"PREOPERATIVE SCORING SYSTEM TO PREDICT DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY "

By

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DISSERTATION SUBMITTED TO

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH KOLAR, KARNATAKA

In partial fulfillment of the requirements for the degree of

MASTER OF SURGERY

IN

GENERAL SURGERY

UNDER THE GUIDANCE OF

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APRIL/MAY-2021

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ACKNOWLEDGEMENT

It is with great pleasure I attribute the success of my dissertation, to my guide **Dr. P.N SREERAMULU** Sir has the attitude and the substance of a genius: he continually and convincingly conveyed a spirit of adventure in regard to research and scholarship and an excitement in regard to teaching. Without his guidance and persistent help this dissertation would not have been possible.

His persistent encouragement, enthusiasm & support have been a source of inspiration all along. His calm demeanour& his excellent surgical skills have left an indelible influence on me. I am indeed blessed to have him as my teacher. I could not have imagined having a better advisor & mentor for my postgraduate course.

I would like to thank my HOD, **Dr. KRISHNA PRASAD K, Professor**, & H.O.D., Department of General Surgery, Sri Devaraj Urs Medical College, Tamaka, Kolar.

I would also like to thank **Dr. SRINIVASAN D, Dr. MOHAN KUMAR K, Dr. PRAKASH DAVE, Dr. SHASHIREKHA.C.A,** of Department of General Surgery, Sri Devaraj Urs Medical College, Tamaka, Kolar, who supported & encouraged me every step of the way.

I would like to thank my parents Mr.TadasinaRavinder Reddy & Mrs. TadasinaVijayalaxmi Reddy, for unconditional love & constant emotional support. I would like to thank my brother, Mr LikhitReddy for his encouragement & support through the study.I would like to thank my wife Dr. Amulya Y S for her unending support & encouragement.

My heartful gratitude to all my patients who submitted themselves most gracefully & wholeheartedly to participate in this study. I sincerely thank my institute Sri Devaraj Urs Medical College, Tamaka, Kolar for giving me a wonderful foundation. Last, but not the least, I would like to express my gratitude to the **Almighty** for all his blessings.

SIGNATURE OF THE CANDIDATE

Dr. TADASINA SAJAY REDDY

LIST OF ABBREVIATION

S.NO	ABBREVIATION	FULL FORM
1	LC	Laparoscopic Cholecystectomy
2	OC	Open Cholecystectomy
3	CA	Cystic Artery
4	CBD	Common Bile Duct
5	BMI	Body Mass index
6	OCP	Oral Contraceptive pills
7	CT	Computed Tomography
8	MRI	Magnetic resonance imaging
9	US	Ultrasound
10	ERCP	Endoscopic retrograde cholangiopancreatography
11	MRCP	Magnetic resonance cholangiopancreatography
12	SILS	Single Incision Laparoscopic Surgery
13	NOTES	Natural Orifice Transluminal Endoscopic Surgery
14	GB	Gallbladder
15	Pre-op	Preoperative

ABSTRACT

BACKGROUND

Laparoscopic Cholecystectomy is considered as the most common laparoscopic procedures in the world & is now the Gold standard treatment for Cholelithiasis & cholecystitis

Gallstone disease (cholelithiasis) has increasingly become one of the major causes of abdominal pain & discomfort in the developing world. Its occurrence has been found to be high (7.4%) in the adult population in the cities of Chandigarh & New Delhi in North Indiawhich is one of the highest in the world.Gallstones are more common in the female population (61%) as compared to males (39%). The common age group affected is 45–60 years (38.5%) among females, & above 60 years in males (20.8%). A relatively higher prevalence of 39% among males when compared to reports from past studies indicates a significant shift in the pattern of prevalence of gallstone disease[1].

Many risk factors for cholelithiasis cannot be modifiable such as ethnic background, advancing age, female gender & family history or genetics. The modifiable risks for cholelithiasis are obesity, quick weight loss & a idle lifestyle. Rising epidemic of obesity & the metabolic syndrome predicts an escalation in gallstones . Frequent risk factors for biliary sludge includes pregnancy, drugs like ceftiaxone, octreotide& thiazide diuretics, total parenteral nutrition & fasting. Diseases like cirrhosis, chronic hemolysis& Crohn's disease are few risk factors for black pigment stones[2].

In our hospital setup (R L Jalappa Hospital & Research Center, Tamaka , Kolar , Karnataka) , in the Department of surgery , a total of 166 cholecystectomies were performed in the period between October 2015 to September 2018 . 134 of these cases were elective laparoscopic cholecystectomy & twenty five of them were elective open cholecystectomies. There were a total of 7 cases which had to be changed from laparoscopic to open procedure due to intra operative difficulty involved. That gives us a conversion rate of 4.96% over the past 3 years in our hospital setup.

Pre operative prediction for the likelihood of conversion to open or difficulty of operation is an important aspect of planning laparoscopic surgery as the prevalence of gall bladder disease is increasing in india & laparoscopic surgery is becoming more accesicible. Arogya Karnataka scheme , which can be used in our hospital setup ,has laparoscopic cholecystectomy as one of its schemes for impoverished patients bringing the chance of laparoscopic surgery to the public. As a result the number of laparoscopic cholecystectomies as a whole as well as the risk of conversion increases making the need for study all the more important.

AIMS & OBJECTIVES

1. To validate that a scoring system based on history , physical examination & Ultrasonographic findings is a reliable predictor of difficulty of laparoscopic cholecystectomy.
2. To help in choosing a favourable treatment modality depending on the score.
3. To help predict the duration of hospital stay & post operative complications with the help of this system

METHODS

A Prospective & Comparative study, considering 70 patients admitted & undergoing laparoscopic cholesystectomy at R.L. Jalappa hospital & research center attached to Sri Devaraj Urs Academy of Higher Education Tamaka, Kolar, during the period of NOVEMBER 2018 & 10th OCTOBER 2020.

RESULTS

The preoperative scoring system devised is excellent at predicting the intraoperative difficulties encountered by surgeons while performing laparoscopic cholecystectomy with a sensitivity of 88.9% & a specificity of 92.3%. The scoring system also predicted intraoperative complications with a specificity of 94.2% when score is >7. There was also a very strong correlation between the preop score & the duration of surgery ($r=0.752$, $p<0.001$) & also between the preoperative score & the duration of hospital stay ($r=0.788$, $p<0.001$)

CONCLUSION

Preoperative prediction of the risk of conversion or difficulty of operation is an important aspect of planning laparoscopic surgery. I would conclude that the scoring system evaluated in our study can be used to predict difficult cases.

Keywords: Cholelithiasis, Preoperative, Scoring system, Laparoscopic, Cholecystectomy

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INTRODUCTION

Gallbladder diseases are a relatively common disorder in most part of the world. The overall prevalence of the cholelithiasis in the USA& much of the Western Europe is between 10 & 20 percent [1,2]. In either sex, the prevalence increases with age. Throughout the world, gallbladder diseases are predominantly a female disease.

In India too, the gallstone disease is relatively common with overall prevalence in the order of 10-20 per cent [3] & predominantly a female disease[4,5]. The results in this issue of the journal by Gaharwar, et al.,[6] are no different.

There is a North-South divide (commoner in North) in the burden of gallbladder diseases in India, a phenomenon which is poorly understood [5,6-8]. A relatively higher prevalence of 39% among males when compared to reports from past studies indicates a significant shift in the pattern of prevalence of gallstones.[9]

Many risk factors for choelithiasiscannot be modifiable such as ethnic background, advancing age, female gender & family history or genetics. The risks which can be modified for gallstones are obesity, sudden weight loss & a idle lifestyle. Rising epidemic of obesity & the metabolic syndrome predicts a risein gallstone frequency. Few risk factors for biliary sludge are pregnancy, drugs such asceftriaxone, octreotide& thiazide diuretics, & total parenteral nutrition / fasting. Cirrhosis, chronic hemolysis & Crohn's disease are few risk factors for black pigment stones [10].

Cholecystectomy was considered the surgical procedure for gall stone disease (cholelithiasis)in 1882, when its pioneer Carl Johann August Langenbuch , performed the first cholecystectomy in a patient who suffered from cholelithiasis. Laparoscopic cholecystectomy(LC)is considered the gold st&ardfor treatment of most of the gallbladder diseases. The advantages of LC are faster return of bowel function, less post-operative pain, cosmetic, shorter duration of hospital stay & also quicker return to full activity.

At times LC has becomes difficult. It takes longer duration even with bile/stone spillage & occasionally it requires conversion to open cholecystectomy (OC). It is very difficult to predict preoperatively, whether it will be easy or difficult. The degree of difficulties in LC is again impossible to predict. At present there is no standard scoring system available to predict the difficulty preoperatively. In my study, we have worked out a scoring system for predicting the difficulty in LC preoperatively & correlate with our intraoperative degree of difficulty . The study recognises the factors which can predict difficulty in LC & thus complications can be prevented beforehand.

OBJECTIVES OF THE STUDY

- To validate that a scoring system based on history , physical examination & ultrasonographic findings is a reliable predictor of difficulty of laparoscopic cholecystectomy.
- To help in choosing a favourable treatment modality depending on the score.
- To help predict the duration of hospital stay & post operative complications with the help of this system

REVIEW OF LITERATURE

EMBRYOLOGY OF BILIARY TREE

During the 3rdweek of gestation, liver primordiumis the first to appear as an outgrowth of the ventral foregut endoderm at the caudal end of foregut. The multiplication of epithelial cells in this liver bud leads to its outgrowth & branching into the surrounding mesenchyme, giving rise to the liver & intrahepatic biliary tree. As it grows caudally, traversing the septum transversum, the persistent connection between the branching epithelium & the foregut develops into extrahepatic bile ducts & gallbladder . The bipotential hepatoblasts eventually become the hepatocytes & cholangiocytes.[11]

By the fifth week of intrauterine life, the cells in between the liver bud & the remaining foregut proliferate to form a primitive bile duct. Common bile duct becomes occluded with epithelial cell proliferation as it elongates & by the end of fifth week it recanalizes moving distally towards the gallbladder which remains solid until 12th week .Failure to recanalize is attributed to the pathogenesis of biliary atresia.

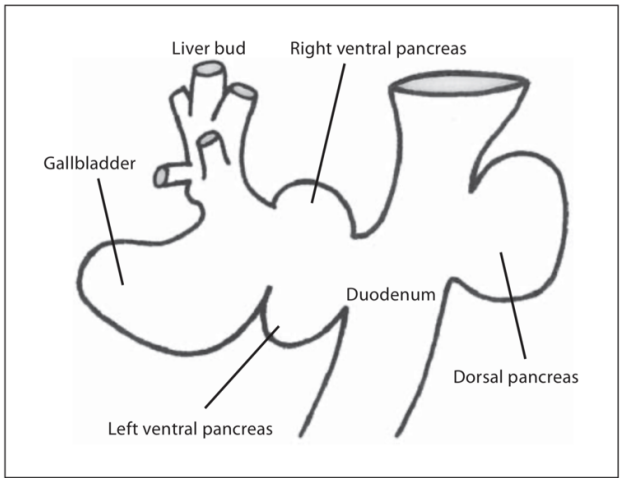

FIG 1 - EMBRYOLOGIC DEVELOPMENT OF BILIARY TREE

ANATOMY OF THE BILIARY TREE

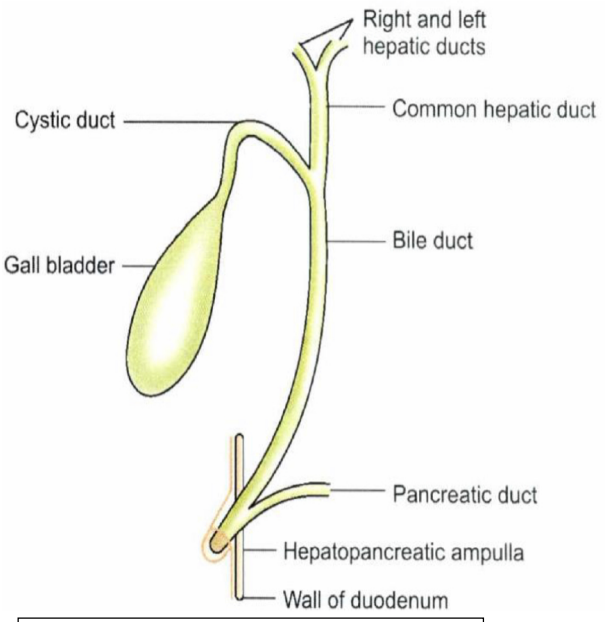

FIG 2 : EXTRAHEPATIC BILIARY TREE WITH GALLBLADDER

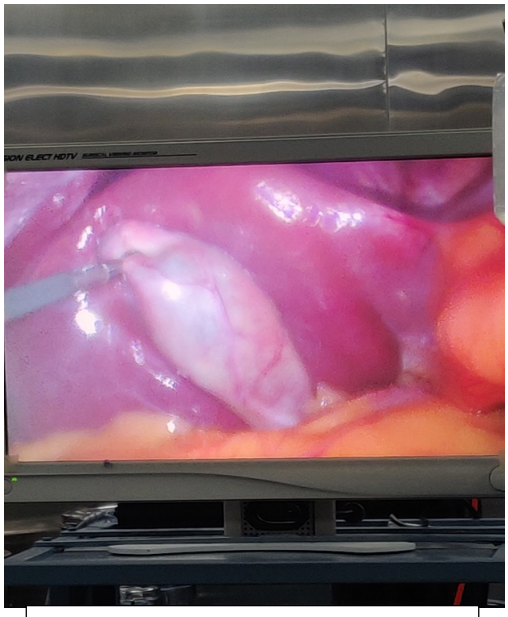

FIG 3 : GALLBLADDER FUNDUS HELD AND RETRACTED TOWARDS RIGHT SHOULDER

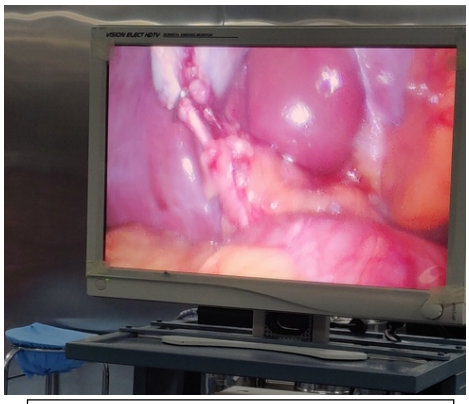

FIG 4 : GALL BLADDER SEEN WITH THE CYSTIC DUCT DISSECTED AND CLIPPED

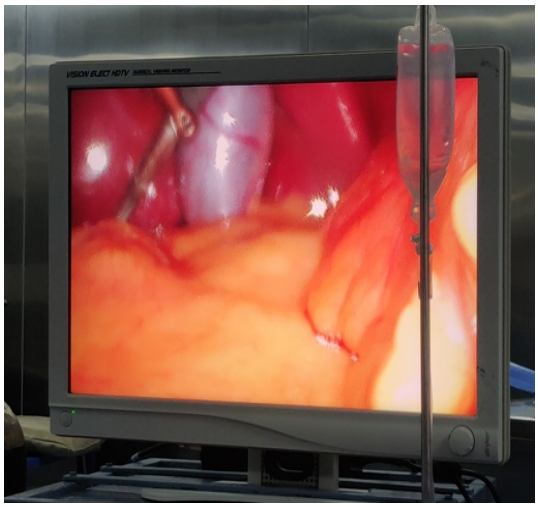

FIG 5 : GALLBLADDER HELD AT INFUNDIBULUM SHOWING CLIPPING OF CYSTIC DUCT

GALL BLADDER

The gallbladder is situated on the undersurface of the anterio-inferior sector (Segment V) of the right lobe of the liver. Though often densely adherent, it is separated from liver parenchyma by cystic plate, a layer of connective tissue arising from Glisson's capsule & in continuity with the hilar plate at the base of Segment IV.

DIMENSIONS & CAPACITY

It is a pear-shaped sac, about 7-10 cm long, having an average capacity of 30-50 mL. On obstruction, the gallbladder can distend markedly up to 300 mL.[12]

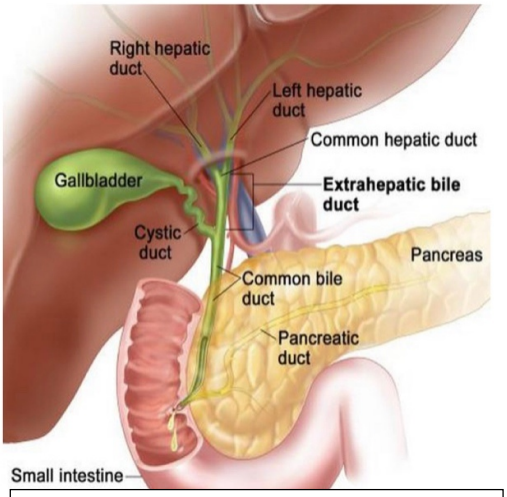

FIG 6 : GALL BLADDER, INTRA AND EXTRA HEPATIC BILIARY RADICLES, LIVER, PANCREAS AND DUODENUM

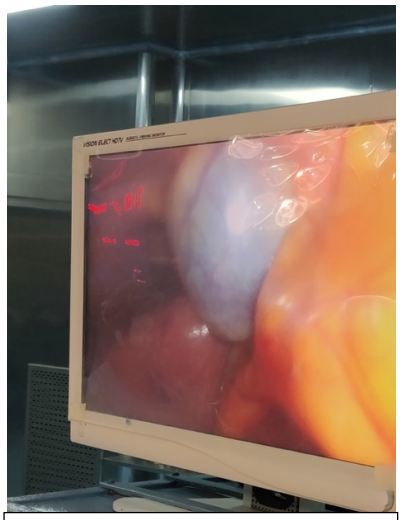

FIG 7 : GALL BLADDER SEEN IN HEPATIC BED

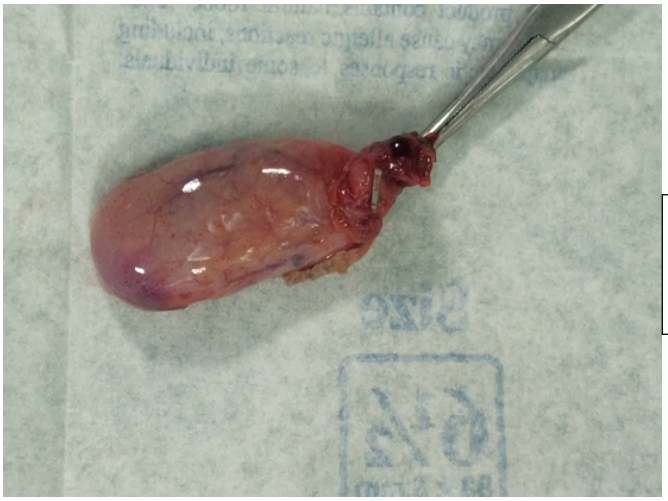

FIG 8 : GALL BLADDER SPECIMEN POST CHOLECYSTECTOMY

PARTS

The Gall bladder is divider into :

1. The Fundus - The rounded, blind end which extends 1-2 cm beyond the liver's margin. Contains most of the smooth muscles of the organ, as opposed to the body, being the main storage area &has most of the elastic tissue.
2. The Body - Extends from the fundus&narrows into the neck, a funnel-shaped area connecting with the cystic duct.
3. The Infundibulum - The neck follows a smooth curve, convexity of which may be enlarged forming the infundibulum or Hartmann's pouch.
4. The Neck - Lies in the lowest part of the gallbladder fossa & extends to the free portion of hepatoduodenal ligament[12]

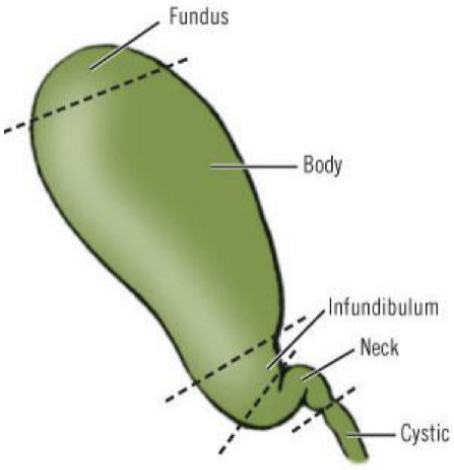

FIG 9 : DIAGRAM SHOWING VARIOUS PARTS OF THE GALLBLADDER

Variations in gallbladder anatomy are rare. These variations include:

(a) Bilobed or double gallbladders,
(b) Septated gallbladders, or
(c) Gallbladder diverticula

CYSTIC DUCT

The cystic duct, emerges from the infundibulum of gallbladder & runs medially & inferiorly to join the common hepatic duct. The cystic duct is typically 1-3 millimetres in diameter & can range from 1 mm to 6 cm in length depending upon its union with common hepatic duct. The mucous membrane, of the cystic duct forms a series of about 5 -12 crescentic folds, arranged spirally to form so-called spiral value of Heister. It is not a true valve.

Cystic duct abnormalities are uncommon & include[13]

A. Low junction between cystic duct & common hepatic duct
B. Cystic duct adherent to the common hepatic duct
C. High junction between cystic & common hepatic duct
D. Cystic duct drains into right hepatic duct
E. Long cystic duct which joins common hepatic duct behind duodenum
F. Absence of cystic duct
G. Cystic duct crosses behind the common hepatic & joins it anteriorly
H. Cystic duct courses in front of the common hepatic duct & joins it posteriorly

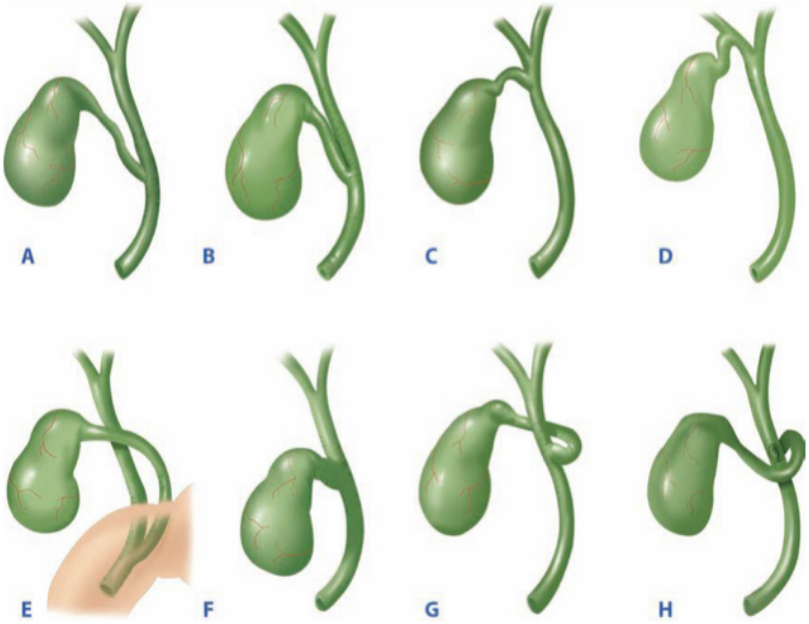

FIG 10 : DIAGRAM SHOWING CYSTIC DUCT ANOMALIES

BLOOD SUPPLY OF GALL BLADDER

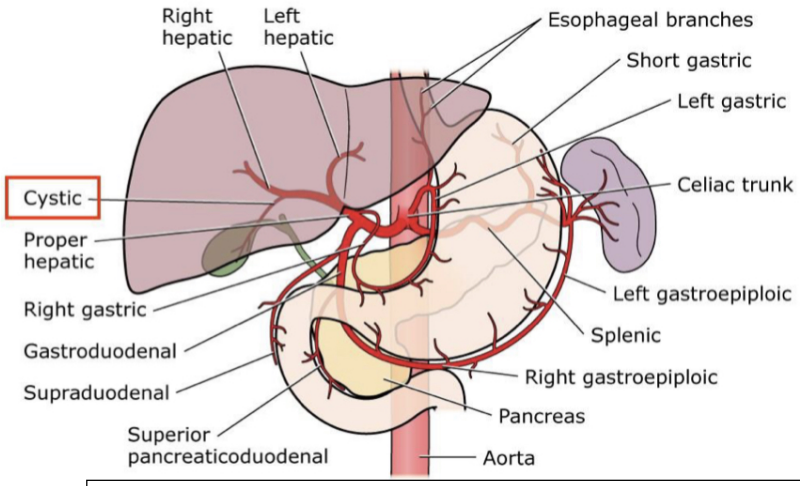

FIG 11: DIAGRAM SHOWING THE ARTERIAL SUPPLY OF THE GALLBLADDER

ARTERIAL SUPPLY:

The gallbladder is supplied by the cystic artery (a branch of right hepatic artery). It may arise from the main trunk of hepatic artery, from the left hepatic artery, or from the gastroduodenal artery.

Cystic artery (CA) & variations (A) Usual origin & course of the CA. (B) Double CA. (C) CA crossing in front of main bile duct. (D) CA originating from right branch of hepatic artery & crossing the common hepatic duct anteriorly. € CA originating from left branch of hepatic artery. (F) CA emerges from gastroduodenal artery

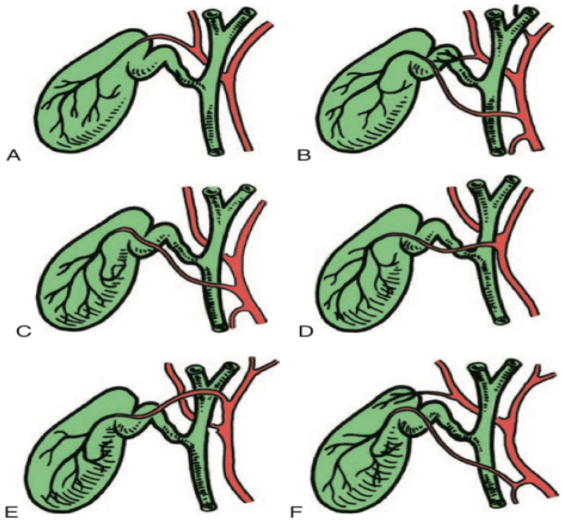

FIG 12 : DIAGRAM SHOWING CYSTIC ARTERY AND ITS VARIATIONS

VENOUS DRAINAGE

The venous drainage of gallbladder is twofold (a) by the cystic vein, which drains into portal vein (b) by a number of small veins, which pass from the superior surface of gallbladder to the liver through gallbladder bed to drain into hepatic veins.

LYMPHATIC DRAINAGE

1. The majority of lymph vessels from the gallbladder drain into (a) the cystic lymph node of Lund, located in the Calot's triangle & (b) the node alongside the upper part of bile duct (node at the anterior border of epiploic foramen), which finally drains into the coeliac group of lymph nodes.
2. Few lymph vessels from the upper surface of gallbladder directly communicate with subscapular lymph vessels of the liver.

NERVE SUPPLY

The gallbladder receives its nerve supply via cystic plexus formed by the sympathetic fibres (T7–T9), parasympathetic fibres (right & left vagus nerve), & fibres of the right phrenic nerve. Clinically, gallbladder pain is referred to

(i) the inferior angle of the right scapula by sympathetic fibres,

(ii) the tip of the right shoulder via the right phrenic nerve, &

(iii) the stomach by vagus.

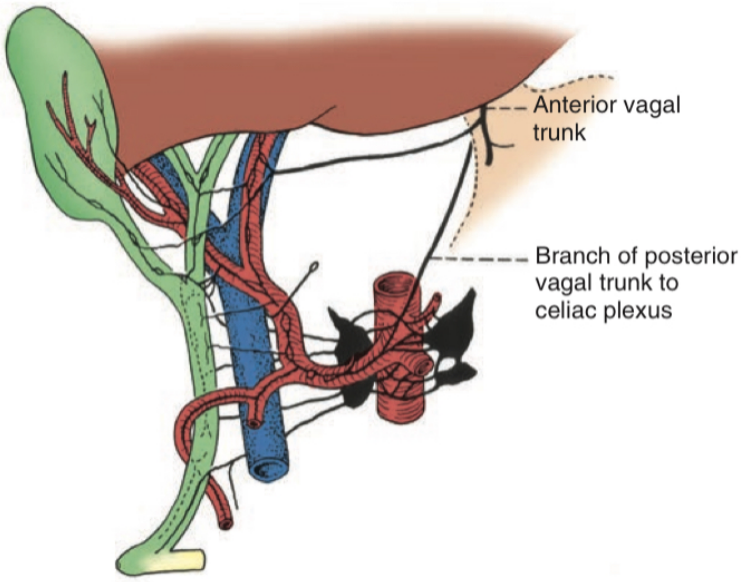

FIG 13 : DIAGRAM SHOWING NERVE SUPPLY OF THE GALLBLADDER

MICROSTRUCTURE OF THE GALL BLADDER

The wall of gall bladder consists of mucosa, fibromuscular layer, muscular connective tissue layer & serosa on all of its surface except the hepatic area, where an adventitia attaches it to the liver. The mucosa exhibits temporary folds, which disappears when the gall bladder is distended with bile .These folds resemble the villus (villi) in the small intestine; however they differ in size ,shape & irregular arrangement .Mucous membrane: It is projected to form folds. Epithelium consists of a single layer of tall columnar cells. Lamina propria contains loose connective tissue. The fibromuscular coat: It consists of smooth muscle fibres & collagen fibres which rests on an outer fibroareolar coat.The gall bladder does not have a layer of mucularismucosae or sub mucosa [14]

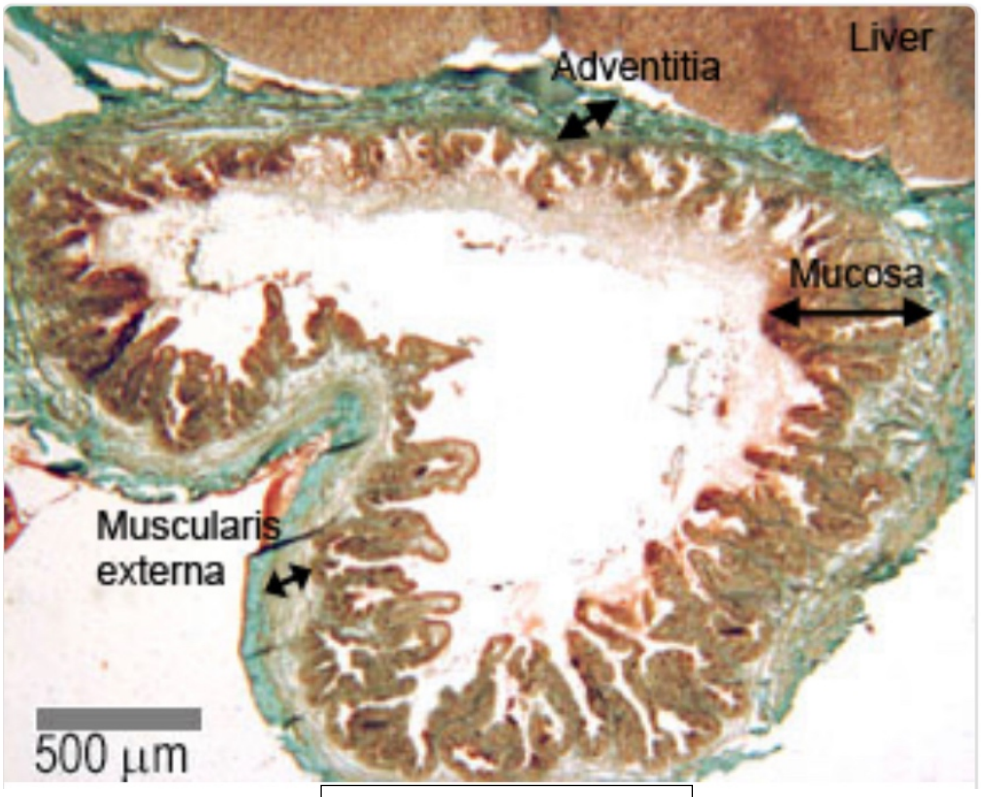

FIG 14: DIAGRAM SHOWING THE DIFFERENT LAYERS OF GALLBLADDER WALL

ANATOMY RELEVANT TO CHOLECYSTECTOMY

Knowledge of relevant anatomy is very important for safe execution of any operative procedure. Specifically, in the context of a cholecystectomy. It has been recognized since long that misinterpretation of normal anatomy & the presence anatomical variations contribute to the occurrence of major postoperative complications especially biliary injuries.

CALOTS TRIANGLE

Calot's triangle, or the hepatobiliary triangle, was initially described by Calot as the space bordered by the cystic duct inferiorly, the common hepatic duct medially & the superior border of the cystic artery. This has been modified in contemporary literature to be the area bound superiorly by the inferior surface of liver, laterally by the cystic duct & medial border of the gallbladder & medially by the common hepatic duct. It is an important surgical landmark as the cystic artery usually can be found within its boundaries & should be identified by surgeons performing a cholecystectomy to avoid damage to the extrahepatic biliary system

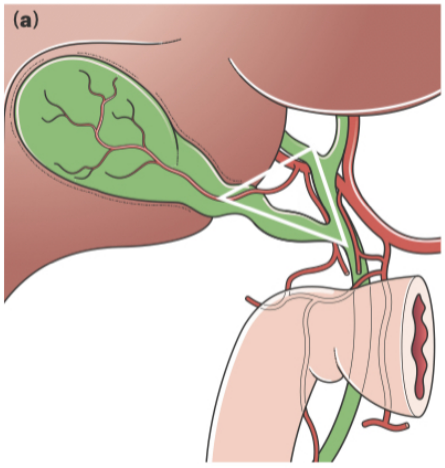

FIG 15 : DIAGRAM SHOWING THE OUTLINES OF CALOTS TRIANGLE

FIG 16 : INTRAOPERATIVE PICTURE OF CALOTS TRIANGLE AND CLIPPING OF CYSTIC ARTERY

The most threatening anomalies are where hepatic artery takes a tortuous course on the front of origin of cystic duct

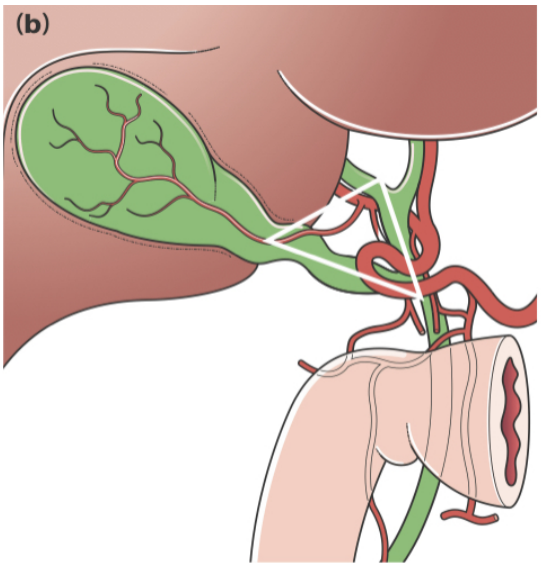

FIG 17 : DIAGRAM SHOWING ANOMALOUS COURSE OF HEPATIC ARTERY IN FRONT OF CYSTIC DUCT

In some cases, right hepatic artery is tortuous & the cystic artery is short. This tortuosity is known as the 'caterpillar turn' or 'Moynihan's hump'. This variation is the cause of many problems during difficult cholecystectomy with inflammation of the cystic duct region. [15]

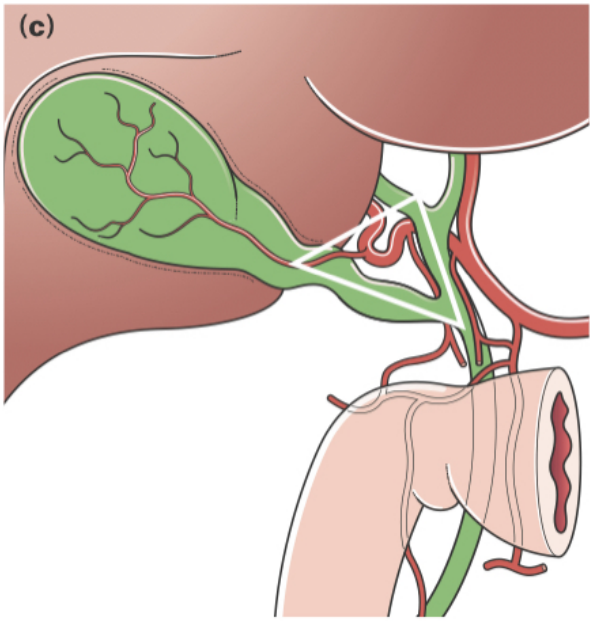

FIG 18 : DIAGRAM SHOWING MOYNIHAN'S HUMP

FUNCTIONS OF GALLBLADDER

- Storage of bile, & its release into the duodenum when needed.
- Absorption of water, & concentration of the bile.
- The normal gall bladder absorbs small amounts of a loose bile salt-cholesterol compound. When the gall bladder is inflammed, the concentration function becomes abnormal & the bile salts alone are absorbed leaving cholesterol behind.
- It regulates pressure in biliary system , by appropriate dilatation or contraction. Thus the normal, choledochoduodenal mechanism is maintained.[16]

PHYSIOLOGY OF BILE

Volume : 800 to 1,200 mL/day

Reaction : Alkaline

pH : 8 to 8.6

Specific gravity : 1.010 to 1.011

Color : Golden yellow or green.

COMPOSITION OF BILE

Bile contains 97.6% of water & 2.4% of solids. Solids include organic & inorganic substances.

SECRETION OF BILE

Bile is secreted by hepatocytes. The initial bile secreted by hepatocytes contains large quantity of bile acids, bile pigments, cholesterol, lecithin & fatty acids. From hepatocytes, bile is released into canaliculi.

From here, it passes through small ducts & hepatic ducts & reaches common hepatic duct. From here, bile is diverted either completely into the intestine or into the gallbladder. Sodium, bicarbonate & water are added to bile when it passes through the ducts. These substances are secreted by the epithelial cells of the ducts. Addition of sodium, bicarbonate & water increases the total quantity of bile [16].

STORAGE OF BILE

Most of the bile from liver enters the gallbladder, where bile gets stored. It is released from gallbladder into the intestine whenever it is required. When bile is stored in gallbladder it undergoes many changes both in quality & quantity such as:

1. Volume is decreased because of absorption of a large amount of water & electrolytes (except calcium & potassium)

2. Concentration of bile salts, bile pigments, cholesterol, fatty acids & lecithin is increased because of absorption of water & electrolytes.

3. The pH is decreased slightly.

4. Specific gravity is increased.

5. Mucin is added to bile.[16]

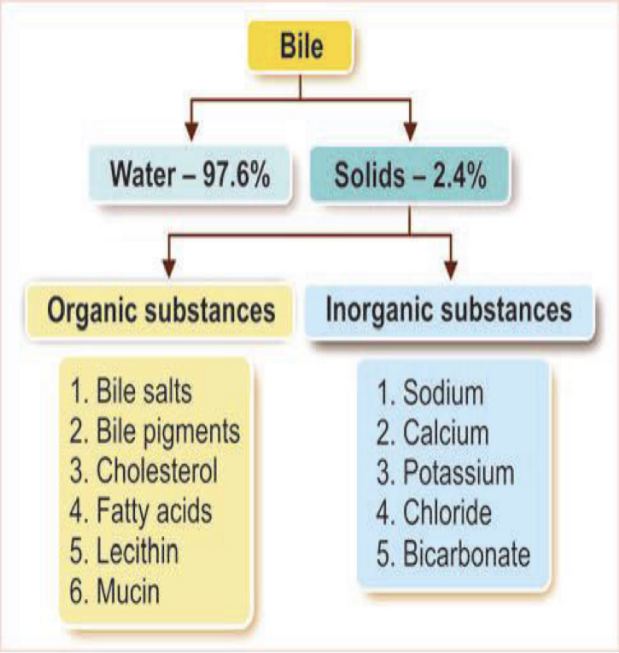

FIG 19 : FIGURE SHOWING THE COMPOSITION OF BILE

REGULATION OF BILE SECRETION

Bile secretion is a continuous process though the amount is less during fasting. It starts increasing after meals & it continues for 3 hrs. Bile secretion from liver &its release from gallbladder are influenced by some chemical factors, which are categorized into three groups:

1. Choleretics
2. Cholagogue
3. Hydrocholeretic agents.

1. CHOLERETICS

Substances which increase the secretion of bile from liver are known as choleretics.

Effective choleretic agents are:

i. Acetylcholine

ii. Secretin

iii. Cholecystokinin

iv. Acid chyme in intestine

v. Bile salts.

2. CHOLAGOGUES

Cholagogue is an agent which increases the release of bile into the intestine by contracting gallbladder Common cholagogues are:

i. Bile salts

ii. Calcium

iii. Fatty acids

iv. Amino acids

v. Inorganic acids All these substances stimulate the secretion of cholecystokinin, which in turn causes contraction of gallbladder & flow of bile into the intestine.

3. HYDROCHOLERETIC AGENTS

Hydrocholeretic agent is a substance which causes the secretion of bile from liver, with large amount of water & less amount of solids. Hydrochloric acid is a hydrocholeretic agent.

PATHOPHYSIOLOGY OF GALLSTONES

DEFINITIONS

Gallstone is a solid crystal deposit that is formed by cholesterol, calcium ions & bile pigments in the gallbladder or bile duct. Cholelithiasis is the presence of gall stones in gallbladder. Choledocholithiasis: gallstones in the bile ducts.

PATHOGENESIS

I. METABOLIC:

Cholesterol is synthesised in liver. Its solubility is determined by relative concentration of cholesterol, bile salts & lecithin. Altered levels of cholesterol, lecithin, & bile salts in bile reduces the micelle concentration in the bile leading to precipitation of insoluble cholesterol, hence, the stone formation (Lithogenic bile).

- Normal ratio of bile salt & lecithin to cholesterol is 25:1. Ratio below 13:1 leads to precipitation of cholesterol. Insoluble cholesterol is within the soluble micelle which is formed by lecithin & bile salts. If cholesterol component increases bile gets supersaturated & inadequate micelle makes insoluble cholesterol to undergo crystallisation & cholesterol monohydrate stone formation (Admiron's triangular hypothesis).

- Some cholesterol remains as bilayered lipid vesicle which are soluble. A specific heat labile glycoprotein in bile induces cholesterol monohydrate crystal formation in the vesicle & causes their aggregation. It is called as nucleation.

- Eventual precipitation & stone formation occurs by infection/infestation; pancreatic fluid reflux into CBD causing conversion of toxic lecithin to lysolecithin which is also toxic (causes supersaturated bile); bile stasis or altered enterohepatic circulation.

- Any condition which either increases the cholesterol secretion in the bile or reduces the bile salt concentration causes cholesterol stone formation. Old age; OCP; obesity; clofibrate may increase cholesterol secretion. Oestrogen, ileal resection &cholestyramine reduce the bile salt concentration.

- Chenodeoxycholic acid &ursodeoxycholic acid prevent cholesterol stone formation by maintaining bile acid pool; reducing cholesterol synthesis & secretion; converting supersaturated bile into normal bile .

II. INFECTIONS & INFESTATIONS:

Bacteria such as E. coli, Salmonella, Parasites like Clonarchissinensis& Ascaris lumbricoides are often associated in the formation of Gallstones

III. BILE STASIS:

Occurs in patients takingestrogen therapy, pregnancy,vagotomy& in patients who are on long term intravenous fluids or TPN.

IV. Increased bilirubin production due to any cause

of haemolysis as in hereditary spherocytosis, sickle cell anaemia, thalassaemia, malaria, cirrhosis. Here pigment stones are common.

FIG 20 : CUT SECTION OF SPECIMEN WITH MULTIPLE STONES (428)

FIG 21: CUT SECTION OF GALL BLADDER SHOWING SOLITARY STONE IN FUNDUS OF GALLBLADDER

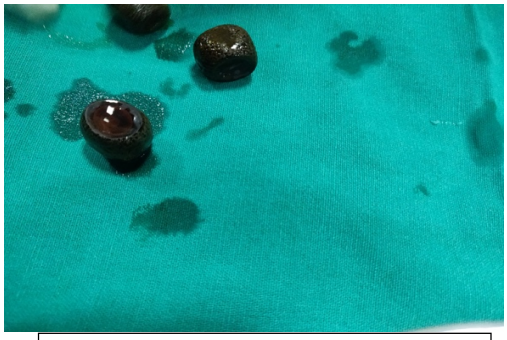

FIG 22 : A MULTIFACETED GALLSTONE SPECIMEN

FIG 23 : CUT SECTION OF GALL BLADDER SPECIMEN SHOWING 4 STONES IN THE LUMEN OF GALLBLADDER

EFFECTS OF GALLSTONES

IN THE GALLBLADDER:

i. Silent asymptomatic stones occur in 10% of males & 20% of females.

ii. Biliary colic with periodicity, severe pain within hours after meal (commonest presentation). Biliary colic is a spasmodic pain often severe, in right upper quadrant & epigastrium radiating to chest, upper back & shoulder. It is self-limiting, reoccurs unpredictably, often precipitated by. a fatty/heavy meal. Fever & increased WBC count may be observed.

iii. Acute cholecystitis.

iv. Chronic cholecystitis.

v. Empyema gallbladder.

vi. Perforation leading to biliary peritonitis or pericholecystitic abscess.

vii. Mucocele of gallbladder.

viii. Limey gallbladder.

ix. Carcinoma gallbladder.

IN THE CBD:

- Secondary CBD stones (occurs in 10% of gallstones).
- Acute Cholangitis.
- Acute Pancreatitis.
- Mirizzi syndrome (compression of CBD by stone from cystic duct or cholecysto-choledochal fistula).

IN THE INTESTINE:

Cholecystoduodenal fistula causing gallstone ileus & so intestinal obstruction,by obstruction of small bowel at the ileo-caecal junction.

CHOLECYSTITIS

Cholecystitis is gallbladder inflammation.The inflammation is seen most commonly (90%) due to cystic duct obstruction following prolonged gallstone impaction. As the inflammatory process progresses, secondary infection develops leading to emphysematous cholecystitis and even gangrenous cholecystitis and perforation. These advanced stages of cholecystitis are associated with significant increase in the morbidity and mortality as compared with earlier stages of cholecystitis.

Acute cholecystitis presents with biliary colic, which is persistant and localized to the right upper quadrant. Physical finding confirming this is “Murphy Sign” (Cessation of inspiration with palpation of right upper abdomen). When the gallbladder becomes chronically inflamed, thickened and is non functioning and non distending , this condition is called chronic cholecystitis. The muscular wall of the gallbladder is atrophied and replaced by fibrous tissue.

There are cases of severe inflammation during cholecystitis in which no obstruction from stone impaction is found (Acalculous cholecystitis) and is thought to be related to bile stasis and/or systemic hypoperfusion as seen in critically ill patients.

When a gallstone impacts in the gallbladder wall and compresses it causing pressure necrosis leading to further adhesion to the common hepatic duct/ common bile duct, eventually leading to cholecystocholedochal fistula is called Mirizzi Syndrome.

DIAGNOSIS OF GALLSTONE DISEASE:

Presence of gallstone is diagnosed by ultrasound scanning, cholangiography, CT scan and MRI scans. Cholangiography is not being done anymore as a result of the advent of MRI

It is now more common to use Contrast enhanced CT scan of the Abdomen & pelvis to visualise the Gallstones & CBD stones.

ULTRASOUND (US)

US often serves as an initial imaging modality to evaluate the biliary system. US is noninvasive, inexpensive, & does not involve ionizing radiation, which is particularly important in the setting of pediatric& pregnant patients. The normal gallbladder is an ovoid, anechoic, fluid-filled structure adjacent to the interlobar fissure, which separates the right & left hepatic lobes. The gallbladder wall should be smooth, & the thickness should not exceed 3 mm. [17]

Primary causes of wall thickening include cholecystitis, adenomyomatosis, & cancer. Secondary causes of wall thickening include acquired immune deficiency syndrome (AIDS) cholangiopathy, sclerosingcholangitis, hepatitis, pancreatitis, heart failure, hypoalbuminemia, cirrhosis, portal hypertension, & lymphatic obstruction.[18]

On US abdomen and pelvis , common hepatic duct is the most frequentlyvisualized portion in extrahepatic biliary system. Cystic duct is normally located posterior to & may join with common hepatic duct at variable distances, forming the common bile duct. The normal diameter of extrahepatic bile duct can range from 4 -8 mm. [19] The size of common bile duct may increase with age, after cholecystectomy, & after endoscopic manipulation of the duct.

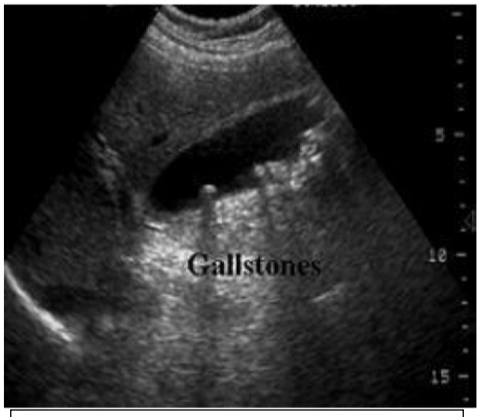

FIG 24 : ULTRASOUND ABDOMEN & PELVIS SHOWING GALLSTONES

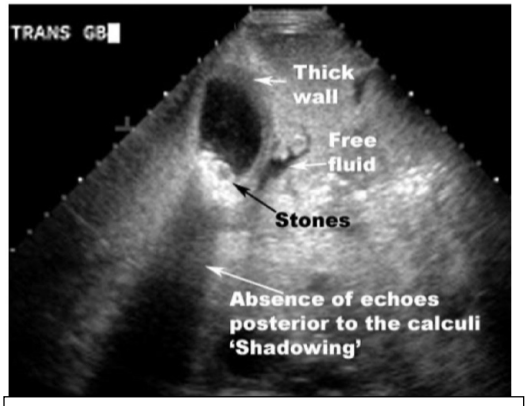

FIG 25 : ULTRASOUND SHOWING THICKENED GALLBLADDER WALL WITH PERICHOLECYSTIC COLLECTION

FIG 26 : TRANSABDOMINAL SAGITTAL RUQ ULTRASOUND IMAGE SHOWING MARKED GALLBLADDER WALL THICKENING IN A SEPTIC PATIENT WITH ACALCULOUS CHOLECYSTITIS

COMPUTED TOMOGRAPHY

Multidetector CT has allowed for improved imaging of the biliary system. Unlike US, CT permitsthe observation of the entire common bile duct & better detects etiologies of biliary obstruction. CT is reported to have a sensitivity of 72% to 88% in detecting choledocholithiasis. [20-22] Disadvantages of CT include exposure to ionizing radiation & use of intravenous (IV) contrast, which may be contraindicated in patients with renal impairment or contrast allergy.

The CT technique for evaluation of biliary system includes obtaining an unenhanced scan through the liver, gallbladder, common bile duct, & pancreas. Unenhanced scans provide a baseline to determine lesion enhancement & to better detect stones, which can be obscured by contrast material. A portal venous scan is obtained 70 to 80 seconds after IV contrast administration. A 10-minute delayed scan should be added when there is suspicion for cholangiocarcinoma because these tumors often demonstrate delayed enhancement relative to the remainder of the hepatic parenchyma. A thin section technique (1 mm or less) allows for higher quality multiplanar reformats (e.g., coronal, sagittal), which are helpful in the assessment of bile ducts.[23]

FIG 27: CT SCAN SHOWING STONE IN THE NECK OF THE GALLBLADDER

MRI

US & CT have some advantages over MRI, including cost, availability, speed, & real-time imaging. However, MRI has increasingly played a vital role in biliary imaging. It is considered a highly sensitive & specific noninvasive imaging modality in the evaluation of biliary tract pathology. Indeed, it has become favored over ERCP & percutaneous cholangiogram in most institutions for diagnostic purposes. It is also useful in patients who can't undergo or have failed ERCP. MRCP may visualize stones as small as 2 mm [24] with sensitivity greatly increasing as stone size increases.

MRCP uses T2-weighted imaging to visualize the biliary system. These images are then reformatted into multiple planes using multiplanar reconstructions & maximal intensity projections (MIPs), allowing for visualization of much of the biliary tract at once. This allows diagnostic imaging in severely ill patients who are unable to be positioned properly for extended periods of time or comply with breathing comm&s. [25-28] These advances, along with inherent benefits of MRI, make MRCP a valuable tool both in diagnostic imaging &presurgical planning.

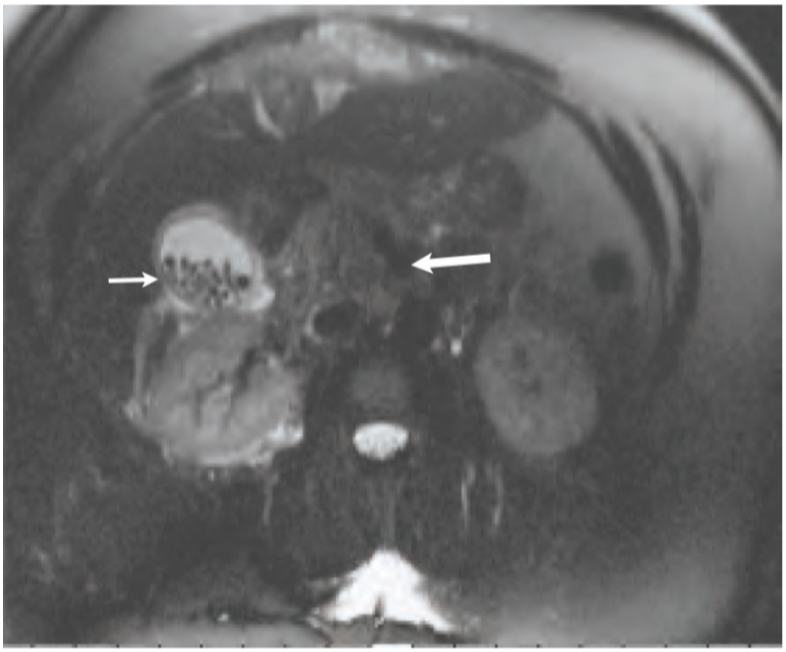

FIG 28 : MAGNETIC RESONANCE CHOLANGIOPANCREATOGRAPHY: CROSS-SECTIONAL IMAGE DEMONSTRATING A HILAR MASS (THICK ARROW) AND GALLSTONES (THIN)

LAPAROSCOPIC CHOLECYSTECTOMY

INDICATIONS FOR LAPAROSCOPIC CHOLECYSTECTOMY

- Symptomatic cholelithiasis
    - Biliary colic
    - Acute cholecystitis
- Choledocholithiasis
    - Gallstone pancreatitis
    - Cholangitis or obstructive jaundice
- Asymptomatic cholelithiasis
- Sickle cell disease
- Total parenteral nutrition
- Chronic immunosuppression
- No speedy access to health care facilities (eg, missionaries, military personnel, peace corps workers, relief workers)
- Incidental cholecystectomy in patients undergoing procedure for other indications
- Acalculous cholecystitis
- Gallbladder dyskinesia
- Gallbladder polyps >10 mm in diameter
- Porcelain gallbladder

CONTRAINDICATIONS OF LAPAROSCOPIC CHOLECYSTECTOMY

Absolute

- Unable to tolerate general anesthesia
- Refractory coagulopathy
- Suspicion of gallbladder carcinoma

Relative

- Previous upper abdominal surgery
- Cholangitis
- Diffuse peritonitis
- Cirrhosis &/or portal hypertension
- Chronic obstructive pulmonary disease (COPD)
- Cholecystoenteric fistula
- Morbid obesity
- Pregnancy

OPERATING ROOM SETUP

Most surgeons use2video monitors, on either side of the operating table to allow bettervisualization by both assistant & surgeon. Using the American technique, surgeon stands to left of patient, the first assistant stands to patient's right .If a laparoscopic video camera operator is used, he st&s to left of the surgeon. In the French technique, the patient's lower limbs are abducted & the surgeon st&s between the legs.[17]

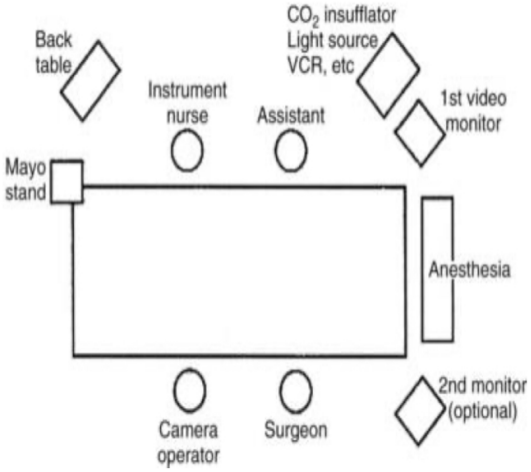

FIG 29: DIAGRAM SHOWING OPERATING ROOM SETUP

FIG 30 : VIEWING SCREEN ALONG WITH LIGHT SOURCE AND CO2 INSUFFLATOR SEEN

PNEUMOPERITONEUM

A working space, provided by creating a pneumoperitoneum, is essential for the surgeon to see & operate within abdominal cavity. CO2 has the advantage of being noncombustible & rapidly absorbable from the peritoneal cavity. It leads to hypercarbia in patients with cardiopulmonary disease.The most common location for initial peritoneal entry is at the midline near the umbilicus. Supraumbilical or infraumbilical incisions may be made in vertical, horizontal, or curvilinear orientations based on surgeon's preference. Pneumoperitoneum is established by either a closed / open technique. In the closed technique, CO2 is insufflated into peritoneal cavity through a Veress needle, which is then placed with laparoscopic port, placed blindly into the abdominal cavity. Open technique: laparoscopic port is inserted under direct vision into peritoneal cavity through a small incision; only after ensuring definitive & safe peritoneal entry in the pneumoperitoneum established. There are both advantages & disadvantages to these techniques. Surgeons performing laparoscopic cholecystectomy should know both&use them accordingly based on the patient's body habitus & previous surgical history .

FIG 31: 10 MM LAPAROSCOPE THROUGH THE PERIUMBILICAL PORT

PORT PLACEMENT & EXPOSURE

Depending on surgeon's choice, a 5- or 10-mm laparoscope is placed into the abdominal cavity through the periumbilical port & the abdominal cavity is visually explored. It is generally advantageous to use an angled (30- or 45-degree) laparoscope rather than a 0-degree scope, because the angled scopes enable obtaining multiple views of the same operative field.

The patient is consequently placed in a reverse Trendelenburg position of 30 degrees angleon rotating the table to the left by fifteen degrees. This allows the colon& duodenum to fall away from edge of liver. Falciform ligament & both lobes are examined for abnormalities. The gallbladder is seen protruding beyond the edge of liver.

2 accessory subcostal ports are placed under direct vision. The first 5-mm trocar is insertedin the right anterior axillary line between the 12th rib & the iliac crest. A 2nd 5-mm port is placed in the right subcostal area in midclavicular line. Grasping forceps are placed through these to secure the gallbladder. Assistant manipulates these forceps, which is used to grasp the fundus & elevate the liver.

The fourth working port is through an incision in the midline of the epigastrium . This trocar is approximately 5 cm below the xiphoid process, but precise position & angle depends on location of GB & size of the medial segment of the left lobe of the liver. Dissecting forceps are placed& directed toward the gallbladder neck.

It should be noted that the placement of the laparoscope is generally parallel to that of cystic duct when the fundus is elevated, whereas the instruments kept through other three ports enter the abdomen at 90 degrees to this plane. The operating surgeon uses dissecting forceps to raise a serosal fold of the most lowest part of the fundus. The assistant's heavy grasping forceps are locked onto this fold using a spring / ratchet device. With axillary grasping forceps, the fundus of the gallbladder is pushed inlateral &cephalad direction, rolling the full right lobe of liver . This is complicated in patients with a fixed, cirrhotic liver / heavy, friable liver due to fatty infiltration.

Patients with few adhesions to gallbladder, pushing of funduscephaladshows the entire gallbladder, its duct, &portahepatis. Most patients, however, have adhesions between the gallbladder & the omentum, hepatic flexure &/or duodenum. These adhesions are generally avascular &should be lysed bluntly by grasping them with dissecting forceps at site of attachment to the gallbladder wall & gently stripping them downwards toward the infundibulum. Extreme caution has to be taken to avoid damage to surrounding structures. Use of electrocautery may accidentally damage the unvisualized CBD or proximally located duodenum. After exposing the infundibulum, blunt grasping forceps held by the surgeon's left hand& placed through the mid clavicular trocar are used to grasp & place traction to neck of gallbladder.[17]

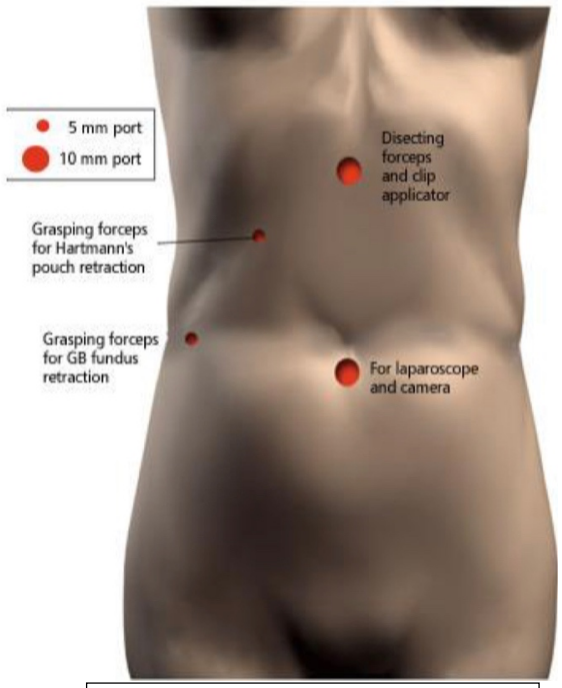

FIG 32: DIAGRAM SHOWING THE PLACEMENT OF PORT SITES

FIG 33: PICTURE OF ABDOMEN AFTER PLACEMENT OF PORTS

DISSECTION

The infundibulum is grasped, applying traction to the gallbladder in a lateral direction to distract the cystic duct from CBD . Fine-tipped dissecting forceps (Maryland) are used to dissect the overlying fibroareolar structures from the infundibulum of gallbladder.

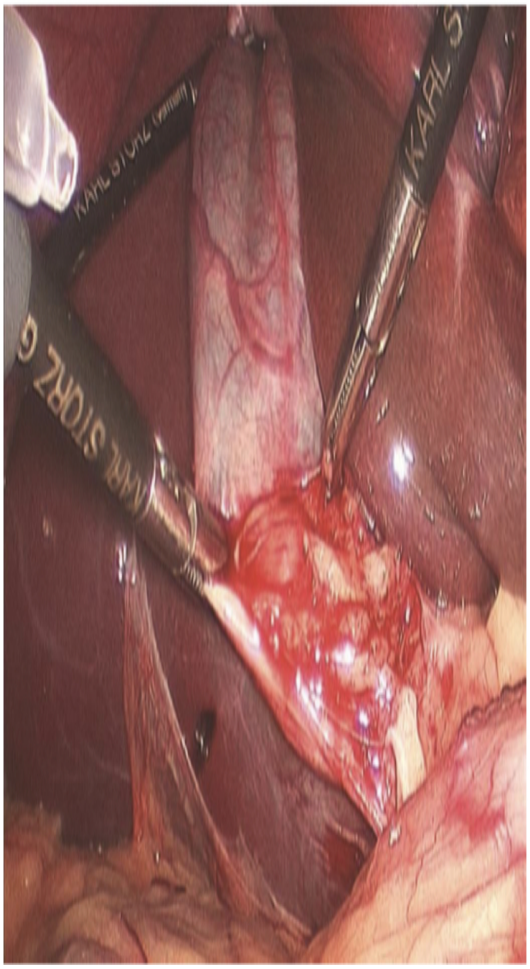

FIG 34: GALLBLADDER RETRACTED LATERALLY TO HELP IN DISSECTION AROUND CYSTIC DUCT

FIG 35: GALLBLADDER RETRACTED UPWARDS AND OUTWARDS

RETRACTION OF GALLBLADDER

The dissection should begin from a known structure, for example, the gallbladder, rather than unknown area, therefore avoiding damage to the underlying structures such as bile duct / hepatic artery. The dissection initially commences 4 or 5 cm proximal to neck of the gallbladder & proceeds distally, such that a modified "top-down" technique is employed. The objective of the initial dissection is to free gallbladder from bed such that there is a window beneath it through which the liver substance can be seen. The hepatocystic triangle is opened & changed into a trapezoid shape by retracting infundibulum of gallbladder inferiorly & laterally while maintaining fundusunder traction in a superior & medial direction. Lymph node usually lies on surface of the cystic artery, &sometimes needed to use a low-wattage electrosurgical coagulation to obtain hemostasis as lymph node is bluntly removed. To expose the reverse of Calot's triangle, infundibulum of gallbladder is pulled in superior & medial direction.

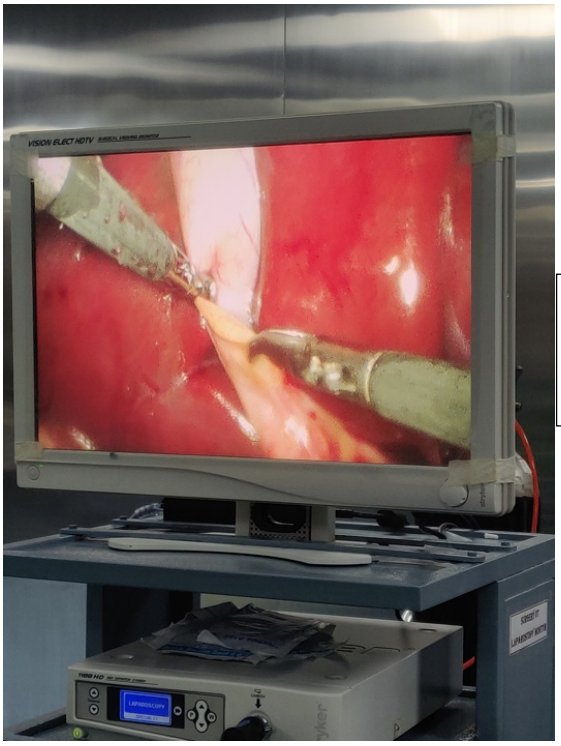

FIG 36: DISSECTION BEING CARRIED OUT IN A 'TOP-DOWN' TECHNIQUE

CYSTIC ARTERY & CYSTIC DUCT SKELETONIZATION

The use of an angled laparoscope facilitates viewing both sides of the hepatocystic triangle when used in combination with these retraction techniques. After clearing of structures from apex of triangle, junction between infundibulum & origin of the proximal cystic duct can be tentatively identified. The strands of peritoneal, lymphatic, & neurovascular tissue are stripped away from the cystic duct to clear a segment from surrounding tissue. Curved dissecting forceps are used in creating a window around posterior aspect of cystic duct to skeletonize duct itself. Alternatively, the tip of the hook cautery is used to encircle & expose the duct.Generally unnecessary & potentially harmful to dissect the cystic duct downwards to its junction with the CBD. Cystic artery is separated from the surrounding tissue by similar blunt dissection . If the cystic artery crosses in front of the duct, the artery may require dissection & division before approaching cystic duct. Neck of gallbladder is dissected away from liver bed, leaving a large window at its base through which the liver parenchyma is visualized. There should be two, & only two, structures (the cystic duct & artery) crossing this window—this is the "critical view of safety," which should be demonstrated prior to clipping or cutting any tubular structures. To reiterate, no structure should be cut until the cystic duct & cystic artery are unequivocally identified. Developing this critical view is an essential step to reduce the chance of bile duct injury while performing laparoscopic cholecystectomy [29].

COMPLETION OF CHOLECYSTECTOMY

CLIPPING OF CYSTIC DUCT & CYSTIC ARTERY

The cystic duct is clipped using an endoscopic clip applier& divided using scissors. 2 clips are placed proximally on the cystic duct & 1 clip is placed closer to gallbladder .For large / friable cystic ducts , a preformed endoloop is preferable for ligating the distal cystic duct. After duct is divided, cystic artery is removed from surrounding tissue for an adequate distance to permit placement of 3 clips. After appropriate length of cystic artery has been dissected free, it is clipped proximally & distally prior to transection.Electrocautery cannot be used for division, as the current may be transmitted to the proximal clips causing subsequent necrosis &hemorrhage. The ligated stumps of cystic duct & artery are examined to ensure no leakage of either bile/ blood & that the clips are placed securely &reduce the entire lumen of the structures without impinging on adjacent tissues.

FIG 37: PICTURE SHOWING PLACEMENT OF CLIPS TO THE CYSTIC DUCT

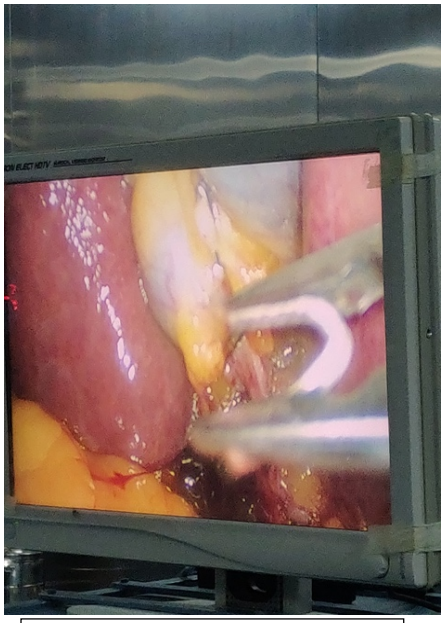

FIG 38: TITANIUM CLIP BEING PLACED

FIG 39: CYSTIC DUCT AND ARTERY AFTER CLIP PLACEMENT

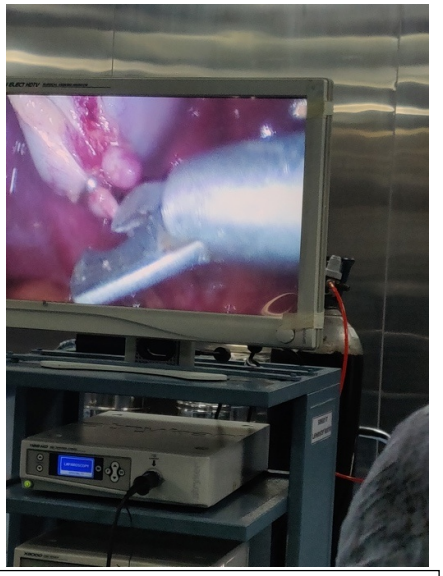

FIG 40: CYSTIC DUCT FOLLOWING CLIPING PRIOR TO TRANSECTION

A suction-irrigation catheter is used to remove debris or blood that has accumulated during the dissection. Separation of the gallbladder away from the hepatic bed is then initiated using an electrosurgical probe for coagulating small vessels & lymphatics. While maintaining cephalad traction on fundus of the gallbladder with the axillary forceps, the midclavicular forceps pulls the neck of the gallbladder anterosuperiorly& then alternatively medially & laterally to expose & place the tissue connecting the gallbladder to its fossa under tension.[2]Dissection of the gallbladder fossa continues from the infundibulum to the fundus, progressively moving the midclavicular grasping forceps cephalad to allow maximal countertraction. The dissection is done until the gallbladder is attached by a thin bridge of tissue. Before completely detaching the gallbladder, the hepatic fossa &portahepatis are again inspected for hemostasis& bile leakage.

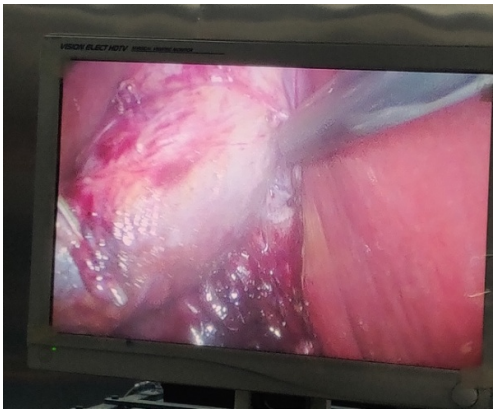

FIG 41: GALLBLADDER DISSECTED OFF THE LIVER BED USING A HOOK ELECTROCAUTERY

Minute bleeding points are coagulated & the right upper quadrant is liberally irrigated & then aspirated while checking for any bleeding / bile leakage. Final attachments of gallbladder are divided, & liver edge is again examined for hemostasis. After cholecystectomy , the gallbladder must be removed from the abdominal cavity. The gallbladder may be placed within an entrapment sac prior to extracting it through the abdominal wall . This is recommended particularly if the gallbladder has been perforated intraoperatively or if the specimen is large. Stone burden is less, the gallbladder can be extracted at the subxiphoid port . Usually, the gallbladder is most easily removed at the umbilical port where there are no muscle layers anterior to the fascial plane. The forceps, trocar, & gallbladder neck are retracted as a unit through the umbilical incision. Stone forceps can be placed into the gallbladder to extract/crush calculi if needed. Extension of fascial incision is done to extract larger stones or thick-walled gallbladders. Each incision is then infiltrated with bupivacaine for postoperative analgesia.[29]

Conversion rates from laparoscopic to an open technique are less than 1% for young healthy people. Conversion rates from laparoscopic to open range from 1.3% to 7.4% in the presence of common bile duct stones. The risk of conversion increases up to 30% if you are over 50 years old , are male , & have acute cholecystitis, have had past abdominal operations , have high fever , obesity , high bilirubin, repeated gall bladder attacks, or conditions that limit your activity.[30,31]

Advantages	Disadvantages
Less pain	Lack of depth perception
Smaller incisions	Adhesions/inflammation limit use
Better cosmesis	More difficult to control hemorrhage
Shorter hospitalization	Decreased tactile discrimination (haptics)
Earlier return to full activity	Potential CO_2 insufflation complications
Decreased total costs	Slight increase in bile duct injuries

FIG 42: TABLE SHOWING THE ADVANTAGES & DISADVANTAGES OF LAPAROSCOPIC CHOLECYSTECTOMY

Single incision laparoscopic surgery (SILS) was developed with a goal of improving outcomes such as postoperative pain reduction & improved patientcosmesis by reducing the number of skin incisions to 1 through which multiple instruments can be introduced. Increased rate of bile duct injuries (0.72%) compared with historical rates of other procedures . This is apparent inspite of these procedures being performed for the most part in the absence of acute cholecystitis (91%), thus with less inflammation & theoretically better conditions for proper identification of anatomic structures.[32] Other studies have shown consistently longer operative times without significant improvements in other intraoperative or postoperative outcomes compared with standard laparoscopic cholecystectomy. [33,34] Increased BMI is associated with a higher rate of conversion from SILS to standard laparoscopy.[35]

Natural orifice transluminal endoscopic surgery :improves postoperative pain &cosmesis outcomes by eliminating incisions associated with laparoscopy & performing the surgical resection & extraction via natural orifices, such as the mouth, vagina, & anus. This approach has longer operative times with no significant improvements in other intraoperative or postoperative outcomes compared with st&ard laparoscopy.[36,37]

Usage of robotic assistance in the area of cholecystectomy has resulted in increased costs but has notreduced complication rates or length of postoperative hospital stay. [38] The lack of haptic feedback has been a disadvantage of this system while potential advantages are its utility as an educational platform for teaching & mentoring in addition to stimulating interest in the field of surgery. [39]

PREOPERATIVE PREDICTIVE FACTORS

In our study the following factors are taken into consideration to predict the preoperative degree of difficulty & compare it with our intraoperative experience. The patients confirmed by USG examination will be posted for laparoscopic cholecystectomy . the patients are subjected to evaluation of the following factors preoperatively based on (history- Age, Sex, History of previous hospitalization for cholecystitis / clinical findings – BMI, Abdominal Scar, Palpable gallbladder / sonology findings – wall thickness, pericholecystic collection, impacted stone) data .

There has been a study conducted by Mittalgodu Anantha Krishna et al at Kasturba Medical College, Manipal University, Mangalore which tried to establish a predictive scoring method for difficult laparoscopic cholecystectomy. They used a number of per operative, USG & intra operative parameters analysed against the end point of difficult laparoscopic cholecystectomy. Our study uses far fewer parameters & aims for similar results40

HISTORY

- Age
- Sex
- h/o previous hospitalisation {abdominal surgeries / cholecystitis / pancreatitis}

CLINICAL

- BMI
- Abdominal scar infraumbilical or supraumbilical
- palpable gall bladder

IMAGING

- Gall bladder wall thickness
- pericholecystic collection
- impacted stone.
- These factors were selected based the previous studies & their respective association with laparoscopic cholecystectomy .[41,42]

HISTORY			MAX SCORING
AGE	<50YRS (0)	>50 yrs (1)	1
Sex	Female	Male(1)	1
H/O Hospitilisation	N (0)	Y(4)	4
BMI	<25 (0)	25-27.5(1) >27.5 (2)	2
Abdominal Scar	N (0)	Infra umblical (1) Supra Umblical (2)	2
Palpable GB	N(0)	Y(1)	1
Wall Thickness	Thin (0)	Thick>4mm(2)	2
Pericholecystic Collection	N (0)	Y(1)	1
Impacted Stone	N (0)	Y(1)	1

Maximum score -15
Score upto 5 - easy,
6–10 - difficult
11–15 - very difficult

FIG 43 : PREOPERATIVE SCORING SYSTEM WITH THE VARIOUS PARAMETERS AND THEIR RESPECTIVE SCORES

Following evaluation the patient will be subjected to laparoscopic cholecystectomy. Factors noted are

- operative Time taken incision to port closure
- biliary / stone spillage,
- bleeding during surgery,
- injury to duct / artery,
- need for conversion regarding upon the difficulty of the case
- Placement of drain

Accordingly the cases are classified into one of the following categories

EASY:

- time taken <60 min
- no bile spillage
- no injury to duct, artery

DIFFICULT

- Time taken 60–120 min
- bile/stone spillage
- injury to duct E
- no conversion

VERY DIFFICULT

- Time taken >120 min
- conversion

All the cases have had a routine work up, pre anesthetic fitness & were subjected to surgery & all the cases were operated by a single surgeon. The duration of surgery is from incision to port closure. We have predicted the preoperative degree of difficulty & going to compare the outcome intraoperatively. Duration of hospital stay was also tabulated

RESULTS

STATISTICAL ANALYSIS:

Data was entered into Microsoft excel data sheet & was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies & proportions. **Chi-square test** was used as test of significance for qualitative data. Continuous data was represented as mean &st&ard deviation. [43,44,45]

TABLE 1 : Validity of scoring system in Screening of Disease:

Screening Test Results	**Diagnosis**		**Total**
	Diseased	**Healthy**	
Positive	a (True postive)	b (False Postive)	a+b
Negative	c (False Negative)	d (True Negative)	c+d
Total	a + c	b + d	a+b+c+d

- Sensitivity = a/(a+c) x 100 = True positive / True positive + False Negative
- Specificity = d/(b+d) x 100 = True Negative / True Negative + False Postive
- Positive predictive value = a/ (a+b) x 100 = True Postive / True positive + False Postive
- Negative predictive value = d/ (c+d) x 100 = True Negative / True Negative + False Negative
- Diagnostic accuracy = a + d / a + b + c + d = True postive + True Negative / Total

Sensitivity: Defined as possibility of a test to identify correctly all those who have the disease i.e. true positive

Specificity: It is the ability of test to identify correctly those who do not have disease i.e. true negative.

Positive predictive value (PPV): The proportion of patients who test positive who actually have the disease.

Negative predictive value (NPV): The proportion of patients who test negative who are actually free of the disease.

Diagnostic accuracy: Is the ability of screening test to detect true positives & true negatives in the total population studied.

Graphical representation of data: MS Excel & MS word was used to obtain various types of graphs such as bar diagram, Pie diagram, ROC Curve & Scatter plots.

p value (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

Statistical software: MS Excel**,** SPSS version 22 **(**IBM SPSS Statistics, Somers NY, USA) was used to analyze data.

Results:

Table 2: History Parameters distribution (Total number of patients = 66)

		Count	%
Age	≤50 years	49	74.2%
	>50 years	17	25.8%
Sex	Female	46	69.7%
	Male	20	30.3%
History of Hospitalization For Cholecystitis	No	53	80.3%
	Yes	13	19.7%

In the study, 49 (74.2%) subjects were ≤50 years & 17 (25.8%) were >50 years. 46 (69.7%) were Female & 20 (30.3%) were Male. 13 (19.7%) had History of Hospitalization for Cholecystitis in the past while 53 (80.3%) patients didn't.

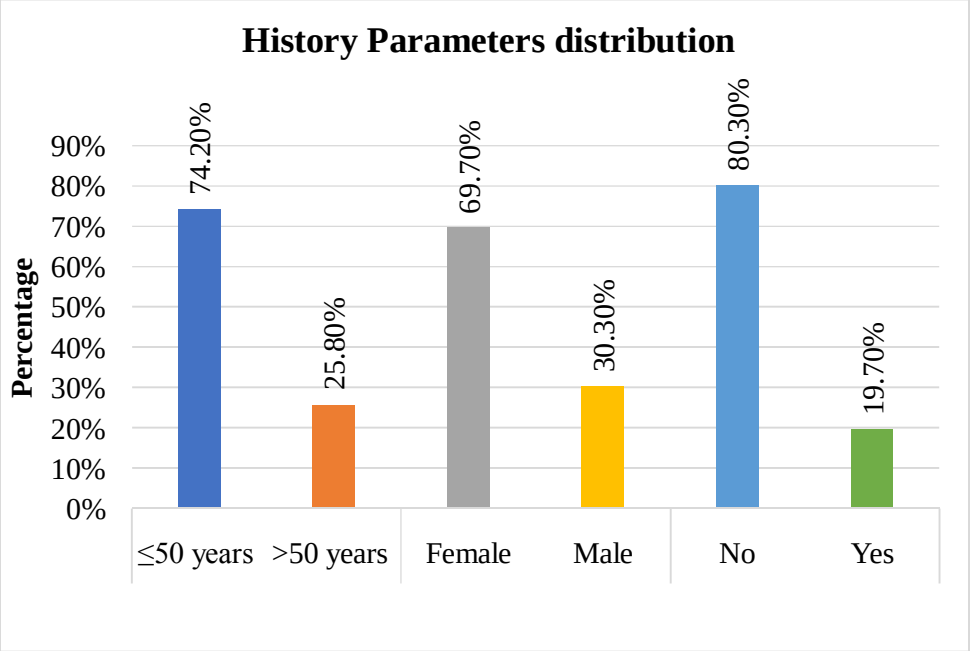

Figure 44: Bar Diagram Showing History Parameters distribution

Table 3: Clinical examination Findings distribution

(Total number of patients = 66)

		Count	%
BMI	<25	21	31.8%
	25 to 27.5	15	22.7%
	>27.5	30	45.5%
Abdominal Scar	No	25	37.9%
	Infra umbilical	31	47.0%
	Supra umbilical	10	15.2%
Palpable Gall Bladder	No	66	100.0%

In the study, BMI was <25 in 21 (31.8%), 25 to 27.5 in 15 (22.7%) &>27.5 in 30 (45.5%) subjects .

31 (47.0%) subjects had Infra Umbilical Abdominal Scar, while 10 (15.2%) had Supra umbilical scar & 25 (37.9%) had none.

No subject presented with a palpable gallbladder

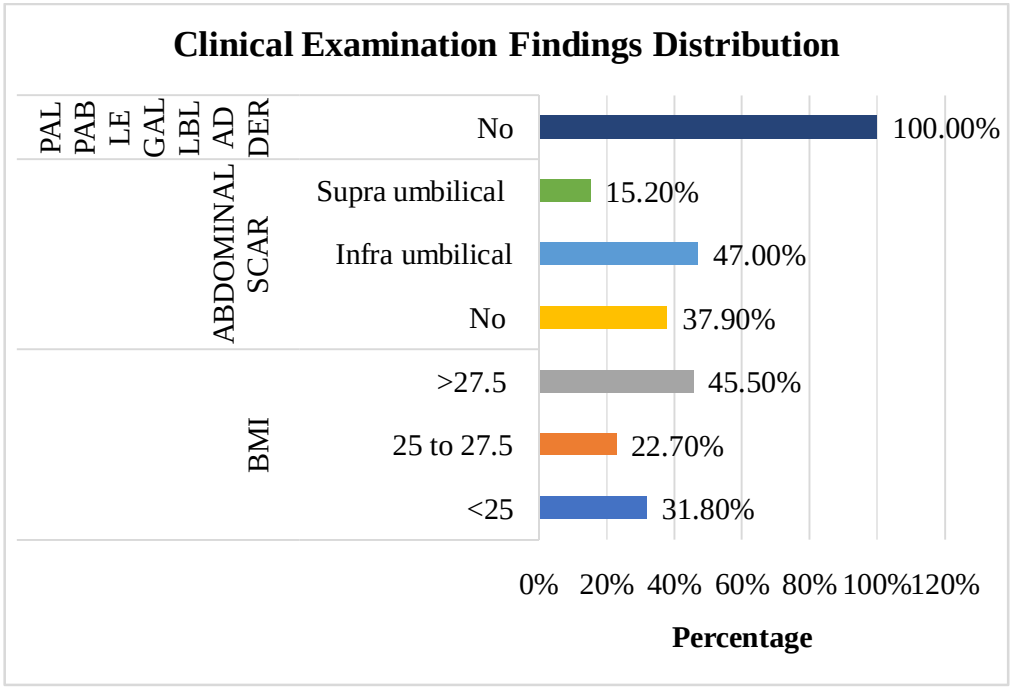

Figure45: Column Diagram Showing Clinical Examination Findings distribution

Table 4: Sonologic Findings distribution (Total number of patients = 66)

		Count	%
Wall Thickness	Thin <4mm	36	54.5%
	Thick ≥ 4 mm	30	45.5%
Pericholecystic Collection	No	53	80.3%
	Yes	13	19.7%
Impacted Stone	No	52	78.8%
	Yes	14	21.2%

On Sonologic findings Wall Thickness was Thin or <4mm in 36 (54.5%) & Thick ≥ 4 mm in 30 (45.5%). Pericholecystic Collection was seen in 13 (19.7%) subjects while 14 (21.2%) presented with an Impacted Stone.

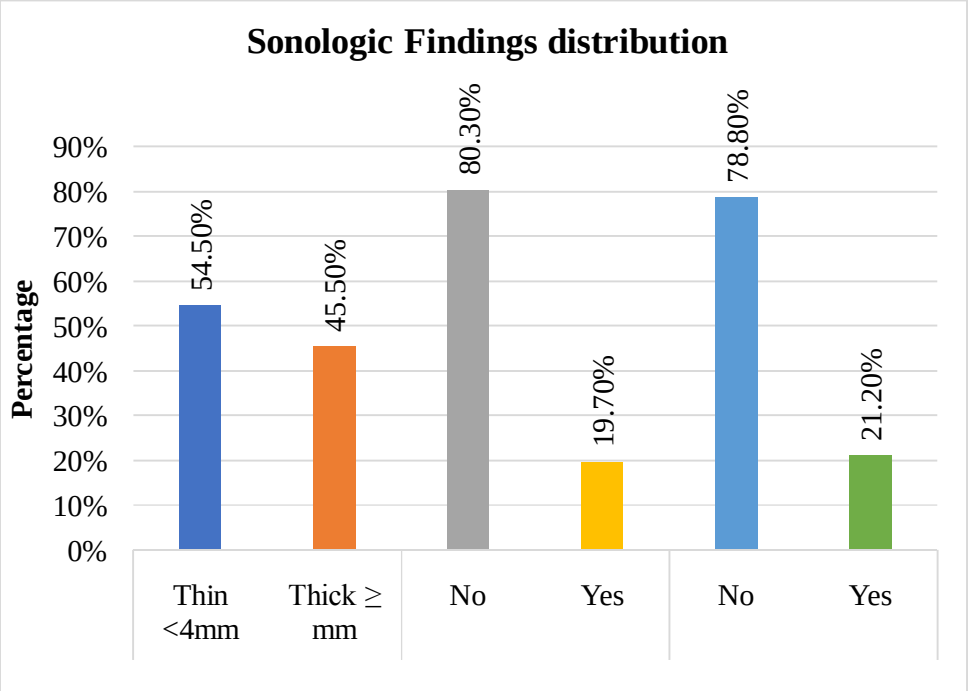

Figure46: Bar Diagram Showing Sonologic Findings distribution

Table 5: Pre-Operative Scoring distribution (Total number of patients = 66)

		Count	%
Pre-Operative Score Grading	**Easy**	39	59.1%
	Difficult	23	34.8%
	Very Difficult	4	6.1%

In the study, as per the Pre-Operative Score system 39 (59.1%) were predicted to have an easy procedure , 23 (34.8%) were predicted to have a difficult procedure 4 (6.1%) to have a very difficult one .

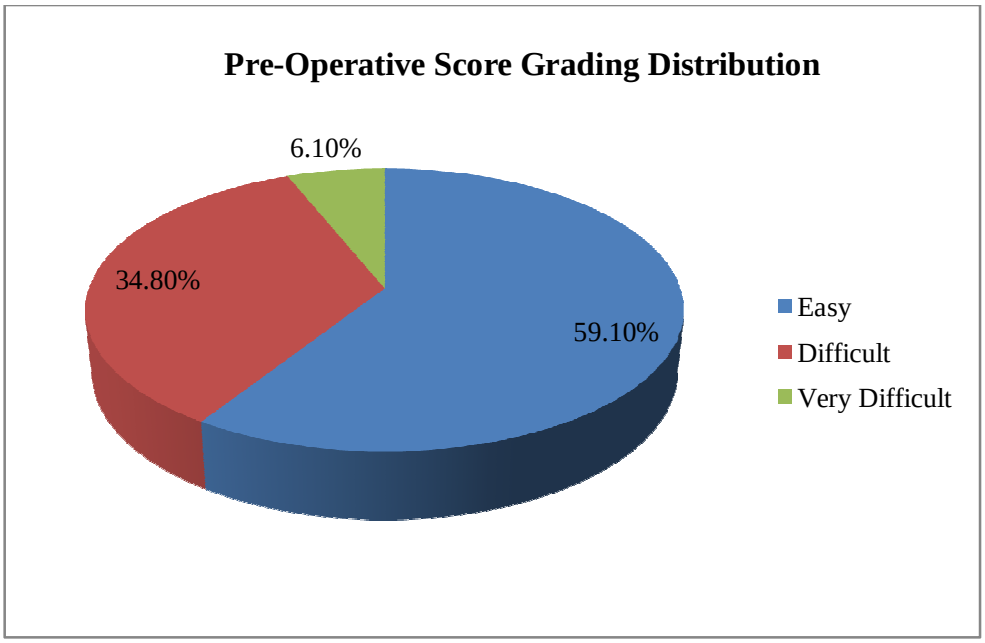

Figure 47: Pie Diagram Showing Pre-Operative Score Grading Distribution

Table 6: Operative Findings distribution (Total number of patients = 66)

		Count	%
Placement Of Drain	No	55	83.3%
	Yes	11	16.7%

In the Study, 11 (16.7%) had Placement of Drain

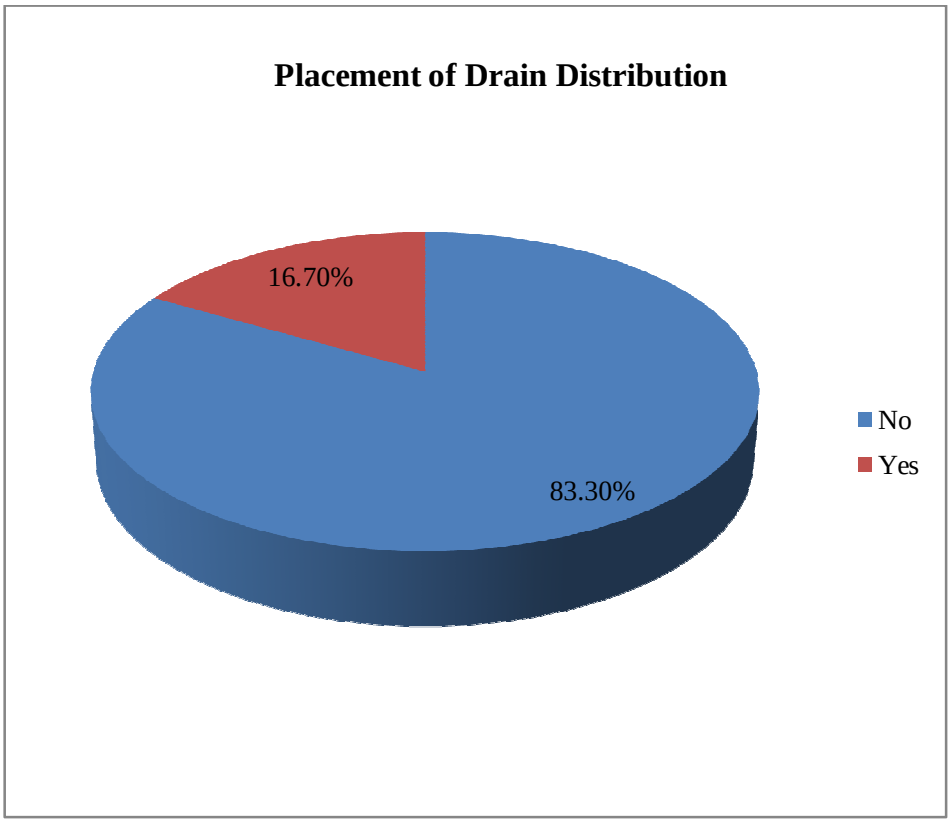

Figure 48: Pie Diagram Showing Placement of Drain Distribution

Table 7: Correlation between Pre-Operative score with duration of surgery & duration of hospital stay

		Pre-Operative Score
Pre-Operative Score	Pearson Correlation (r)	1
	P value	
	N	66
Duration of Surgery (In Mins.)	Pearson Correlation (r)	0.752**
	P value	<0.001*
	N	66
Duration of Hospital Stay	Pearson Correlation (r)	0.788**
	P value	<0.001*
	N	66

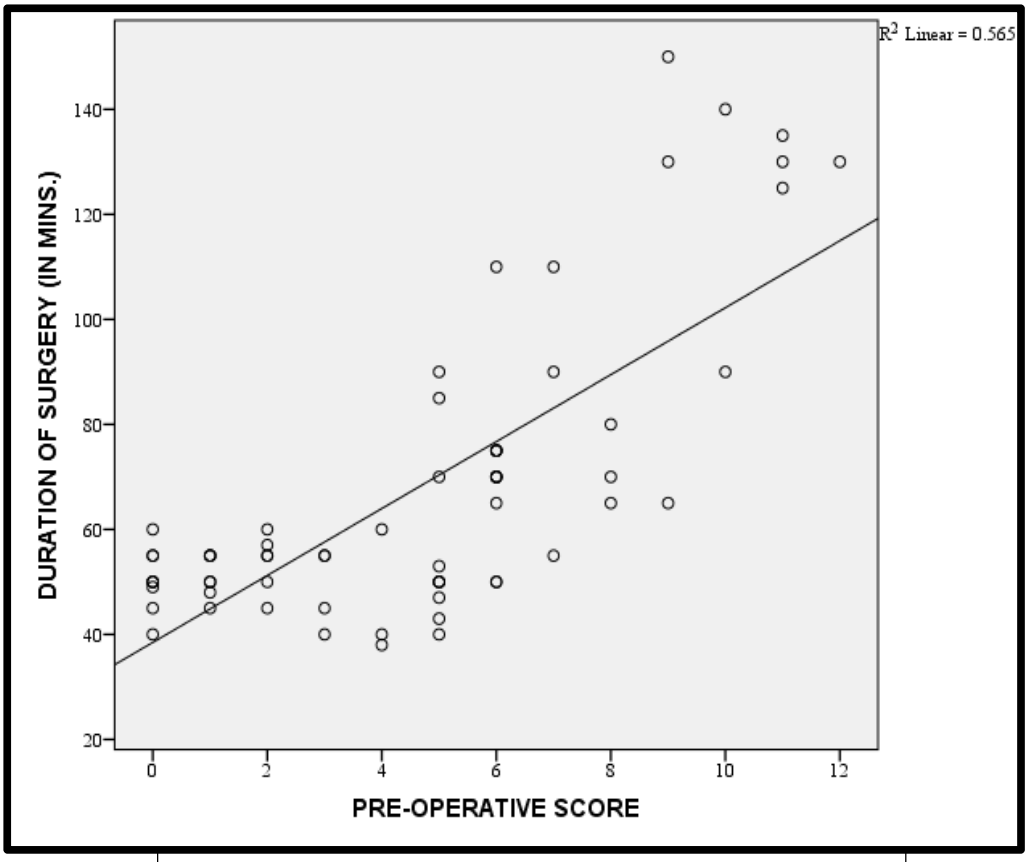

FIG49 : LINEAR GRAPH SHOWING RELATIONSHIP BETWEEN PREOPERTAIVE SCORE AND THE DURATION OF SURGERY

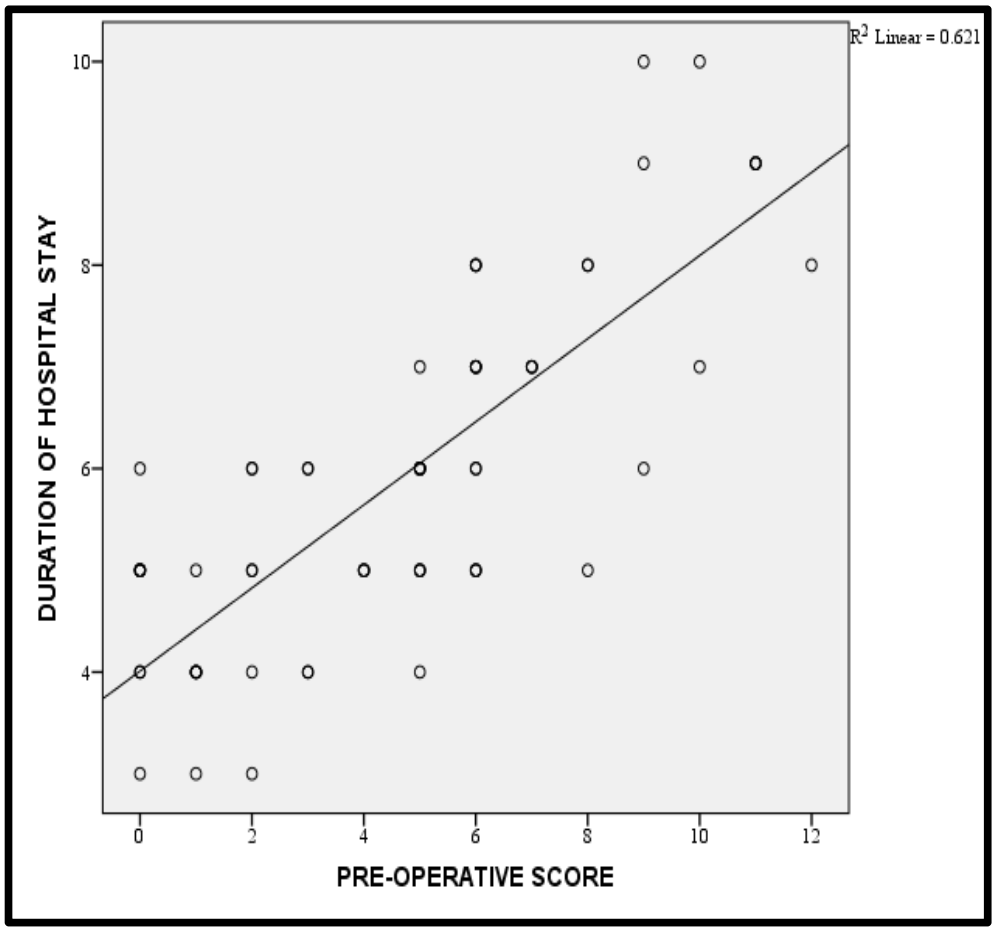

FIG 50 : LINEAR GRAPH SHOWING RELATIONSHIP BETWEEN PREOPERTAIVE SCORE AND THE DURATION OF HOSPITAL STAY

There is a significant positive correlation between the pre operative score & the duration of surgery ($p<0.001$) & the duration of hospital stay

Table 8: Intraoperative Complications distribution

(Total number of patients = 66)

		Count	%
Intraoperative Complications	**Bleeding from Abdominal Wall (Port)**	1	1.5%
	Bleeding From Cystic Artery	3	4.5%
	Bleeding from Tissues Adjacent to The Gallbladder	1	1.5%
	Iatrogenic Perforation of The Gallbladder	4	6.1%
	Spilled Gallstones	2	3.0%
	Thickly Adherent Gall Bladder	3	4.5%
	None	52	78.8%

Out of 66 patients, 52 (78.8%) had No intraoperative complications, while 14 (21.2%) had intraoperative complications , 4 (6.1%) had Iatrogenic Perforation of the Gallbladder, 3 (4.5%) had Bleeding from Cystic Artery, 3 (4.5%) had Thickly Adherent Gall Bladder,2 (3%) had Spilled Gallstones, 1 (1.5%) had Bleeding from Abdominal Wall (Port) & 1 (1.5%) had Bleeding from Tissues Adjacent to the Gallbladder.

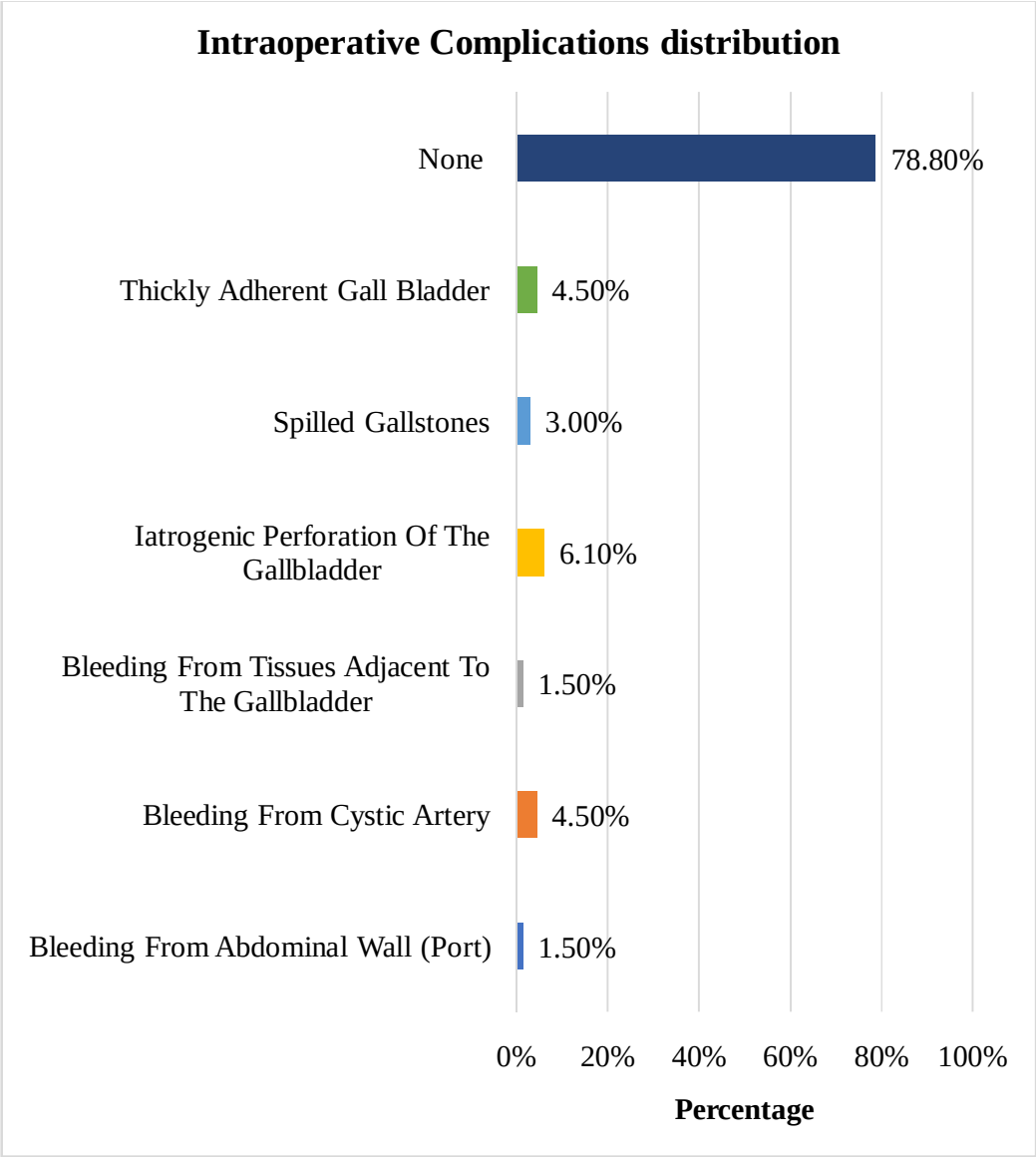

Figure 51: Column Diagram Showing Intraoperative Complications & their distribution

Table 9: Operative Outcome distribution (Total number of patients = 66)

		Count	%
Operative Outcome	**Easy**	39	59.1%
	Difficult	20	30.3%
	Very Difficult	7	10.6%

Operative Outcome was Easy in 39 (59.1%), Difficult in 20 (30.3%) & Very Difficult in 7 (10.6%) subjects

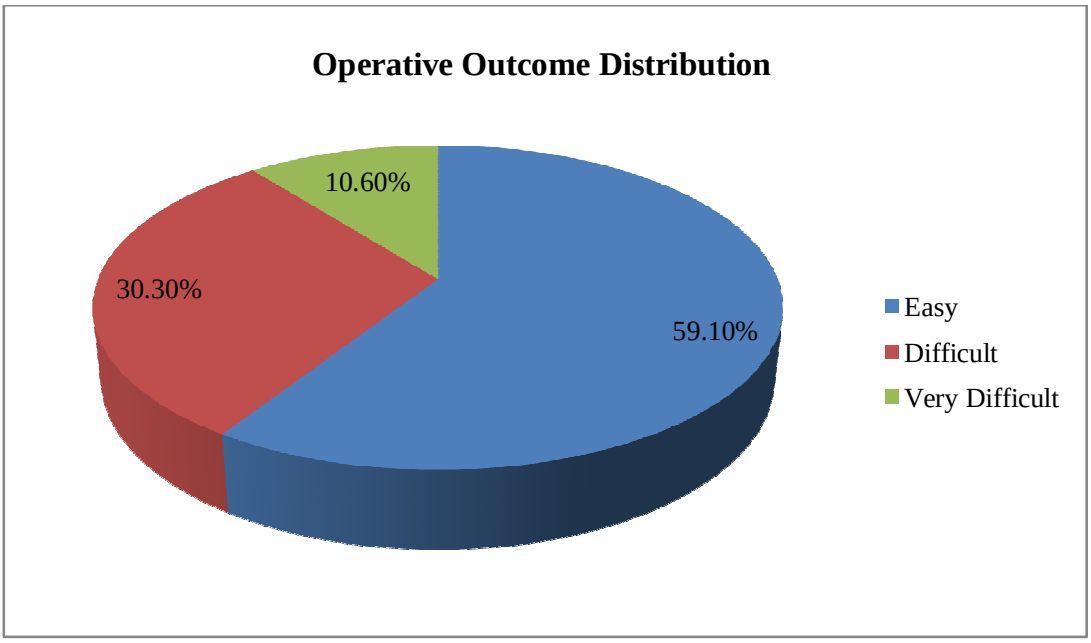

Figure 52: Pie Diagram Showing Operative Outcome Distribution

Table 10: Association between Operative Outcome & Pre-Operative score.

(Total number of patients = 66)

		Operative Outcome					
		Easy		Difficult		Very Difficult	
		Count	%	Count	%	Count	%
Pre-Operative Score Grading	Easy	36	92.3%	3	15.0%	0	0.0%
	Difficult	3	7.5%	17	85.0%	3	7.5%
	Very Difficult	0	0.0%	0	0.0%	4	100%

$\chi 2 = 74.52$, df =4, $p < 0.001$*

39 patients out of 66 were preoperatively predicted to have an easy cholecystectomy depending on their scores. 36 (92.3%) of patients in whom easy procedure was predicted preoperatively had an easy cholecystectomy. Only 3 (15%) had a difficult procedure in spite of being predicted otherwise , no patients with an easy grading underwent a very difficult procedure

23 patients out of 66 were preoperatively predicted to have a difficult cholecystectomy depending on their scores. 17 (85%) of patients in whom difficult procedure was predicted preoperatively had an difficult cholecystectomy. 3 (7.5%) had an easy procedure & 3 (7.5%) had a very difficult procedure in spite of being predicted to be difficult.

4 patients out of 66 were preoperatively predicted to have a very difficult cholecystectomy depending on their scores. 4 (100%) of patients in whom very difficult procedure was predicted preoperatively had a very difficult cholecystectomy.

There was a significant difference in Association between Operative Outcome & Pre-Operative score.

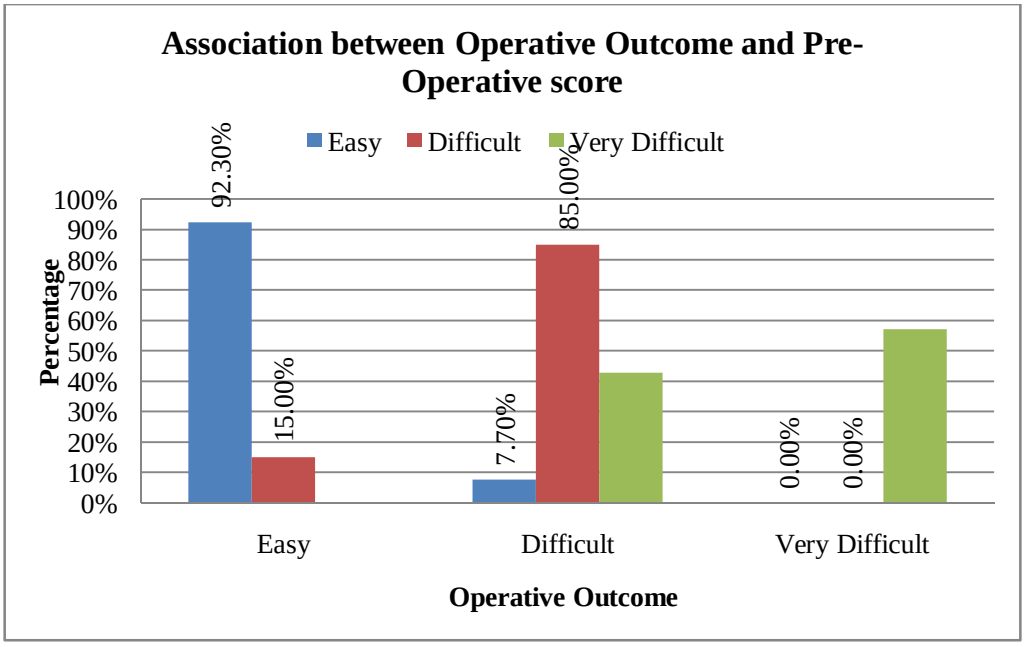

Figure 53: Bar Diagram Showing Association between Operative Outcome & Pre-Operative score

Table 11: Association between Pre Op Grade & Operative Outcome.

(Total number of patients = 66)

		Operative Outcome			
		Difficult		Easy	
		Count	%	Count	%
Pre Op Grade	Difficult	24	88.9%	3	7.7%
	Easy	3	11.1%	36	92.3%

$\chi 2 = 43.51$, df =1, p <0.001*

Difficult & Very difficult outcome in Operative Outcome were clubbed.

6 cases were outliers during the study with respect to the pre operative score & intra operative outcome

Operative Outcome was predicted correctly as Difficult in 88.9% & Easy in 92.3%.

11.1%(3) had Difficult Operative Outcome when the Pre Op Grade was Easy.

7.7%(3) had Easy Operative Outcome when Pre Op Grade was Difficult.

There was a significant difference in Association between Pre Op Grade & Operative Outcome.

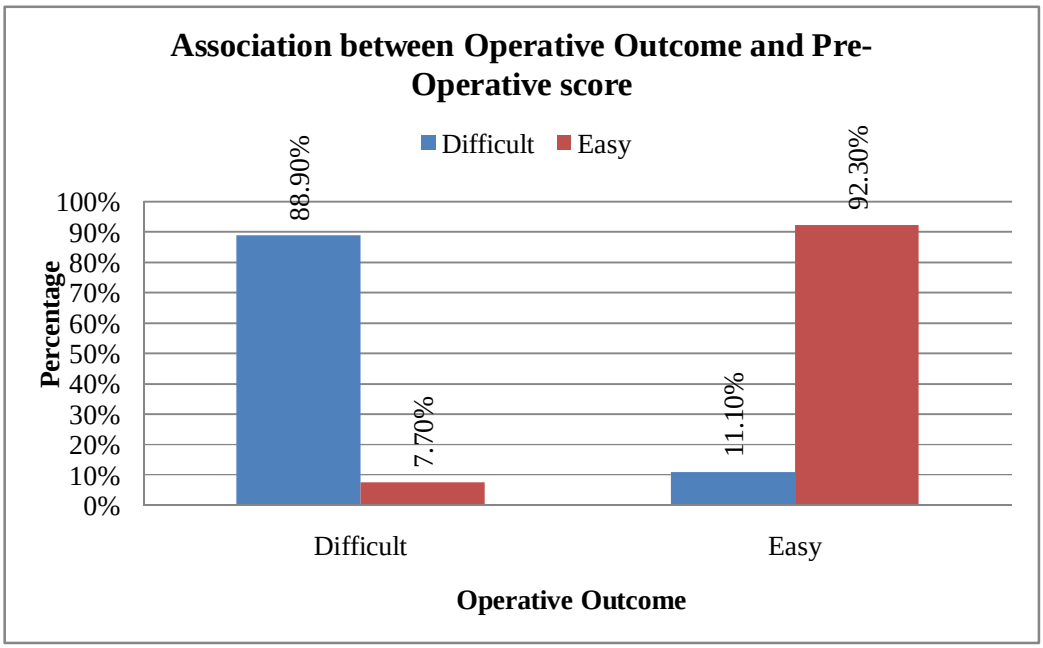

Figure 54: Bar Diagram Showing Association between Operative Outcome & Pre-Operative score

Table 12: Association between Pre Op Grade &Intraoperative complications. (Total number of patients = 66)

		Intra op complications			
		Yes		No	
		Count	%	Count	%
Pre Op Grade	**Difficult**	12	85.7%	15	28.8%
	Easy	2	14.3%	37	71.2%

χ 2 =14.75, df =1, p <0.001*

Intraoperative complications were seen in 14 of the 66 test subjects. 12(85.7%) of these subjects had a preoperative grade which predicted a difficult procedure. In 2 (14.3%) of these subjects intraoperative complications were encountered in spite of a preoperative prediction of easy procedure

There was a significant difference in Association between Pre-Op Grade & Intraoperative complications.

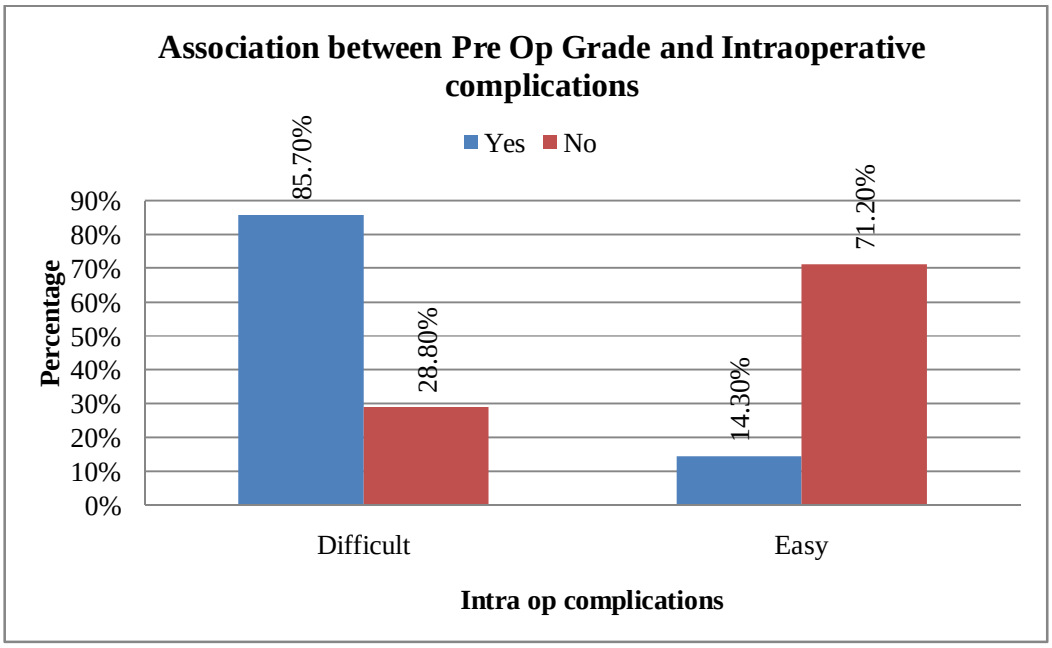

Figure 55: Bar Diagram Showing Association between Pre Op Grade & Intraoperative complications

Table 13: Validity of Pre Op score in differentiating difficult & easy Outcome. (Total number of patients = 66)

Area under the ROC curve (AUC)

Area under the ROC curve (AUC)	0.962
St&ard Error	0.0194
95% Confidence interval	0.883 to 0.993
z statistic	23.825
Significance level P (Area=0.5)	<0.0001

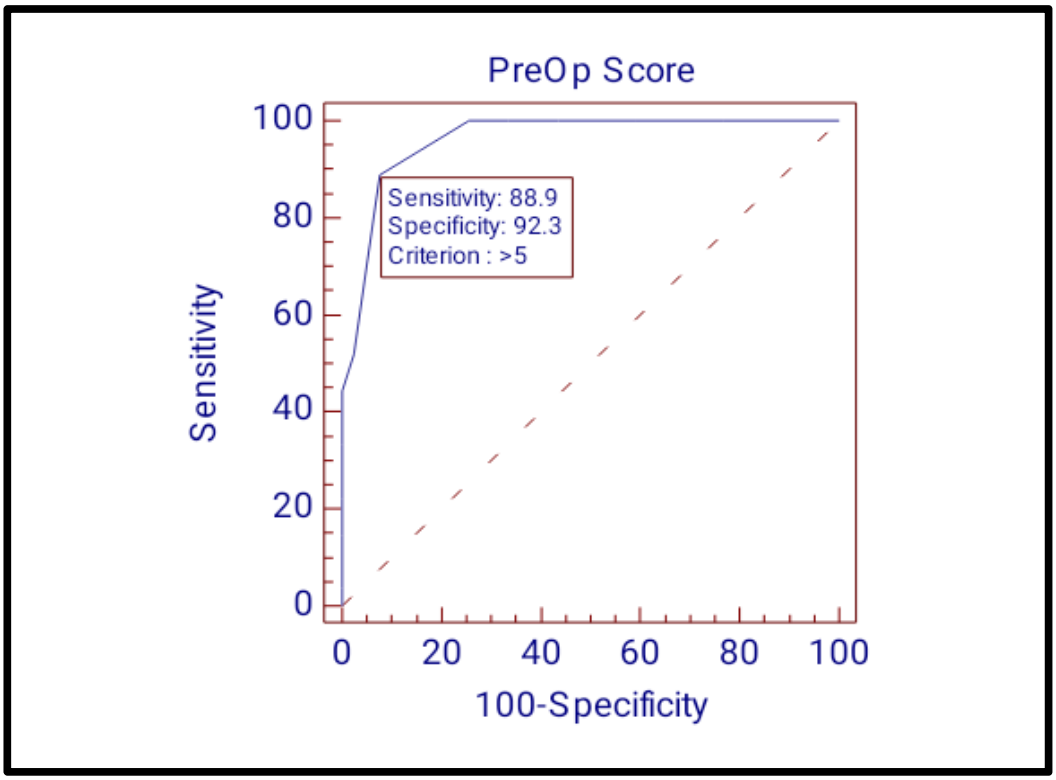

Figure 56: ROC Curve showing Validity of Pre Op score in differentiating difficult & easy Outcome

The curve shows a sensitivity of 88.9% & a specificity of 92.3% at a pre operative score of > 5 which is very significant & shows that the scoring system is a very good predictor of operative outcome

Table 14: Validity of Pre Op score in predicting Intraoperative complications. (Total number of patients = 66)

Area under the ROC curve (AUC)

Area under the ROC curve (AUC)	0.900
St&ard Error	0.0421
95% Confidence interval	0.802 to 0.960
z statistic	9.508
Significance level P (Area=0.5)	<0.0001

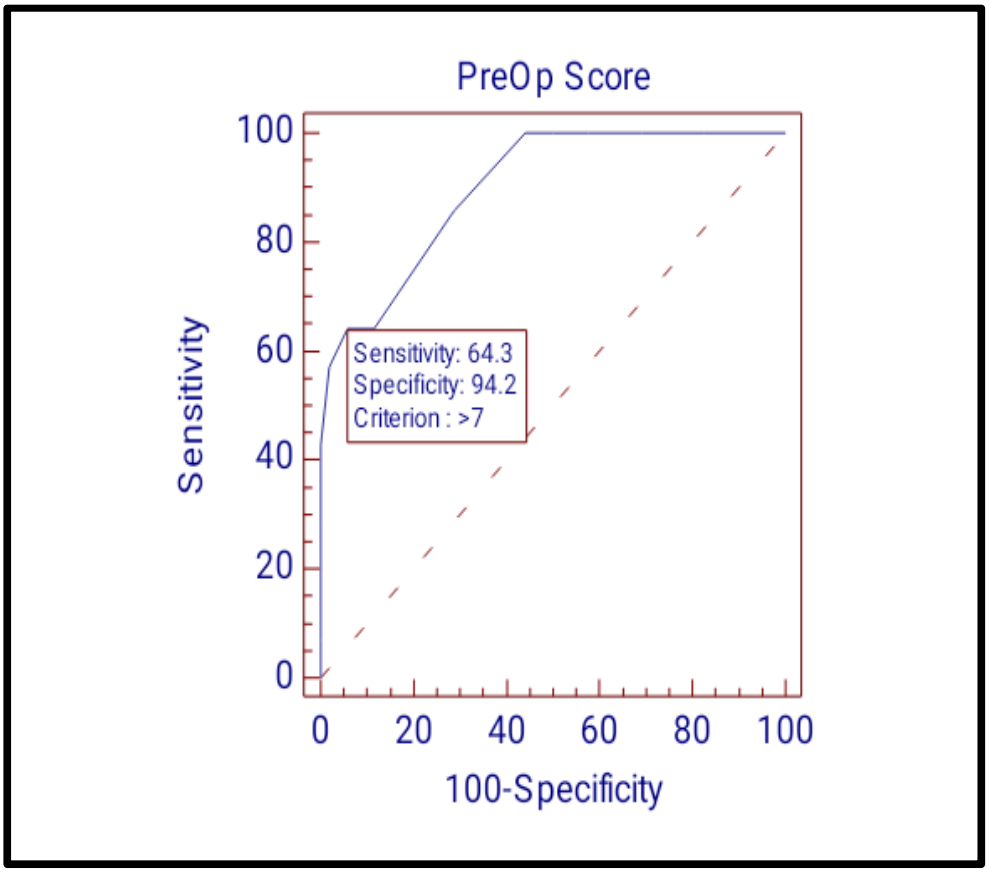

Figure 57: ROC curve showing Validity of Pre Op score in predicting Intraoperative complications

The curve shows a very high specificity of 94.2% at a pre operative score of > 7 for predicting intraoperative complications

DISCUSSION

Laparoscopic cholecystectomy was first performed in animal model by Fillipi, Mall &Roosma in 1985. [46] Philip Mouret in 1987 was the first to remove the gall bladder successfully through an unmagnified mechanical rigid pipe without doing laparotomy.

Initially, the complication rate with LC was high but with technological advancement & increase in the expertise, it has now reached a remarkably low level at 2.0-6.0%. [47] Conversion rate of 7-35% has been reported in literature. [48]

The gold st&ard treatment of choice for gallbladder disease mainly symptomatic cholelithiasis is laparoscopic cholecystectomy (Oymaci et al., 2014)[49]. But this treatment is not devoid of complications albeit it is lower in experienced h&s which require caution from the surgeon (Jethwani et al., 2013) [50] . My study was aimed to assess the various preoperative predictors (history/ clinical/ imaging) & develop a scoring method for difficult laparoscopic cholecystectomy with a secondary objective of correlating preoperative predictive factors with intraoperative difficulty in lap cholecystectomy. A study of 66 subjects to understand the pre-operative predictors of difficult laparoscopic cholecystectomy revealed that majority of them were below or equal to 50 years of age (74.2%, n=49) & most of them were females (69.7%, n=46). A majority of the patients were obese with 30 (45.5%) with a BMI > 27.5 & 15 (22.7%) with a BMI between 25 & 27.5 kg/m2. 41 out of 66 patients had abdominal scars from previous operations, 31 (47%) had an infraumbilical scar & 10 (15.2%) had a supraumbilical scar. On sonologic examination 30 (45.5%) patients had a gall bladder wall thickness of more than or equal to 4 mm, while 13 patients showed pericholecystic collection & 14 patients had impacted stones.

In our study, the method employed was to develop a scoring system to preoperatively ascertain the difficulty in laparoscopic cholecystectomy based on clinical findings, history &sonology. The grades were given as easy (<5), difficult (5-10) & very difficult (11-15). The scoring system was able to predict correctly 57 times (86.36%)

Randhawa JS et al.[51] in 2009 (88-92%, easy to difficult) & Dhanke PS et al.[52] in 2014 (94.05-100%, easy to difficult) published similar findings.

Higher BMI – 22 (73.3%) patients out of 30 with a BMI of >27.5 kg/m2 had difficult cholecystectomies. GB thickness >4mm also correctly predicted difficult cholecystectomies with findings in 23 (76.6) patients, previous history of hospitalisation for cholecystitis also showed a positive correlation between it & difficulty in surgery with 11 (84.6) out of 13 patients having difficult cholecystectomies. Pericholecystic collection was the parameter with the highest association with difficulty in laparoscopy, 12 (92.3%) out of 13 patients with collections underwent difficult procedures. . This study is in agreement with Dhanke PS et al. [52] in 2014 who reported that history of prior hospitalization; high BMI &pericholecystic collection are predictors of the difficulty of laparoscopic cholecystectomy. Nachnani J et al. [53] in 2005 also reported that BMI >30 kg/m2, previous history of hospitalisation & GB thickness >3mm are good predictors of the level of difficulty in laparoscopic cholecystectomy.

In my study, no cases were converted into open. This is very different compared to 19 cases (17%) by R&hawa JS et al. in 2009, 27.9% (Oymaci et al, 2014), 11.4% (Nachnani J et al in 2005), 0.36% (Singh K et al, 2005), 5.3% (Ishizaki Y et al [54], 2006) & 5.7% (Bakos E et al [55] , 2008). This variation can be accounted due to the difference in sample size, the underlying prognostic determinants of the individual, surgeon to surgeon variations & lack of uniform evaluating system. The low rate of complications can be attained by perfecting the surgical techniques along with the experience of the surgeons.

In this study, there is a positive correlation between preoperative total score of the participants & the operative outcome (χ 2 =74.52, df =4, p <0.001*). There is a positive correlation between preoperative grade & operative outcome (χ 2 =43.51, df =1, p <0.001*). There is also a positive correlation between the preoperative score & duration of surgery (r = 0.752 & p < 0.001*) & the length of hospital stay (r = 0.788,

p<0.001*). Finally there is a positive correlation between the preoperative score & the intraoperative complications (χ 2 =14.75, df =1, p <0.001*). Owing to a small sample, the validation of the scoring system is limited. On the other h&, a single surgeon has been followed to avoid individual bias in surgery. An individual surgeon has been followed for the given duration & the results reflect the outcomes of surgery from a single surgeon. A balance has been maintained to get adequate sample size avoiding the bias from different surgeons.

9 cases did not fall into the correct prediction of outcome from scoring. 3 patients with a preoperative of score of 5 had difficult cholecystectomies. One of them was a 65 year old female with a BMI of 28.50 with infraumbilical incision & impacted stone on sonologic examination . It was predicted as easy with a score of 5 but the duration extended to 70 minutes making it difficult. Another 2 case were of females with a BMI of > 27.5 kg/m2 with infraumbilical incision & gallbladder wall thickness of > 4mm. They were predicted as easy with a score of 5 but the duration extended to 85 & 90 minutes making it difficult. This is attributed to the presence of thickly adherent gallbladder in bladder fossa

3 patients with a preoperative score between 6 & 10 underwent easy laparoscopic cholecystectomies. One was male of 55 years of age , with a BMI between 25 & 27.5 & a infraabdominar scar (lower midline) & a wall thickness on USG abdomen & pelvis of > 4mm. The preoperative score in this patient was 6, but the operation took only 50 mins making it easy. The other 2 were males were below the age of 50, who had previous history of hospitalization for cholecystitis, one patient had GB wall >4mm in thickness & one had a BMI of 26. The preoperative grades were 7 & 6 respectively, but both patients underwent easy cholecystectomies (55 & 50 mins)

3 patients with a preoperative score between 6 & 10 underwent very difficult lap cholecystectomies as opposed to just difficult as predicted. 2 of these patients were males above the age of 50 & with a BMI of >27.5. Both had supraumbilical scars, a GB wall thickness of >4mm &pericholecystic collections. Both had a preoperative score of 9 but underwent operations exceeding 120 mins with one patient having

iatrogenic perforation of gallbladder & another having spilled gallstones. The final patient was a 60 year old lady with previous hospitalization for cholecystitis, an infraabdominal scar, GB wall thickness of >4mm in size, pericholecystic collection & an impacted stone. The preoperative score was 10, but the patient underwent a 140 min surgery & also had intraoperative complication of iatrogenic injury to the gallbladder.

The current scoring system used in this study is very effective in predicting the difficulty of the laparoscopic cholecystectomy with very high sensitivity. The smaller sample size limits the ability to accurately predict & discuss the other determinants of difficulty in laparoscopic cholecystectomy. Future research should focus on finding out the exact relationship between the individual variables & the difficulty of the surgical procedure.

SUMMARY

This study was aimed to study a preoperative scoring system to predict difficult laparoscopic cholecystectomies. A prospective observational study was performed using 66 subjects. All the patients had a thorough history taken, a proper clinical examination & all of whom underwent ultrasound abdomen & pelvis scanning. Depending on History (Age, Sex, H/o hospitalization for attacks of cholecystitis), Clinical examination (BMI, Abdominal scar & palpable gallbladder) & USG Abdomen & pelvis (wall thickness, pericholecystic collection & impacted stone) parameters all the subjects were awarded a preoperative score of 0 to 15. A score of 0-5 was predicted to be an easy cholecystectomy (Time taken <60 mins, no bile spillage & no injury to duct or artery), a score of 6-10 was predicted to be a difficult cholecystectomy (time taken 60 to 120 mins, bile/stone spillage, injury to duct & no conversion) & a score of 11-15 was predicted to be a very difficult cholecystectomy (time taken >120 mins or conversion to open)

It was seen that the scoring system evaluated in our study is a reliable, sturdy& useful benchmark (χ 2 =43.51, df =1, p <0.001*) to predict difficult cases. It was excellent in predicting the intraoperative complications(85% of patients with complications had a preoperative grade of difficult) , the overall difficulty of procedure being performed & also the duration of hospital stay

CONCLUSION

This study was aimed to assess various pre-operative predictors (history/ clinical/ imaging) & develop a scoring method for difficult laparoscopic cholecystectomy & to correlate preoperative predictive factors with intraoperative difficulty in laparoscopic cholecystectomy, intraoperative complications & duration of hospital stay . Laparoscopic cholecystectomy has become the procedure of choice for management of symptomatic gall stone disease.

The following conclusions can be drawn from the study; The preoperative scoring system devised is excellent at predicting the intraoperative difficulties encountered by surgeons while performing laparoscopic cholecystectomy with a sensitivity of 88.9% & a specificity of 92.3%. The scoring system also predicted intraoperative complications with a specificity of 94.2% when score is >7. There was also a very strong correlation between the preop score & the duration of surgery ($r=0.752$, $p<0.001$) & also between the preoperative score & the duration of hospital stay ($r=0.788$, $p<0.001$). Surgeons encounter difficulty when there were dense adhesions in the calot's triangle, fibrotic & contracted GB , acutely inflamed, pericholecystic collection. The risk factors which make laparoscopic surgery difficult according to our study were previous hospitalization for attacks of acute cholecystitis , obesity (especially > 27.5), previous abdominal surgery & certain ultrasonographic findings i.e. thickened gall bladder wall, pericholecystic fluid collection & impacted stone .
Preoperative prediction of the risk of conversion or difficulty of operation is an important aspect of planning laparoscopic surgery. Our study sample size with outcome is strengthened inmulticentric studies and larger sample size . I would conclude that the scoring system evaluated in our study is a reliable predictor of difficult cholecystectomy cases.

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ANNEXURES

PROFORMA

Preoperative scoring system to predict difficult Laparoscopic Cholecystectomy

PARTICULARS OF THE PATIENTS:

- Name :
- **Age:**
- **Gender:**
- Occupation:
- Date of admission:
- Date of discharge:
- UHID NO :
- Religion :
- Socio economic status :

HISTORY

- Chief complaints:
- HOPI :
- **Past History: history of previous hospitalization for acute cholecystits**
- Family History:
- Personal History
- Menstrual history
- Family history:

GENERAL PHYSICAL EXAMINATION :

- **General physical examination – BMI**
- Built & nourishment:
- Level of Consciousness:

VITALS

- Pulse rate :
- Blood pressure :
- Respiratory Rate:
- Temperature

SYSTEMIC EXAMINATION

- CVS :
- RS :
- CNS:
- **PER ABDOMEN – Abdominal scar , Palpable gall bladder**

:

INVESTIGATIONS

- 1.HAMETOLOGICAL:
- Hb% - PCV - TC- DC- RBC- Platelets-
- ESR- BT - CT- Blood grouping-
- Blood Urea - Serum Creatinine –
- Serum sodium- Serum potassium-
- LFT-
- HIV- HBsAg-
- ECG- USG- Wall thickness

Pericholecystitic collection

Impacted stone

- CXR-
- MRCP (in case of previous attack of cholangitis) -

DIAGNOSIS:

- SURGERY PERFORMED:
- OPERATING TIME

PATIENT INFORMATION SHEET

STUDY TITLE:PREOPERATIVE SCORING SYSTEM TO PREDICT DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY

GUIDE:Dr. SREERAMALU P N.

STUDY CONDUCTED BY:Dr.TADASINA SAJAY REDDY

STUDY LOCATION:R L Jalappa Hospital & Research Centre attached to Sri DevarajUrs Medical College, Tamaka, Kolar.

PROCEDURE: Assess patients admitted for laproscopic cholecystectomy at R L Jalappa hospital on the basis of history, clinical parameters & sonography.

NEED FOR STUDY: TO ANALYSE THE VARIOUS RISK FACTORS & TO PREDICT DIFFICULTY PREOPERATIVELY(FOR LAPAROSCOPIC CHOLECYSTECTOMY) BY THE USE OF A SCORING SYSTEM

SUBJECT: PATIENTS WITH CHOLELITHIASIS OF BOTH SEXES & ALL AGE GROUPS.

INVESTIGATIONS: - CBC, LFT, serum amylase, RFT , ECG, Chest Xray & ultrasonography after overnight fasting.

COMPLICATIONS: INTRA-OPERATIVE –haemorrhage, iatrogenic perforation of gallbladder, common bile duct injuries , injury to the intestine, bowel & blood vessels, deep vein thrombosis, risks from general anaesthetic

POST-OPERATIVE- bile leakage , haemorrhage, sub hepatic abscess & retained gall stonesPatients presenting with complaints of upper abdominal pain with features of cholecystitis will be included in the study .

Patients in this study will have to undergo routine preoperative investigations, CBC, LFT, serum amylase, RFT , ECG, Chest Xray & one SPECIAL INVESTIGATION – ultrasound abdomen & pelvis in the morning after fasting overnight.

You can ask any question regarding the study. If you agree to participate in the study we will collect information (as per proforma) from you or a person responsible for you or both. Relevant history will be taken. This information collected will be used only for dissertation & publication.

All information collected from you will be kept confidential & will not be disclosed to any outsider. Your identity will not be revealed. This study has been reviewed by the Institutional Ethics Committee & you are free to contact the member of the Institutional Ethics Committee. There is no compulsion to agree to this study. The care you will get will not change if you don't wish to participate. You are required to sign/ provide thumb impression only if you voluntarily agree to participate in this study.

For further information contact:
Dr. TADASINA SAJAY REDDY [Post Graduate]
PHONE NO:9980491848
Departrment of General Surgery, SDUMC, Kolar

PATIENTS SIGNATURE:

PATIENTS ATTENDER SIGNATURE :

INFORMED CONSENT FORM

I Mr./Mrs. have been explained in my own underst&able language, that I will be included in a **STUDY OF PREOPERATIVE SCORING SYSTEM TO PREDICT DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY.**

I have been explained that my clinical findings, investigations, intraoperative findings, post-operative course, will be assessed & documented for study purpose.

I have been explained my participation in this study is entirely voluntary, & I can withdraw from the study any time & this will not affect my relation with my doctor or the treatment for my ailment.

I have been explained about the follow up details & possible benefits & adversities due to interventions, in my own underst&able language.

I have understood that all my details taken during the study are kept confidential & while publishing or sharing of the findings, my identity will be masked.

I have principal investigator mobile no for enquiries.

I in my sound mind give full consent to be included in this study.

Signature of the patient:

Name:

Dr. TADASINA SAJAY REDDY

(Post Graduate)

PH NO: 9980491848

Signature of the witness:

Name:

Relation to Patient:

ತಿಳಿವಳಿಕೆಯ ಸಮ್ಮತಿ ನಮೂನೆ

ನಾನು ಶ್ರೀ / ಶ್ರೀ. ನನ್ನ ಸ್ವಂತಅರ್ಥವಾಗುವಂತಹ ಭಾಷೆಯಲ್ಲಿ ವಿವರಿಸಲ್ಪಟ್ಟಿದೆ, ನಾನುಪ್ರಾತಿನಿಧಿಕ ಲ್ಯಾಪರೊಸ್ಕೋಪಿಕ್CHOLECYSTECTOMY ಗೆ ಪ್ರಾಪರ್ಟಿ ಸ್ಕೋರಿಂಗ್ ಸಿಸ್ಟಮ್ನಅಧ್ಯಯನದಲ್ಲಿ ಸೇರ್ಪಡೆಗೊಳ್ಳುತ್ತೇನೆ.

ಅಧ್ಯಯನದ ಉದ್ದೇಶಕ್ಕಾಗಿ ನನ್ನ ವೈದ್ಯಕೀಯಸಂಶೋಧನೆಗಳು, ತನಿಖೆಗಳು, ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಗೆ ಒಳಪಡುವ ಆವಿಷ್ಕಾರಗಳು, ಆಪರೇಟಿವ್ ಕೋರ್ಸ್, ಮೌಲ್ಯಮಾಪನ ಮತ್ತು ದಾಖಲಿಸಲಾಗುವುದು ಎಂದುನನಗೆ ವಿವರಿಸಲಾಗಿದೆ.

ಈ ಅಧ್ಯಯನದ ನನ್ನ ಪಾಲ್ಗೊಳ್ಳುವಿಕೆಯುಸಂಪೂರ್ಣವಾಗಿ ಸ್ವಯಂಪ್ರೇರಿತವಾಗಿರುವುದನ್ನು ನಾನು ವಿವರಿಸಿದ್ದೇನೆ ಮತ್ತು ಯಾವುದೇ ಸಮಯದಲ್ಲಿನಾನು ಈ ಅಧ್ಯಯನದಿಂದ ಹಿಂತೆಗೆದುಕೊಳ್ಳಬಹುದು ಮತ್ತು ಇದು ನನ್ನ ವೈದ್ಯರೊಂದಿಗೆ ನನ್ನಸಂಬಂಧವನ್ನು ಅಥವಾ ನನ್ನ ಕಾಯಿಲೆಯ ಚಿಕಿತ್ಸೆಗೆ ಪರಿಣಾಮ ಬೀರುವುದಿಲ್ಲ.

ನನ್ನ ಸ್ವಂತ ಅರ್ಥವಾಗುವ ಭಾಷೆಯಲ್ಲಿ, ಮಧ್ಯಸ್ಥಿಕೆಗಳ ಕಾರಣದಿಂದಾಗಿ ಅನುಸರಣೆವಿವರಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಯೋಜನಗಳು ಮತ್ತು ವಿಪತ್ತುಗಳ ಬಗ್ಗೆ ನನಗೆ ವಿವರಿಸಲಾಗಿದೆ.

ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ ತೆಗೆದುಕೊಳ್ಳಲಾದಎಲ್ಲಾ ವಿವರಗಳನ್ನು ಗೌಪ್ಯವಾಗಿರಿಸಲಾಗುವುದು ಮತ್ತು ಪ್ರಕಟಣೆ ಮಾಡುವಾಗ ಅಥವಾ ಆವಿಷ್ಕಾರಗಳಹಂಚಿಕೆಯ ಸಂದರ್ಭದಲ್ಲಿ ನನ್ನ ಗುರುತನ್ನು ಮರೆಮಾಚಲಾಗುವುದು ಎಂದು ನಾನುಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ.

ವಿಚಾರಣೆಗಾಗಿ ನಾನು ಪ್ರಧಾನ ತನಿಖಾಧಿಕಾರಿಮೊಬೈಲ್ ಸಂಖ್ಯೆ ಇಲ್ಲ.

ನನ್ನ ಅಧ್ಯಯನದಲ್ಲಿ ನಾನು ಒಳಗೊಳ್ಳಲುಪೂರ್ಣ ಸಮ್ಮತಿಯನ್ನು ನೀಡುತ್ತೇನೆ.

ರೋಗಿಯ ಸಹಿ:

ಹೆಸರು:

ಡಾ. ಸಜಯ್ ರೆಡ್ಡಿ
(ಸ್ನಾತಕೋತ್ತರ ಪದವಿ)
Ph:9980491848

ಸಹಿ:

ಸಾಕ್ಷಿ ಸಹಿ:

ಹೆಸರು:

ರೋಗಿಗೆ ಸಂಬಂಧ**:**

MASTER CHART

S. NO.	UHID NO.	HISTORY			CLINICAL EXAMINATION			SONOLOGIC FINDINGS			PRE-OPERATIVE SCORE	OPERATIVE FINDINGS			OPERATIVE OUTCOME	DURATION OF HOSPITAL STAY
		AGE	SEX	HISTORY OF HOSPITALIZATION FOR CHOLECYSTITIS	BMI	ABDOMINAL SCAR	PALPABLE GALLBLADDER	WALL THICKNESS	PERICHOLECYSTIC COLLECTION	IMPACTED STONE		PLACEMENT OF DRAIN	DURATION OF SURGERY (IN MINS.)	INTRAOPERATIVE COMPLICATIONS		
1	809397	0	0	4	1	1	0	0	0	0	6	YES	75	BLEEDING FROM TISSUES ADJACENT TO THE GALLBLADDER	DIFFICULT	8
2	822844	0	1	0	1	2	0	0	0	1	5	NO	50	NONE	EASY	6
3	781853	0	0	0	2	2	0	2	0	0	6	NO	70	NONE	DIFFICULT	5
4	785465	0	0	4	1	0	0	2	1	0	8	NO	80	NONE	DIFFICULT	8
5	784453	0	0	0	2	1	0	0	0	0	3	NO	45	NONE	EASY	4
6	826341	0	0	0	0	0	0	0	0	0	0	NO	50	NONE	EASY	5
7	803989	1	0	0	2	1	0	0	0	1	5	NO	70	NONE	DIFFICULT	6
8	793047	0	0	0	0	0	0	0	0	0	0	NO	50	NONE	EASY	3
9	793093	0	0	0	0	1	0	0	0	0	1	NO	55	NONE	EASY	4
10	804485	1	0	0	1	1	0	2	0	0	5	NO	47	NONE	EASY	5
11	828117	0	0	0	2	1	0	2	0	0	5	NO	85	THICKLY ADHERENT GALL BLADDER	DIFFICULT	4
12	792627	0	0	0	0	0	0	0	0	0	0	NO	55	NONE	EASY	5
13	773117	0	1	0	2	1	0	2	0	0	6	NO	65	NONE	DIFFICULT	7
14	764204	0	1	0	1	0	0	0	0	0	2	NO	60	NONE	EASY	5
15	771295	0	0	0	2	1	0	2	0	0	5	NO	90	THICKLY ADHERENT GALL BLADDER	DIFFICULT	6
16	809527	1	1	0	1	1	0	2	0	0	6	NO	50	NONE	EASY	5
17	811553	0	0	0	2	2	0	2	0	0	6	NO	70	NONE	DIFFICULT	8
18	745850	0	0	0	1	0	0	0	0	0	1	NO	55	NONE	EASY	4
19	726463	1	1	0	1	1	0	0	0	1	5	NO	40	NONE	EASY	5

20	726533	0	0	0	0	0	0	0	0	0	0	NO	60	NONE	EASY	6
21	703103	1	1	0	2	2	0	2	1	0	9	YES	150	IATROGENIC PERFORATIONS OF THE GALLBLADDER	VERY DIFFICULT	10
22	644465	1	0	0	2	1	0	2	0	0	6	NO	75	NONE	DIFFICULT	8
23	848489	0	0	0	2	1	0	0	0	0	3	NO	55	NONE	EASY	4
24	849069	1	1	0	2	0	0	2	1	0	7	NO	110	NONE	DIFFICULT	7
25	835578	1	0	0	0	1	0	0	0	0	2	NO	55	NONE	EASY	5
26	675570	0	0	0	0	1	0	0	0	0	1	NO	50	NONE	EASY	3
27	632080	0	0	0	2	1	0	2	0	0	5	NO	43	NONE	EASY	6
28	657864	1	1	0	2	2	0	2	1	0	9	YES	130	SPILLED GALLSTONES	VERY DIFFICULT	9
29	760816	0	0	0	2	1	0	0	0	1	4	NO	38	NONE	EASY	5
30	676023	0	1	4	0	0	0	2	0	0	7	NO	55	NONE	EASY	7
31	664815	0	0	0	1	1	0	0	1	0	3	NO	55	NONE	EASY	6
32	683664	0	0	0	2	1	0	2	0	1	6	NO	70	NONE	DIFFICULT	6
33	683475	0	0	0	0	0	0	0	0	0	0	NO	50	NONE	EASY	5
34	656649	0	0	0	1	1	0	0	0	0	2	NO	55	NONE	EASY	4
35	689998	1	0	0	2	1	0	2	0	0	6	NO	110	NONE	DIFFICULT	7
36	375032	0	1	0	1	0	0	0	0	0	2	NO	45	NONE	EASY	6
37	692913	0	1	4	1	0	0	0	0	0	6	NO	50	NONE	EASY	5
38	743170	0	0	4	2	1	0	2	1	0	10	NO	90	THICKLY ADHERENT GALL BLADDER	DIFFICULT	7
39	748691	1	1	0	2	2	0	2	0	0	8	YES	70	BLEEDING FROM ABDOMINAL WALL (PORT)	DIFFICULT	8
40	756525	0	0	0	2	1	0	2	1	0	6	NO	75	NONE	DIFFICULT	7
41	756204	0	0	0	2	1	0	2	0	0	5	NO	50	NONE	EASY	5
42	755826	0	0	4	1	1	0	2	0	1	9	NO	65	NONE	DIFFICULT	6
43	753596	0	0	0	2	2	0	2	0	0	6	YES	70	SPILLED GALLSTONES	DIFFICULT	6
44	694186	0	0	4	2	1	0	0	0	1	8	NO	65	NONE	DIFFICULT	5
45	752203	0	1	0	2	2	0	0	0	0	5	NO	53	NONE	EASY	7
46	694186	0	0	0	1	1	0	0	0	1	3	NO	40	NONE	EASY	6
47	752557	0	1	4	1	0	0	0	0	1	7	NO	90	NONE	DIFFICULT	7
48	677801	0	1	0	2	2	0	0	0	0	5	NO	50	NONE	EASY	6

49	822272	0	0	4	2	1	0	2	1	1	11	YES	130	BLEEDING FROM CYSTIC ARTERY	VERY DIFFICULT	9
50	868434	1	0	4	0	1	0	2	1	1	10	YES	140	IATROGENIC PERFORATION OF THE GALLBLADDER	VERY DIFFICULT	10
51	867350	1	1	0	0	0	0	2	0	0	4	NO	60	NONE	EASY	5
52	850671	0	0	4	2	1	0	2	1	1	11	YES	125	BLEEDING FROM CYSTIC ARTERY	VERY DIFFICULT	9
53	868888	0	0	0	2	0	0	2	0	0	4	NO	40	NONE	EASY	5
54	329848	0	0	4	2	1	0	2	1	1	11	YES	135	BLEEDING FROM CYSTIC ARTERY	VERY DIFFICULT	9
55	863508	1	1	0	0	0	0	0	0	0	2	NO	50	NONE	EASY	3
56	822844	0	1	0	0	0	0	0	0	0	1	NO	55	NONE	EASY	4
57	826341	0	0	0	0	0	0	0	0	0	0	NO	45	NONE	EASY	5
58	824580	0	0	4	2	2	0	2	1	1	12	YES	130	IATROGENIC PERFORATION OF THE GALLBLADDER	VERY DIFFICULT	8
59	877627	0	1	0	2	0	0	2	1	0	6	YES	75	IATROGENIC PERFORATION OF THE GALLBLADDER	DIFFICULT	7
60	878095	0	0	0	0	1	0	0	0	0	1	NO	50	NONE	EASY	4
61	854198	0	0	0	0	0	0	0	0	0	0	NO	55	NONE	EASY	5
62	871444	1	0	0	0	0	0	0	0	0	1	NO	48	NONE	EASY	4
63	882045	1	1	0	0	0	0	0	0	0	2	NO	57	NONE	EASY	6
64	878239	1	0	0	0	0	0	0	0	0	1	NO	45	NONE	EASY	5
65	778705	0	0	0	0	0	0	0	0	0	0	NO	40	NONE	EASY	4
66	887414	0	0	0	0	0	0	0	0	0	0	NO	49	NONE	EASY	4