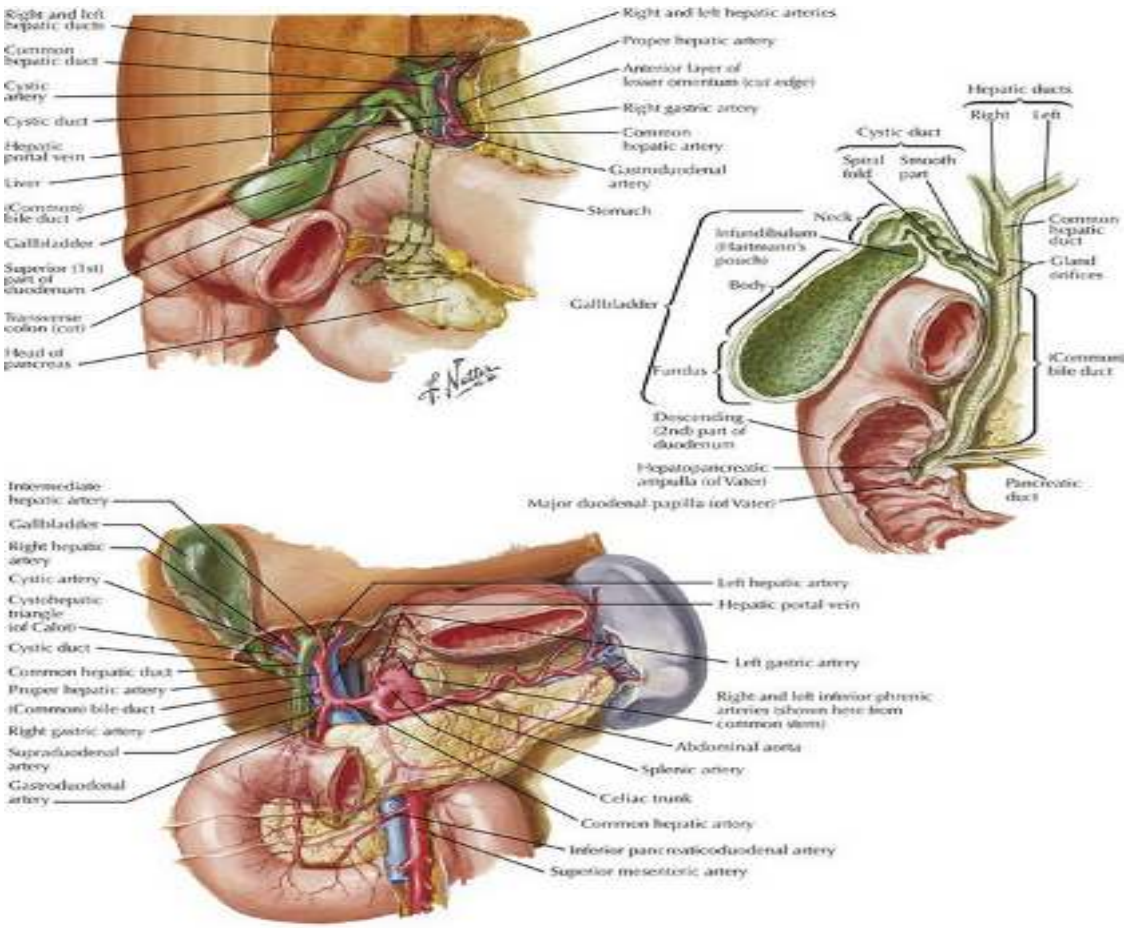


FIGURE 2: GALLBLADDER ANATOMY

NECK:

It is narrow, curved upwards and forwards, later curved backwards and downwards where it becomes cystic duct.

It lies close to porta hepatis at it medial end , has a peritoneal covering which attaches it to the liver, this usually has cystic artery as its content and lies medial to 2nd part of the duodenum.

MEDIAL END OF THE NECK: mucosa is obliquely ridged, where it forms a spiral groove. This is in continuation with the spiral valve of cystic duct.

LATERAL END OF THE NECK: becomes widened; often called as HARTMANN'S POUCH (originally described by Broca); this is found to be secondary to pathological state after Gall Bladder dilatation.[25]

BODY:

It is in continuation with the neck, lies underneath in contact with the liver surface.

ANTERIOR RELATION: 2nd part of duodenum, also the right transverse colon.

INFUNDIBULUM: this is a part of body of gall bladder that joins the neck.

FUNDUS:

Expanded end of the gall bladder, extend downwards and then forwards to the right, extends beneath inferior border of the liver, at the level of 9th right costal margin touches the anterior abdominal wall. This is the place where right rectus abdominus crosses right costal margin.

CLINICAL SIGNIFICANCE: Gall bladder enlargement is best appreciated here.

POSTEROR RELATION: The fundus is related to transverse colon near the commencement of it.

PHRYGIAN CAP: where the gall bladder fundus can be folded back upon the body of gall bladder.[27]

EXTRAHEPATIC BILIARY TREE

CYSTIC DUCT:

3 to 4 cm long. Arising from the neck of gall bladder it passes posteriorly to the left to join the common bile duct to further form common bile duct. Cystic duct enters hepatic duct at an acute angle, may run parallel to it for a certain distance before joining it. Junction is usually near porta hepatis.

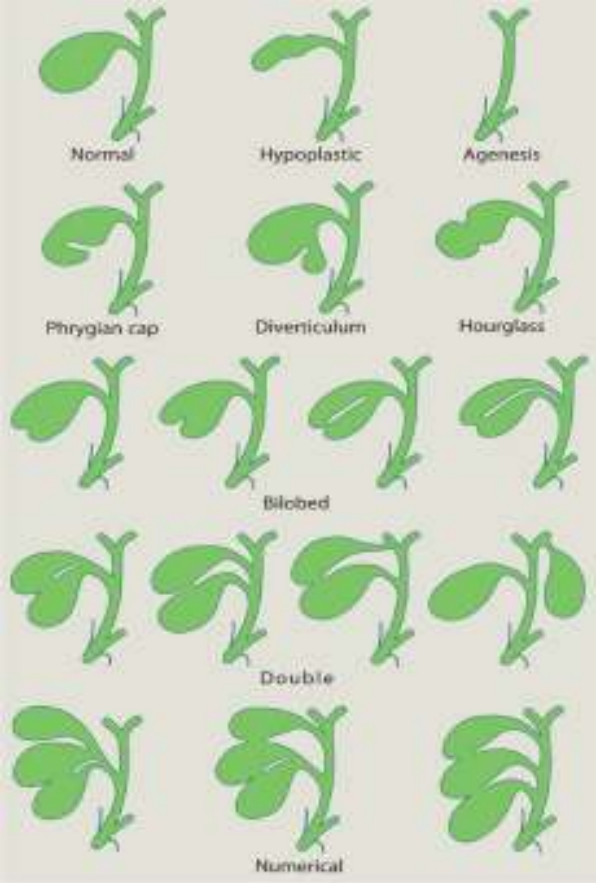


FIGURE 3: ANATOMICAL VARIATIONS OF GALLBLADDER

ANATOMICAL VARIENTS OF CYSTIC DUCT:[26]

1) When cystic duct joins right hepatic duct longer in length, lies anterior or posterior of the common hepatic duct, later joins the right hepatic duct.
2) When it lies at the right edge of lesser omentum, at this place both cystic and common bile duct can be closely adhered.
3) Double or absent cystic duct gall bladder drainage is directly into the common bile duct.
4) Accessory hepatic duct mostly arising from segment V of liver, joins right common hepatic common bile duct or cystic duct or sometimes to the gall bladder. spiral valve of cystic duct due to the mucosa forming 5 to 12 cresenteric folds. In distended ducts these spaces in between folds dilate and duct appears twisted.

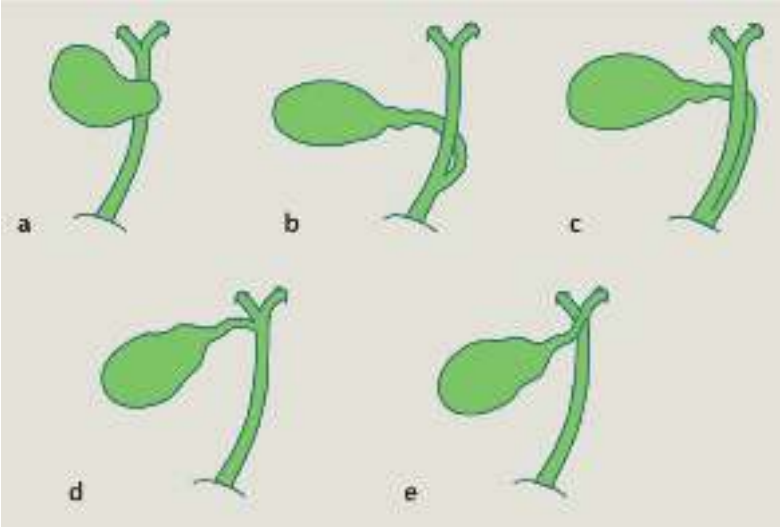


FIGURE 4: ANAMOLIES OF CYSTIC DUCT

a) absent cystic duct.

b) lower confluence of cystic to common bile duct

c) long cystic duct draining into common bile duct

d) cystic duct confluence to right hepatic duct

e) cystic duct draining at the confluence of both hepatic duct[28]

HEPATIC DUCTS:

Common hepatic duct formed by the confluence of right and left hepatic duct near the right end of porta hepatis.

After descending for about 3 cm joins cystic duct and this forms common bile duct.

Location: anterior to portal vein, right to hepatic artery

Near free edge of lesser omentum.

COMMON BILE DUCT:

This is formed by the confluence of cystic duct with common hepatic duct. (ductus choledochus) measures 4 to 8 cm in length and 6mm in diameter.

CBD is divided into:

1) Supradudodenal
2) Infraduodenal
3) Retroduodenal
4) Intraduodenal

Anterior to portal vein and right to hepatic artery CBD passes behind 1st part of duodenum, next to it on its left lies the gastroduodenal artery, final passes in a groove over the superolateral part in the posterior surface of the pancreas.

HEPATOPANCREATIC AMPULLA OF VATER: (FIGURE 5)

It consists of circular muscles which usually surrounds the CBD at its lower part, also the terminal part of the pancreatic duct where the CBD and pancreatic duct confluence just before they enter the 2nd part of duodenum.[29]

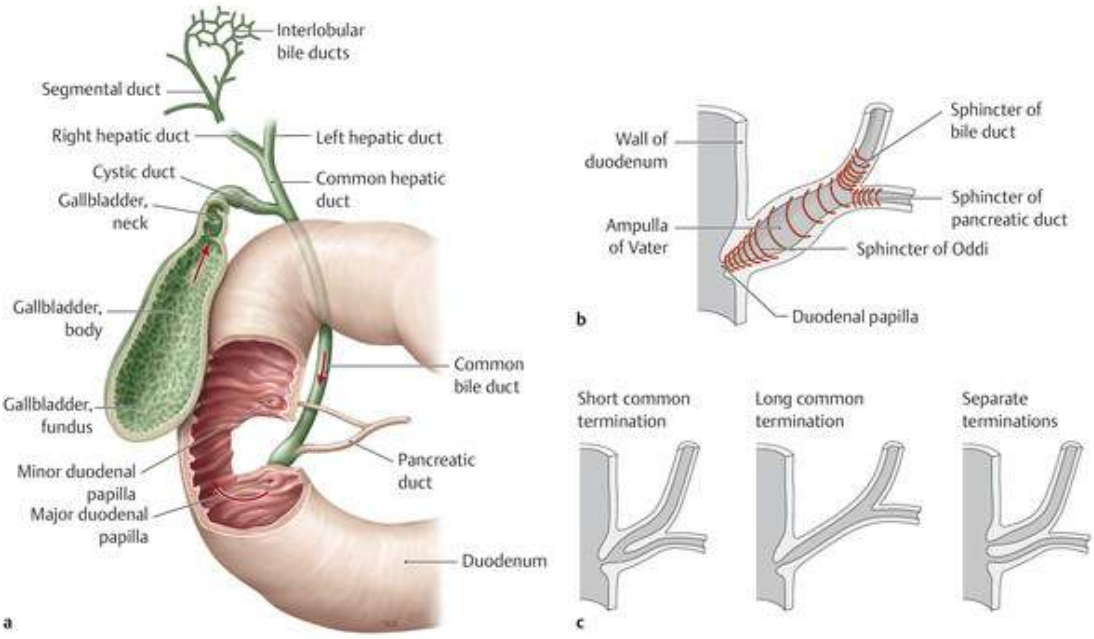


FIGURE 5: HEPATOPANCREATIC AMPULLA OF VATER

HEPATOCYSTIC TRIANGLE AND CALOT'S TRIANGLE:

Hepatocystic triangle:

Upper boundary: segment V of inferior border of liver

Medially: common hepatic duct

Laterally: cystic duct and the neck of gall bladder

CALOT'S TRIANGLE BOUNDARIES:

Upper boundary: cystic duct

Medially: common bile duct

Laterally: cystic duct.

Double layer of peritoneum is enclosing it forming short mesentery of cystic duct.

CALOT'S TRIANGLE CONTENTS [30]

1) Right hepatic artery
2) Cystic artery
3) Cystic lymph node of Lund
4) small cystic veins
5) Autonomic nerves piecing gall bladder
6) Adipose tissue
7) Some accessory ducts draining GB.

BLOOD SUPPLY TO THE GALL BLADDER:[28]

CYSTIC ARTERY:

This mostly is the main supply to the gall bladder.in about 12% of cases double cystic artery may be present. Its origin and course is variable. Most common origin is from the right hepatic artery, with its course posterior to the common hepatic duct over the cystic duct and then to the neck of gall bladder at its superior aspect. Here it gives both superficial as well as deep branches. These arteries anastomose over the body and fundus of GB.

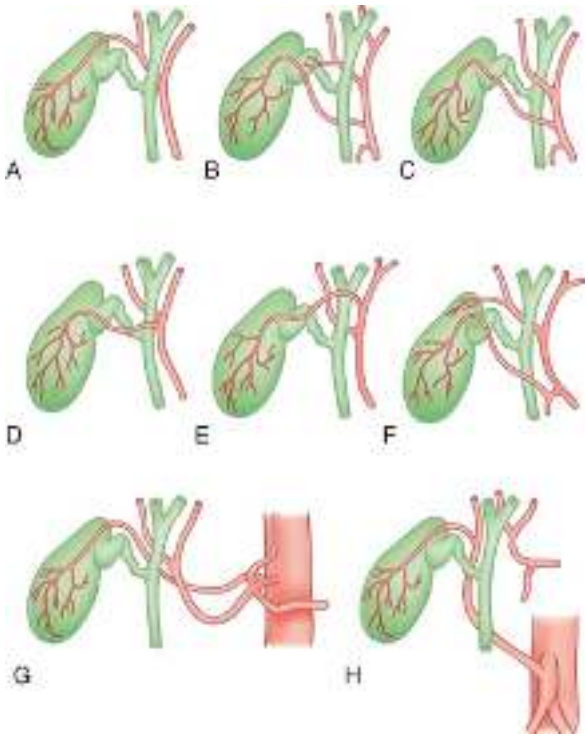
As cystic artery forms an end artery, its occlusion leads to gangrene of the gall bladder.

ANATOMICALVARIATIONS OF CYTSIC ARTERY:[26]

1) Origin of it can vary from left or common hepatic artery, gastroduodenal or superior mesenteric artery.
2) Common hepatic artery or one of its branches can give rise to accessory artery.
3) Close to its origin, cystic artery bifurcates and gives rise to 2 arteries supplying the gall bladder.
4) In case of intrahepatic gall bladder, multiple branch of arterial arcade arise from segment IV and V of liver parenchyma and supply gall bladder.

Also multiple cystic branches arise from the main cystic artery supplying upper part of CBD, common hepatic ducts and lobar hepatic ducts.

FIGURE 6: ANATOMICAL VARIATIONS OF CYSTIC ARTERY



A) Typical course B)double cystic artery C) cystic artery crossing anterior to bile duct D) cystic artery origin from right hepatic artery passing anterior to common hepatic duct. E) origin of cystic artery from left hepatic artery branch F) gastroduodenal artery giving cystic artery branch G) Celiac artery origin of cystic artery H) replaced right hepatic artery giving rise to cystic artery.[26]

CYSTIC VEINS [31]

Venous drainage is also variable.

These are veins that arise from superior surface of gall bladder at the body and the neck and lie between the gall bladder and the liver in the areolar tissue. They further drain into segmental portal vein after entering the liver parenchyma.

Some forms cystic veins and enter directly into the liver after its drainage from hepatic duct veins and upper bile duct veins.

LYMPHATICS[31]

The submucosal and subserosal plexus of gall bladder and cystic duct carry numerous lymphatics. Intrahepatic lymphatics receive lymphatic vessels from hepatic aspect of gall bladder. Rest of the lymphatics drain into cystic lymph node of Lund. situated in calot's triangle above the cystic duct and a node situated at the border of epiploic foramen. The efferent vessels further drain to a node situated over the anterior border of free side of lesser omentum containing celiac group of pre aortic nodes.

Increase of sentinel nodes in cholecystitis or carcinoma distorts the normal anatomy.

INNERVATION:

Hepatic plexus innervates gall bladder and extrahepatic biliary tree. Pyloric branches of vagus (parasympathetic nerve fibres) also innervates retroduodenal part of CBD, also the hepatopancreatic ampulla, causing its relaxation and stimulation of gall bladder.

The sympathetic fibres arising from celiac ganglia whose pre ganglionic cells is from T7 to T9 of lateral horn of spinal cord, inhibiting contraction.

REFERRED PAIN:

Referred pain from CBD dilatation or from gall bladder is to the central of epigastrium. If somatic peritoneum is involved there would be more localized pain to the right upper quadrant of abdomen and to the inferior scapular angle. Further referred pain to the right shoulder in gall bladder diseases is due to phrenic nerve innervation to gall bladder via the hepatic plexus of nerves.

LAPAROSCOPIC ANATOMY OF GALL BLADDER

In laparoscopic first view, primarily subphrenic space is demonstrated, followed by the abdominal side of the diaphragm, also diaphragmatic surface of the liver. Gall bladder of fundus noted to appear from inferior liver surface. Between the left and the right sub phrenic spaces is the falciform ligament dividing it.

On retraction of the fundus of the gall bladder cranially towards right shoulder, adhesions from various surfaces such the omentum, the duodenum and the transverse colon can be noted.

Calot's triangle dissection is important part of laparoscopic anatomy. The calot's triangle is often flattened with distortion if anatomy after retracting it.[32]

Refraining from performing fundus first approach unlike the open method, leads to lack of calot's triangle exposure as well.

Calot's triangle dissection posteriorly or in reverse fashion with frequent flipping of gall bladder leads to further discrepancy in the anatomy.[33]

During posterior dissection of gall bladder in LC, a sulcus/ fissure between the right and caudate lobe of liver called the Rouviere's sulcus is clearly seen in most of the individuals. This is present where the right pedicle enters liver at the level of porta hepatis. Therefore in order to prevent bile duct injury the recommendation is that all the dissection has to be carried out above the level of this sulcus.

This is unaffected by distortion of gall bladder due its pathology as it an extra biliary point.

Critical view of safety is another important aspect of laparoscopic anatomy of gall bladder, essential to prevent bile duct injury.[33]

HISTOLOGY OF GALL BLADDER [34]

MUCOSA: contains variable branching folds that are honey comb like appearance which usually more prominent in a non-distended gall bladder. These surfaces gets flattened with bile is accumulated in the gall bladder.

SURFACE EPITHELIUM: it consists of uniform single layer of tall columnar epithelium having apical villi, containing basal nuclei, and pale cytoplasm. Here goblet cells are not present.

Basement membrane contains multiple capillaries. Beneath it is a loosely arranged fibromuscular layer in circular, longitudinal or oblique fashion consisting of smooth muscles with fibrous tissue.

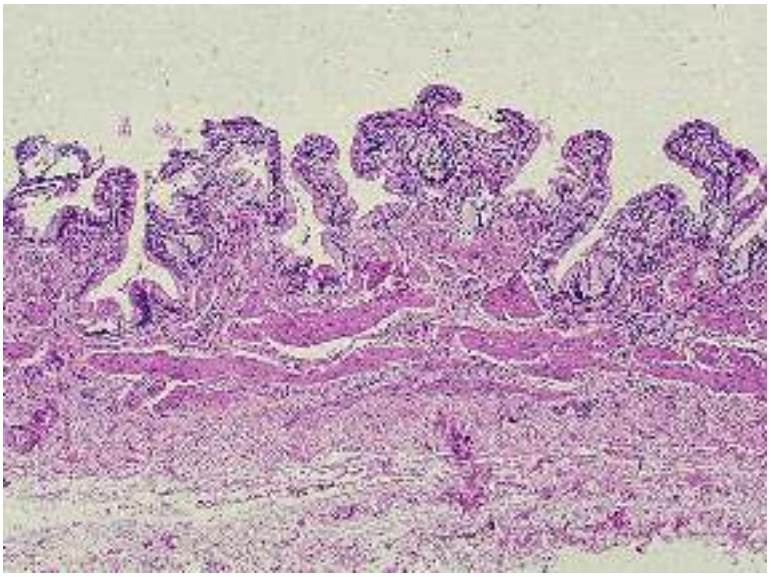


FIGURE 7: HISTOLOGY OF GALLBLADDER

PHYSIOLOGY [35]

Bile is mainly composed of bile salts and bile pigments including other dissolvable substance in alkaline medium.

Total amount secreted sums upto 750 to 1000ml.

Composition of bile include, 85% of water and major organic solvents including bile salts, bilirubin, cholesterol and phospholipids.

The colour golden yellow, is mainly due to glucoronides of bilirubin, biliverdin which are the bile pigments.

TABLE 1: COMPOSITION OF HEPATIC AND GALLBLADDER BILE

Characteristics*	Hepatic Bile	Gallbladder Bile
Sodium	160	270
Potassium	5	10
Chloride	90	15
Bicarbonate	45	10
Calcium	4	25
Magnesium	2	4
Bilirubin	1.5	15
Proteins	150	200
Bile acids	50	150
Phospholipids	8	40
Cholesterol	4	18
Total solids	—	125
pH	7.8	7.2

Significant ranges may be seen.

Bile Acids Secretion:

Their secretion vary from 500 to 600 mg in a day.

Their synthesis is from cholesterol.

The 2 forms of bile acids produced by liver include: cholic acid and chenodeoxycholic acid.

In the gut b, the bacterial flora covert primary bile acids into secondary bile acids these include chenodeoxycholic acid and lithocholic acid.

ENTEROHEPATIC CIRCULATION[26] **(FIGURE 8)**

This entire circulation takes place twice for every meal and almost 6 to 8 times every day.

Bile Salts Secretion:

Secreted in hepatocytes they drain into the canaliculi and further into the small bile ducts. They contain potassium and sodium salts, when these salts are secreted into the bile they conjugate with glycine and taurine, forming primary bile salts. In the intestine they can form secondary bile salts, due to alteration by bacterial gut flora, forming deoxycholate and lithocolate.

They help in lipid solubility by forming micelles hence facilitating its absorption.

The bile salt pool is maintained mainly by gall bladder, followed by liver and small intestine.

Small intestine helps in absorption of 90 to 95 % of bile salts through either non ionic diffusion or mostly by sodium bile salt co-transport containing $Na^{+}K^{+ATPase}$ present in terminal ileum. Resynthesis also happens from liver for the amount lost in stools.

0.2 to 0.4 g in a day is the normal bile salt synthesis rate.

About total of 3.5 g gets repeatedly recycled through the enterohepatic circulation.

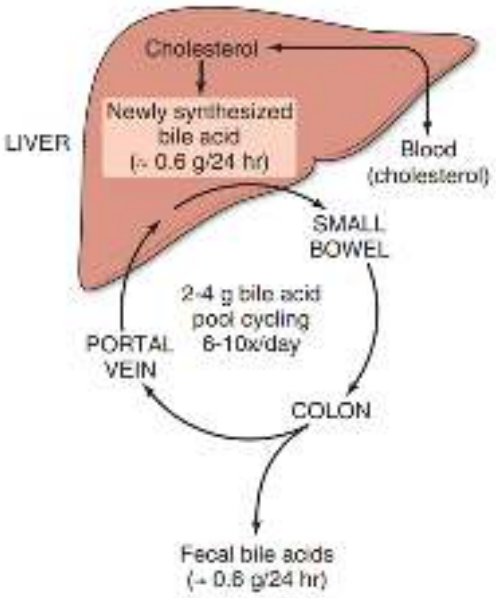


FIGURE 8: ENTEROHEPATIC CIRCULATION OF BILE SALTS

BILIRUBIN METABOLISM AND EXCRETION

Breakdown of haemoglobin helps in formation of bilirubin. Albumin helps by binding the bilirubin in circulation and dissociating with it in liver. Hepatocytes absorbs free bilirubin by binding it to cytoplasmic proteins.

Bilirubin is conjugated by UDP – glucoronyl transferase into glucuronic acid. This acid situated in endoplasmic reticulum forms bilirubin diglucuronide, a water soluble compound.

Most of the bilirubin diglucuronide transported into bile canaliculi actively against gradient.

Some amount escapes into the blood and is further excreted in the urine.

REGULATION OF SECRETION OF BILE

The bile flow modification, flow, storage and regulation is taken care by gall bladder, bile ducts and sphincter of Oddi.

Flow of bile is controlled by humoral, neurogenic and chemical control.

Bile secretion is increased by vagal stimulation and decreased by vasoconstriction of splanchnic blood vessels.

Various hormones responsible for regulation include CCK, gastrin secretin and glucagon, causes secretion of water and electrolyte and hence increase bile flow. These are termed as choleretics, substances which increase bile secretion.

Rate of synthesis of bile salt by hepatocytes with enterohepatic circulation also regulates bile flow.

Sphincter of Oddi's tone decreases on intake of food. Further CCK causes gall bladder contraction and termed as cholagogues. (Substances causing gall bladder contraction)

PATHOGENESIS OF GALL STONES [36]

Factors impairing Gall Bladder function include:

Contraction, absorption and secretion of bile:

1) The precipitated cholesterol crystals and mucus clumps are removed by contraction prevention stone formation. In case of poor contractility and increase gall bladder volume impairs motility and bile stasis leading to gallstone formation.[37]
2) Decrease gall bladder receptor's motor activity, due to age induced decrease in number and sensitivity of receptors for motilin, cholecystokinin and other stimuli.

3) Impaired motility of gall bladder is also attributed to increase gene expression which encodes the primary synthesis of pituitary polypeptide's type II receptor which further activates adenylate cyclase enzyme in the gall bladder leading to development of gall stones.[38]
4) Atropine, somatostatin and methylscopalamine reduces contractility of the gall bladder whereas morphine induces sphincter spasm at the sphincter of Oddi.

COMPOSITION OF GALL STONES [39]

It has majority of unesterified cholesterol along with unconjugated bilirubin, fatty acids, bilirubin calcium salts, calcium carbonate and phosphates along with mucin glycoprotein.

1) The 3 main categories of stones include
    a) Cholesterol stones – 75% of all gall stones
    b) Pigment stones
    c) Mixed stones

CHOLESTEROL STONES: Round or oval in shape, yellow or whitish in colour, burns in bright flame on igniting and floats in water. They contain cholesterol crystals which align radially and mainly consists of cholesterol monohydrate with mixture of bile acids, calcium salt and glycoprotein.

PIGMENTED STONES:

These stones are mostly black, compact and small containing less than 30% of cholesterol crystals, sometimes brown in colour, large and soft which are frequently seen in elderly. The content of these stones is mainly calcium carbonate, bilirubinate and phosphate. The pathogenesis related to the formation of these stones is due to super-saturation with unconjugated bilirubin.

MIXED GALL STONES:

These are more common type of stones, which sink in water and poorly burns in the flame with a lamellar pattern. The most common once are cholesterol-calcific-pigment stones.

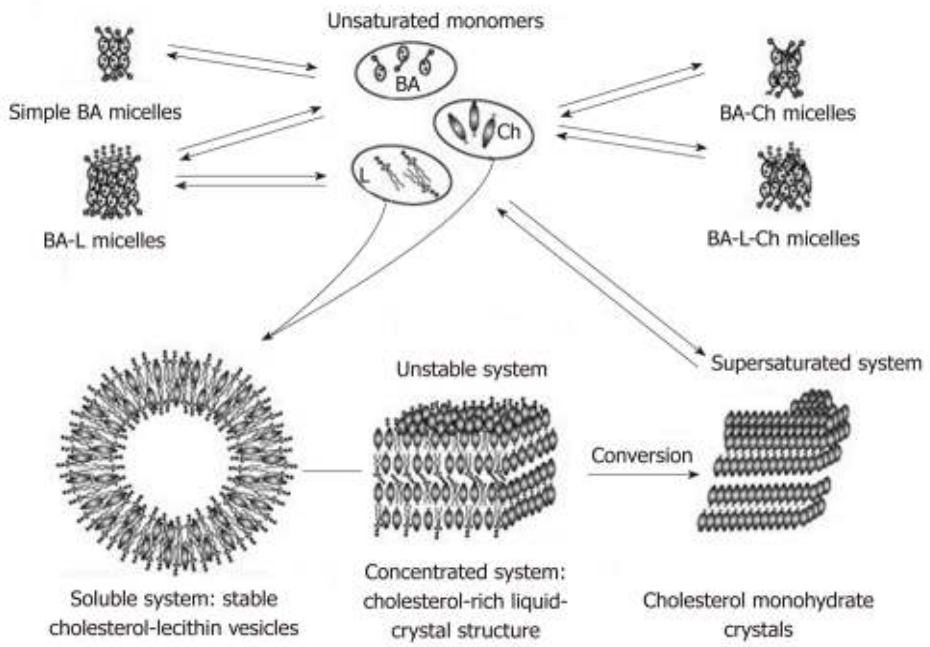


FIGURE 9: FORMATION OF STONES

GALL STONE EPIDEMIOLOGY[40, 41]

AGE

Found in about 10% of adults.

Prevalence increases with increase in age, more after 60 years of age in about 10 to 15% men and prevalence of 20 to 40% in woman.

SEX

2: 1 is identified as the female is to male ratio according to the ultrasonography survey.

The risk increases with females on OCP (Oral contraceptive pills), hormone replacement therapy in post-menopausal age group and in pregnancy.

PLACE

Gall stone is more prevalent in countries like Scandinavian and Chile. There is highest occurrence of by 7 times in North India compared to South India.

The Pima tribe, Mexican America and American Indians have higher prevalence for Gall Stones.

WEIGHT – OBESITY

Gall stone is more prevalent in morbidly obese patients and also in patients who rapidly have weight lose .[42]

There is increase in biliary cholesterol in patients who past this phenomenon is more prominent in obesity [43]

Gall bladder emptying is reduced in obese patients.

DIABETES MELLITUS

Atony of gallbladder can be explained due to autonomic neuropathy in patients with diabetes mellitus which favours super saturation of bile and stone formation. [43]

Morbidity and mortality is not increased in these patients with gall stone diseases. Complications with increased incidence seen in patients with other comorbidities like cardiovascular disease, also in renal insufficiency.

ESTROGEN AND CHOLESTEROL LOWERING AGENTS

Two impacts of excess of oestrogen include, decrease gall bladder motility and increase cholesterol formation.

In woman increase oestrogen therapy is taken in the form of oral contraceptive pills hormone replacement therapy and in pregnancy. Patients on Clofibrate therapy are on increased risk of gall stone formation due to increase in biliary cholesterol.

FASTING

Increase concentration of bile with cholesterol can be observed in prolong fasting thus reducing gall bladder motility. Diet rich in cholesterol low in fibre and high in starch have more risk of gall stone formation.

In a study by Wayne et al, soluble dietary fibre psyllium reduces cholesterol saturation index in bile there by inhibiting formation of cholesterol[43]

VAGOTOMY

Post truncal vagotomy dilated gallbladder can be observed in ultrasonography. [44] earlier studies had proven truncal vagotomy causing increase in gall stone formation by two folds which has failed to be proven at present.

CIRRHOSIS OF LIVER

Patients with cirrhosis has increased risk by three times in formation of gallstones. The pathogenesis is mainly due to chronic haemolysis leading to pigmented stones. Due to the debilitating condition cholecystectomy has an adverse effect and causes increase morbidity and mortality in these patients. [45]

INFLAMMATORY BOWEL DISEASE

Patients having ileal dysfunction or jejuno–ileal operation have increase chance of gall stone formation, [43] this due to impaired absorption of bile salts leading to increase formation of gall stone.

TPN AND GALL STONE FORMATION

45% of patients who are taking TPN fora long term have chances of forming symptomatic gall stones. This is due to altered motility of gall bladder and its decrease stimulation for contraction leading to biliary lithiasis.[46]

MISCELLANEOUS

10 to 40% of sickle cell disease 10% of thalassemia and 43 to 66% of hereditary spherocytosis have the property to form pigmented gall stones.

Progesterone excess in pregnancy tend to decrease gall bladder motility in pregnancy and propensity to form gall stones. No increase in mortality to biliary disorder surgery in second trimester.[47]

Gall stone is prevalent in 70% of gallbladder carcinoma.[48]

CLINICAL PRESENTATION

SYMPTOMS

Though more than two third of patients with gall stones are asymptomatic, the rest present with pain which is intermittent in nature in right upper abdomen, radiating to back or to right shoulder. This can be associated with nausea, dyspepsia or vomiting. High fat in food can provoke these symptoms is some. The abdominal pain is termed as biliary colic.one attack to another can vary between week, months or even many years. Nonspecific symptoms are common in certain individuals.

The gall stones can produce acute cholecystitis, chronic cholecystitis or obstructive jaundice or biliary colic.

In patients with obstructive jaundice or cholangitis, fever, pain and jaundice can be elicited. This is termed as Charcot's triad, when this is associated with hypotension and altered mental status indicates Raynaud's pentad.

PHYSICAL SIGNS

On examination slight discomfort may be present on deep palpation in right upper quadrant,

Murphy's sign which is elicited by palpation in right hypochondrium on patient's deep inspiration. This is positive in acute cholecystitis.

Other symptoms and signs include fever with tachycardia.

One can notice palpable enlarged gall bladder in empyema or mucocele of gall bladder.

Boa's sign is due to hyperesthesia present over the posterior aspect of 9 and 11^{th} rib, classically seen in patients with acute cholecystitis.

COMPLICATIONS OF GALL STONES in the gall bladder:

It can cause:

Acute or chronic cholecystitis.

Perforation of gall bladder

Gangrene of gall bladder

Mucocele or empyema of gallbladder

Carcinoma of gall bladder

In bile duct it Causes:

Cholangitis

Obstructive Jaundice as well as pancreatitis.

In the intestine:

Gall stone ileus leading to intestinal obstruction.

INVESTIGATIONS

LIVER FUNCTION TESTS

In the absence of CBD obstruction or any gall bladder pathology, biliary colic does not produce abnormal liver function.

Obstructive jaundice due to choledocholithiasis is increases bilirubin and ALP levels in blood.

ROUTINE BLOOD INVESTIFATIONS

Complete blood picture, renal function test and coagulation profile.

Neutrophilic leucocytosis is predominantly seen acute cholecystitis, also in cholangitis.

PT/ INR raise usually seen in case of liver dysfunction.

IMAGING STUDIES

PLAIN RADIOGRAPH

In plain abdominal films about 15% stones are only visible as they render to be radiopaque due to presence of calcium.

These plain radiograph are important in order to check for perforation and air fluid levels, dilated bowel loops and pneumonia of lower lobe.

1) **ULTRASONOGRAPHY**[49]

This is primary investigation in patient presenting with gall stone disease or diseases of biliary tree. The sensitivity ranges from 95 to 98 % [26]

The various information that can be identified through ultrasonography includes, the gall bladder wall thickness, pericholecystic collection, number and size of calculi and impacted calculi cystic duct. Dilated intra and extrahepatic biliary radicle, suggesting obstruction.

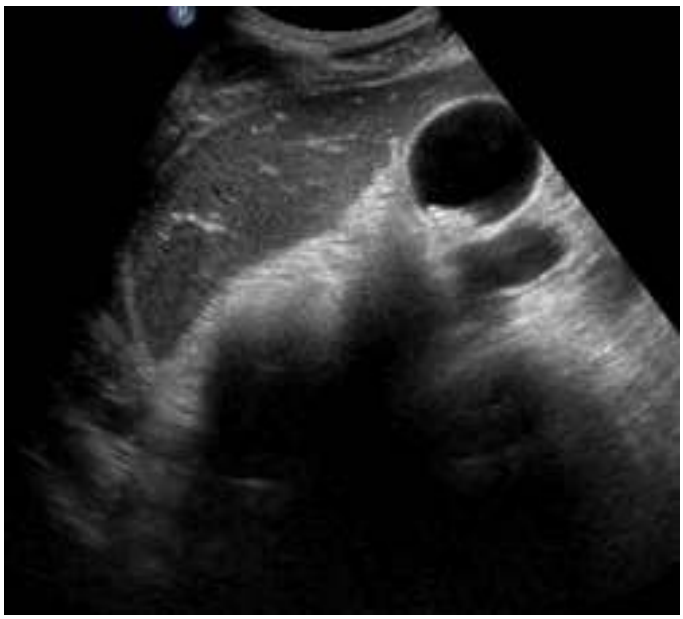


FIGURE 10: SONOGRAPHY IMAGE SHOWIG GALL STONES

2) COMPUTED TOMOGRAPHY

The sensitivity rate for computed tomography in patients with gall bladder and biliary pathology ranges from 55 to 65 % as most of the gall stones are iso-dense. Only calcified gall stones can be identified.

3) MAGNETIC RESONANCE IMAGING

T2W images and MRCP sequences are used to identify gall stones. MRCP also help in identifying CBD stones.[50]

4) **ERCP (Endoscopic retrograde cholangiopancreatography)**

This is the most reliable investigation to rule out bile duct stones. Using a fibreoptic duodenoscope cannulation of ampulla of vater can be done.

Here a water soluble contrast is used to inject in to the bile duct to differentiate g the surgical from the non surgical jaundice. Also by using brushings from bile duct cytology and microbiology can be assessed.

The complication which is commonly encountered is bile leak, biliary sepsis and bleeding. [43] The most severe complication include acute necrotizing pancreatitis.

5) INTRA OPERATIVE CHOLANGIOGRAM

This is the commonest method used during laparoscopic cholecystectomy in order to assess choledocholithiasis and to delineate biliary anatomy.

This was first described by MIRRIZI in 1937.

It is seldom used routinely as it can cause ductal strictures, pancreatitis, time and money consuming.

It is important, safe and effective in evaluating the bile duct. A small incision made in the cystic duct close to the junction of gall bladder neck. A 5 Fr catheter, 60 cm in length is advanced into cystic duct

TREATMENT

1) ESWL (EXTRACORPOREAL SHOCKWAVE LITHOTRIPSY)

Extracorporeal shockwave lithotripsy was used first in 1980 in Munich. This was primarily developed to treat renal calculi.[51]

Here it helps in fragmentation of gall stones and in gall bladder clearance in combination with oral bile salts. [52]

The important criteria for gall stone

a) Stones size less than 3 cm

b) Cholesterol stones

c) Less than 3 in number

The percentage of recurrence in these cases varies from 5 to 7 % in a year to about 15% in 2 years.

Advantage of ESWL, decrease morbidity as it is non-invasive, while the disadvantage include increase in cost, increase chances of recurrence and high failure rate.

2) MEDICAL MANAGEMENT

Most important for medical management is ursodeoxycholic acid present less than 5% this is conjugated by taurine and glycine and excreted into the bile. They undergo enterohepatic circulation.

USES →

1) Used for small non calcified cholesterol stone dissolution by 50 % by giving dosage of 10mg/kg in a day for about 1 to 2 years.
2) Used also in biliary cirrhosis and cases with decreased liver function in the dosage of 13- 15 mg/kg in a day
3) Used also in obese patients who are undergoing weight loss therapy.

3) SURGICAL APPROACH

OPEN CHOLECYSTECTOMY

Done in places laparoscopic approach is not available or in conversion of laparoscopy to open in about 5 to 35% individuals. Other indications include:

Poor cardiac or pulmonary reserve

In 3rd trimester pregnancy

In suspected cases of gallbladder carcinoma. In cases of cirrhosis with portal hypertension.

LAPAROSCOPIC CHOLECYESTOMY

This is the standard approach in cases with cholelithiasis.

There are proven studies with less hospital stay reduced complication and conversion rate. [53-55]

Primary treatment modality for cholecystitis is laparoscopic cholecystectomy. [56] In the western countries it is one of the most common major abdominal procedure performed. [57] The advantage of laparoscopy is that it decreases post operative pain therefore need for analgesia is reduced and shortens hospital stay to even 24 hours. Also the advantage of returning to activity within a week of surgery compared to open cholecystectomy by 1 month. [58]. Indications for laparoscopic cholecystectomy is similar to open.

About 2 to 3 % of patients all asymptomatic patients may become symptomatic in a year. The need for cholecystectomy is decided by weighing the risk and complications with or without operation.[59] In case of immunocompromised individuals irrespective of symptoms treatment has to be given.

INDICATIONS FOR LAPAROSCOPIC CHOLECYSTECTOMY

Elective cholecystectomy is the indication in patients with biliary colic and gall stones on sonography.[60] Whereas in a patient biliary colic in absence of stones, biliary dyskinesia needs to ruled out by doing CCK- DISIDA scan.[61]

Others include acute and chronic cholecystitis, porcelain gall bladder, gall bladder polyp, gall stone induced pancreatitis, asymptomatic gall stones secondary to sickle cell disease, with patient on total parenteral nutrition and chronic state of immunosuppression.

CONTRAINDICATIONS FOR LC

These include:

ABSOLUTE

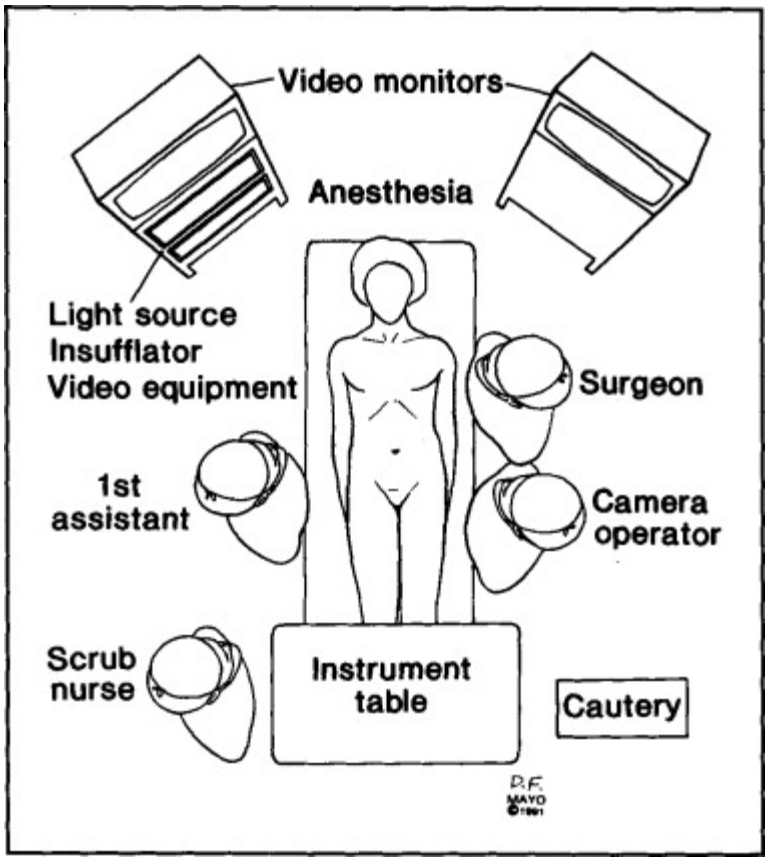
1) Patients who cannot tolerate general anaesthesia
2) Coagulation disorder
3) Congestive cardiac failure (EF 20 %)
4) Pulmonary diseases

RELATIVE

1) Hemodynamic instability due to diffuse peritonitis
2) Cholangitis
3) Cirrhosis with portal hypertension
4) Previous abdominal surgeries

STEPS OF LAPAROSCOPIC CHOECYSTECTOMY

FIGURE 11: SETTING OPERATING ROOM



At the beginning of the procedure, all equipment are to be examined by the surgeon for their normal functioning.

The monitors are usually placed over each of the patient's shoulder. They are angled contralaterally.

Patient placement is in supine position with both the hands at the side of the body, with appropriate straps and foot board in order to secure the patient on the operating table.

ANESTHESIA TECHNIQUE

General anaesthesia is the preferred in all laparoscopic cases. Nitric oxide is generally avoided as there are chances of bowel distension with it. Cautious use of fluid intra operatively after taking into consideration the insensible loses.

Pneumoperitoneum itself in a stimulator for antidiuretic hormone. When carbon dioxide pneumoperitoneum is used it is important to monitor end tidal Pco_2, in order to look for hypercarbia and acidosis. Once intubation is done, a foley's catheter is placed and a nasogastric tube is placed for suction and decompression of stomach.

PNEUMOPERITONEUM

Is essential in order to create a proper working space in the abdominal cavity.[62] Carbon dioxide is used and the pressure is maintained at 15 mmHg.

Other gases that can be used include: helium, argon, nitrous oxide.

The 2 techniques of pneumoperitoneum include:

1) VERESS NEEDLE TECHNIQUE (CLOSED)

Here pneumoperitoneum is created using Veress needle, by sliding it through the umbilicus and confirming its position using normal saline by using a plunger less syringe. Further CO_2 insufflation is done.

The initial flow rate of CO_2 is at 2litre/min.

Needle's intra-abdominal position is confirmed by uniform distension of abdomen and tympany. Once confirmed the flow rate is increased to 15 mmHg.

2) OPEN HASSAN'S TECHNIQUE

In this method the pneumoperitoneum is obtained under direct vision by opening the abdominal cavity in layers. Once peritoneum is entered a 10mm trocar is inserted and secured with sutures. Further CO_2 insufflation is done.

STEPS OF LAPAROSCOPIC CHOLECYSTECTOMY IN DETAIL:

A) PORT PLACEMENT AND EXPOSURE: (FIGURE 12)

In the periumbilical region a 5- or 10-mm port is placed.

Through a 30 or a 0-degree laparoscope the entire abdomen is inspected, including liver, gall bladder, omentum, stomach, small and large bowel and pelvis.

This is to evaluate and rule out other pathologies which also includes adhesions and in order to ensure no evidence of iatrogenic injury during initial entry on first port placement.

Under direct vision 2 additional 5mm ports are placed in the right upper quadrant, one in the right anterior axillary line just about 2 cm below costal margin and the other in the right mid clavicular line.

Usually a 10mm port is placed in the sub xiphoid region after locating the falciform ligament, with its tip towards right of it.

Patient is now placed in reverse Trendelenburg position with rotation to the left by 15 degrees, allowing colon, omentum and small bowel to move away from gall bladder.

FIGURE 12: PORT PLACEMENT

B) EXPOSURE OF PORTA HEPATIS (FIGURE 13)

The fundus of the gall bladder is lifted and retracted upwards towards right shoulder. Here an atraumatic grasper is used. This exposes the hilum of the liver and the calot's triangle.

The adhesions over the under surface of the liver over the gall bladder is taken down from fundus towards the neck with blunt dissection and cautery combination.

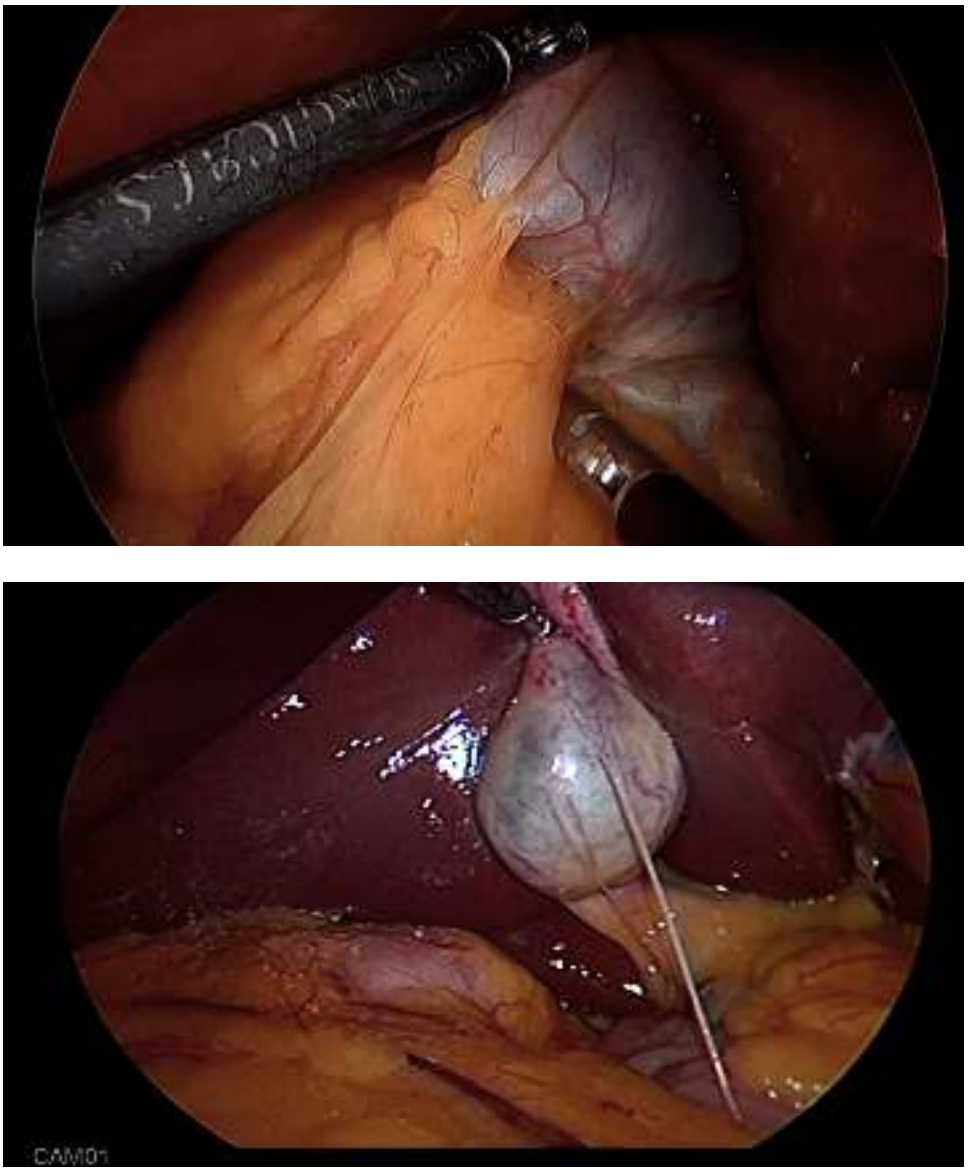


FIGURE 13: EXPOSURE OF PORTA HEPATIS

C) CALOT'S TRIANGLE DISSECTION (FIGURE 14)

For the exposure of this triangle infundibulum is retracted caudally and laterally. The peritoneal layer over the neck of the gall bladder exposed and opened using cautery.

Further this is continued laterally and superiorly 1 to 2 mm from the edge of the liver this helps in calot's triangle dissection both anteriorly and posteriorly. (Flag technique)

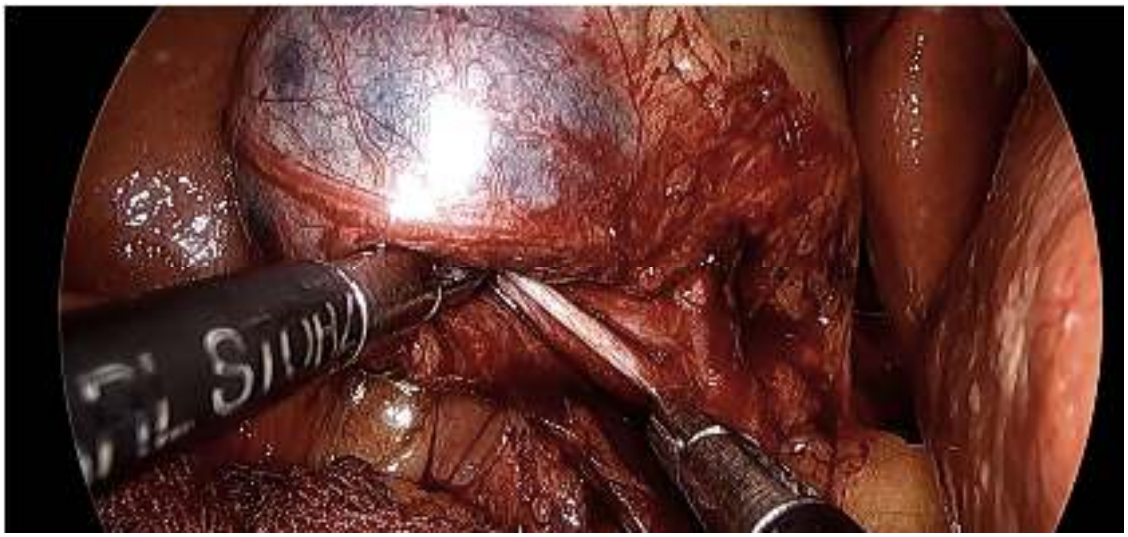


FIGURE 14: CALOT'S TRIANGLE DISSECTION

D) OBTAINING CRITICAL VIEW OF SAFETY (FIGURE 15)

This was described in 1995.[63,64]

Most important technique to prevent inadvertent bile duct injury during dissection and clamping and requires complete dissection of calot's triangle and infundibulum's separation from liver bed.

The neck of the gall bladder is identified and all attachments are taken down until only 2 structures are obtained passing through the gall bladder that is the cystic artery and cystic duct. CBD need not be identified always and dissected. (Danger

Zone: this is the area between CBD and cystic duct.)[65] A blunt dissection is usually done using a Maryland in order to make a window behind the cystic duct.

FIGURE 15: CRITICAL VIEW OF SAFETY

Both artery and duct are to be clipped. 2 clips over the duct side and one over the side of gall bladder.

Milking of the stones away from cystic duct towards the gall bladder is essentially done before the clip is applied. Straight scissors or hook used to divide between the clips. Usually the artery is divide first followed by the cystic duct.

If cystic duct has impacted stones a partial cut is made over the cystic duct and the stones is milked and extracted.

FIGURE 16: CLIPPING OF CYSTIC ARTERY

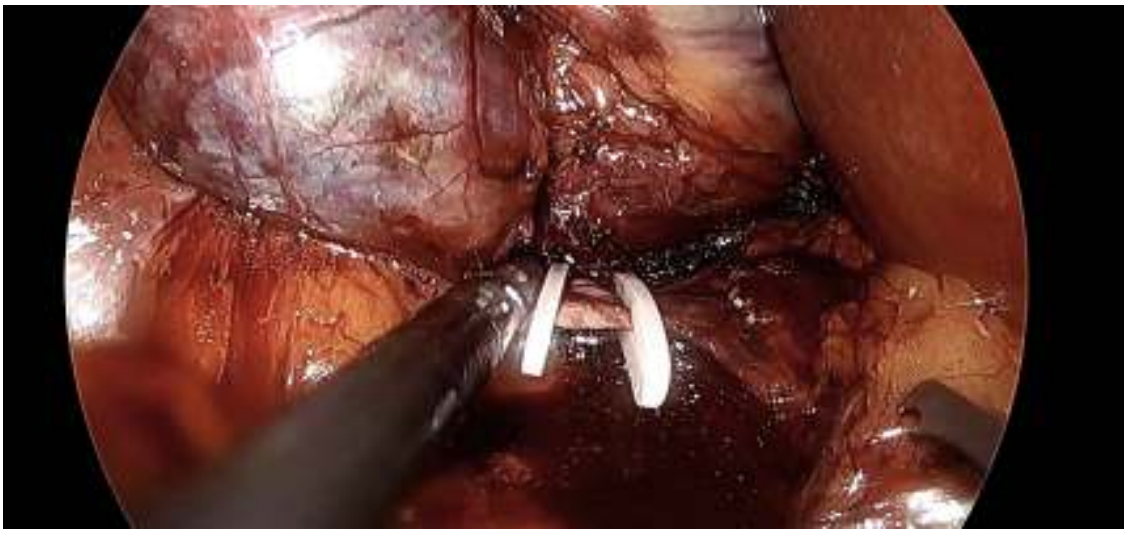


FIGURE 17: CLIPPING OF CYSTIC DUCT

Alternatively, infundibular cystic technique is used where, after retraction of infundibulum, isolation of cystic duct is done both anteriorly and posteriorly of calot's triangle and isolated and traced towards gall bladder.

E) DETACHING THE GALL BLADDER FROM THE FOSSA: (FIGURE 18)

The cystic plate is exposed by dissecting the gall bladder from its bed by using a spatula or monopolar hook cautery or monopolar scissors. Much care has is to be obtained In order to prevent gall bladder perforation by giving only necessary traction and counter traction and preventing injury to the liver and porta hepatis.

If iatrogenic bile spillage is noted, immediately it is controlled by a tie or by grasping the opened area. Suction and irrigation of bile and gall stones has to be performed immediately.

The liver bed with the gall bladder fossa is inspected prior complete gall bladder detachment.

Haemostasis has to be obtained adequately; further total detachment is performed after confirming the clips are securely placed.

FIGURE 18: DETACHING GALLBLADDER FROM THE FOSSA

F) GALL BLADDER EXTRACTION

The sub xiphoid port is used for camera placement and the gall bladder is grasped by the beck through the umbilical port.

Advantages of Periumbilical port delivery of gall bladder:

a) Decrease pain on enlargement compared to other ports.

b) Better cosmetic effect

The gall bladder is placed in an endobag before extraction to prevent any spillage. A claw shaped forceps is often used to grasp the gall bladder at its neck and is pulled out through the incision. A small incision is made over it bile suctioned through the incision and the stones crushed and removed for easy retrieval of gall bladder. Robert clamp is used to increase the facial defect in cased where the gall bladder is thick.

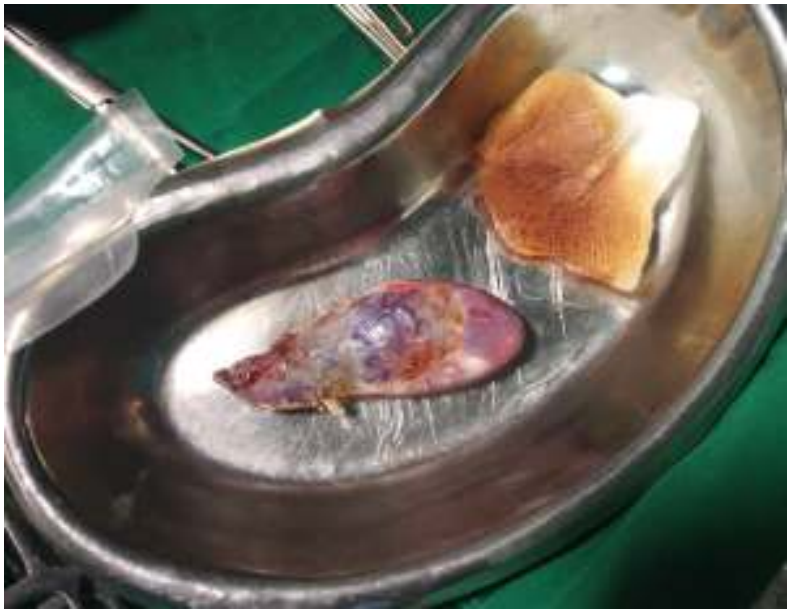


FIGURE 19: GALLBLADDER SPECIMEN AFTER EXTRACTION

G) INSPECTION AND IRRIGATION

Once the extraction of gall bladder is done, the port is placed back, bleeding from the port is being inspected.

Saline irrigation to the gallbladder fossa Morison's pouch paracolic gutter is performed.

Venous ooze is usually controlled by hemlock solution soaked gelatine sponges, rarely by intracorporeal suturing.

H) DRAINAGE AND CLOSURE

A drain is placed when bleeding from liver bed is suspected and in case of iatrogenic bile spillage through gall bladder perforation.

Further trocars removed under direct vision pneumoperitoneum released and post closure and skin closure performed.

CONVERSION TO OPEN[66,67]

These could be due to various factors which include:

1) In patients with acute severe cholecystitis due increase inflammation causing oedema and adhesions.
2) Multiple previous surgeries making it difficult to have laparoscopic peritoneal access.
3) In patients with liver cirrhosis, which can cause severe haemorrhage and liver injury.
4) Patients suffering from acute pancreatitis, as it is difficult to visualize calot's due to oedematous head of pancreas.
5) Pregnancy, in third trimester – uterine injury rates would be very high.
6) Cholangitis leading to septic shock

7) Abdominal access for laparoscopic approach might be difficult in morbidly obese individuals.

DIFFICULTY IN GALL BLADDER EXTRACTION

Is commonly seen in thickened gall bladder or with gall bladder containing large stones.

In such cases, gall bladder has to be placed in an endo bag through the abdomen the neck is retrieved a small incision is made the stone is further crushed and removed.

COMPLICATIONS OF LAROSCOPIC CHOLECYSTECTOMY[60]

Though extremely safe the procedure has a mortality rate ranging from 0.22-0.4%. 5% patients can succumb to major complications [61]

1) Haemorrhage from blunt adhesion dissection or from calot's triangle dissection and bleeding or from trocar site.
2) Intra operative Gall Bladder perforation, bile spillage and Gall stone spillage, commonly due electrocautery usage or while detachment from liver bed, while grasping or traction by assistant, in case increase adhesions or frozen calot's triangle.

INTRA OPERATIVE GALL BLADDER PERFORATION HAS VARIOUS RISKS, THESE INCLUDE:

1) In cases where gall bladder is inflamed in acute condition, this might cause the friable tissue having higher susceptibility to tear.
2) In presence of adhesions which are thick and dense , can lead to difficulty in gall bladder dissection and can lead to perforation,

3) When decompression of distended gall bladder is not performed it has higher chances of perforation [49]
4) Instrumental injury during manipulation of gall bladder, or while dissecting the gall bladder from its fossa over the liver bed or while extraction of the gall bladder from the port site causing the tear.
5) Spilled bile and stones are also observed in cases with slippage of clip applied to the cystic duct.[67]

Considering these factors as a learning curve while operating for laparoscopic cholecystectomy with high chances of perforation in surgeon's early part of the career brings scope to this study.

FIGURE 20: BILE SPILLAGE WHILE REOMVING GALL BLADDER FROM ITS FOSSA

FIGURE 21: GALL BLADDER PERFORATION AND STONE SPILLAGE WHILE GRASPING

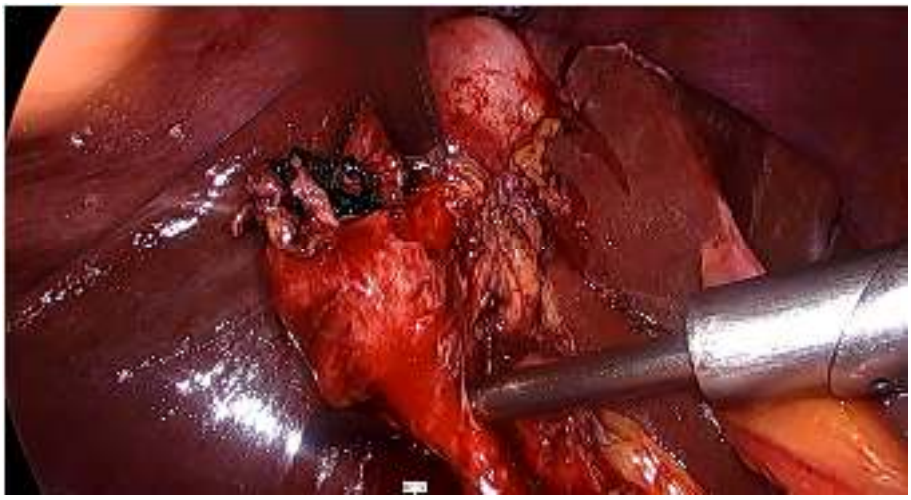


FIGURE 22: BILE SPILLAGE DUE TO FRIABLE GALL BLADDER

FIGURE 23: DENSE ADHESIONS OVER GALL BALLDER

FIGURE 2 : DIFFICULTY IN CALOT'S TRAINGLE DISSECTION – BILE SPILLAGE AT THE BODY OF GALL BLADDER

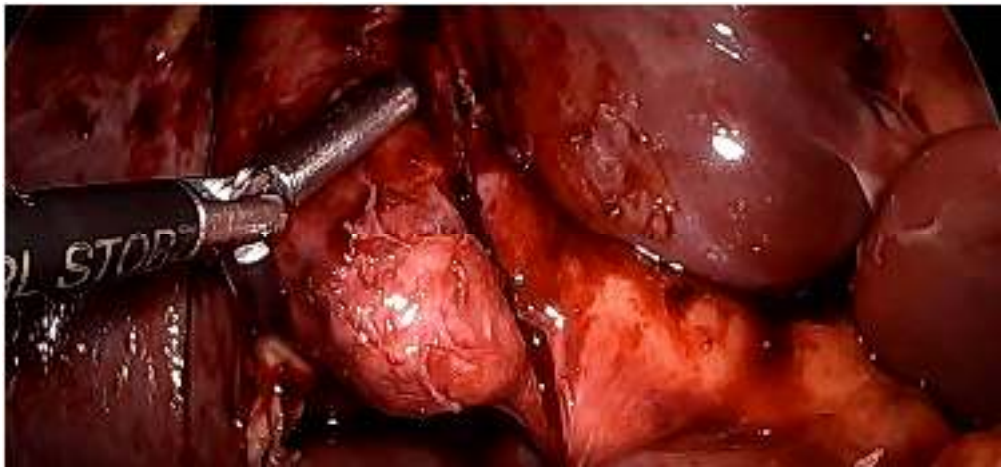
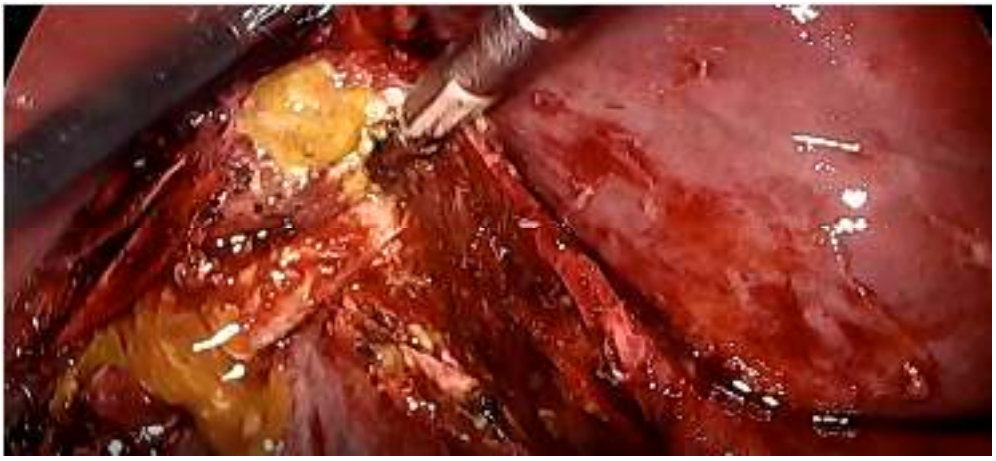


FIGURE 25: TRACTION AND GRASPING – SPILLAGE OF PUS (EMPYEMA GALLBLADDER)



COMPLICATIONS DUE TO GALL BLADDER CONTENT SPILLAGE INCLUDE:

1) Spilled gall stones initially lost was considered as in significant but has been recognized to cause significant morbidity in in post operative period ranging from 0.1 to 6 %.
2) The various post operative complications include, fever, pain, bowel obstruction, fistula formation or sinus infection.
3) Various risk factors after spillage of bile and stones are due to either infected bile spillage, presence of mixed stones or due to multiple stones (about 15) or increase in stone size (more than 1.5 cm)

VARIOUS COMPLICATIONS POST SPILLAGE CAN INCLUDE :[68]

1) Patient can clinically present with complications like intra-abdominal abscesses (liver, subhepatic space, retroperitoneal or pelvis).
2) Various cutaneous manifestations like port site infection, fistula formation or sinus tract formation.
3) Rare Gastrointestinal manifestations include acute pancreatitis, small bowel obstruction, perforation or necrosis.
4) Uncommon respiratory system manifestation would be pleural effusion, empyema haemoptysis, pleurolithiasis.
5) Miscellaneous, peritoneal granuloma and incarceration with hernia.

PREVENTION OF INTRAOPERATIVE GALL BLADDER PERFORATION

In order to avoid complications due to spillage

1) one has to be aware of the likely causes of perforation intra operatively, like inflammation, adhesions
2) to attain precise dissection skills,
3) to handle tissues with care,
4) to use the electrocautery devices with caution,
5) At most care has to be taken during dissection of gall bladder from the liver bed, can save time lost in stone retrieval.
6) Usage of endobag for retrieval of gall bladder from port site.

In case a difficult gallbladder is identified during laparoscopic surgery due to adhesions, inflammations or distension of gallbladder, there is no single ideal way of approach according to studies.

The various options given in the studies include:

a) Subtotal cholecystectomy
b) Perioperative cholangiogram
c) Fundus first approach
d) Also conversion to open in some cases.

TREATMENT OF BILE SPILLAGE

Despite all measures it is inevitable sometimes to have intra operative gall bladder perforation and bile spillage. The measures to be taken in such cases include

1) Suction and irrigation will aid in removing majority of stones and clears all the bile.
2) A draining tube is often placed.

3) The site that is perforated is often closed with a ligature or held by a grasper.
4) Retrieving all the spilled gall stones using a bag placed the liver. [69]
5) Antibiotic usage in postoperative period with visible spillage and with high amount of bile spilled.

   Most important part of the event post spillage is the documentation regarding the intra operative perforation and spillage of bile and stones. If suspecting in lost stone in the peritoneal cavity vigilant postoperative care examination if required imaging has to be performed.[70,71]

USE OF DRAIN IN LAPROSCOPIC CHOLECYSTECTOMY

The drain use is divided by surgeon's experiences and beliefs. [72]

Various causes of collection: bile leak or spillage secondary to intra operative gallbladder perforation which can lead to biliary peritonitis, this could be due to slippage in cystic duct clip or from aberrant bile duct.

Postoperative haemorrhage is another reason for drain placement.

Excess CO_2 insufflation will be allowed to escape through drain site, these decreases the shoulder pain.

In case of excess cautery usage or excess of dissection it will help in draining serous fluid. [73]

When collection of blood is not drained post operatively might lead to pyrexia, increase wound infection rates and prolong hospital stay. In case of presence of serous fluid is being absorbed by peritoneal cavity. Most of the collection are not clinically significant and does not require intervention unless present with symptoms.

Johansson et al. performed many lap cholecystectomy under day care admission with decrease re admission rates. Insertion of drain however caused prolong hospital stay [74]

Also pain related to drain placement, negates the important benefit of less pain in laparoscopic surgery.it is also the most evident cause of delay in discharge after the procedure.[75]

POST OPERATIVE PAIN IN LC

Pain in abdomen is found to be greater in upper abdomen. Predominant pain after laparoscopy is due to visceral organ pain, less frequently due to shoulder pain which increases in severity with passing days.

Post operative pain is mainly an acute pain which is divided into somatic or visceral pain.

Somatic pain is due to skin and subcutaneous tissue and is well localized pain , described as throbbing, pricking or burning sensation. Pain from internal organ or its capsule causes visceral pain

PAIN PATHWAY :[76]

First order neuron: cranial nerve and dorsal root ganglia in head and heck respectively. Eg: trigeminal nerve having gasserian ganglion.

Second order neuron: ascending or descending pain fibres synapse with second order neuron in ipsilateral dorsal horn of grey matter. Most of these form lateral spinothalamic tract by crossing over the midline and send fibres to thalamus and nucleus raphe with periaqueductal grey matter.

Third order neuron: location in the thalamus, these send somatosensory fibres to area I and II of cerebral cortex.

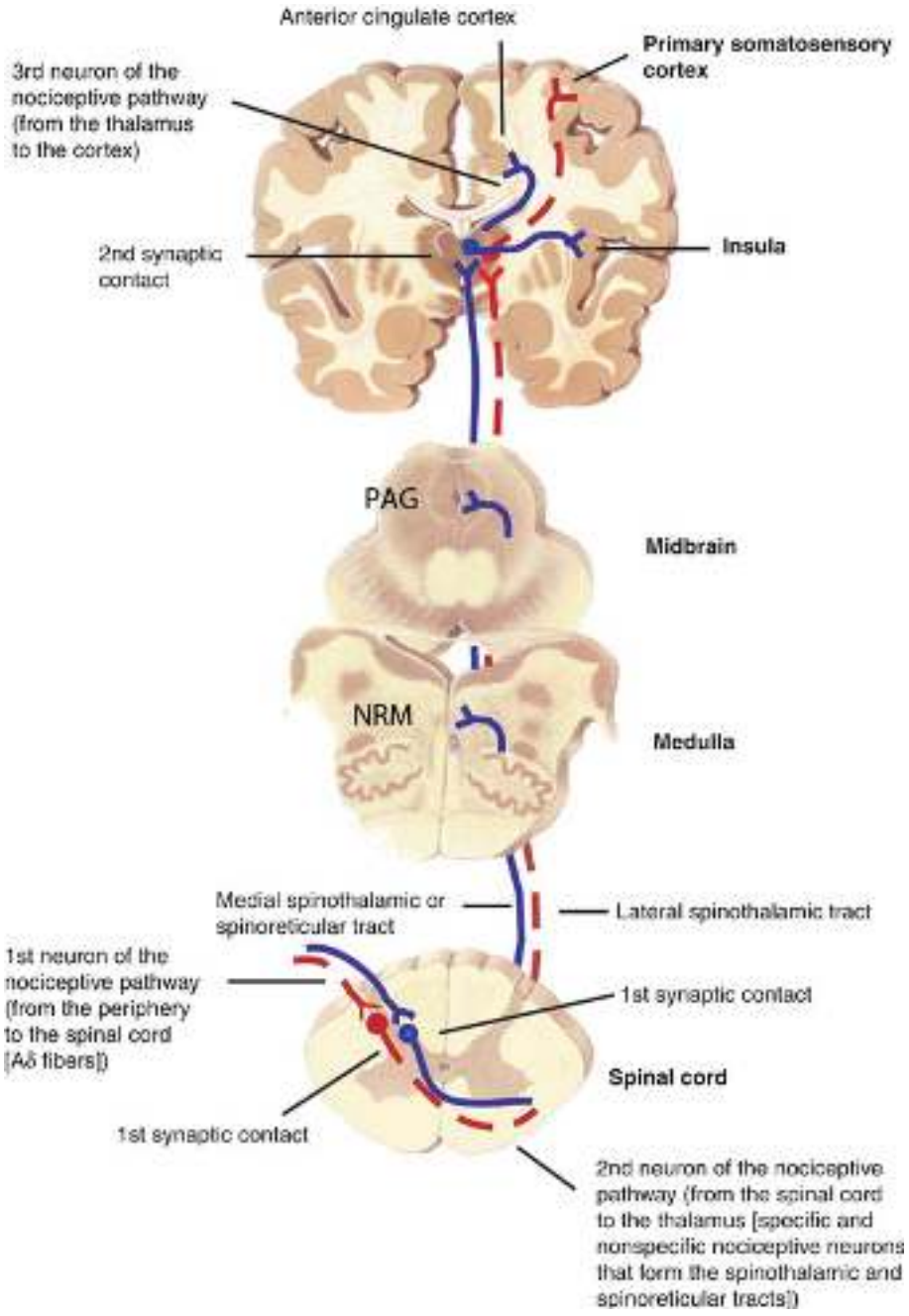
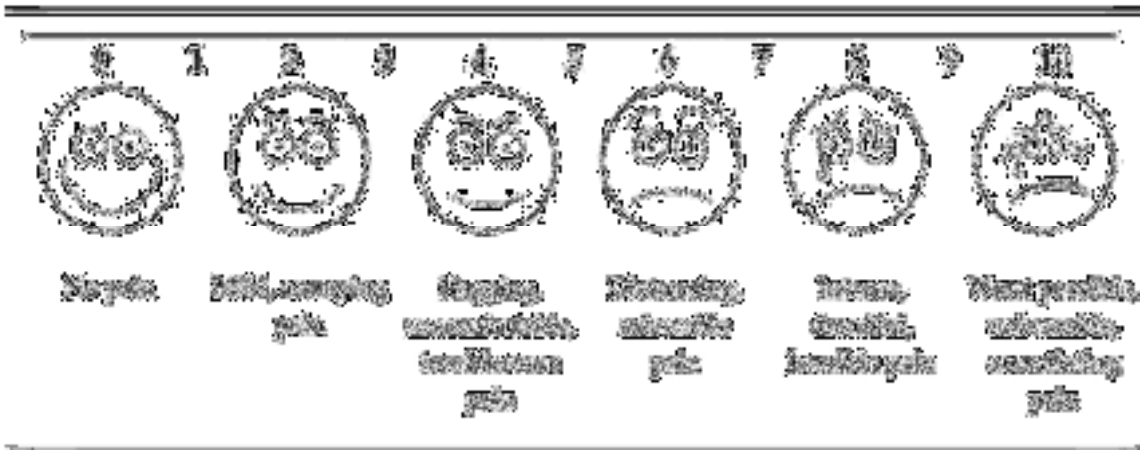


FIGURE 26: PAIN PATHWAY

The factors affecting postoperative pain are the site nature and time duration of surgery, the type of incision taken, preoperative medications, physical and psychological aspects, the type of anaesthesia and their management and followed by the quality of post operative care.[77]

FIGURE 27 : VISUAL ANALOGUE SCALE (VAS)



This will help the patient in order to orient themselves with the degree of pain.

WOUND INFECTION POST LAROSCOPIC CHOLECYSTECTOMY

The incidence of wound infection post laparoscopic cholecystectomy ranges between 1 to 2%.[78] Retrieval bag extraction of gall bladder prevents wound infection risk.

METHODOLOGY

This study was conducted in the Department of General Surgery, in KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Belagavi from January 2020 to June 2021 on 100 patients who were planned for elective laparoscopic cholecystectomy.

1**. SOURCE OF DATA**:

Patients attending surgery OPD with clinical presentation of cholelithiasis, getting admitted and under treatment at KLES Dr Prabhakar Kore hospital and MRC Belagavi.

2. **METHOD OF DATA COLLECTION**:

INCLUSION CRITERIA:

Patients above 18 years of age with cholelithiasis proven by ultrasonography with at least one attack of upper abdominal pain and considered fit for cholecystectomy are included in the study.

EXCLUSION CRITERIA:

Patients < 18 or > 70 years of age.

1) Patients with neoplasia of gall bladder or in presence of stones in CBD or common hepatic duct were excluded.

2) Patient with associated liver diseases, immunocompromised patients, patients on immunosuppressive therapy were excluded from the study.

3) Patient not willing to be a part of the study.

ETHICAL CLEARANCE:

Clearance from the Ethical Committee of Jawaharlal Medical College was obtained before commencement of the study.

TYPE OF STUDY: It is a prospective observational study.

STUDY PERIOD: It was a hospital based study conducted between time period of 1st January 2020 to 30th June 2021.

STUDY DURATION: 18 months

STUDY POPULATION: *Patients admitted as Inpatients for the management of gall stone disease, in the Dept. of General Surgery in KLE's Dr Prabhakar Kore Hospital, Belagavi.*

SAMPLE SIZE AND SAMPLE SIZE COLLECTION:

$n= (Z_{\alpha/2}+Z_{\beta})^2PQ/ d^2$

n-Sample size

P- prevalence, Q - 100 - Z for 95% confidence= 1.96,

d for error d – error that is, 10% of P

P from previous study- 16.7%.[79] Therefore, sample size that is obtained is **100**

SAMPLING PROCEDURE:

All consecutive patients fulfilling the criteria and who gave informed consent during the period of study was selected as the sample of this study.

STATASTICAL ANALYSIS

The statistical tests applied here were Chi Square test and Multiple Logistics Regressions. The statistical analysis was performed using SPSS GraphPad prism version 9. All data was obtained in terms of, mean ± standard deviation and analysis was obtained.

INFORMED CONSENT: The written informed consent obtained from all the patients who fulfilled in the inclusion criteria and was willing to participate in the study (Annexure II).

METHODOLOGY:

All patients undergoing elective and emergency laparoscopic cholecystectomy for symptomatic cholelithiasis or cholecystitis at KLES Hospital were recruited for the study after confirming the criteria for inclusion.

A detailed history and clinical examination were taken and all the data was recorded prospectively.

Each patient underwent a sonographic examination, leucocyte count and liver function tests.

Each procedure was performed by one surgical team with resident participation using a well published technique.

At the end of the procedure, all the operative finding was documented.

Clinical outcome of this study was measured in terms of operative time (from the insertion of Veress needle to the completion of last skin closure) , duration of hospital stay after surgery ,postoperative drain requirement severity of pain using visual analogue scale (VAS), laboratory results (leucocyte, bilirubin, liver function

test elevations) and post operative complications such as wound infections, increase pain and redness around the wound with any pus discharge was assessed.

Patient was grouped under intra operative gall bladder perforation leading to bile spillage and non- bile spillage cases and results were obtained.

ASSESSMENT

The patient was assessed for:

1) Incidence of perforation.
2) Preoperative ultrasonography findings causing increase intraoperative gall bladder perforation.
3) Cause for intraoperative perforation was assessed under following headings.

a) Difficulty in calot's triangle dissection was seen due to dense adhesions, also in case of frozen calots, there was contraction of gallbladder making it tense and friable which was difficult to hold and had higher chances to perforate. This was measured in our study.

b) Use of energy source leading to accidental GB injury, due to inappropriate contact leading to injury of the tissue, when the active electrode gets accidentally activated, incomplete view of the instrument leading to injury of untargeted tissue, also due to vision impairment when the smoke is released due to active electrode hitting a target tissue. This was assessed and measured to assess GB perforation.

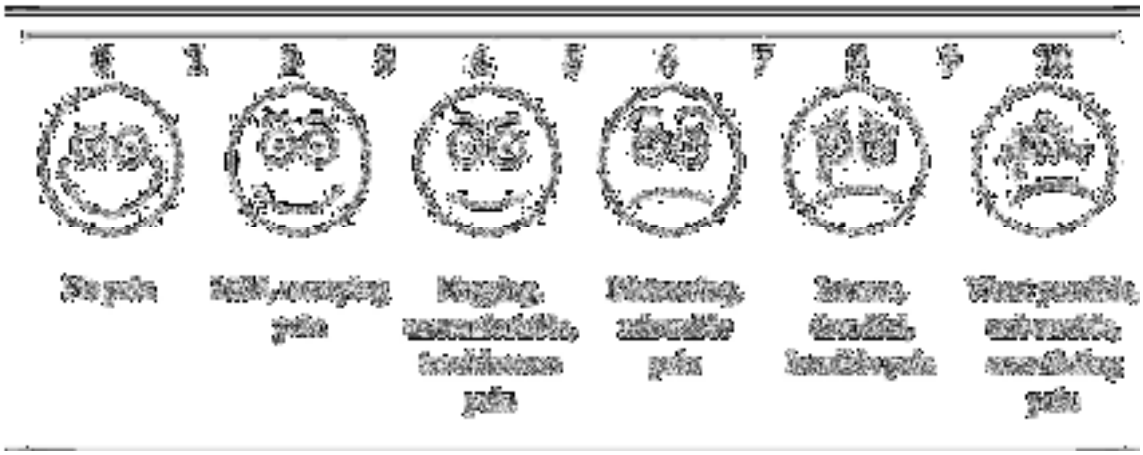
c) Technical snag was caused due to faulty connection of the instruments, malfunctioning of the equipment, wrong settings or incorrectly placed equipment, the incidence of the same was measured.[80]

d) While traction or grasping of oedematous gallbladder with a traumatic grasper , or a friable gallbladder lead to inadvertent gall bladder injury. The incidence of this was assessed.

e) Assistant's mistake: Assistant played a vital role by giving optimal amount of traction, by ensuring adequate dissection plane to be viewed during laparoscopic cholecystectomy. Increase in the force of traction given or in case oedematous or necrotic gallbladder due to excess traction or accidental injury due to instrumentation by the assistant was regarded as assistant's mistake and assessed.

4) Duration of Surgery (in minutes)

5) Postoperative pain (by using Visual Analogue Scale, patients was graded from 0-10



6) Postoperative wound infection.

7) Other outcomes like:

a) Postoperative hospital stay.

b) Postoperative drain requirement

8) Predisposing risk factors that led to perforation of gall bladder were assessed. (age, gender, BMI)

RESULTS

The present study includes 100 cases which were observed prospectively from January 2020 to June 2021. In these patients the parameters that were observed and analysed were as follows.

The information obtained are represented and compared with necessary charts and represented in graphs. These data are also compared with similar studies in the past.

GROUP A: INTRAOPERATIVE NON-PERFORATED GB GROUP

GROUP B: INTRAOPERATIVE PERFORATED GB GROUP

TABLE 1 DEMOGRAPHIC DISTRIBUTION IN THE NON PERFORATED V/S PERFORATED GROUP

	GROUP A				GROUP B					
	MEAN	S.D.	MINIMUM	MAXIMUM	MEAN	S.D.	MINIMUM	MAXIMUM	p VALUE	INFERENCE
AGE	47.03	14.58	19	78	50.12	13.80	23	70	0.3544	NS
BMI	27.33	2.61	22	35	28.88	3.43	24	36.1	0.0199	S
PULSE RATE	84.72	8.65	66	106	86.96	12.52	64	116	0.3219	NS
SBP	125.52	14.63	100	160	124.24	11.67	110	150	0.6922	NS
DBP	80.00	9.84	60	100	80.00	10.41	60	100	1.0000	NS
RR	18.53	2.82	14	26	18.88	3.19	14	26	0.6079	NS

BMI = BODY MASS INDEX; SBP = SYSTOLIC BLOOD PRESSURE; DBP = DIASTOLIC BLOOD PRESSURE; RR = RESPIRATORY RATE;

S = SIGNIFICANT; NS = NOT SIGNIFICANT

VARIABLES:

1) AGE

In this study there are 75 patients having mean age of 47.03 with a range of 19 years to 78 years included in the non bile spillage group, whereas a mean of 50.12 with a range of 23 years to 70 years in patients with bile spillage group (n = 25). There is no statistical significance between the 2 groups.

2) BMI

When comparing the non bile spillage with the spillage group , the mean body mass index in the non spillage category is 27.33 whereas that in the spillage group is

28.88 with a p value of 0.019 making this data statistically significant, that is , spillage group have higher body mass index than the non- spillage group.

TABLE 2 ASSESSING DURATION OF PAIN AND DURATION OF OPERATION

	GROUP A				GROUP B					
	MEAN	S.D	MINIMUM	MAXIMUM	MEAN	S.D	MINIMUM	MAXIMUM	P VALUE	INFERENCE
OPERATIVE DURATION (IN MIN)	60.41	10.85	45	95	72.71	9.78	50	90	< 0.0001	HS
PAIN IN RIGHT HYPOCHONDRIUM (DAYS)	41.11	57.85	1	365	61.96	82.44	2	365	0.1663	NS

SD = STANDARD DEVIATION; NS = NOT SIGNIFICANT; HS = HIGHLY SIGNIFICANT

1) PAIN IN THE RIGHT HYPOCHONDRIUM

The mean value for the patients presenting with pain in non spillage group was 41.1 and that in the spillage group was 61.96 with a p-value of 0.1663. No statistical significance was drawn between the 2 groups.

2) OPERATIVE DURATION

The mean duration of surgery that is from the time of incision to the time of closure is 60.41 in non bile spillage group compared to the bile spillage group where it is 72.7 with a p- value of ,0.0001 making this data statistically highly significant.

TABLE 3: TOTAL NUMBER OF GALL BLADDER PERFORATION

GB PERFORATED	NUMBER
NO	75
YES	25
TOTAL	100

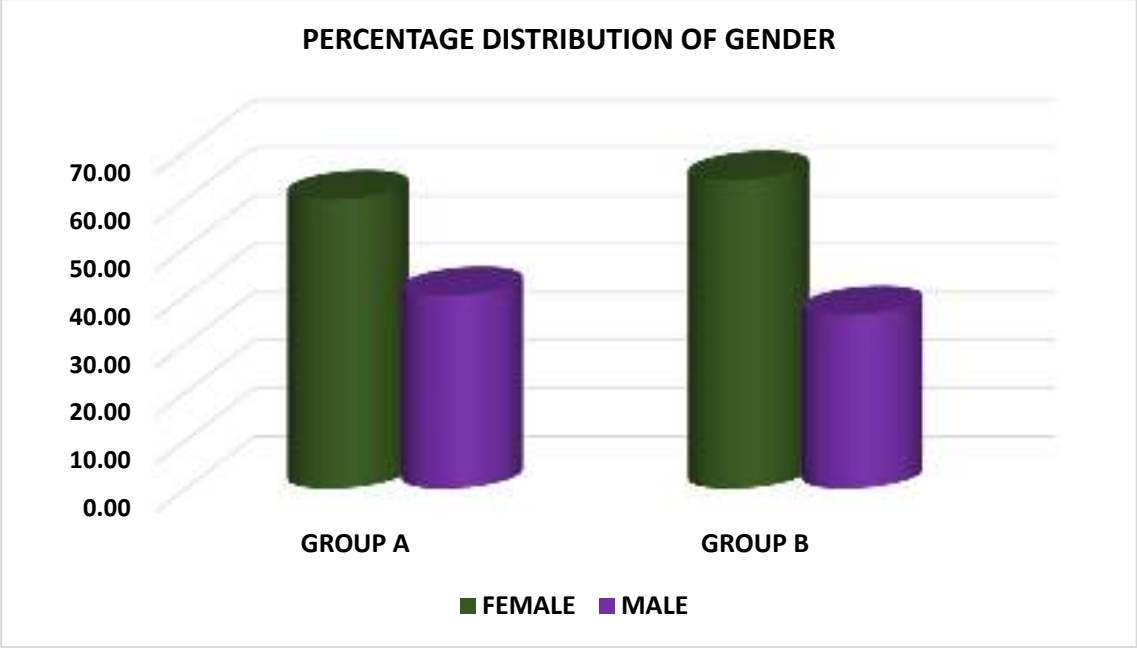
In total number of 100 cases the number of intra operative gall bladder perforated cases were included to be 25 the rest had no evidence of perforation or bile spillage intra operatively. Among the perforated group 15 were female and 10 were male.

TABLE 4: GENDER DISTRIBUTION

	GROUP A (n = 75)		GROUP B (n= 25)		
GENDER	**NUMBER**	**%**	**NUMBER**	**%**	**TOTAL**
FEMALE	45	60.00	16	64.00	61
MALE	30	40.00	9	36.00	39
TOTAL	75	100.00	25	100.00	100

In this table the p value is calculated using student's unpaired t test.

GRAPH 1 – COMPARING THE NON BILE SPILLAGE V/S BILE SPILLAGE GROUP BY GENDER DIVISION



Among group A, 45 (60%) of 75 individuals who presented with cholelithiasis were females whereas 30 (40%) were male. In group B, 16 (64%) out of 25 individuals were female whereas 9 (36%) were male.

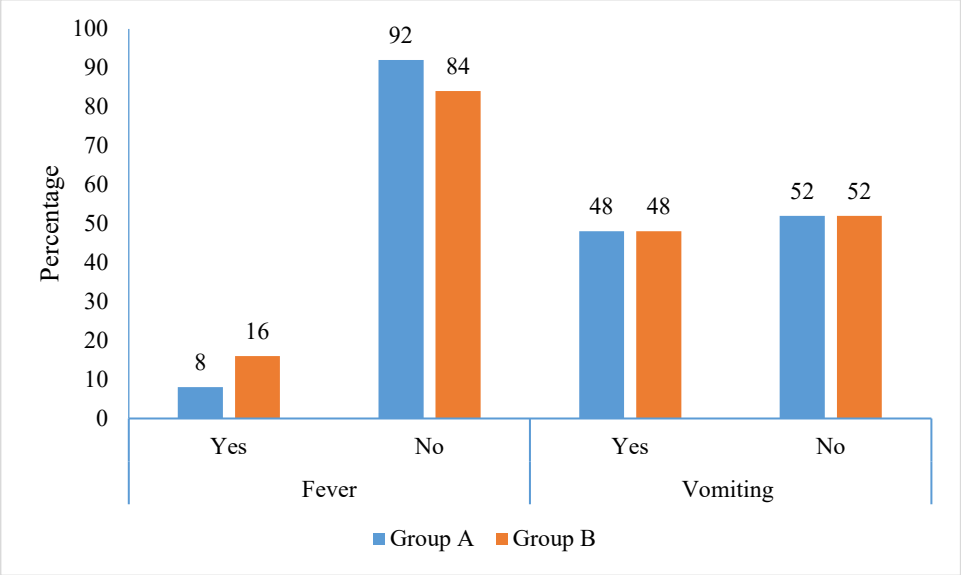
This graph shows female preponderance for cholelithiasis.

TABLE 5 SHOWING INCIDENCE OF CINICAL SYMPTOMS

Variables	Sub Category	Group A	Group B	p-value
FEVER	Yes	6 (8%)	4 (16%)	0.24
	No	69 (92%)	21 (84%)	
	Total	75 (100%)	25(100%)	
VOMITING	Yes	36 (48%)	12 (48%)	1.0
	No	39 (52%)	13 (52%)	
	Total	75 (100%)	25 (100%)	
PAIN IN RIGHT HYPOCHONDRIUM (DAYS)	Mean ± SD	41.10 ± 57.8	61.96 ± 82.4	0.16
	Min, Max	1, 365	2, 365	

This table shows the distribution of symptomatology between the 2 groups. The most common symptoms in both the groups was pain in right hypochondrium.

GRAPH 2: Bar graph depicting the division of symptoms between Group A and Group B



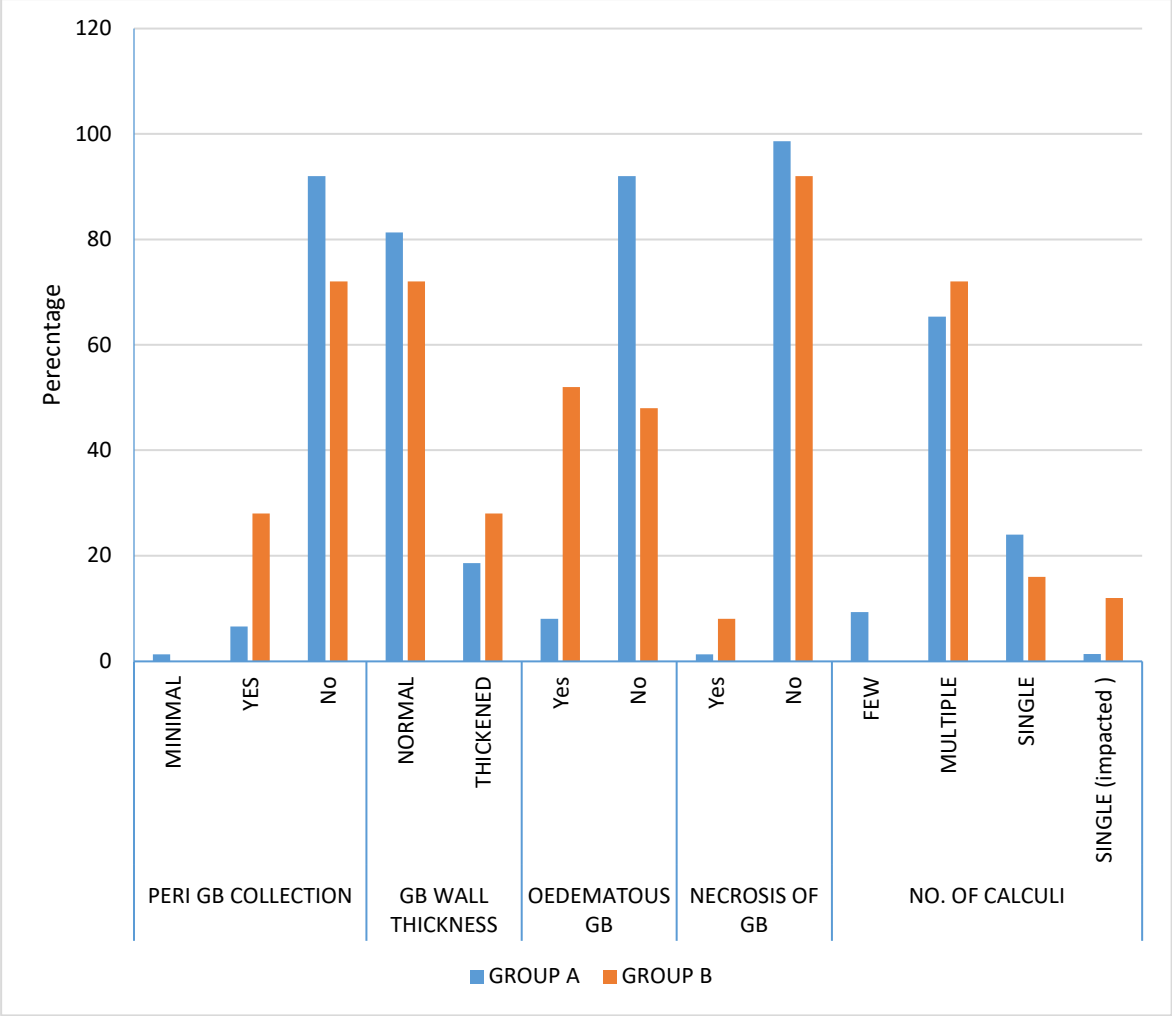
In this study, in group A, 6 (8%) presented with fever, 36 (48%) presented with vomiting. In group B, 4 (16 %) presented with fever and 12 (48 %) presented with vomiting. No statistically significant difference was drawn between the 2 groups (p – value 0.24 and 1.0 respectively) as far as symptomatology was concerned.

TABLE 6: DEPICTING ULTRASONOGRAPHY FINDINGS

Variables	Sub Category	Group A	Group B	p-value
Number of calculi	Few	7 (9.3%)	0	0.03*
	Multiple	49 (65.3%)	18 (72%)	
	Single	18 (24%)	4 (16%)	
	Single (impacted)	1 (1.3%)	3 (12%)	
	Total	75 (100%)	25 (100%)	
Pericholecystic Collection	Minimal	1(1.33%)	0	0.015*
	Yes	5 (6.6%)	7 (28%)	
	No	69 (92%)	18 (72%)	
	Total	75 (100%)	25 (100%)	
GB wall thickness	Normal	61 (81.3%)	18 (72%)	0.32
	Thickened	14 (18.6%)	7 (28%)	
	Total	75 (100%)	25 (100%)	
Oedematous GB	Yes	6 (8%)	13 (52%)	<0.0001*
	No	69 (92%)	12 (48%)	
	Total	75 (100%)	25 (100%)	
Necrosis of GB	Yes	1 (1.33%)	2 (8%)	0.09
	No	74 (98.6%)	23 (92%)	
	Total	75 (100%)	25 (100%)	

*statistically significant

GRAPH 3: Bar graph depicting the ultrasonography findings in both the groups



VARIABLES:

1) PERI CHOLECYSTIC COLLECTION

In group A, the evidence of collection was 5 (6.6%) when compared to group B which was 7 (28%). This value was statistically significant (p – 0.015) in group B in comparison to group A.

2) GALL BLADDER WALL THICKNESS

Sonography finding of thickened gall bladder wall was found to be 14 (18.6%) in group A and 7 (28%) in group B with a p value of 0.32 . hence there was no statistically significant difference was found between the 2 groups as per GB wall thickness was noted.

3) OEDEMATOUS GALL BLADDER

In this study, 13 (52%) of patients in group B was found to have oedematous gall bladder when compared to 6 (8%) in group A. This is statistically significant with p value of <0.0001 in group B individuals.

4) NECROSIS OF GALL BLADDER

In group A it was identified that 1 (1.33%) had necrosis of gall bladder in comparison to 2(8%) in group B. In this recorded data, no statistical significance was obtained.

5) NUMBER OF CALCULI

The number of calculi was few in 7 (9.3%) of patients in group A, whereas 0 in group B.

Multiple stone findings noted in group A included 49 (65.3%) whereas there were 18 (72%) of group B patients with multiple calculi. There is clinically significant difference in group B in comparison with group A.

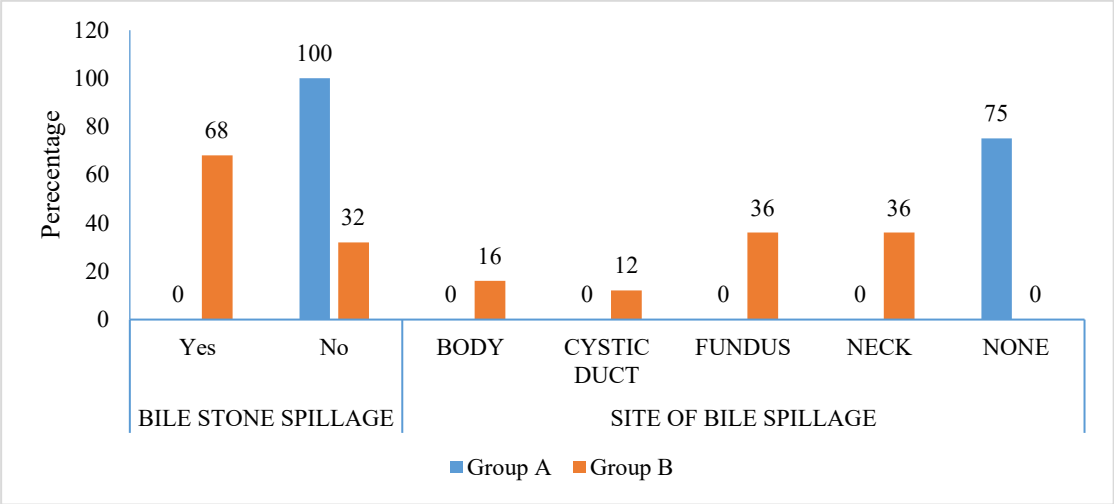
Single stone was found in 18 (24%) of group A patient and 4 (16%) of group B individuals.

In these individuals, impacted stones in cystic duct was found to be 1 (1.3%) in group A and 3 (12%) in group B. his overall data is statistically significant in group B with p-value of 0.03

TABLE 7 – INTRA OPERATIVE FINDINGS IN NON PERFORATED GROUP

Variables	Sub Category	Group B
BILE STONE SPILLAGE	Yes	17 (68%)
	No	8 (32%)
	Total	25 (100%)
SITE OF BILE SPILLAGE	**BODY**	4 (16%)
	CYSTIC DUCT	3 (12%)
	FUNDUS	9 (36%)
	NECK	9 (36%)
	NONE	0
	TOTAL	25 (100%)

GRAPH 4: Bar graph showing the intra operative site of spillage and stone spillage incidence



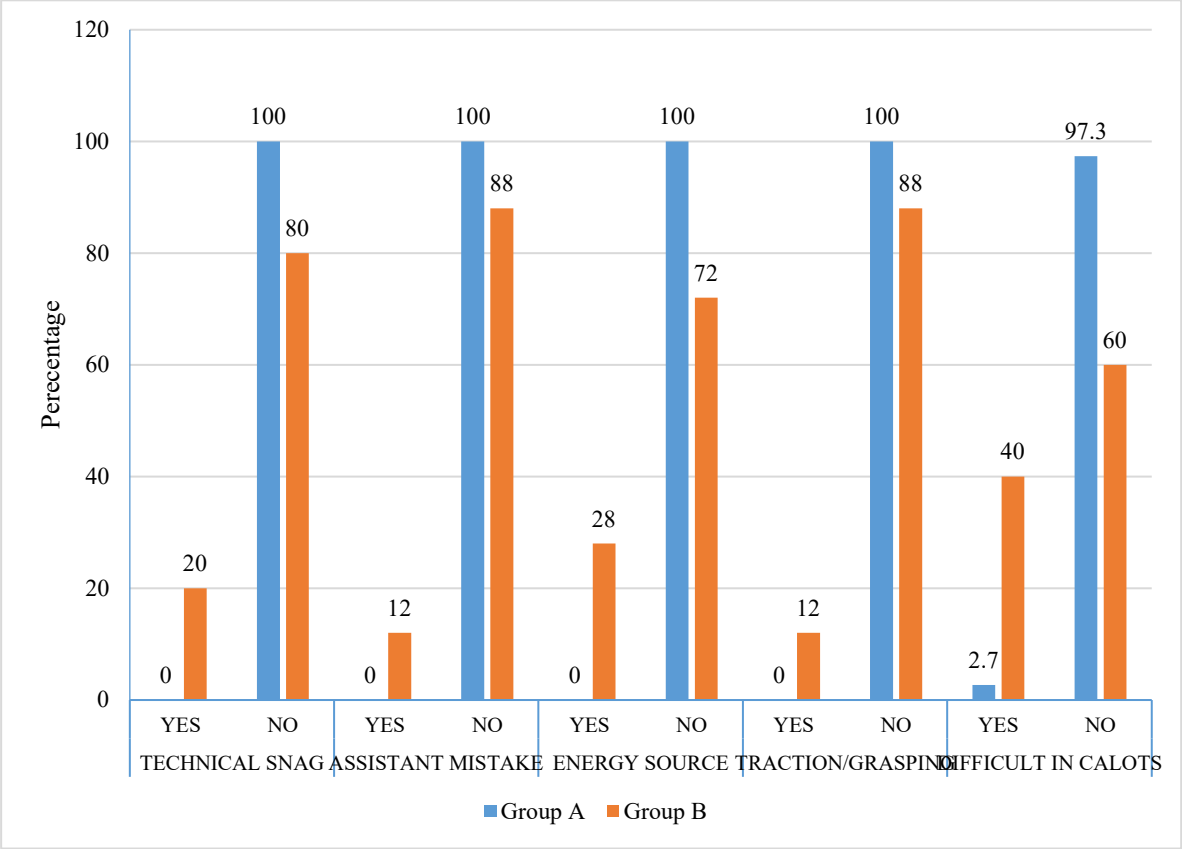
1) The intra operative incidence of gall stone spillage among the 25 individuals with bile spillage was found to be 68% that is, 17 individuals had bile stone spillage along with bile.
2) The site of spillage was more common in fundus and neck of gall bladder (36% or n= 9 each), in comparison to spillage from body which was about 16 %(n=4) and due to cystic duct slippage was 12 % (n=3).

TABLE 8 – ENUMERATING CAUSES INTRAOPERATIVE GB PERFORATION

Variables	Sub Category	Group A	Group B	p-value
Technical snag	yes	0	5 (20%)	0.0001*
	No	75 (100%)	20 (80%)	
	Total	75 (100%)	25 (100%)	
Assistant mistake	Yes	0	3 (22%)	0.0023*
	No	75 (100%)	22 (88%)	
	Total	75 (100%)	25 (100%)	
Energy source	Yes	0	7 (28%)	<0.0001*
	No	75 (100%)	18 (72%)	
	Total	75 (100%)	25 (100%)	
Traction/grasping	Yes	0	3 (22%)	0.0023*
	No	75 (100%)	22 (88%)	
	Total	75 (100%)	25 (100%)	
Difficult in calots	Yes	2 (2.6%)	10 (40%)	<0.0001*
	No	73 (97.3%)	15 (60%)	
	Total	75 (100%)	25 (100%)	

*statistically significant

GRAPH 5: BAR GRAPH SHOWING THE CAUSES FOR INTRA OPERATIVE BILE SPILLAGE



The various causes for bile spillage in group B (n =25) are enumerated in this bar chart with 10 (40%) of difficulty in calot's triangle dissection having bile spillage, while 7 (28%) cases of bile spillage are caused while usage of energy source.

5 (20%) of bile spillage were found due to technical snag.

Finally 3 (22%) cases of spillage are attributed to traction due to grasping, also sub categorizes due assistant's mistake.

TABLE 9 – THE CONTENTS OF GALL BLADDER SPILLAGE Group B

	GROUP B	
TYPE OF BILE	**NUMBER**	**%**
NORMAL	22	88.00
PUS	1	4.00
WHITE	2	8.00
TOTAL	25	100.00

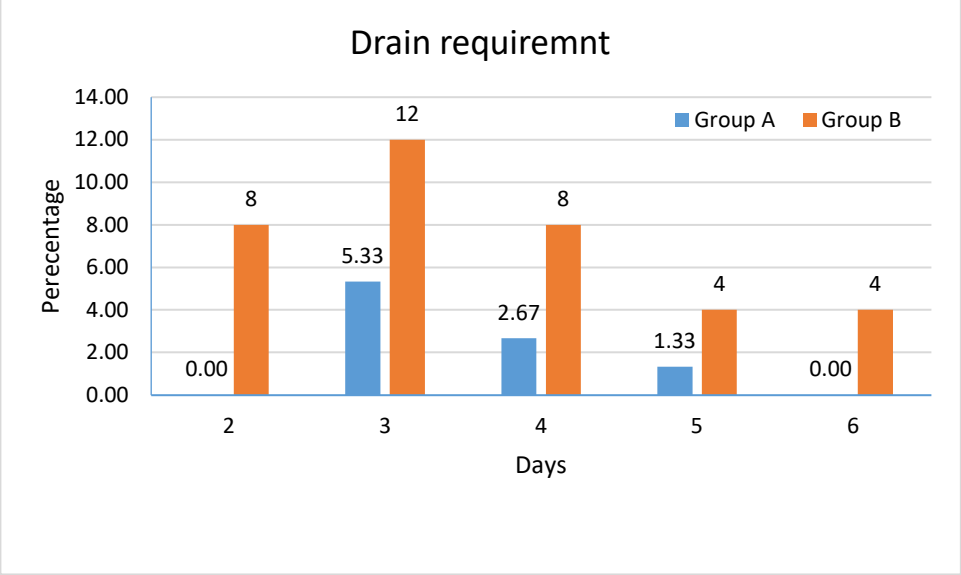
In this table, in total bile spillage group (n=25), 22 (88%) had bile of normal consistency, 2 (8%) was observed to have white bile mucous), 1 (4%) patient had frank pus spillage during laparoscopic cholecystectomy.

TABLE 10 – DURATION OF POSTOPERATIVE DRAIN REQUIREMENT

	GROUP A		GROUP B			
DRAIN REQUIREMENT	**NUMBER**	**%**	**NUMBER**	**%**	**p VALUE**	**INFERENCE**
2 DAYS	0	0.00	2	8.00	0.0019	VS
3 DAYS	4	5.33	3	12.00		
4 DAYS	2	2.67	2	8.00		
5 DAYS	1	1.33	1	4.00		
6 DAYS	0	0.00	1	4.00		
YES	7	9.3	9	36		
NO	68	90.67	16	64.00		
TOTAL	75	100.00	25	100.00		

VS = VERY SIGNIFICANT

GRAPH 6 – POSTOPERATIVE DRAIN REQUIREMENT



The above graph explains regarding the drain requirement in both groups, in group B total 2 individuals had drain requirement for 2 days, 3 among 25 required drain for 3 days , 2 for 4 days , 1 for 5 days and 1 for 6 days on the other hand in group A drain requirement was less, 4 for 2 days , 2 for 3 days and 1 for 4 days. This variables is statistically very significant among the groups.

TABLE 11- POST OPERATIVE WOUND INFECTION (COMPLICATION)

WOUND INFECTION	GROUP A	%	GROUP B	%	P value
YES	2	2.6%	3	12 %	0.09
NO	73	97.3%	22	88%	
TOTAL	75	100	25	100	

The total number of wound infections in bile spillage group was 12% compared to the non bile spillage group, that is 2.6 %. This data is not statistically significant between the 2 groups.

TABLE 12 – TABLE SHOWING VAS SCORING AND POSTOPERATIVE HOSPITAL STAY IN GROUP A AND

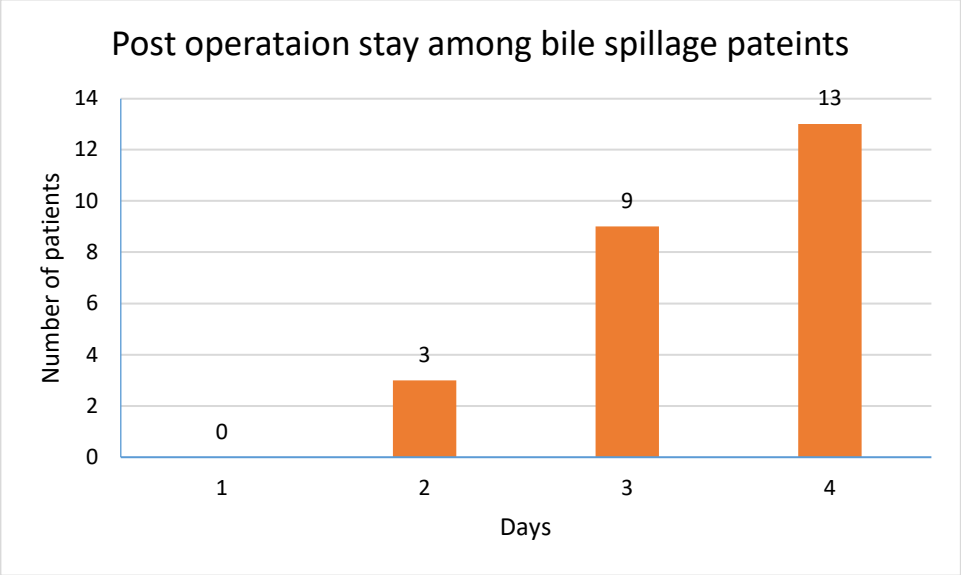
	GROUP A			**GROUP B**			
	Mean ± S.D.	**Minimum**	**Maximum**	**Mean ± S.D.**	**Minimum**	**Maximum**	**p value**
VAS	3.2 ± 0.59	2	4	3.4 ± **0.6**	2	4	0.06
POST OP STAY (DAYS)	4.57 ±**2.8**	1	13	5.88 ± 3.08	2	17	0.054

VAS = VISUAL ANALOG SCALE

The mean VAS score for group A is 3.2 ± 0.59 while that for group B is 3.4 ± **0.6.** This is not clinically significant when compared between the two groups.

The mean duration of stay in post operative period in group A was 4.57 and that in group B was 5.88 with a p-value of 0.0540 making this variable statistically insignificant between the 2 groups

GRAPH 7 POSTOPERATIVE HOSPITAL STAY AMONG BILE SPILLAGE PATIENTS



This bar graph depicts the days of hospital stay post surgery in bile spillage group, where 13 patients stayed for 4 days, 9 patients for 3 days and 3 of them for 2 days.

DISCUSSION

The incidence of gallstones vary between 10 to 15% worldwide, while it is 3 to 6 % in India. Laparoscopic cholecystectomy has become the standard of care since 1989 [81] .The advantage of this technique is decrease morbidity, reduce hospital stay, quick recovery. [82,83]

Since the invent of laparoscopic technique for cholecystectomy, numerous reports have been established to weigh the complications for the same. High risk of complications has been discussed secondary to intraoperative gallbladder perforation.

These complications are attributed to certain risk factors associated with it like , dense adhesions, acute inflamed and friable gallbladder with difficult anatomy, oedematous and tense gall bladder when decompression is not done have higher susceptibility to perforate.

Inadvertent laparoscopic instrumentation could be the other cause for perforation or while dissecting the gall bladder from its fossa over the liver. Lastly spillage of bile or stones is also attributed to cystic duct clip slippage or while extracting the specimen out through the port and surgeon's experience is also a contributory factor.

Over a decade many studies have been conducted to review the incidence of gallbladder perforation during laparoscopic cholecystectomy, with risk factors associated with it and have varied results.

This study was conducted to provide enhancement in knowledge and understanding the outcome of patients with intraoperative gall bladder perforation to enumerate the factors leading to intraoperative bile spillage and percentage

stratification for each in order to develop a learning curve to reduce the postoperative morbidity in such patients.

The present study is a prospective observational study carried out in a total number of 100 patients who underwent elective and emergency laparoscopic cholecystectomy under the Department of General surgery, KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Belgaum from January 2020 to June 2021. All patients who fulfilled the inclusion criteria and were willing to participate were included in the study.

The study population in the present study belonged to age group between 19 to 78 with a mean age of 47.03 years in non perforated group comparison with perforated GB group where mean age was 50.12 years in which 16 (64%) were women and 9 (36%) were men this is in concordance with Jasim et al study[84] and akmoosh et al [85] in which the mean age group was 38.6 years, and was in agreement in terms of female preponderance. Another study supporting this is , Rice et al[86] , in which the mean age group was 52 years , with incidence in female higher (57%) compared to men (43%). (TABLE 3)

Obesity is one of the risk factor which causes difficulty in laparoscopic surgery due to varied risk factors [87] The present study shows a higher body mass index which was closely associated with perforation of gall bladder and bile spillage (28.8) in comparison to the non bile spillage (27.3) this was statistically significant between the 2 groups (p- value of 0.019). Obesity therefore increases the morbidity and the duration of operation this is in accordance with a study by Yunus Emre Altuntas et al. where non perforated group had BMI of 28.5 compared to perforated group with 29.6 with a p value of 0.05 [88]

In a study described by Memon MA et al [69] abdominal pain was the main symptom present in all patients on presentation, this was associated with bloating in about 36% nausea and vomiting in 18 and 4 % respectively. This matched with the results in our study in which all patients had abdominal pain as a common manifestation associated with vomiting in about 48%. Also, fever was observed in few individuals (10%).

In the present study all patients were subjected to routine blood investigations which included complete blood picture, tests to assess liver function and ultrasound of abdomen as a preoperative investigation. The liver biochemistry was normal in all the patients in our study.

The ultrasonography parameters were assessed between the two groups and there was no CBD dilatation. The thickness of gall bladder was the main contributing factor for fibrosis of the wall as a cause of inflammation in the past [89,90]. In present study, 18.6% in non perforated group and 28% in perforated group had gallbladder thickened but the data analysis had no significance statistically between to the two groups to predict intraoperative spillage, this was in line with one of the study in which thickened gallbladder did not lead to difficult in laparoscopy and hence the spillage[91.] Contrary to our study many studies have reported thickened gallbladder as a cause for difficulty during laparoscopic cholecystectomy leading to spillage as gallbladder wall thickness could be associated with difficulty of dissection of gallbladder from its bed that is while manipulating the gallbladder while grasping it.

The ultrasonography finding for pericholecystic collection was significantly higher in group B with intraoperative perforation and bile spillage in comparison with group A. Chindarkar H et al. similar to our conclusion gave significant higher rates of difficulty intraoperatively.[92] This result can be explained as pericholecystic fluid

collection is a sign of acute inflammation seen in acute cholecystitis. The unclear anatomy due to adhesion of gallbladder to the surrounding structures and difficulty in and dissection was the reason for higher chances of intraoperative gallbladder perforation.

In the present study distended inflamed oedematous gallbladder had significant difficulty intraoperatively associated with spillage as compared in study by Mohammed Azfar Siddiqui et al [93] Where 21 patients with distended gallbladder had difficulty in laparoscopy by causing gallbladder perforation and spillage of bile and 15 patients did not have spillage. While necrosis of gall bladder had no significant analysis for intraoperative perforation in our study, with 2 (8%) of perforated group was found to have necrotic gallbladder and 1(1.33%) of non perforated group had necrosis, with p value of 0.09. Necrotic gall bladder has increased risk of gallbladder perforation due to difficulty in gaining traction and hence increases the chance of intraoperative perforation. This result is insignificant in our study probably because early surgical intervention was performed in patients who were at risk of developing subsequent gallbladder necrosis if the procedure was delayed.

Impacted stone in the neck had higher degree of difficulty in surgery, [94] as it posed difficulty in retraction of the neck for calot's triangle dissection, this analysis was significant in our study where impacted stones in gallbladder perforated group had statistically significant data compared to the non-perforated group.

Accidental gallbladder perforation and bile and stone spillage during laparoscopic cholecystectomy is attributed to many risk factors, but this effectively has inverse relation with laparotomy in consistent with a study by Zucker et al[95.] In our study there was conversion in 1 out of 25 patients in perforated group this could

be attributed to multiple abdominal surgeries posing difficulty of dissection while performing laparoscopic cholecystectomy.

As per the present study the most common risk factor to cause intra operative perforation and bile spillage is caused due to difficulty in calot's triangle dissection (frozen calot's) this is in accordance with study Robin et al[96] in which the proved the commonest reason for bile spillage and probable need of conversion was frozen calot's triangle. This also causes fibrosis of the gallbladder making it tense and tough increasing the chances of iatrogenic injury the result of which is similar to another study given by Raad Faraj Hanashe[97]. According to another study Y. Assaff et al[98] explains in patients with chronic cholecystitis, due to the continuous ongoing inflammatory process leads to fibrosis of gallbladder making it vulnerable for perforation, while doing dissection.

A study from Rice et al[86] assad mohammed kadhim et al[99] and rafa's sami et al[100] revealed the cause of accidental intraoperative gallbladder perforation attributed while removing gall bladder from its fossa[86]. This has shown similar results in our study where in the second most common cause in our study is due to the usage of energy sources, especially while removing the gall bladder from the fossa. In our study this was mainly attributed to the use of monopolar hook devices for dissection compared to the Maryland bipolar and harmonic devises in descending order. This has similar findings in a study by Brajesh kumar et al[101] where the use of monopolar device had higher incidence of intraoperative gallbladder perforation.

In our study the other causes of spillage are enumerated with technical snag in terms of faulty connection of instruments and malfunctioning of instruments such as monitor, camera and clip applicator leading to intraoperative gallbladder perforation which accounted for 20% this result is in accordance with a study by Shamim,

Muhammad[102], where there is increase in rate of conversion for the same. The various reasons attributing to this was found out to be the incomplete application of clip to the cystic duct or slippage of the clip due to the malfunction of the instrument while applying it, or the haziness of the lens of the laparoscope making the view for the dissection difficult and the faulty instruments causing continuous CO_2 leak , leading to decrease working space and difficulty in dissection.

Another intraoperative finding noted was traction and grasping attributing to 12% of total bile spillage which is similar to study given by Rafa's et al[100] where gall bladder perforation due to traction is 6% due to adhesions is 0.8%. Another study supporting this is Assad mohammed Khadim et al[99] in which the traction or grasping leading to gall bladder perforation accounted for 18.2%. This was also evaluated with similar results of assistant's mistake by excessive traction and tissue exposure leading to injury as given by a study by Jody Kaar[103] We also evaluated assistant's mistake leading to gallbladder perforation in our study which was 3 (22%). Here we evaluated that the correct method of traction was through the midclavicular line port, by using a grasper to produce continuous progressive torquing forcing over the neck of the gallbladder and need to avoid the use of tooth grasper in order prevent traumatic perforation especially when the gallbladder is tense.

Among the GB perforated and bile spillage group (n=25), 22 had normal bile spillage, 17 (68%) had bile stone spillage 2 had mucous or white bile and 1 had frank pus spillage which can be compared to a similar study by Jasim et al[84]. where normal bile spillage noted in 97, stone spillage in 47 % and 3 had pus spillage. Another such study performed by Rice et al[86], had patients with bile spillage amounting to 62% with gallstone spillage in 38% cases. There was significant increase in surgical site infection in patients with pus spillage, that is 2 out 3 patients developed port site

collection and required higher antibiotics and drainage. A study by Brahma RC et al[104]. also showed similar results.

The site of bile spillage in our study was common in fundus and neck compared to body or cystic duct.

In an analysis conducted by Memon MA et al[69] drain requirement post operatively was 2.5 days, which was in correlation to our study. Also non perforated group in this study had lesser drain requirement compared to the perforated group making this data statistically very significant among the two groups.

Postoperative complication that was addressed in this study was wound infection of 2.6% in non perforated group and 12% in perforated group which was statistically not significant between the 2 groups. This was similar in comparison to study performed by Jasim et al[84]. where 3 (8.8%) out of 34 patients developed wound site infection.

The complication rates were also assessed by postoperative pain by using visual analogue scale in non perforated group with a mean of 3.2 and that in perforated group was 3. This is not significant statistically proving no much significant difference of pain in both the groups, this is similar to study performed by Jasim et al[84] where 2.94% developed severe post operative pain.

The postoperative outcome was outlined in our study by studying the postoperative stay of the patients, which was significantly less in non perforated group when compared to perforated group. Similar studies like Assad mohammad khadim et al [99] and Raad Faraj Hanashe [97] has proven the same.

In study by Rice et al[86] the mean postoperative stay was 2.1days and the same in Jasim et al[84] was 2 days while in our study the mean duration of stay was 4.57 days. The increase in length of hospital stay could be attributed the various causes as in our

study, due to increase requirement of drain in postoperative in the perforated group. In these patients usually drain was kept for 24 to 72 hours, requiring extended hospitalization. This could also be due the various discharge protocols followed in different institutes.

We have a dearth of knowledge about the consequences, the risk factors and complications due to intraoperative gall bladder perforation with spilled bile and gall stones. Various studies have reported cause and ways to prevent intraoperative gall bladder perforation, by educating the surgeons regarding the safe practices that can be performed during LC, identifying the risk factors, intraoperative challenges and management of complications. Every attempt has to be made to retrieve all the spilled gall stones and to irrigate and suction adequately after bile spillage to minimize complications.[105,106]

LIMITATIONS

Long term follow up of these patients was not assessed in order to check for long term postoperative complications such as surgical site wound dehiscence, intraabdominal abscesses, pancreatitis, cutaneous fistula.[78]

The sample size was small.

The variables differs with the expertise of the Surgeon performing it.

CONCLUSION

The incidence of accidental intraoperative gallbladder perforation in this study was 25%. The most common risk factor causing bile spillage was due to difficulty in dissection of calot's triangle and also while removal of gall bladder from its fossa using an energy source.

In our study it was found that by providing adequate saline irrigation in to the peritoneal cavity, aspirating the bile and retrieving the stones and good perioperative antibiotic coverage had similar postoperative outcome as that of non perforated group and hence the need for conversion to open was mostly nil.

However, the duration of surgery was lengthened, with increase requirement of drain in postoperative period and increase duration of hospital stay in intraoperative bile spillage patients thus undermining the benefits of laparoscopic cholecystectomy. Therefore, the surgeon needs to make every effort in order to prevent gallbladder perforation this could partially be achieved by surgeon's precision and careful dissection among the other causes.

As our study is on a small group, done in a single institute, the ideal situation would be that each and every surgeon makes it a routine habit to record all the cases of Gallbladder perforation intraoperatively in order to analyse and treat postoperative complications and further advice on the follow up.

SUMMARY

Gall stone disease is the most common gallbladder pathology with an average incidence of 10 to 15% and gold standard treatment for the same is laparoscopic cholecystectomy.

One of the highlighting complication of laparoscopic cholecystectomy is intraoperative gallbladder perforation and bile spillage.

This study was conducted to analyse the risk factors and the most probable surgical outcome post gall bladder perforation during laparoscopic cholecystectomy. The study groups were divided as non perforated (group A) and perforated group (group B)

In this study the mean age group with bile spillage was 50.12, the average BMI was 28.8 which gave statistically significant value compared to the intraoperative non perforated group. The study showed distribution of gallstone disease higher in females.

The operative duration was higher in perforated group and hence statistically significant in comparison with non perforated group.

Ultrasonography findings of oedematous gallbladder (52%) with pericholecystic collection (28%) or impacted stones in cystic duct (12%) had higher chances of spillage with significant data statistically compared to non bile spillage group.

The most common risk factor for spillage in this study was due to difficulty in calot's triangle dissection due to adhesions, making the tissue more friable. The next most common risk factor was due to usage of energy source and the least was due to technical snag during the procedure.

The duration of postoperative hospital stay (5.88) and the requirement of drain (36%) was highly significant in perforated group compared to non perforated group (4.57 and 9.3% respectively).

The immediate complications due to spillage was mild and was treated conservatively with lesser significance in postoperative outcome in both the groups.

Hence, intraoperative gallbladder perforation and bile spillage is important to be noted in order to prevent postoperative outcome and reduce morbidity in patients undergoing laparoscopic cholecystectomy.

Also, this study forms the learning curve in order to prevent intraoperative perforation by minimizing the risk and increasing the precision in dissection and adding value by improving the outcome.

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ANNEXURE I

CONSENT STATEMENT

Purpose of the study

I, **REG NO BH0119004**, Post Graduate student in M.S General Surgery under the guidance of Dr. _____, Professor and Unit Head, Department of General Surgery, JNMC, Belagavi am conducting a study on Accidental gallbladder perforation during laproscopic cholecystectomy: incidence risk and effect on clinical outcome for patient admitted at KLES Prabhakar Kore Hospital Belagavi.

The Purpose of the study: There have been a number of studies attempting to determine the influence of gallbladder perforation on the clinical outcomes, but the results are still conflicting. Therefore, in this study I am investigating the incidence, clinical outcomes and risk factors in patients who sustains gallbladder perforation during laproscopic cholecystectomy, hence reducing the morbidity and enhancing the benefits of laproscopic surgery.

Type of study

This is a prospective study.

Participant selection

We are inviting all gallbladder stone patients who visit our hospital in General Surgery department for further management to participate in this study.

Voluntary participation

Your participation in research is voluntary. It is your choice whether to participate or not. Your decision whether to participate in the study or not will not change present or future health care services offered to you and will not affect your

relationship with J.N. Medical College. If you choose not to participate in this study, you will still be offered the routine treatment given at our hospital. You will continue to receive the routine care at our hospital even if you decline to participate in this study. If you decide to participate you are free to withdraw at any time.

Procedure

Once you have signed the informed consent, necessary personal information, detailed medical history and clinical examination will be taken by the investigator. Each patient will undergo a sonographic examination, leucocyte count and liver function tests. Each procedure will be performed by one surgical team with resident participation using a well published technique. Operative findings will be recorded at the end of the procedure. Clinical outcomes such as operative time (from the insertion of veress needle to the completion of last skin closure), duration of hospital stay after surgery, severity of pain using visual analog scale (VAS), labrotory results (leucocyte, bilirubin, liver function test elevations) and post operative complications such as wound infections, increase pain and redness around the wound with any pus discharge will be assessed.

Risks and Benefits

No possible risk detected. The benefit of the study is it may have an effect on minimizing the number of accidental perforation of gall bladder during laproscopic cholecystectomy by identifying the risks associated with it and hence enhancing the benefits of laproscopic surgery and reducing the morbidity.

Alternatives

Your participation in this study is entirely voluntary. You are free to refuse to participate or withdraw from the study at any time. You will still receive standard medical care from the hospital. The investigator holds the right to terminate the study at any time. You will be informed about any new information that may affect your decision to participate in the study.

Privacy and Confidentiality

Any information collected during the study will remain confidential. The only people who will know that you are the research subject will be the members of the research team. No information about you or information provided by you during the research will be disclosed to others without your written permission except:

1. In emergency to protect your rights and welfare.
2. If required by law.

Financial Incentives for participation

No financial incentives are being offered to enrolled patients. It is purely being done with the idea of research and all the cost of the study will be borne by the investigator.

Authorization to Publish Results

The information about you will be analysed together with other study participants. When the results of this study will be published and presented in scientific groups, in conferences for scientific purposes, but no information will be displayed that would disclose your identity. Any information that is obtained in connection with this study and that can be identified with you will remain confidential.

Right to refuse or withdraw from study:

You do not have to participate in this research if you do not wish to. You can withdraw at any time from the study. There will be no penalty for withdrawal. Your treatment and care in this hospital will not change irrespective of whether you agree to participate or not. You can be removed from the study if necessary.

Institutional Policy

In the event of any injury related to the study, treatment will be made available through KLE's Hospital & MRC, Belgaum. There is no compensation or payment for such medical treatment by law. If you are injured you may contact **REG NO BH0119004,** Post graduate student, Department of General Surgery, KLE's Hospital& MRC.

Contact details:

In case you have any questions related to the study, in future or in case of study related injury or illness, you can contact **REG NO BH0119004** Department of General Surgery, JN Medical College, Belagavi. Dr._____, Professor and Unit head, Department of General Surgery, KLE's JNMC, Belagavi.

Your participation in this study is voluntary. In case you need any further information regarding your rights as study participants, you may contact Dr. Roopa.M.Bellad, Professor of Pediatrics, as Chairman of J.N.Medical College Institutional Ethics Committee on Human Subjects Research, Phone no: 0831 247 3777 ext-1527 at J.N. Medical College, Belagavi. You are free to stop participation in this at any time and for any reason.

CONSENT FORM

Study title: The accidental gall bladder perforation during laproscopic cholecystectomy incidence, risk and effect on the clinical outcome in the patients admitted at KLE's Dr Prabhakar Kore Hospital and MRC, Belagavi.

Initial Box

1) I confirm that I read the contents and understood the information sheet for the above study and have had the opportunity to ask questions. ☐

2) I understood that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. ☐

3) I understood that sponsor of the clinical trial; others working on the sponsor's behalf, the Ethics Committee and the regulatory authorities will not need my permission to look at my health records both in respect of current study and further research that may be conducted in relation to it, even if I withdraw from the trial. ☐

4) I agree to this access. However, I understood that my identity will not be revealed in any information released to third parties or published. ☐

5) I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purposes. ☐

6) I agree to take part in the above study. ☐

Participant's name _____

Participant's signature/left thumb print

Experimenter's name _____

Experimenter's signature _____

PATIENT'S LEGALLY ACCEPTABLE REPRESENTATIVE'S STATEMENT

I, as the patient's legally acceptable representative, was present during the consenting procedure and understand the preceding information describing this study. All of the questions regarding the study and the patient's participation in it have been answered to my satisfaction and that of the patient. I state that all aspects of the study were clearly presented during the consent procedure. The patient is willing to participate in the study and I sign below on his/her behalf testifying to this effect.

Name of the patient:

Witness's name _____

Relationship to the patient: _____

Witness's signature _____

ANNEXURE II. ETHICAL CLEARANCE.

K.L.E. ACADEMY OF HIGHER EDUCATION AND RESEARCH
(Deemed – to- be- University)
Accredited "A" Grade by NAAC (2nd Cycle) Placed in Category "A" by MHRD (GoI)
JAWAHARLAL NEHRU MEDICAL COLLEGE,
NEHRU NAGAR, BELAGAVI-590010 (KARNATAKA-INDIA)
Website: http//www.jnmc.edu
E-Mail : dome@jnmc.edu
Phone: (+ 91-(0)831 Office : 2472550
Principal: 2471701
Fax No. +91 (0)831 – 2470759

Ref: MDC/DOME/ 284 **Date: 24/12/2019**

To.
REG NO BH0119004
PG student in Surgery,
J.N.Medical College,
BELAGAVI.

Sub: Institutional Ethical Clearance for the study.

With reference to the above, we wish to inform you that your proposed research project titled **"ACCIDENTAL GALLBLADDER PERFORATION DURING LAPAROSCOPIC CHOLECYSTECTOMY: INCIDENCE AND EFFECT ON THE PATIENTS ADMITTED AT A TERTIARY CARE CENTRE: A ONE YEAR PROSPECTIVE STUDY"**, is ethical and justifiable. The proposed research project has been cleared by the JNMC Institutional Ethics Committee on Human Subjects Research.

(Dr. Anita Dalal)
Member Secretary
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

(Dr. Roopa M Belliad)
Chairman,
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

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ANNEXURE III - PROFORMA

SCREENING FORM

SCREENING NUMBER : ☐☐☐☐☐

DATE OF SCREENING (DD/MM/YY):
NAME :
AGE :
IP NUMBER :

Gender : 1. Male ☐ 2.Female ☐

1. DOA (dd/mm/yy) ☐☐ ☐☐ ☐☐☐☐

2. DOD (dd/mm/yy) ☐☐ ☐☐ ☐☐☐☐

3. Date of interview (dd/mm/yy) ☐☐ ☐☐ ☐☐☐☐

4. Address : 1.Belagavi ☐
   2.Outside Belagavi

5. Phone: ☐☐☐☐☐☐☐☐☐

6. Occupation : ☐
   1-Unemployed
   2-Unskilled
   3-Semi-skilled
   4-Skilled
   5-Professional

7. Education : ☐
   1-Illiterate
   2-Primary (1st-7th std)
   3-High school (8th-10th std)
   4-Intermediate
   5-Degree and above

Socio-economic status : ☐
1-Low
2-Middle
3-High

History : Pain in the right hypochondrium (no. of days)

On Examination: On palpation Pain/tenderness 1.Yes ☐

2. No ☐

Investigations: USG Abdomen 1) suggestive of Gall bladder calculous

1 .Yes ☐

2. No ☐

2) single or multiple stones.

3) Gall bladder wall thickness.

NORMAL ☐

THICKENED ☐

4) Contracted or distended Gall bladder ☐

5) Peri GB Collection: Yes ☐

No ☐

EXCLUSION CRITERIAS 1. YES 2. NO

1. Gall bladder Neoplasm
2. Co existing CBD stones
3. Associated Liver Diseases
4. Immunocompromised

8. Applicant is willing to give consent : 1-Yes ☐

2-No

9. Final result 1-Inelgible ☐

2-Elgible but refused

3-Elgible and participating

PROFORMA

1. Patient IP no. ☐☐☐☐☐☐☐

2. Age (in years) ☐☐

3. Gender : 1. Male 2. Female ☐

4. Height (in cms): ☐☐☐

5. Weight (in kgs): ☐☐

6. BMI(kg/m^2): ☐☐

7.DOA (dd/mm/yy) ☐☐☐☐☐☐☐☐

8. DOD (dd/mm/yy) ☐☐☐☐☐☐☐☐

9. Date of interview (dd/mm/yy) ☐☐☐☐☐☐☐☐

ANALYSIS

PRE OPERATIVE :

1) Risk Factors:

a) Pre operative imaging : 1) USG
2) MRCP
3)Previous ERCP

b) Deranged LFT :

2) Intraoperative :

1) Gall bladder perforated : Yes:
No :

2) Gall stone spillage : Yes :
No:

3) Bile spillage : Type : Bile
White bile
Purulent

Gall bladder peroforation due to difficult in dissection due to :

a) Pericholecystic Adhesions
b) Oedamatous gall bladder
c) Necrosis of gall bladder
d) Difficulty in calots triangle dissection
e) Traction or grasping
f) Cystic duct slippage
g) Gall bladder extraction through small port.
h) Technical snag.
i) Assistant mistake
j) Energy source :instrument used to have less chances of injuries.
k) Surgeons over confidence after clipping the cystic duct.

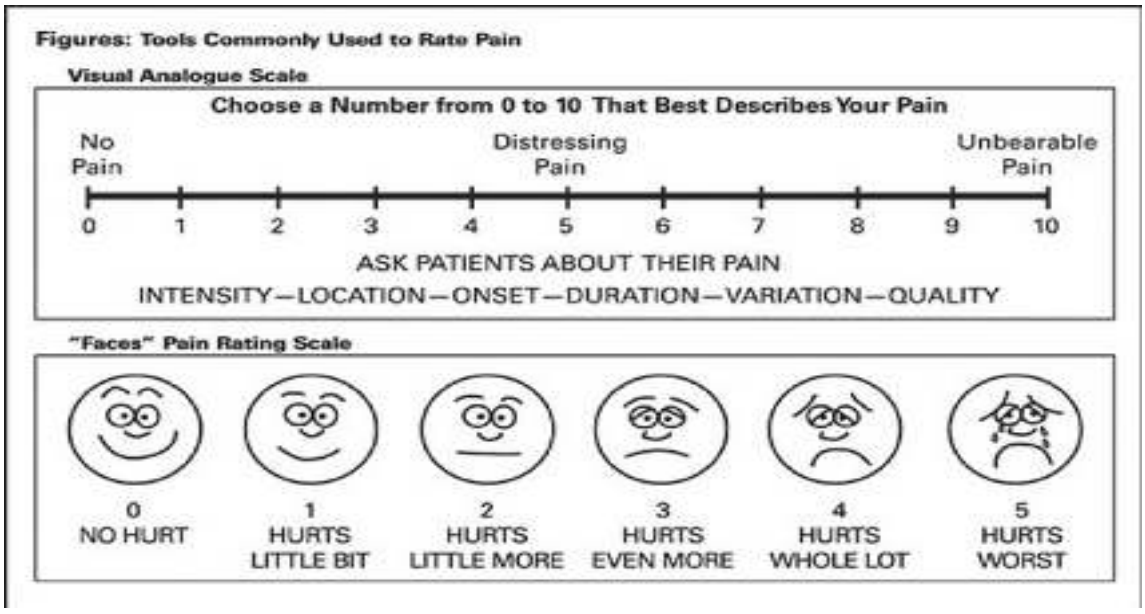
4) Site of bile spillage: 1) neck
2) body

3) fundus
4) cystic duct
5) common bile duct

5) Operative duration : In minutes ☐

6) Postoperative pain : by using Visual Analogue Scale ☐

:



3. Postoperative wound infection : Yes : ☐
No : ☐

4. Post opeartive stay : Number of days –
Outcome -

5. Post Operative drain requirement

ANNEXURE IV - KEY TO MASTERCHART

DOA	–	Date of admission
DOD	–	Date of discharge
RR	–	Respiratory rate
BP	–	Blood Pressure
BMI	–	Body mass index.
LFT	–	Liver function test
GB	–	Gallbladder
HTN	–	Hypertension
DM	–	Diabetes mellitus
LSCS	–	Lower uterine segment section.
N/A	–	not applicable
PC	–	Peri cholecystic collection
VAS	–	Visual analogue

Sr. No.	IP NO.	AGE (years)	SEX	DOA	DOD	Date of Interview	Pain in Right Hypochondrium Duration	Vomiting	Fever	Comorbidities	Previous Surgery	BMI	Pulse Rate	BP	RR	LFT	No. of calculi	GB Wall thickness	Contracted/Distended GB	Peri GB Collection	GB perforated	Gall Stone spillage	Bile Spillage	Type of Bile	CAUSE OF PERFORATION										Site of Bile Spillage	Operative Duration (in min)	Conversion to open	Pain (VAS)	Wound Infection	Post op Stay	Drain Requirement	Outcome
																									Adhesions	Oedematous GB	Necrosis of GB	Difficult in Calots	Traction/Grasping	Cystic Duct slippage	GB extraction	Technical Snag	Assistant Mistake	Energy Source								
1	993238	54	MALE	2-1-2020	13-1-2020	01-03-2020	5 DAYS	No	No	NONE	NONE	29	80	120/90	16	N	MULTIPLE	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	MILD											60 min	NONE	2	NO	4 DAYS	NO	GOOD
2	993251	60	FEMALE	2-1-2020	22-1-2020	01-03-2020	10 DAYS	Yes	Yes	NONE	TUBECTOMY	28.6	76	130/90	17	N	MULTIPLE	THICKENED	DISTENDED	NO	YES	YES	YES	NORMAL	MODERATE	+		+						+	BODY	80 min	NONE	4	no	8 days	3 DAYS	GOOD
3	995102	60	FEMALE	11-1-2020	17-1-2020	13/1/20	7 DAYS	No	No	HYPOTHYROIDISM HTN	TUBECTOMY	29.2	80	150/90	14	N	MULTIPLE	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	MILD											70 min	NONE	3	no	5 days	NO	UNEVNTFUL
4	997826	24	FEMALE	26-1-2020	31-1-2020	27-01-2020	15 DAYS	Yes	No	NONE	APPENDECTOMY, LSCS, TUBECTOMY	30.6	84	110/70	20	N	MULTIPLE	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	MILD											60 min	NONE	4	no	6 days	NO	GOOD
5	997939	47	FEMALE	27-1-2020	29-1-2020	28/1/20	15 DAYS	Yes	No	NONE	LSCS, TUBECTOMY	26.1	86	140/80	16	N	FEW	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	ABSENT											45 min	NONE	3	no	2 days	NO	UNEVENTFUL
6	997953	51	MALE	27-1-2020	4-2-2020	28/1/20	30 DAYS	Yes	No	NONE	NONE	24.2	78	130/90	18	N	MULTIPLE	NORMAL	CONTRACTED	YES	YES	YES	YES	NORMAL	ABSENT			+				+			NECK	80 min	NONE	4	no	4 days	NO	UNEVENTFUL
7	1002916	29	FEMALE	22-2-2020	7-3-2020	24/3/20	2 DAYS	No	No	NONE	NONE	29	92	130/90	16	N	MULTIPLE	NORMAL	DISTENDED	NO	YES	NO	YES	NORMAL	MODERATE	+						+		+	FUNDUS	70 min	NONE	4	no	5 days	NO	GOOD
8	1002992	58	FEMALE	23-2-2020	25-2-2020	24/2/20	60 DAYS	No	No	HTN, DM	HYSTERECTOMY	24.6	92	120/70	16	N	SINGLE	NORMAL	NORMAL	NO	NO	NO	NO	N/A	ABSENT											70 min	NONE	2	NO	2 DAYS	NO	UNEVENTFUL
9	1003067	35	FEMALE	24-2-2020	12-3-2020	25/2/20	30 DAYS	Yes	No	NONE	NONE	25	68	140/100	18	N	FEW	NORMAL	NORMAL	NO	NO	NO	NO	N/A	MODERATE											60 min	NONE	3	NO	1 DAY	NO	GOOD
10	1003149	50	FEMALE	24-2-2020	26-2-2020	25/2/20	30 DAYS	No	No	HYPOTHYROIDISM	TUBECTOMY, HEMORRHOIDECTOMY	29.1	72	100/70	17	N	MULTIPLE	NORMAL	NORMAL	NO	NO	NO	NO	N/A	ABSENT											50 min	NONE	3	NO	2 DAYS	NO	GOOD
11	1005795	76	MALE	7-3-2020	11-3-2020	03-08-2020	60 DAYS	No	No	DM	LEFT INGUINAL HERNIA	30.5	78	130/80	20	N	MULTIPLE	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	MODERATE											60 mn	NONE	3	NO	2 DAYS	NO	GOOD
12	1006348	55	FEMALE	11-3-2020	20-3-2020	13/3/20	90 DAYS	No	No	HTN	TUBECTOMY	23.4	84	150/80	22	N	MULTIPLE	THICKENED	DISTENDED	NO	NO	NO	NO	N/A	ABSENT											55 min	NONE	3	NO	4 DAYS	NO	GOOD
13	1006277	55	MALE	11-3-2020	14-3-2020	01-12-2020	90 DAYS	No	No	NONE	NONE	30.2	82	130/70	22	N	MULTIPLE	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	MILD											45 min	NONE	3	NO	2 DAYS	NO	UNEVENTFUL
14	1006360	54	MALE	11-3-2020	13-3-2020	03-12-2020	5 DAYS	No	Yes	HTN	NONE	26	98	140/80	17	N	MULTIPLE	NORMAL	DISTENDED	YES	NO	NO	NO	N/A	MODERATE											60 min	NONE	3	NO	2 DAYS	NO	GOOD
15	1007292	56	FEMALE	16-3-2020	23-3-2020	18/3/30	8 DAYS	Yes	Yes	HTN	NONE	24.5	102	130/90	16	N	MULTIPLE	NORMAL	CONTRACTED	YES	YES	YES	YES	WHITE	MODERATE	+					+				BODY	80 min	NONE	3	NO	6 DAYS	NO	GOOD
16	1014553	65	FEMALE	12-6-2020	19-6-2020	13/6/20	150 DAYS	Yes	No	HTN	NONE	27.2	78	150/90	14	N	INGLE (impacted	NORMAL	DISTENDED	NO	YES	NO	YES	NORMAL	MODERATE	+								+	NECK	90 min	NONE	3	NO	4 DAYS	NO	UNEVENTFUL
17	1017362	50	FEMALE	2-7-2020	7-7-2020	07-02-2020	120 DAYS	No	No	NONE	NONE	26.1	92	130/80	16	N	MULTIPLE	THICKENED	DISTENDED	NO	NO	NO	NO	N/A	ABSENT												NONE			05 DAYS	NO	GOOD
18	1018016	50	MALE	7-7-2020	12-7-2020	07-08-2020	5 DAYS	Yes	No	HTN, HYPOTHYROIDISM	NONE	29.1	82	110/80	17	N	SINGLE	NORMAL	CONTRACTED	NO	YES	YES	YES	NORMAL	ABSENT			+		+					CYSTIC DUC	60mmin	NONE	3		6 DAYS	3 DAYS	IMPROVED
19	1018489	78	FEMALE	11-7-2020	18-7-2020	07-12-2020	2 DAYS	No	No	NONE	NONE	30	76	110/70	18	N	MULTIPLE	NORMAL	NORMAL	NO	NO	NO	NO	NORMAL	ABSENT											50 min	NONE	2	NO	2 DAYS	NO	GOOD
20	1020412	25	MALE	6-8-2020	16-09-2020	08-07-2020	5 DAYS	Yes	No	NONE	ESWL FOR RENAL CALCULI	32	82	130/80	20	N	MULTIPLE	THICKENED	NORMAL	NO	NO	NO	NO	N/A	ABSENT											45 min	NONE	3	NO	4 DAYS	NO	IMPROVED
21	1022507	35	MALE	5-9-2020	16-9-2020	09-06-2020	60 DAYS	No	No	NONE	NONE	36.1	76	140/90	22	N	MULTIPLE	THICKENED	DISTENDED	NO	YES	YES	YES	N/A	DENSE	+								+	NECK		NONE	3	NO	7 DAYS	NO	UNEVENTFUL
22	1025195	40	FEMALE	12-10-2020	16-10-2020	13/10/20	7 DAYS	No	No	NONE	NONE	27	90	110/70	20	N	SINGLE	NORMAL	CONTRACTED	NO	NO	NO	NO	NORMAL	ABSENT											50 min	NONE	3	NO	2 DAYS	NO	GOOD
23	1025416	58	MALE	14-10-2020	23-10-2020	16/10/20	60 DAYS	No	No	HTN	NONE	30	82	120/80	18	N	SINGLE	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	ABSENT											65 min	NONE	3	NO	6 DAYS	NO	UNEVENTFUL
24	1026400	70	MALE	27-10-2020	4-11-2020	27/10/20	90 DAYS	Yes	No	NONE	NONE	26.5	96	120/70	16	N	MULTIPLE	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	DENSE		+									70 min	NONE	4	NO	10 DAYS	NO	UNEVENTFUL
25	1026806	68	MALE	1-11-2020	5-11-2020	11-02-2020	56 DAYS	No	No	HTN, HYPOTHYROIDISM, DM	NONE	24.9	68	140/80	18	N	MULTIPLE	NORMAL	NORMAL	NO	NO	NO	NO	N/A	DENSE	+										60 min		4	NO	4 DAYS	NO	GOOD
26	1026816	47	FEMALE	1-11-2020	5-11-2020	11-02-2020	01 DAY	Yes	No	NONE	LSCS + TUBECTOMY	28.2	78	110/80	18	N	SINGLE	THICKENED	NORMAL	NO	NO	NO	NO	N/A	MODERATE											70 min	NONE	3	NO	4 DAYS	NO	UNEVENTFUL
27	1005621	53	FEMALE	6-3-2020	16-3-2020	03-07-2020	7 DAYS	No	No	NONE	NONE	27	92	140/90	16	N	MULTIPLE	THICKENED	CONTRACTED	NO	NO	NO	NO	N/A	DENSE											50 min	NONE	4	NO	10 DAYS	NO	GOOD
28	1016514	32	FEMALE	26-6-2020	5-7-2020	29/6/20	5 DAYS	Yes	No	NONE	NONE	28	86	100/90	16	N	MULTIPLE	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	MILD											45 min	NONE	3	NO	5 DAYS	NO	GOOD
29	1015201	54	FEMALE	17-6-2020	23-06-2020	18-06-2020	30 DAYS	No	No	DM	HYSTERECTOMY	28.3	78	100/70	18	N	SINGLE	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	SEVERE											55 min	NONE	4	NO	4 DAYS	NO	UNEVENTFUL
30	1016063	39	FEMALE	23-6-2020	7-7-2020	27/6/20	30 DAYS	No	No	NONE	ANGIOPLASTY, OP/C/O RENAL STONES	26	84	110/80	14	N	SINGLE	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	SEVERE	+										60 min	NONE		NO	4 DAYS	NO	UNEVENTFUL
31	1015894	34	FEMALE	22-6-2020	29-6-2020	23/6/20	90 DAYS	Yes	No	NONE	TUBECTOMY	29.2	78	110/70	16	N	SINGLE	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	MILD											70 min	NONE	4	NO	4 DAYS	NO	GOOD
32	1003662	51	FEMALE	26-2-2020	18-3-2020	28/2/20	365 DAYS	No	No	NONE	TUBECTOMY	29	68	120/70	17	N	MULTIPLE	NORMAL	CONTRACTED	YES	YES	NO	YES	NORMAL	MILD				+				+		FUNDUS	80 min	NONE	3	NO	4 DAYS	NO	IMPROVED
33	1024041	19	FEMALE	25-9-2020	30-9-2020	26/9/20	60 DAYS	No	No	NONE	NONE	27	86	110/70	16	N	SINGLE	NORMAL	DISTENDED	YES	NO	NO	NO	N/A	DENSE											50 min	NONE	3	NO	5 DAYS	NO	GOOD
34	1034584	60	MALE	12-1-2021	27-1-2021	14/1/2020	5 DAYS	Yes	No	NONE	APPENDICECTOMY	26	84	120/70	18	N	FEW	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	ABSENT											60 min	NONE	3	NO	4 DAYS	NO	UNEVENTFUL
35	1029693	60	MALE	30-11-2020	12-12-2020	20/11/2020	4 DAYS	Yes	No	NONE	NONE	27.2	92	120/80	22	N	FEW	NORMAL	DISTENDED	NO	NO	NO	NO	NORMAL	MILD											55 min	NONE	3	NO	5 DAYS	NO	GOOD
36	1030558	45	MALE	8-12-2020	11-12-2020	12-09-2020	30 DAYS	No	No	NONE	NO	26	84	110/70	18	N	MULTIPLE	THICKENED	DISTENDED	NO	NO	NO	NO	N/A	ABSENT										-	65 min	NONE	4	NO	3 DAYS	4 DAYS	UNEVENTFUL
37	1029945	74	MALE	2-12-2020	4-12-2020	12-02-2020	15 DAYS	No	No	DM, HTN	HEMORRHOIDECTOMY	25	88	120/70	16	N	SINGLE	NORMAL	NORMAL	NO	NO	NO	NO	N/A	MILD											75 min	NONE	3	NO	2 DAYS	NO	UNEVENTFUL
38	1030474	67	MALE	7-12-2020	14-12-2020	12-09-2020	365 DAYS	No	Yes	NONE	?LIPOMA EXCISION	29.2	92	130/90	22	N	SINGLE	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	MILD											45 min	NONE	3	NO	8 DAYS	NO	UNEVENTFUL
39	1034024	45	FEMALE	6-1-21	11-1-21	01-06-2021	24 DAYS	No	No	NONE	TUBECTOMY	32	74	120/80	14	N	SINGLE	NORMAL	NORMAL	NO	NO	NO	NO	N/A	ABSENT											90 min	NONE	4	NO	4 DAYS	NO	IMPROVED
40	1034364	48	MALE	8-1-21	16-1-21	01-10-2021	20 DAYS	No	No	NONE	APPENDECTOMY	30.2	94	130/80	17	N	MULTIPLE	THICKENED	CONTRACTED	NO	YES	YES	YES	N/A	DENSE					+					CYSTIC DUC	70 min	NONE	4	NO	4 DAYS	2 DAYS	IMPROVED
41	1035155	36	FEMALE	15-1-21	20-1-21	18/1/21	60 DAY	No	No	BRONCHIAL ASTHMA	APPENDECTOMY	27	80	110/70	18	N	FEW	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	ABSENT											50 min	NONE	3	NO	5 DAYS	NO	UNEVENTFUL
42	1034985	45	FEMALE	13-1-21	25-1-21	14/1/21	30 DAYS	Yes	No	NONE	APPENDECTOMY, TUBECTOMY	26.4	86	110/60	18	N	INGLE (impacted	NORMAL	DISTENDED	NO	YES	NO	YES	N/A	DENSE	+								+	NECK	65 min	NONE	4	NO	7 DAYS	YES	IMPROVED
43	1035506	50	FEMALE	19-1-21	25-1-21	20/1/21	7 DAYS	Yes	No	HYPOTHYROIDISM, OSTEOARTHRITIS	NONE	29	82	140/90	16	N	SINGLE	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	ABSENT										-	70 min	NONE	3	NO	3 DAYS	4 DAYS	GOOD
44	1026403	47	FEMALE	27-10-2020	14-11-2020	28/10/20	4 DAYS	Yes	No	NONE	TUBECTOMY	26.3	90	110/80	14	N	MULTIPLE	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	ABSENT											60 min	NONE	3	NO	13 DAYS	NO	GOOD
45	1035914	44	FEMALE	20-1-21	4-2-21	22/1/21	120 DAYS	Yes	No	DM, COPD	NONE	24	84	150/90	15	N	TWO	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	MILD											55 min	NONE	4	NO	8 DAYS	NO	IMPROVED
46	1033696	42	FEMALE	4-1-21	9-1-21	01-05-2021	5 DAYS	No	No	NONE	LAP TUBAL LIGATION	22	76	140/78	16	N	MULTIPLE	NORMAL	NORMAL	NO	NO	NO	NO	N/A	SEVERE											60 min	NONE	4	NO	5 DAYS	NO	GOOD
47	1034551	68	FEMALE	9-1-2021	19-1-2021	01-11-2021	60 DAYS	Yes	No	HYPOTHYROIDISM	HEMORRHOIDECTOMY, FIBROADENOMA EXCISION	24.6	72	130/80	18	N	SINGLE	NORMAL	DISTENDED	YES	YES	NO	YES	NORMAL	MODERATE	+		+							BODY	70 min	NONE	4	NO	05 DAYS	2	GOOD
48	1026001	30	FEMALE	21-10-2020	23-10-2020	21-10-2021	7 DAYS	No	No	HYPOTHYROIDISM	LSCS	35	98	126/78	16	N	SINGLE	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	MILD											60 min	NONE	4	NO	3 DAYS	3 DAYS	GOOD
49	1037191	40	FEMALE	29-1-21	2-2-21	18/3/21	20 DAYS	Yes	No	NONE	HEMORRHOIDECTOMY, LSCS	32.2	64	120/70	22	N	MULTIPLE	THICKENED	CONTRACTED	NO	YES	YES	YES	YES	DENSE	+	+								FUNDUS	80 min	NONE	2	NO	8 DAYS	6 DAYS	UNEVENTFUL
50	1037708	58	FEMALE	2-2-21	6-2-21	02-02-2021	180 DAYS	No	No	DM	NONE	29.2	94	110/70	20	N	MULTIPLE	NORMAL	NORMAL	NO	YES	YES	YES	NORMAL	MILD			+							NECK	60 min	NONE	2	NO	4 DAYS	NO	GOOD
51	1023882	56	MALE	23/09/20	09-07-2020	25/09/20	5 DAYS	No	No	DM,HTN,HYPOTHYROID		25	84	110/80	21	N	MULTIPLE	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	MILD											90 min	NONE	2	NO	4 DAYS	NO	GOOD
52	1038391	64	MALE	02-06-2021	13/3/31	02-07-2021	5 DAYS	Yes	No	DM,HTN,IHD	NONE	32	90	120/80	20	N	SINGLE	THICKENED	DISTENDED	NO	YES	YES	YES	NORMAL	MODERATE	+									NECK	80 min	NONE	4	NO	4 DAYS	YES	GOOD
53	1006277	55	MALE	03-11-2020	13/3/20	03-11-2020	90 DAYS	No	No	NONE	NONE	30	78	130/90	26	N	MULTIPLE	THICKENED	CONTRACTED	NO	YES	YES	YES	NORMAL	MODERATE			+				+	+		FUNDUS	90 min	NONE	4	NO	3 DAYS	N0	IMPROVED
54	1016854	71	FEMALE	28/6/20	07-06-2020	29/6/20	6 DAYS	No	No	NONE	,HYSTERECTOMY, BKR	32.5	82	140/90	20	N	INGLE (imacted	NORMAL	DISTENDED	NO	NO	NO	NO	NORMAL	ABSENT											70 min	NONE	3	NO	8 DAYS	3 DAYS	GOOD
55	1017382	52	FEMALE	07-02-2020	07-08-2020	07-03-2020	4 DAYS	No	No	NONE	NONE	29.4	78	150/100	24	N	MULTIPLE	NORMAL	DISTENDED	NO	YES	YES	YES	N/A	MILD			+	+						CYSTIC DUC	80 min	NONE	4	NO	6 DAYS	5 DAYS	GOOD
56	1014875	20	FEMALE	16/6/20	27/6/20	17/6/20	5 DAYS	No	No	NONE	NONE	29.5	88	110/80	22	N	FEW	NORMAL	CONTRACTED	YES	NO	NO	NO	N/A	ABSENT											60 min	NONE	3	NO	10 DAYS	NO	IMPROVED
57	1002799	70	MALE	22/220	17/3/20	23/2/20	60 DAYS	No	No	NONE	NONE	36	84	130/70	16	N	MULTIPLE	NORMAL	DISTENDED	NO	YES	YES	YES	NORMAL	MODERATE	+		+							NECK	70 min	NONE	4	NO	8 DAYS	NO	GOOD
58	994212	32	FEMALE	01-07-2020	17/1/20	01-09-2020	8 DAYS	Yes	Yes	NONE	NONE	22	78	140/80	18	N	MULTIPLE	THICKENED	DISTENDED	NO	NO	NO	NO	N/A	ABSENT	+										60 min	NONE	3	NO	4 DAYS	NO	GOOD
59	100808	53	MALE	02-11-2020	13/2/20	02-11-2020	10 DAYS	Yes	Yes	NONE	NONE	24.6	90	130/90	22	N	MULTIPLE	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	ABSENT											70 min	NONE	2	NO	2 DAYS	NO	IMPROVED
60	997342	46	FEMALE	23/120	17/2/20	25/1/20	25 DAYS	No	No	DM	HYSTERECTOMY	29.4	92	110/70	18	N	MULTIPLE	NORMAL	DISTENDED	YES	YES	YES	YES	NORMAL	MILD			+'							FUNDUS	75 min	NONE	3	YES	17 DAYS	3 DAYS	GOOD
61	HATIZA S	35	FEMALE	01-01-2020	17/1/20	01-02-2020	20 DAYS	Yes	No	NONE	NONE	25.8	88	100/60	16	N	MULTIPLE	THICKENED	DISTENDED	NO	NO	NO	NO	N/A	ABSENT											45 min	NONE	2	NO	7 DAYS	NO	IMPROVED
62	1019779	57	FEMALE	27/7/20	08-02-2020	27/7/20	2 DAYS	Yes	No	HTN	TUBECTOMY	26.9	68	130/90	14	N	MULTIPLE	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	MODERATE											50 min	NONE	4	NO	2 DAYS	NO	GOOD
63	1015673	19	MALE	24/6/20	30/6/20	24/6/20	4 DAYS	No	No	NONE	NONE	24.7	78	116/78	17	N	MULTIPLE	NORMAL	NORMAL	NO	NO	NO	NO	N/A	MILD											60 min	NONE	3	NO	5 DAYS	NO	GOOD
64	1046031	60	FEMALE	24/3/21	31/3/21	25/1/21	8 DAYS	No	No	NONE	TUBECTOMY	26.8	88	140/80	22	N	MULTIPLE	NORMAL	NORMAL	NO	NO	NO	NO	N/A	ABSENT											65 min	NONE	2	NO	5 DAYS	NO	IMPROVED
65	1037724	39	FEMALE	02-02-2021	111/2/21	02-03-2021	3 DAYS	Yes	No	NONE	NONE	25.2	90	150/90	24	N	MULTIPLE	NORMAL	NORMAL	NO	NO	NO	NO	N/A	ABSENT	+										55 min	NONE	3	NO	6 DAYS	NO	IMPROVED
66	1043738	26	FEMALE	03-12-2021	04-09-2021	23/3/21	4 DAYS	Yes	No	NONE	NONE	26	92	140/80	20	N	MULTIPLE	NORMAL	NORMAL	NO	NO	NO	NO	N/A	MILD											70 min	NONE	4	YES	10 DAYS	NO	GOOD
67	1044873	39	FEMALE	18/3/21	20/3/21	18/3/21	120 DAYS	Yes	No	NONE	OVARIAN CYST	29	82	130/70	16	N	MULTIPLE	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	ABSENT											60 min	NONE	3	NO	2 DAYS	NO	GOOD
68	1043593	36	MALE	03-11-2021	13/3/21	03-11-2021	120 DAYS	Yes	No	NONE	NONE	2923.4	86	110/70	18	N	SINGLE	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	ABSENT											55 min	NONE	3	NO	1 DAY	NO	GOOD
69	1031391	65	FEMALE	15/12.20	23/1/2/20	16/12/20	15 DAYS	No	No	NONE	HYSTERECTOMY	26.8	90	120/80	18	N	MULTIPLE	NORMAL	DISTENDED	YES	NO	NO	NO	N/A	ABSENT											45 min	NONE	4	NO	5 DAYS	NO	IMPROVED
70	1039377	50	MALE	02-12-2021	03-01-2021	15/2/21	90 DAYS	Yes	No	NONE	APPENDECTOMY , INCISIONAL HERNIA	24.9	74	130/80	20	N	MULTIPLE	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	ABSENT											95 min	YES	4	NO	10 DYS	NO	IMPROVED
71	1039261	25	FEMALE	02-12-2021	23/2/21	13/2/21	90 DAYS	Yes	Yes	NONE	NONE	25.7	88	140/90	16	N	MULTIPLE	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	MILD											60 min	NONE	4	YES	7 DAYS	NO	GOOD
72	1035358	45	FEMALE	17/1/21	19/1/21	17/1/21	8 DAYS	Yes	No	HTN	NONE	26	90	110/70	18	N	SINGLE	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	ABSENT											70 min	NONE	3	NO	2 DAYS	NO	IMPROVED
73	1032382	22	FEMALE	23/12/20	26/12/20	24/12/20	8 DAYS	Yes	No	NONE	NONE	29	96	110/60	22	N	MULTIPLE	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	MILD											60 min	NONE	3	NO	2 DAYS	NO	GOOD
74	1038519	52	MALE	02-08-2021	02-11-2021	02-08-2021	60 DAYS	Yes	No	HTN	NONE	24.5	92	150/100	24	N	SINGLE	THICKENED	DISTENDED	NO	NO	NO	NO	N/A	MODERATE	+										70 min	NONE	4	NO	3 DAYS	NO	IMPROVED
75	1039089	45	MALE	02-11-2021	13/2/21	02-11-2021	5 DAYS	Yes	No	NONE	NONE	32	68	140/90	20	N	MULTIPLE	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	MILD											60 min	NONE	2	NO	2 DAYS	NO	GOOD
76	1040605	43	MALE	20/2/21	23/2/21	20/2/21	60 DAYS	No	No	NONE	NONE	30	82	130/90	16	N	SINGLE	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	ABSENT											55 min	NONE	3	NO	2 DAYS	NO	GOOD
77	1037511	48	FEMALE	02-01-2021	02-11-2021	02-03-2021	240 DAYS	Yes	No	NONE	TUBECTOMY	32.4	90	160/100	20	N	FEW	THICKENED	DISTENDED	NO	NO	NO	NO	N/A	ABSENT											65 min	NONE	3	NO	4 DAYS	NO	GOOD
78	1029894	39	MALE	12-02-2020	12-11-2020	12-04-2020	15 DAYS	Yes	Yes	HTN	APPENDICECTOMY	28.5	84	110/70	16	N	MULTIPLE	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	ABSENT											55 min	NONE	3	NO	4 DAYS	NO	GOOD
79	1040041	49	MALE	17/2/21	22/2/21	17/2/21	18 DAYS	Yes	No	NONE	NONE	26.4	92	130/70	18	N	MULTIPLE	NORMAL	NORMAL	NO	NO	NO	NO	N/A	ABSENT											60 min	NONE	3	NO	5 DAYS	NO	GOOD
80	1029594	40	MALE	30/11/20	12-04-2020	30/1//20	40 DAYS	No	No	NONE	NONE	29.4	78	120/80	18	N	MULTIPLE	NORMAL	NORMAL	NO	NO	NO	NO	N/A	ABSENT	+										50 min	NONE	2	NO	5 DAYS	NO	GOOD
81	1041228	61	FEMALE	24/2/21	03-03-2021	26/2/21	14 DAYS	Yes	No	DM ,HTN	TUBECTOMY	24.8	106	130/80	16	N	MULTIPLE	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	ABSENT											45 min	NONE	3	NO	6 DAYS	NO	GOOD
82	1036409	32	FEMALE	24/1/21	02-07-2021	25/1/21	2 DAYS	No	No	HTN	NONE	25	82	110/60	19	N	MULTIPLE	THICKENED	DISTENDED	MINIMAL	NO	NO	NO	N/A	ABSENT											75 min	NONE	3	NO	12 DAYS	5 DAYS	IMPROVED
83	1029135	24	MALE	25/1//20	12-05-2020	26/11/20	60 DAYS	No	No	NONE	NONE	26.4	88	110/80	22	N	SINGLE	NORMAL	CONTRACTED	NO	YES	NO	YES	NORMAL	ABSENT		+								NECK	60 min	NONE	4	YES	7 DAYS	4 DAYS	IMPROVED
84	1033119	70	FEMALE	30/12/20	01-05-2021	30/12/20	2 DAYS	No	Yes	NONE	NONE	31	102	130/90	20	N	MULTIPLE	NORMAL	CONTRACTED	NO	YES	NO	YES	NORMAL	DENSE										FUNDUS	70 min	NONE	3	NO	4 DAYS	NO	GOOD
85	1027312	58	FEMALE	6/1120	21/1/20	11-08-2020	180 DAYS	No	No	NONE	TUBECTOMY	33.9	116	110/70	26	N	MULTIPLE	NORMAL	CONTRACTED	NO	YES	NO	YES	NORMAL	ABSENT							+		+	FUNDUS	80 min	NONE	3	NO	9 DAYS	NO	GOOD
86	1046350	29	MALE	25/3/2021	16/04/2021	28/3/2021	120 DAYS	No	No	NONE	NONE	28.5	92	140/90	24	N	MULTIPLE	THICKENED	CONTRACTED	NO	NO	NO	NO	N/A	ABSENT											70 min	NONE	4	NO	13 DAYS	3 DAYS	IMPROVED
87	1047446	58	FEMALE	04-01-2021	04-07-2021	04-03-2021	60 DAYS	Yes	No	NONE	NONE	29.4	68	130/90	18	N	SINGLE	THICKENED	DISTENDED	NO	NO	NO	NO	N/A	MILD											60 min	NONE	4	NO	2 DAYS	NO	GOOD
88	1050500	59	MALE	24/4/2021	27/4/2021	25/4/2021	30 DAYS	No	No	HTN , DM	NONE	25	78	150/100	20	N	MULTIPLE	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	MILD											70 min	NONE	3	NO	2 DAYS	NO	IMPROVED
89	1052180	45	FEMALE	05-12-2021	15/5/20211	05-12-2021	2 DAYS	Yes	No	HTN	TUBECTOMY	26.4	106	140/100	26	N	MULTIPLE	NORMAL	DISTENDED	NO	NO	NO	NO	PUS	ABSENT											50 min	NONE	4	NO	2 DAYS	NO	GOOD
90	1049865	42	MALE	20/4/2021	21/4/2021	20/4/2021	60 DAYS	No	No	NONE	NONE	28.6	92	130/70	18	N	MULTIPLE	NORMAL	CONTRACTED	NO	NO	NO	NO	N/A	MODERATE											60 min	NONE	3	NO	01 DAY	NO	IMPROVED
91	1048408	75	MALE	04-07-2021	04-10-2021	04-07-2021	1 DAY	Yes	No	COPD , HTN	NONE	29.4	66	120/80	20	N	MULTIPLE	NORMAL	CONTRACTED	YES	NO	NO	NO	N/A	ABSENT											45 min	NONE	3	NO	2 DAYS	NO	GOOD
92	1050529	64	FEMALE	24/4/2021	05-01-2021	25/4/2021	4 DAYS	No	No	DM, HTN	NONE	25.6	78	112/78	20	N	MULTIPLE	NORMAL	NORMAL	NO	NO	NO	NO	N/A	MILD											50 min	NONE	4	NO	4 DAYS	NO	IMPROVED
93	1047788	28	FEMALE	04-04-2021	04-09-2021	04-05-2021	25 DAYS	No	No	NONE	2 LSCS	27.1	92	120/68	22	N	MULTIPLE	THICKENED	NORMAL	NO	NO	NO	NO	N/A	ABSENT											60 min	NONE	3	NO	4 DAYS	NO	GOOD
94	1049570	53	FEMALE	17/4/2021	23/4/2021	18/4/2021	90 DAYS	Yes	No	NONE	NONE	23	96	130/80	24	N	MULTIPLE	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	ABSENT											60 min	NONE	3	NO	3 DAYS	NO	GOOD
95	1047378	38	FEMALE	04-01-2021	04-06-2021	04-02-2021	30 DAYS	Ye	No	NONE	NONE	24	98	116/90	16	N	MULTIPLE	NORMAL	DISTENDED	NO	YES	YES	YES	NORMAL	ABSENT				+				+		FUNDUS	50 min	NONE	3	NO	02 DAYS	NO	IMPROVED
96	1048744	62	FEMALE	10/4/202`	23/4/2021	04-12-2021	90 DAYS	Yes	No	NONE	NONE	29	102	120/70	18	N	MULTIPLE	NORMAL	DISTENDED	YES	YES	YES	YES	NORMAL	MILD	+						+			NECK	70 min	NONE	4	YES	9 DAYS	4 DAYS	GOOD
97	1048631	33	MALE	04-09-2021	19/4/2021	04-10-2021	90 DAYS	No	No	NONE	NONE	24	84	130/90	22	N	MULTIPLE	NORMAL	DISTENDED	NO	NO	NO	NO	NORMAL	MODERATE											80 min	NONE	4	NO	07 DAYS	3 DAYS	IMPROVED
98	1048160	35	MALE	04-06-2021	04-10-2021	04-08-2021	3 DAYS	Yes	No	NONE	NONE	25.9	82	120/70	18	N	MULTIPLE	NORMAL	DISTENDED	NO	YES	YES	YES	WHITE	DENSE	+									BODY	70 min	NONE	4	NO	02 DAYS	NO	GOOD
99	1047205	23	FEMALE	31/3/2021	04-06-2021	04-01-2021	60 DAYS	No	Yes	NONE	NONE	24.7	102	120/70	16	N	INGLE (impacted	THICKENED	CONTRACTED	YES	YES	YES	YES	N/A	MILD	+								+	FUNDUS	65 min	NONE	4	NO	4 DAYS	NO	GOOD
100	1050569	47	MALE	24/4/2021	30/4/2021	25/4/2021	5 DAYS	Yes	No	DM, HTN , IHD	APPENDICECTOMY, INGUINAL HERNIA		100	110/90	22	N	MULTIPLE	NORMAL	DISTENDED	NO	NO	NO	NO	N/A	ABSENT											70 min	NONE	3	NO	4 DAYS	NO	GOOD