CLINICORADIOLOGICAL MARKERS IN PREDICTING A DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY – AN OBSERVATIONAL STUDY AT A TERTIARY CARE TEACHING HOSPITAL IN BELAGAVI REGION OF NORTH KARNATAKA

By

REG NO. BH0122005

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With reference to the above, we wish to inform you that your proposed research project titled **"CLINICORADIOLOGICAL MARKERS IN PREDICTING A DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY- AN OBSERVATIONAL STUDY, AT A TERTIARY CARE TEACHING HOSPITAL IN BELAGAVI REGION OF NORTH KARNATAKA",** is ethical and justifiable. The proposed research project has been cleared by the JNMC Institutional Ethics Committee.

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LIST OF ABBREVIATIONS

S. NO.	ABBREVIATIONS	FULL FORM
1.	LC	Laparoscopic Cholecystectomy
2.	GB	Gall Bladder
3.	CBD	Common Bile Duct
4.	ERCP	Endoscopic Retrograde Cholangiopancreatography
5.	TPN	Total Parenteral Nutrition
6.	RUQ	Right Upper Quadrant
7.	CBC	Complete Blood Count
8.	WBC	White – cell blood count
9.	TLC	Total Leucocyte Count
10.	AST	Aspartate Aminotransferase
11.	ALT	Alanine Aminotransferase
12.	CT	Computed Tomography
13.	CECT	Contrast – Enhanced Computed Tomography
14.	MRCP	Magnetic Resonant Cholangiopancreatography
15.	CO2	Carbon – di – oxide
16.	BMI	Body Mass Index
17.	KLE	Karnataka Lingayat Education
18.	MRC	Medical Research Center
19.	SD	Standard Deviation
20.	JNMC	Jawaharlal Nehru Medical College
21.	DM	Diabetes Mellitus
22.	USG	Ultrasound

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ABSTRACT

Gall stone disease is one of the most common pathologies encountered in surgical wards these days, with 10-15% of the general population suffering from symptomatic or asymptomatic cholelithiasis, which makes it one of the most common pathologies of gall bladder and biliary tree. Laparoscopic cholecystectomy is currently considered as the gold standard treatment for the same. Despite its widespread success, laparoscopic cholecystectomy can still pose challenges. One of the most critical concerns for surgeons is predicting which cases will become ‘difficult’ laparoscopic cholecystectomies (DLCs), as these may necessitate conversion to open surgery. The aim of this study is to identify the clinicoradiological markers that can predict a DLC and the likelihood of its conversion to open cholecystectomy using the Nassar grading as a predictive model.

A total of 96 cases were included in the study in which, 59 cases were considered straightforward and easy. 44 cases were considered difficult with the difficulty level escalating in turn requiring the conversion to open cholecystectomy. Overall, 76 surgeries were performed laparoscopically, and the remaining 20 surgeries were converted to open cholecystectomy.

Difficulty markers were identified in both clinical manner and radiological manner. Clinically these were accompanying symptoms of vomiting, fever and the duration to pain in the right upper quadrant. Radiologically these were the presence of complex adhesions, edematous wall, empyema with or without perforation or impending rupture through USG and CECT.

This study concluded that there was a significant correlation in clinicoradiological markers to predict a difficult LC and the necessity of thorough

preoperative assessment, including imaging and comorbidity evaluation, to predict and manage surgical difficulty in LC.

INTRODUCTION

Gallstone disease is indeed a common condition affecting the digestive system, characterised by the formation of stones in the gallbladder. Autopsy reports have indicated a significant prevalence of gallstones, ranging from 11% to 36%. The likelihood of developing gallstones is influenced by various factors, including –

Age – The risk of gallstones increases with age. Older adults are more likely to develop gallstones than younger individuals.

Gender – Women are generally more prone to gallstones than men. This is partly due to the influence of female hormones like oestrogen, which can increase cholesterol levels in bile, a key factor in gallstone formation.

Other factors that may contribute include genetics, obesity, rapid weight loss, diet, and certain medical conditions like diabetes or liver disease. Understanding these risk factors is crucial for preventing and managing gallstone disease effectively[1].

Laparoscopic cholecystectomy (LC) has become the gold standard for treating gallbladder diseases, particularly symptomatic cholelithiasis. Over the years, it has largely replaced open cholecystectomy due to its minimal invasiveness, quicker recovery, and fewer complications. However, despite its widespread success, the procedure can still present challenges. One of the most critical aspects for surgeons is predicting which cases will turn out to be "difficult" laparoscopic cholecystectomies (DLCs), as these cases may require conversion to open surgery.

Several factors contribute to the difficulty of the procedure, including patient demographics, clinical conditions, and radiological findings. Predicting difficult laparoscopic cholecystectomy through clinic radiological markers can significantly enhance the surgical

planning process. Identifying predictors of a difficult laparoscopic cholecystectomy is crucial for preoperative planning, patient counselling, and optimising surgical outcomes.

Early identification of challenging cases can help surgeons prepare adequately, thereby

reducing risks, improving patient outcomes, and optimising resource use.[2] By analysing patient demographics, clinical features, and radiological findings, this study seeks to provide insights into the preoperative identification of high-risk cases, thereby improving surgical preparedness and patient outcomes.

AIMS AND OBJECTIVES

1. To identify the clinicoradiological markers that can predict difficult laparoscopic cholecystectomy (LC) and the likelihood of its conversion to open cholecystectomy.
2. The primary objective of this study is to evaluate the clinical and radiological parameters that can reliably predict a difficult laparoscopic cholecystectomy (LC) and the potential for conversion to an open cholecystectomy. This involves analysing patient demographics, medical history, ultrasound findings, and other radiological markers to develop a predictive model that enhances preoperative assessment and decision-making.

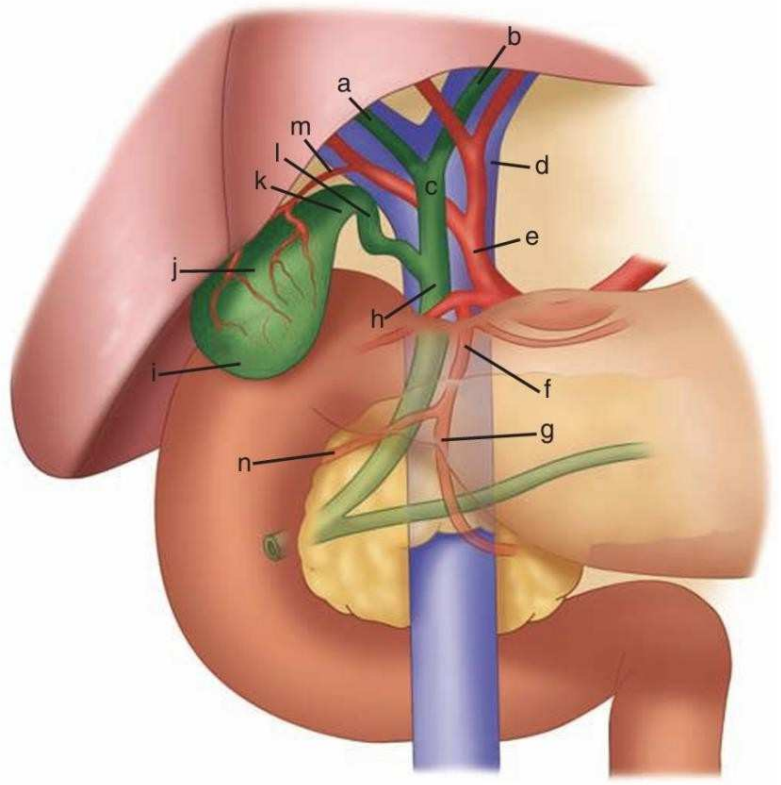
REVIEW OF LITERATURE

The Gall Bladder

The gallbladder is a pear – shaped organ, approximately 7 cm to 10 cm long, with an average capacity of 30 to 50 mL. This located in a fossa under the inferior surface of the liver.[6]

The gallbladder is anatomically divided into three main parts – the fundus, body, and neck, each serving different functions.

1. **Fundus** – The fundus is the rounded, blind end of the gallbladder that typically extends 1 to 2 cm beyond the margin of the liver. It contains the majority of the smooth muscle in the gallbladder, which plays a key role in the organ's contractions.
2. **Body** – The body is the main storage area of the gallbladder, where bile is stored and concentrated. It contains most of the elastic tissue of the organ, allowing it to expand as bile accumulates.
3. **Infundubulum –** It is a mucosal out-pouching present at the junction of cystic duct and neck.
4. **Neck** – The neck is the funnel-shaped portion that connects the body of the gallbladder to the cystic duct. It usually follows a gentle curve, with its convexity potentially forming an enlargement known as the infundibulum or Hartmann's pouch. The neck lies in the deepest part of the gallbladder fossa and extends into the free portion of the hepatoduodenal ligament.



(7)

Figure 1

A. Right hepatic duct
B. Left hepatic duct
C. Common hepatic duct
D. Portal vein
E. Proper hepatic artery
F. Gastroduodenal artery
G. Right gastroepiploic
H. Common bile duct
I. Fundus of gall bladder
J. Body of gall bladder
K. Cystic duct
L. Infundibulum of gall bladder
M. Cystic artery
N. Superior pancreaticoduodenal artery

Histological features[7] –

1. **Epithelium** –

   The lining is composed of tall columnar epithelial cells that are highly folded, giving the mucosa a convoluted appearance. These cells contain cholesterol and fat globules, likely reflecting the role of the gallbladder in bile concentration and storage.

2. **Mucus secretion** –

   Tubuloalveolar glands located in the infundibulum and neck of the gallbladder produce mucus. These glands are absent in the body and fundus.

3. **Lamina propria** –

   The epithelium is supported by a lamina propria, a layer of loose connective tissue.

4. **Muscle layer** –

   The consists of a mix of circular, longitudinal, and oblique fibers without the distinct organization seen in other parts of the gastrointestinal tract.

5. **Perimuscular subserosa** –

   This layer contains connective tissue, nerves, blood vessels, lymphatics, and adipocytes.

6. **Serosa** –

   The gallbladder is covered by a serosa, except where it is directly attached to the liver.

Key Histological Difference[7] –

The gallbladder lacks a muscularis mucosa and a submucosa, which distinguishes it from other parts of the gastrointestinal tract. This structure allows the gallbladder to efficiently store and concentrate bile while adapting to its function in the biliary system.

Neurovasuculature[7] –

1. **Arterial Supply –**

Supplied by the cystic artery. In more than 90% of cases, the cystic artery arises from the right hepatic artery. Less commonly, variations in its origin can occur, requiring careful identification during surgery.

2. **Venous drainage –**

Small veins carry blood directly into the liver parenchyma. Occasionally, a large cystic vein drains into the portal vein.

3. **Lymphatics** –

Lymph from the gallbladder drains to nodes near the neck of the gallbladder. A prominent lymph node, often referred to as the node of Calot, is frequently visible near the insertion of the cystic artery.

4. **Innervation** –

a. Parasympathetic fibers arise from the vagus nerve, aiding in gallbladder contraction.
b. Sympathetic fibers travel through the celiac plexus, playing a role in regulating vascular tone and sensation.

Structural Features[7] –

1. **Cystic Duct –**

It plays a vital role in bile flow between the gallbladder and the biliary tree. The cystic duct typically measures 1 to 5 cm in length. It usually drains into the CBD at an acute angle. Variations in some cases, the cystic duct may insert into the right hepatic duct or at other atypical locations, leading to variations in biliary anatomy that have clinical implications.

2. **Valves of Heister –**

The mucosal folds within the neck of the gallbladder and cystic duct are arranged in a spiral pattern. These valves help regulate bile flow, preventing over-drainage from the gallbladder. They also facilitate bile retention until contraction occurs in response to hormonal or enteric stimulation (e.g., cholecystokinin release).

3. **Calot's Triangle –**

   a. **Boundaries –**

   i. **Superiorly** – cystic artery.

   ii. **Medially** – common hepatic duct

   iii. **Laterally** – cystic duct and the gallbladders' neck

   b. **Contents** –

   i. Cystic lymph node of Lund.

   ii. Small cystic veins.

   iii. Autonomic nerves piercing gall bladder.

   iv. Adipose tissue.

   v. Right hepatic artery.

vi. Some accessory ducts draining gall bladder.

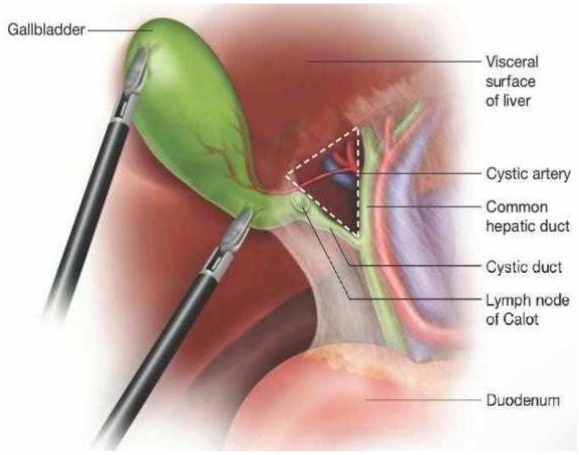


Figure 2

4. Cholecystohepatic triangle

a. Boundaries –

i. **Superiorly** – the inferior surface of the liver

ii. **Medially** – common hepatic duct

iii. **Laterally** – cystic duct and the neck of gall bladder

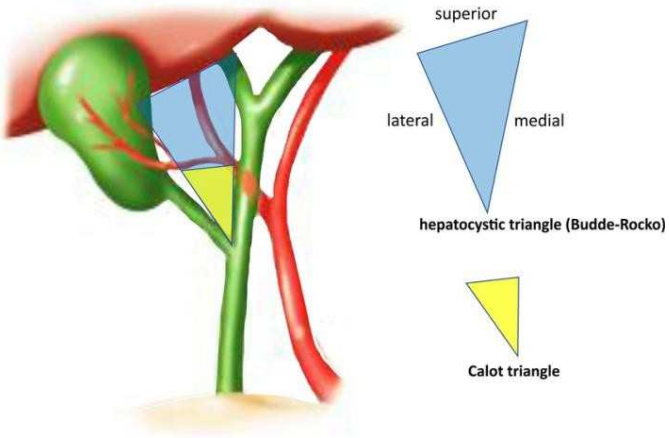


Figure 3

Clinical Importance –

The cystic duct and its anatomical variations are crucial to recognize during cholecystectomy to prevent injury to adjacent structures like the hepatic ducts or CBD. The Valves of Heister can complicate the passage of instruments during procedures like endoscopic retrograde cholangiopancreatography (ERCP) or gallstone extraction. Understanding these features is essential for surgical and diagnostic procedures involving the biliary tract.

Gallstone disease

Gallbladder stones also known as Cholelithiasis are indeed more prevalent in certain populations and regions, with significant differences worldwide due to genetic, dietary, and environmental factors. In India the prevalence is estimated to be around 4% in the general population[4]. Higher prevalence is seen in the northern regions of India, possibly due to dietary patterns (low fiber, high cholesterol diets) and genetic predisposition. In the western world the prevalence is higher, approximately 10% or more. Contributing factors include a diet high in fat and cholesterol, a sedentary lifestyle, and an aging population. Gallstones are often asymptomatic and discovered incidentally during imaging or surgical procedures for other reasons. Many individuals remain asymptomatic throughout life. They often require no treatment unless symptoms such as pain, nausea, or complications like cholecystitis or biliary obstruction develop.

Gallstones are classified into two major subtypes cholesterol stones and pigment stones based on their primary composition. The formation of these stones involves complex interactions of bile composition, gallbladder function, and external factors[7].

1. **Cholesterol Stones** –

Predominantly cholesterol with calcium salts. Pure Cholesterol Stones are rare and less than 10%. Cholesterol precipitates when bile becomes supersaturated with cholesterol and lacks sufficient bile salts to solubilize it.

2. **Pigment Stones** –

a. Black Pigment Stones – Associated with hemolytic conditions (e.g., sickle cell disease, hereditary spherocytosis) and cirrhosis. Formed due to elevated bilirubin concentration and occur almost exclusively in the gallbladder.

b. Brown Pigment Stones – Typically found in the biliary ducts. Related to biliary infection, stasis, or impaired motility. Contain cholesterol and are influenced by bacterial activity.

Mechanisms of Gallstone Formation

Supersaturation of Bile –

High concentrations of cholesterol or bilirubin in bile predispose to stone formation[7].

Bile Concentration –

In the gallbladder, water and sodium are absorbed, further concentrating bile solutes and increasing the risk of crystallisation[7].

Crystal Nucleation –

Pro-nucleating agents like glycoproteins and immunoglobulins accelerate cholesterol crystallisation[7].

Gallbladder Dysmotility –

Impaired gallbladder emptying leads to bile stasis, giving time for solutes to precipitate. Contributing factors include prolonged fasting, total parenteral nutrition (TPN), vagotomy and use of somatostatin analogues[7].

Predisposing Factors

1. **Cholesterol Stones** – Obesity, rapid weight loss, pregnancy, high-fat diets, and metabolic syndrome.
2. **Pigment Stones** – Chronic hemolysis, liver disease, biliary infections, or parasitic infections (e.g. Clonorchis sinensis).

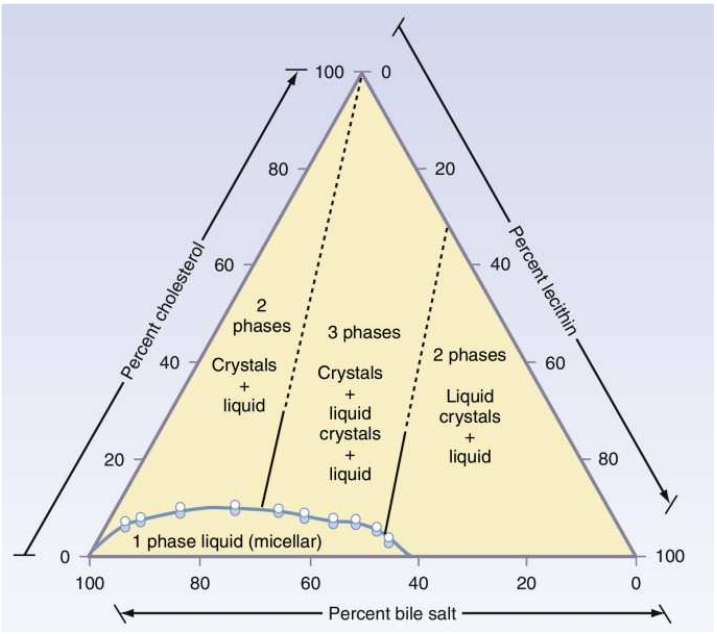


Figure 4[7]

Clinical Presentation

Gall stones are usually asymptomatic and are increasingly detected on radio imaging for other symptoms. When gallstones cause symptoms, they typically present with biliary colic and complications such as acute cholecystitis or other severe outcomes if untreated.

Symptoms of Gallstone-Related Disorders:

1. **Biliary Colic** –

Pain which is located in the right upper quadrant (RUQ) or epigastrium, often radiating to the back or right shoulder. Pain is described as dull, continuous, and severe rather than true "colicky" pain. Episodes last from several minutes to hours and are often accompanied by nausea and vomiting. Pain typically begins at night, often waking the patient from sleep. Frequently triggered by fatty meals or intermittent gallbladder contractions. Resolution occurs spontaneously or with medication as the gallstone moves back into the gallbladder.

2. **Acute Cholecystitis** –

Persistent RUQ pain. Fever and systemic inflammatory signs. Positive Murphy's sign: Exacerbation of RUQ tenderness during deep inspiration when palpated in the right subcostal region. If untreated, complications such as empyema, necrosis, or perforation with localised peritonitis may occur.

3. **Other Symptoms** –

Dyspepsia, flatulence, and fat intolerance: These are nonspecific and may not always be related to gallstones. Altered bowel habits have been occasionally reported but not diagnostic.

Investigations

Patients who are asymptomatic or have uncomplicated cholelithiasis usually have no hematological derangements.

Labs

1. **Complete Blood Count (CBC)** –

Acute Cholecystitis – Polymorphonuclear leukocytosis (elevated WBC count). Up to 30% of cases may not show leukocytosis[5].

Cholangitis: Marked leukocytosis with possible left shift (indicating severe infection).

2. **Liver Function Panel** –

Acute Common Bile Duct (CBD) Obstruction (Choledocholithiasis) – in early disease elevated ALT and AST (liver transaminases). In later – Rising bilirubin (direct > indirect) and alkaline phosphatase (ALP). Bilirubin > 3 mg/dL is a strong predictor of CBD stones (~60% cases)[5].

3. **Cholangitis** –

Marked elevation of bilirubin and ALP with signs of sepsis (fever, hypotension). In prolonged obstruction there is a declining trend of transaminases with persistently elevated bilirubin and ALP. Prolonged obstruction may elevate prothrombin time due to vitamin K deficiency (bile-dependent absorption).

4. **Amylase and Lipase** –

Elevated in gallstone pancreatitis, especially if a stone obstructs the ampulla of Vater. Levels may correlate with the severity of pancreatic inflammation.

Imaging

1. **Ultrasound** –

Primary modality for diagnosis of cholelithiasis. Findings include hyperechoic (bright) gallstones with posterior acoustic shadowing. Gallstones may move with changes in patient position. Gallbladder wall thickening and pericholecystic fluid may indicate associated cholecystitis. Advantages are that it is a non-invasive, no radiation, widely available, and highly sensitive (95%-98%)[5].

2. **Computed Tomography (CT) Scan** –

Less sensitive than ultrasound for detecting gallstones. Findings include gallstones may appear as hyperdense structures in the gallbladder. Other information that can be derived are wall thickness, presence of fat stranding, hydrops and pericholecystic collection. Useful for identifying complications (e.g., perforation, abscess). Often used when ultrasound is inconclusive or when other abdominal pathology is suspected.

3. **Magnetic Resonance Cholangiopancreatography (MRCP)** –

Highly sensitive and specific for both gallstones and bile duct stones (choledocholithiasis). Findings include gallstones appear as signal voids in the gallbladder or bile ducts. Advantages are non-invasive and radiation-free.

Clinical Markers –

Clinical markers encompass findings from physical examinations, patient history, and presenting symptoms that help anticipate complications during surgery. These markers include:

1. **Age of the patient** – Older individuals may present with more complex anatomical challenges.

2. **Previous abdominal surgeries** – Surgical scars or adhesions could complicate the procedure.
3. **Comorbid conditions** – Conditions such as obesity, diabetes, and cardiovascular diseases increase surgical risks.
4. **Gallbladder characteristics** – Conditions like acute cholecystitis, thickened gallbladder walls, or large stones may make surgery more difficult.

Radiological Markers –

Radiological markers utilise imaging techniques, including ultrasound, CT scans, and MRCP, to assess the anatomical structure and conditions of the gallbladder and adjacent organs. Key radiological markers include **–**

1. **Gallbladder size** – An enlarged or distended gallbladder can complicate access during laparoscopic surgery.
2. **Gallbladder wall thickness** – Thickened walls may indicate inflammation, infection, or complications.
3. **Presence of stones** – Larger or impacted stones are more challenging to remove and complicate dissection.
4. **Anatomical variations** – Variations in the biliary tree, such as abnormal duct positioning, can complicate the procedure.
5. **Liver or cystic duct abnormalities** – These abnormalities, visible on imaging, may present additional challenges during surgery.

By considering both clinico and radiological markers, a comprehensive preoperative assessment can be made to predict whether laparoscopic cholecystectomy will be straightforward or difficult. These markers help the surgical team anticipate potential

challenges, enabling them to adjust their approach or consider alternative techniques to ensure the best outcome for the patient.[4]

Nazar Grading for Difficult Laparoscopic Cholecystectomy (LC) –

The Nazar Grading System is a classification tool used to predict the difficulty of laparoscopic cholecystectomy (LC) based on both clinical and radiological factors. This grading system is particularly useful in an observational study such as this, which focuses on clinicoradiological markers for predicting difficult LC procedures. The grading system helps in identifying patients who may require more complex surgical interventions or conversion to open cholecystectomy[8].

The grading is divided into 5 grades, with the difficulty level escalated as the grade increases. The grades are divided into gall bladder, cystic pedicle and adhesions/ fistulae. The grading system is designed as a summary for the overall condition of the operative conditions of patients who are getting operated for a difficult gall bladder.

The grading is as follows in the table below[3] –

Grade	Gall Bladder	Cystic Pedicle	Adhesion/ Fistulae
Grade 1	Floppy Non – adherent	Clear Thin	Simple, to GB neck and Hartman's pouch
Grade 2	Mucocele Packed with stones, deep fossa	Fat – laden Anterior or accessory artery	Simple, up to the body. Omentum on liver preventing retraction
Grade 3	Acute Cholecystitis Contracted, fibrosis Hartman's pouch adherent to CBD or with stone impaction	Cystic duct short Dilated/ obstructed Impacted cystic duct stones Abnormal duct anatomy	Dense, up to the fundus Involving hepatic flexure/ duodenum Not on GB but hinder retraction on pedicle
Grade 4	Completely obstructed Empyema/ Gangrene Abscess or mass	Impossible to clarify without fundus first dissection Mirizzi I syndrome Cirrhosis, dilated veins	Dense, fibrous wrapping the gall bladder Duodenum or hepatic flexure Difficult to separate
Grade 5	Burnt out GB Cholecysto-cutaneous abscess	Mirizzi II	Cholecysto-duodenal fistula Cholecysto-colic fistulae

Table 1

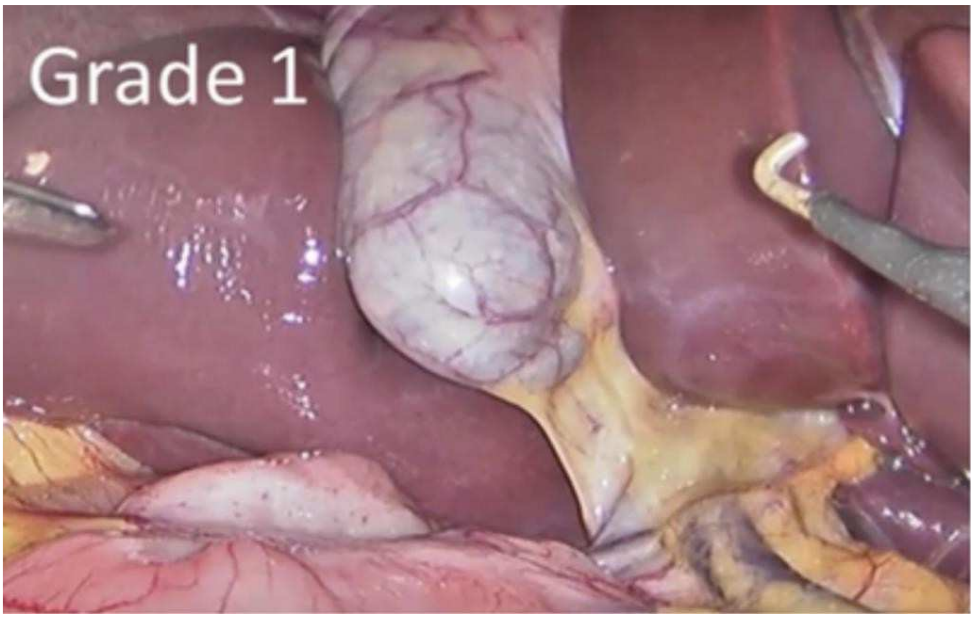


Figure 5

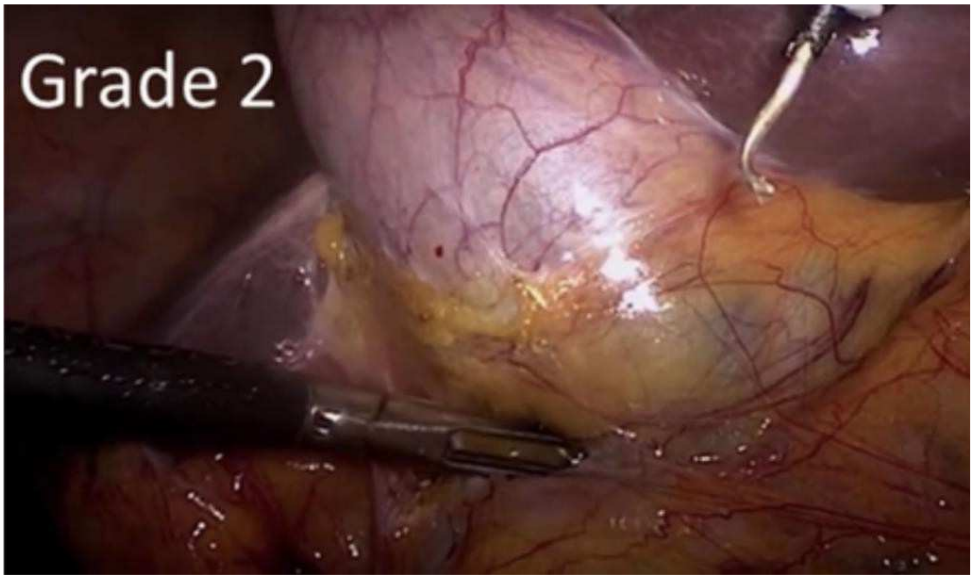


Figure 6

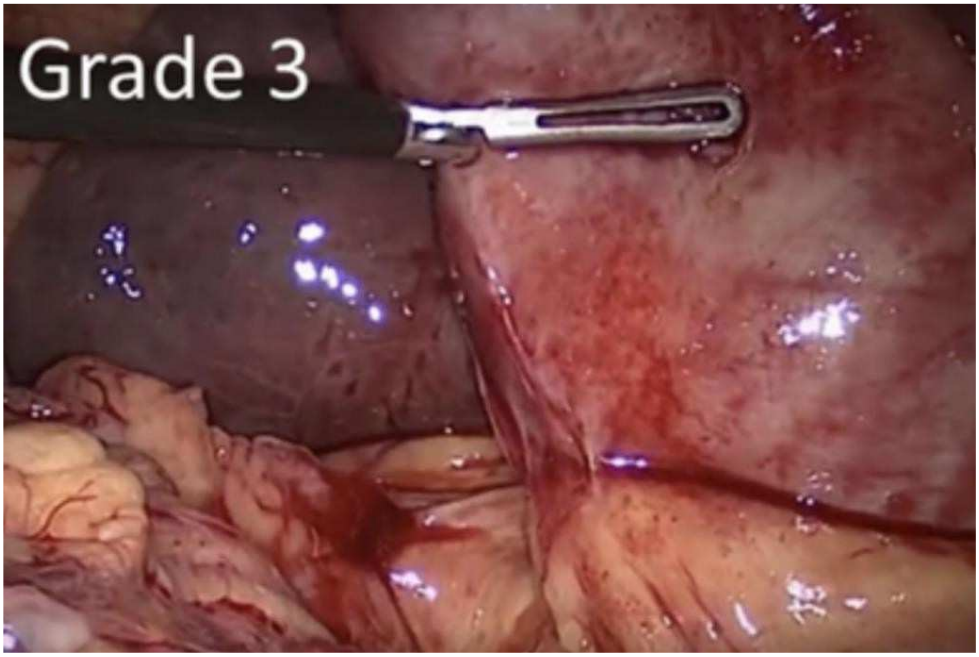


Figure 7

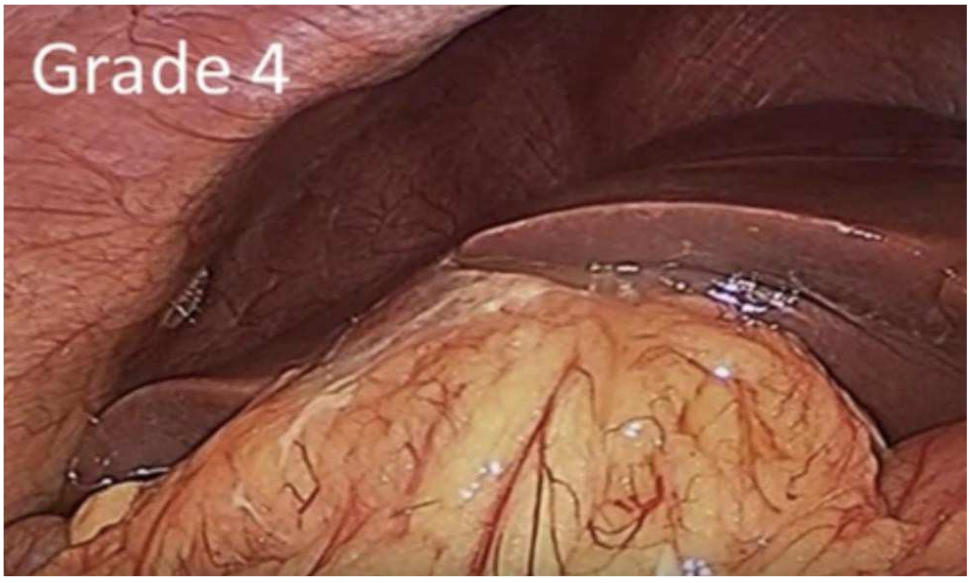


Figure 8

Griffiths et al (2018) conducted a prospective cohort in utilising a difficulty grading scale for LC and found that a higher operative difficulty, as graded by the Nassar scale[8], was consistently linked to worse patient outcomes in both the reference and CholeS cohorts. As difficulty increased from grade 1 to 4, the median hospital stay rose from 0 to 4 days, and the 30-day complication rate increased from 7.6% to 24.4% (both $p < 0.001$). In the CholeS cohort, higher difficulty was most strongly associated with conversion to open surgery (AUROC = 0.903) and 30-day mortality (AUROC = 0.822). Multivariable analysis confirmed the Nassar scale as an independent predictor of operative duration, conversion, 30-day complications, and re-intervention, emphasising the importance of preoperative risk assessment in surgical planning.

Bhagtana A, Singh N, Mahajan A, et al. (2018) This study evaluated clinical and ultrasonography parameters to predict difficult LC. It emphasised the role of gallbladder wall thickness, pericholecystic fluid, and stone characteristics as key predictors. The findings highlighted that preoperative ultrasound is a valuable tool for assessing surgical difficulty, aiding in better patient counselling and surgical planning[19].

Surgical treatment

Laparoscopic cholecystectomy is currently the gold standard for treating cholelithiasis. Many a times there's possibility of conversion to open cholecystectomy due to intraoperative complications for the safe ending of the procedure and takes more than anticipated time. The preoperative identification of difficult laparoscopic cholecystectomy provides an important advantage not only for the surgeon. In patients with clinical and laboratory parameters of

acute cholecystitis, therefore, it would be advisable to carry out a preoperative abdominal CT scan with evaluation of features that can be easily assessed also by the surgeon.

Equipment[5]

1. Laparoscopic monitor
2. One laparoscope (5/10 mm, 0/30 degrees) including camera cord and light source
3. Carbon dioxide source and tubing for insufflation
4. 5 mm and 10 mm trocars (average three 5 mm working trocars and one 10 mm trocar)
5. Laparoscopic instruments: Atraumatic graspers, Maryland grasper, clip applier, electrocautery (e.g., hook, spatula), and a retrieval bag
6. Scalpel (11/15 blade), forceps, needle holder, vicryl port closure, ethilon sutures
7. Major open tray, for possible conversion

Steps –

1. **Anesthesia** – General anesthesia is administered for all laparoscopic cholecystectomy procedures.
2. **Patient Positioning** – With their arms by their sides and their feet tightly strapped, the patient is positioned in a supine position.
3. **Preparation** – After intubation, a Foley catheter and a Ryle's tube are inserted
4. **Creating Pneumoperitoneum** – A pneumoperitoneum is established to create a working space in the peritoneal cavity, maintained at a pressure of 12-14 mmHg. There are two techniques to achieve this –

a. **Closed (Veress Needle) Technique** –

i. At the umbilicus, a Veress needle is introduced through the anterior abdominal wall. The position is confirmed using normal saline with a plunger-less syringe.

ii. CO2 is insufflated at a rate of 2 liters per minute.

iii. Correct intra-abdominal placement is confirmed by observing uniform abdominal distension.

b. Open (Hasson) Technique –

i. An incision is made supraumbilically, and layers are opened under direct vision to enter the peritoneum.

ii. A 10mm trocar is inserted and secured with sutures.

iii. Further CO2 insufflation is performed.

5. Placement of Ports and Adequate Exposure –

A port measuring 10 mm is placed in the periumbilical area. The abdominal cavity, including the gall bladder, omentum, liver, colon, and pelvis, is examined with a 30- degree laparoscope to check for adhesions or other diseases. One additional 10 mm port and two, 5 mm ports are strategically placed within direct sight: one in the upper right quadrant, one in the right anterior axillary line 2 cm below the costal margin, and one in the right midclavicular line.

6. Exposure of calots –

The Gallbladder fundus is raised and retracted upward toward the right shoulder using an atraumatic grasper. It gives an adequate view of calot's triangle and liver for dissection. Any adhesions if present between the liver and gallbladder are separated from the fundus towards the neck of the gallbladder using blunt dissection and cautery.

7. Calot's Triangle Dissection –

After retraction of the infundibulum laterally for better visualization, the peritoneal layer over the neck of the gall bladder is exposed and opened.

8. Obtaining a critical view of safety –

To prevent bile duct damage, it is important to thoroughly dissect the Calot's triangle and separate the infundibulum from the liver bed. Following dissection in Calot's triangle, only the cystic artery and cystic duct should be visible as they course toward the gallbladder. During ligation, two clips are applied to the side of the duct and one clip is applied to the side of the gallbladder over the cystic duct. Before placing clips, the stones located in the cystic duct, which connects to the gallbladder, are gently squeezed out. The cystic artery is ligated prior to the cystic duct.

9. Detachment of gallbladder from fossa –

Cystic plate is exposed after dissection of gall bladder fossa from its bed.

10. Extraction of gallbladder specimen –

The camera is placed in the subxiphoid port and the gallbladder after placing in endobag is removed from the umbilical port.

11. Drainage and closure –

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

Open Cholecystectomy[9] –

1. Antegrade approach –

a. Referred to as the "fundus-down" method, begins with dissection at the hepatoduodenal ligament, focusing on the peritoneum covering Calot's triangle.

b. This facilitates early identification, ligation, and division of the cystic artery and duct, achieving the critical view of safety akin to that in laparoscopic cholecystectomy.

c. Subsequently, the gallbladder is dissected from the liver bed in the subserosal plane.

d. Advantages of this method include operating in a relatively bloodless field and minimizing blood loss during gallbladder removal.

2. Retrograde approach –

a. Referred as the "fundus-first" technique, initiates dissection at the gallbladder's fundus and progresses toward the hepatoduodenal ligament.

b. This method is particularly beneficial in cases of severe inflammation or when anatomical structures are difficult to delineate, as it allows for the gallbladder to be separated from the liver bed before addressing the cystic duct and artery.

c. By leaving the cystic duct and artery as the final attachments, this approach can facilitate their precise identification and division.

The choice between antegrade and retrograde techniques depends on factors such as the severity of inflammation, anatomical considerations, and the surgeon's experience. In situations where the anatomy of Calot's triangle is obscured due to acute inflammation or fibrosis, the retrograde approach may be preferred to reduce the risk of bile duct injury.

Conversely, the antegrade method may be more straightforward in cases with minimal inflammation, offering a clearer view of critical structures early in the procedure[9].

The study titled "Predicting Difficult Laparoscopic Cholecystectomy Based on Clinicoradiological Assessment" was conducted by Ravindra Nidoni, Tejaswini V. Udachan, Prasad Sasnur, Ramakanth Baloorkar, Vikram Sindgikar, and Basavaraj

Narasangi and published in 2015. This prospective study, conducted from October 2010 to October 2014, aimed to identify clinical and radiological parameters that could predict the difficulty of laparoscopic cholecystectomy (LC) and the likelihood of conversion to open surgery. The study included 180 patients who underwent LC, focusing on four key parameters – gallbladder wall thickness, pericholecystic fluid collection, number of previous attacks of cholecystitis, and total leukocyte count (TLC). Statistical analysis using the Z-test revealed that TLC >11,000, more than two previous attacks of cholecystitis, gallbladder wall thickness >3 mm, and pericholecystic fluid collection were all statistically significant predictors of difficult LC and conversion to open surgery. The findings showed that out of 180 patients, 126 (70%) were classified as easy LC, 44 (24.44%) as difficult LC, and 10 (5.56%) required conversion to open cholecystectomy, with an overall conversion rate of 5.6%. These results align with the global conversion rate range of 113%. The study highlighted that a thickened gallbladder wall and pericholecystic fluid collection indicate inflammation and fibrosis, while multiple attacks of cholecystitis lead to adhesions, all of which increase surgical difficulty. Elevated TLC was also a strong indicator of acute inflammation, further complicating the procedures[10].

Tika Ram Bhandari et al (2021) in an observational study considered laparoscopic cholecystectomy (LC) as the gold standard treatment for symptomatic gallstone disease. A total of 338 patients (82 males) with a median age of 47 years were included in the study. Among them, 52 patients (15.4%) were classified under the difficult LC group. The overall conversion rate to open cholecystectomy was found to be 8.9%. The logistic multivariable regression analysis identified five significant independent predictors for difficult LC – Male gender, Past history of acute

cholecystitis, Gallbladder wall thickness (≥4–5 mm), Fibrotic gallbladder, and adhesion at Calot's triangle. These findings indicate that male patients, those with a previous history of acute cholecystitis, and those exhibiting anatomical changes such as increased gallbladder wall thickness, fibrosis, and adhesions are at a higher risk for difficult LC.This study highlights gender (male), past history of acute cholecystitis, gallbladder wall thickness (≥4–5 mm), fibrotic gallbladder, and adhesion at Calot's triangle as significant predictors for difficult laparoscopic cholecystectomy[11]. Awareness of these predictors allows for better preoperative planning, risk stratification, and allocation of resources to manage difficult cases effectively. Surgeons should consider these factors when assessing patients for LC to improve surgical outcomes and reduce complications.

Giger et al. (2006) analyzed perioperative complications in 22,953 laparoscopic cholecystectomy cases from the Swiss Association of Laparoscopic and Thoracoscopic Surgery database. They identified risk factors such as patient comorbidities, prior abdominal surgeries, and acute inflammation, which increased complication rates[12]. The study emphasized the importance of surgical expertise in reducing adverse outcomes. They also noted that older patients and those with obesity had higher risks of postoperative infections and prolonged hospital stays. Their findings highlighted the need for thorough preoperative evaluation and risk stratification to optimize surgical outcomes.

Ghadhban (2019) assessed laparoscopic cholecystectomy difficulties among patients in Baghdad, focusing on intraoperative challenges and conversion rates. The study found that gallbladder wall thickness, patient BMI, and prior abdominal surgeries were significant predictors of difficulty. Surgeons experienced more complications in male patients and those

with chronic cholecystitis. The study suggested that a structured approach to preoperative imaging and patient selection could improve surgical success. Additionally, it emphasised the importance of training and skill development for laparoscopic surgeons to handle complex cases effectively[13].

Di Buono et al. (2021) investigated predictive factors for difficult laparoscopic cholecystectomy. Their study identified patient age, BMI, prior gallbladder infections, and ultrasound findings as significant indicators of surgical difficulty. They emphasized the role of preoperative imaging in identifying patients at higher risk of complications. The study also highlighted the importance of alternative surgical approaches in complex cases. Their findings suggested that a multidisciplinary approach could improve patient selection and reduce conversion rates[14].

Philip Rothman et al. (2016) conducted a systematic review and meta-analysis of observational studies to determine preoperative risk factors for conversion from laparoscopic to open cholecystectomy. Their analysis found that factors like male gender, increased BMI, and gallbladder inflammation significantly increased the likelihood of conversion. They emphasised the importance of preoperative risk assessment to guide surgical planning. The study also suggested that improved laparoscopic techniques and training could help minimise conversion rates. Additionally, they called for further research into novel imaging modalities for better preoperative risk stratification[15].

Gupta & Jain (2019) discussed safe laparoscopic cholecystectomy practices and the adoption of a universal culture of safety in surgery. They advocated for standardising procedural steps to reduce complications and improve outcomes. Their study emphasised teamwork, preoperative risk assessment, and continuous surgical education as key factors in enhancing safety. They also highlighted the importance of

intraoperative decision-making and alternative techniques in managing difficult cases[16]. The study called for global implementation of structured safety protocols to minimise surgical errors.

Stanisic et al. (2020) conducted a prospective cohort study predicting difficult laparoscopic cholecystectomy cases. Their research identified risk factors such as acute cholecystitis, previous abdominal surgery, and thickened gallbladder walls. They proposed a scoring system to predict surgical difficulty and improve preoperative planning. The study emphasised the need for better training and risk assessment tools in laparoscopic surgery. Their findings suggested that a standardised prediction model could reduce operative time and patient complications[17].

Sugrue et al. (2019) developed an intraoperative gallbladder scoring system to predict conversion from laparoscopic to open cholecystectomy. Their study demonstrated that factors like gallbladder inflammation, adhesions, and bile duct anomalies significantly impacted conversion rates. They proposed that intraoperative scoring could assist in early decision making[18]. The study emphasised the role of advanced laparoscopic training in managing difficult cases. Their findings suggested that structured intraoperative assessments could improve patient safety.

M S, BR S, Galani NS, Raju LS (2022) This comparative study assessed two scoring systems for predicting difficult LC. It found that clinical history, ultrasound findings, and inflammatory markers were significant predictors. The study concluded that a standardised scoring system incorporating these parameters could improve preoperative risk stratification and reduce conversion rates[20].

Nidoni R, Udachan TV, Sasnur P, et al. (2015) – This prospective study evaluated four parameters – gallbladder wall thickness, pericholecystic fluid, number of cholecystitis attacks,

and TLC[10]. It found that all four were statistically significant in predicting difficult LC and conversion, with a conversion rate of 5.6%. The study provided a practical framework for preoperative assessment.

Chand P, Singh R, Singh B, et al. (2015) – This study focused on preoperative ultrasonography as a predictor of difficult LC and conversion to open surgery. It identified gallbladder wall thickness >3 mm, contracted gallbladder, and pericholecystic fluid as strong predictors. The study reinforced the importance of ultrasound in preoperative assessment[21].

Each study provides valuable insights into laparoscopic cholecystectomy, emphasising risk assessment, preoperative planning, and surgical training to improve patient outcomes.

MATERIALS AND METHOD

1. Source of Data –

The study was conducted at the Department of General Surgery, KLE'S Dr. Prabhakar Kore Hospital & MRC, Belagavi, Karnataka, India. The hospital is a tertiary care teaching hospital that caters to a large population in the Belagavi region of North Karnataka.

2. Study Design –

*This is an **observational study** aimed at identifying clinicoradiological markers that can predict a difficult laparoscopic cholecystectomy (LC). The study will observe and analyze patient data without any intervention.*

3. Study Period –

The study was conducted over a period of **12 months**, from **June 2023 to May 2024**.

4. Sample Size –

The sample size was calculated using the formula for a 95% confidence interval and a 20% tolerable error. Based on previous studies, the sample size was determined to be 96 patients.

Sample size at 95% confidence interval and 20% tolerable error

$$\frac{n = z^2 1\text{-}\frac{\alpha}{2} \times SD^2}{(20\% \text{ of } SD)^2} \quad \text{where } Z\ 1 - \frac{\alpha}{2} \text{ is } 1.96$$

$$n = \frac{1.96 \times 1.96}{0.20 \times 0.20} \times 1$$

$$n = 96$$

5. Sampling Technique –

i. **Inclusion Criteria –**

- Patients aged between 18 to 60 years.
- Patients presenting with symptoms of right upper quadrant abdominal pain, fever, and/or vomiting.
- Patients diagnosed with gallbladder disease (cholelithiasis) based on ultrasound findings.
- Patients planned for laparoscopic cholecystectomy.

ii. **Exclusion Criteria –**

- Patients who have previously undergone cholecystectomy.
- Patients with acute pancreatitis.
- Pregnant women.
- Immunocompromised patients.
- Patients with a history of major gastrointestinal surgeries.
- Patients with malignancy.

6. Data Collection Procedure –

i. **Preoperative Data –**

- Detailed history and physical examination will be conducted.
- Routine investigations will be performed, including:
  - Complete blood count (CBC)
  - Ultrasound of the abdomen and pelvis.
  - CT scan of the abdomen and pelvis (if required)

ii. **Intraoperative Data –**

- The difficulty of the laparoscopic cholecystectomy will be assessed using the **Nassar grading scale** (Grades 1-4), which evaluates the gallbladder, cystic pedicle, and associated adhesions[8].
- Operative time, ease of dissection, and any intraoperative complications (e.g., bleeding, bile duct injury) will be recorded.

iii. **Postoperative Data –**

- Postoperative complications such as wound infection, bile leakage, and hospital stay duration will be documented.

7. Data Processing and Statistical Analysis –

i. **Data Analysis –**

- Quantitative variables will be expressed as mean ± standard deviation.
- Categorical variables will be expressed as counts and percentages.
- The **Chi-square test** will be used to compare categorical variables.
- A **p-value < 0.05** will be considered statistically significant.

ii. **Statistical Software –**

Data will be analyzed using statistical software such as SPSS or R.

8. Ethical Considerations –

i. The study has been approved by the **JNMC Institutional Ethics Committee**.

ii. Informed consent will be obtained from all participants in all three that is, English and regional languages (Kannada and Marathi.)

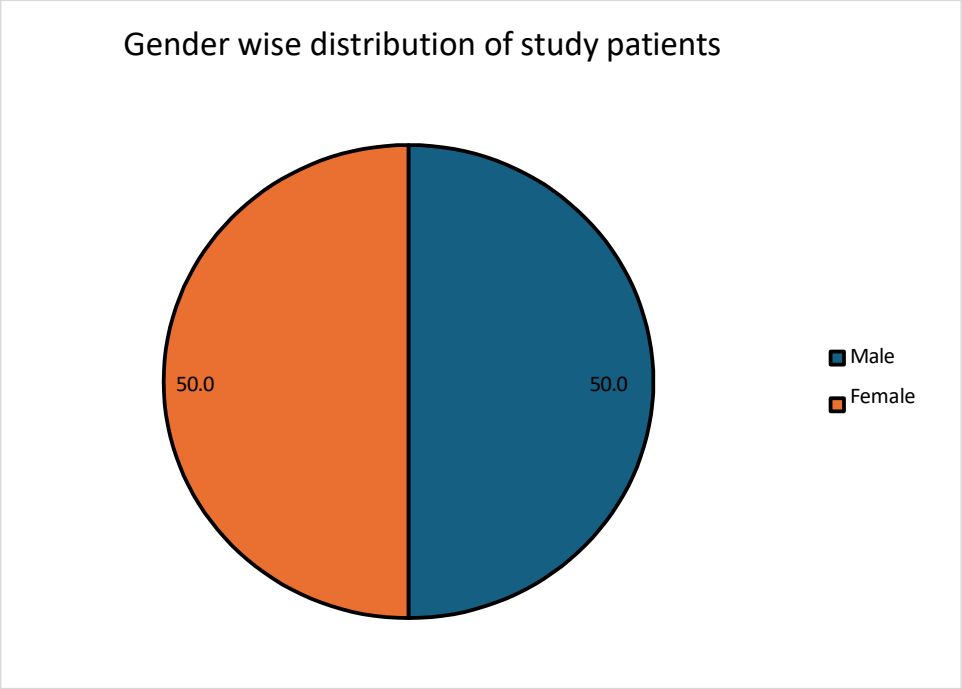
Participants will be informed about the voluntary nature of the study and their right to withdraw at any time without affecting their treatment

RESULTS

Demographics –

S. No.	Gender	n (%)
1	Male	48 (50.0%)
2	Female	48 (50.0%)
3	Total	96 (100%)

Table 2



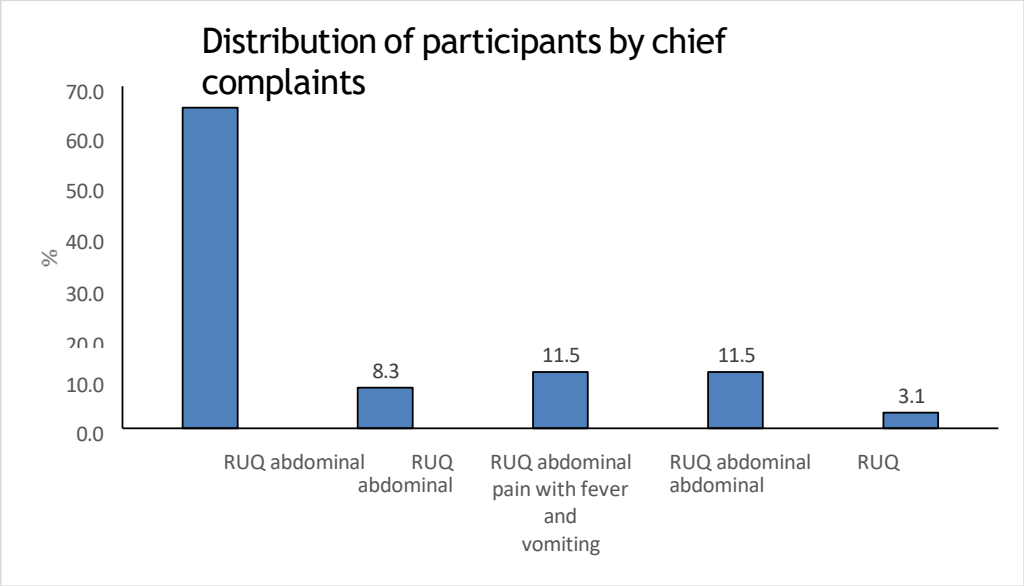
Graph 1

Socio demographic & Clinical parameters		n (%)
Chief Complaint	RUQ abdominal pain for 2 to 3 days	63 (65.6)
	RUQ abdominal pain with fever for at least 10 days	8 (8.3)
	RUQ abdominal pain with fever and vomiting for more than 2 weeks	11 (11.5)
	RUQ abdominal pain with nausea for 5 days	11 (11.5)
	RUQ abdominal pain with vomiting for 3 days	3 (3.1)
Past Medical History	No co-morbidities	55 (57.3)
	Hypertension	13 (13.5)
	Type II DM	10 (10.4)
	Hypertension, DM	18 (18.8)
Diagnosis	Acute Calculous Cholecystitis	16 (16.6)
	Acute on Chronic Calculous Cholecystitis	6 (6.3)
	Symptomatic Cholelithiasis	71 (74.0)
	Empeyma Gall bladder	3 (3.1)

Table 3

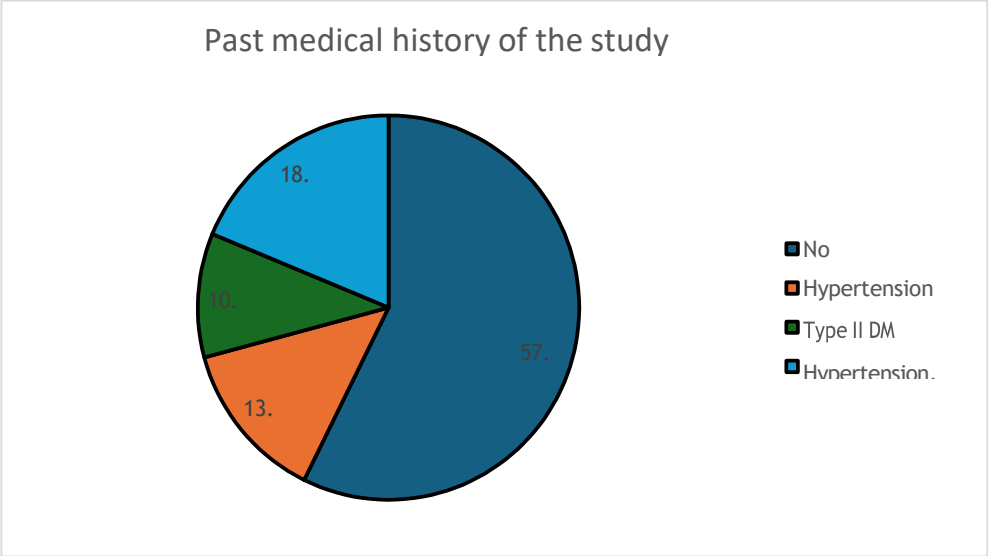
Table 3 shows descriptive statistics, there are 96 patients in all, with an equal number of male and female patients (48 each, 50.0%). With 63 patients (65.6%) reporting right upper quadrant (RUQ) abdominal discomfort, this was the most prevalent primary complaint. Fever (8.3%), vomiting (3.1%), RUQ discomfort with nausea (11.5%), and a mix of fever and vomiting (11.5%) were among the other symptoms.

55 patients (57.3%) had no comorbidities related to prior medical history, whereas the remaining cases had type II diabetes mellitus (DM) (10.4%), hypertension (13.5%), or a combination of both (18.8%). Acute calculous cholecystitis (16.6%), acute on chronic calculous cholecystitis (6.3%), empyema gallbladder (3.1%), and symptomatic cholelithiasis (74.0%) were the most prevalent diagnoses.



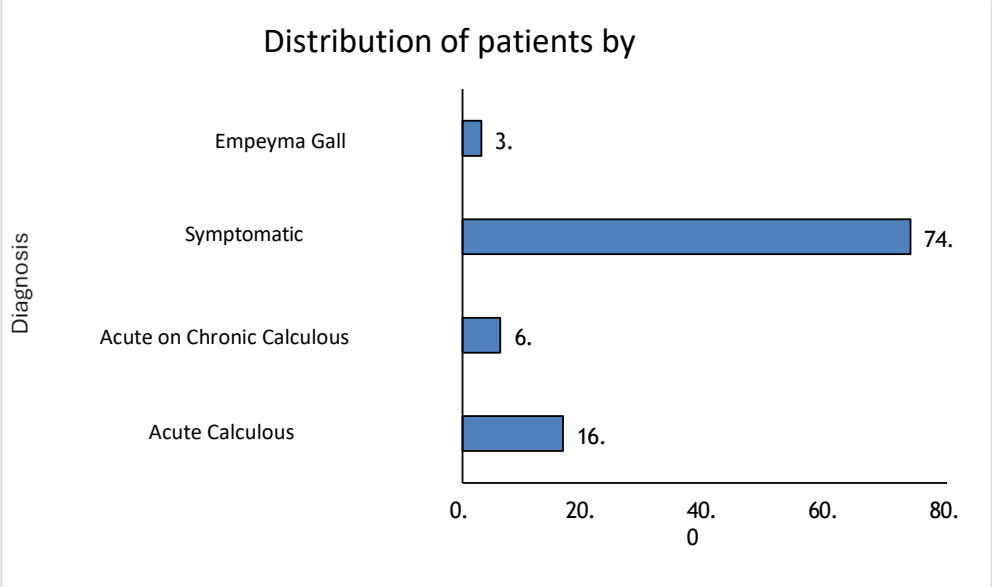
Graph 2

Graph 2 reveals that, 63 patients (65.6%) reporting right upper quadrant (RUQ) abdominal discomfort, this was the most prevalent primary complaint. Fever (8.3%), vomiting (3.1%), RUQ discomfort with nausea (11.5%), and a mix of fever and vomiting (11.5%) were among the other symptoms.



Graph 3

Graph 3 shows that 55 patients (57.3%) had no comorbidities related to prior medical history, whereas the remaining cases had type II diabetes mellitus (DM) (10.4%), hypertension (13.5%), or a combination of both (18.8%).



Graph 4

Graph 4 shows diagnosis of patients in which symptomatic cholelithiasis (74.0%) was the most prevalent diagnosis followed by acute calculous cholecystitis (16.6%), acute on chronic calculous cholecystitis (6.3%), and empyema gallbladder with chronic cholecystitis (3.1%) respectively.

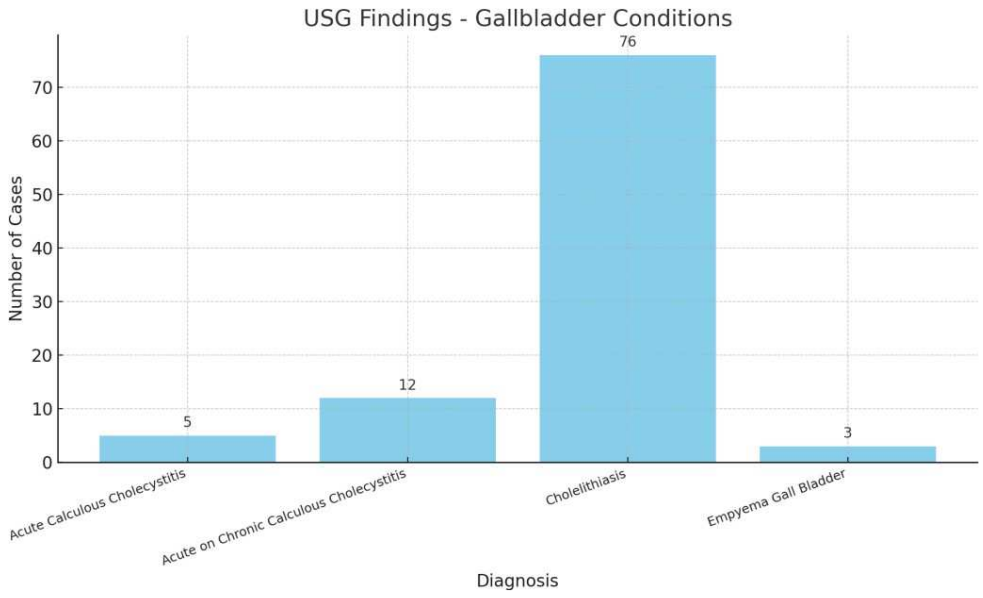
USG	Acute Calculous Cholecystitis	5 (5.2)
	Acute on Chronic Calculous Cholecystitis	12 (12.1)
	Cholelithiasis	76 (79.2)
	Empyema Gall Bladder	3 (3.1)

Table 4

CECT A + P	None	70 (72.9)
	Cholecystitis, edematous with wall thickening and no collection	3 (3.1)
	GB adherent, edematous with wall thickening, no collection	3 (3.1)
	GB distended, multiple calculi, no wall thickness or collection	3 (3.1)
	GB distended, no wall thickness or collection	5 (5.2)
	GB distended, thickened wall (7 mm), edematous with collection	1 (1.0)
	GB distended, thickened wall (4mm), edematous with collection	2 (2.1)
	GB distended, thickened wall (4mm), edematous, no collection	2 (2.1)
	GB distended, thickened wall (5 mm) with collection	1 (1.0)
	GB distended, thickened wall (6mm), edematous with collection	5 (5.2)
	GB distended, thickened wall (9 mm), edematous with collection	1 (1.0)

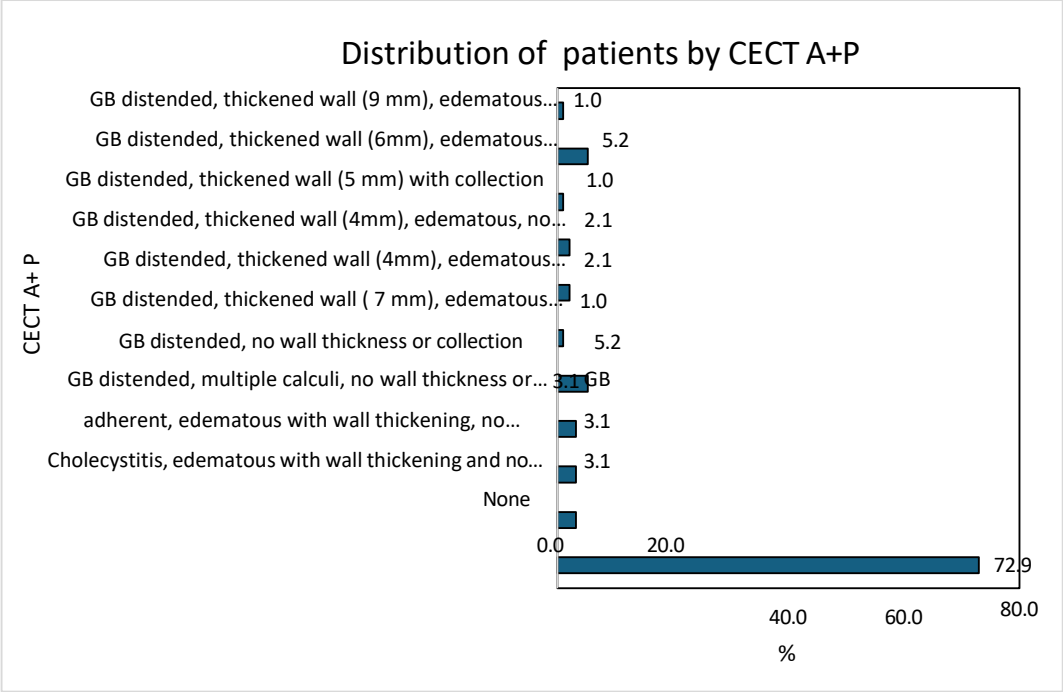
Table 5

In table 4 and 5 cholelithiasis was confirmed by Ultrasonography (USG) in 76 patients (79.2%), and there were additional reports of acute on chronic calculous cholecystitis (12.1%), acute calculous cholecystitis (5.2%), and empyema gall bladder (3.1%). Seventy-two percent of patients reported no significant results on contrast-enhanced computed tomography (CECT). Gallbladder (GB) distension with thicker walls and pericholecystic collections, which ranged in thickness from 4 mm to 9 mm, were the most prevalent anomalies among individuals who had them.



Graph 5

Graph 5 shows that Symptomatic cholelithiasis was confirmed by ultrasonography (USG) in 76 patients (79.2%), and there were additional reports of acute on chronic calculous cholecystitis (12.1%), acute calculous cholecystitis (5.2%), and empyema gall bladder (3.1%) respectively.

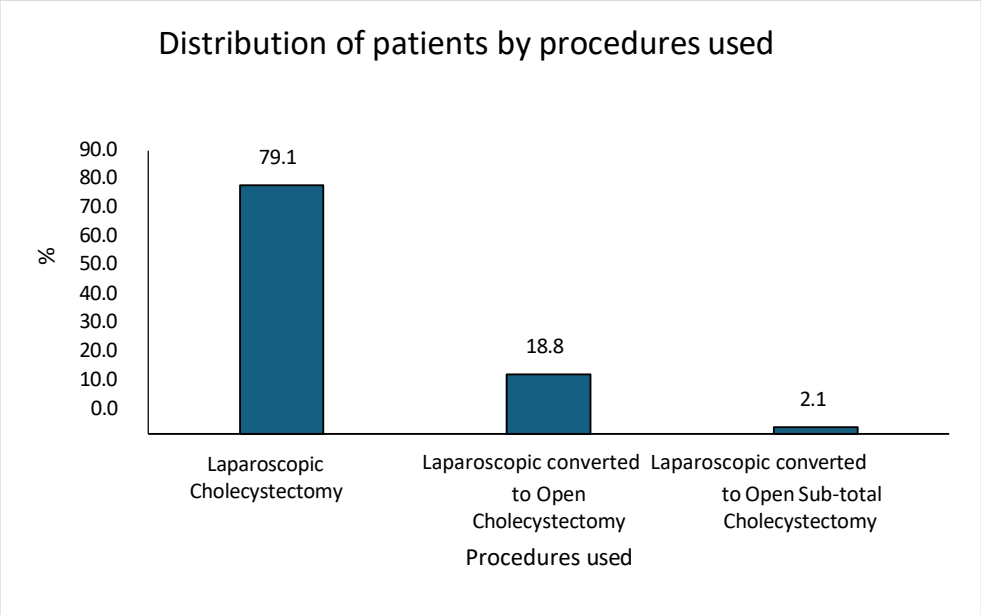


Graph 6

Graph 6 shows that 72.9% of patients had no discernible CECT results. The two most prevalent anomalies among those with oedema or collection were GB thickening (4–9 mm) and GB distension without wall thickening (5.2%). 3.1% of patients had cholecystitis with thickening of the wall, while other instances included perforation, numerous calculi, or GB adhesion.

Procedure	Laparoscopic Cholecystectomy	76 (79.1)
	Laparoscopic converted to Open Cholecystectomy	18 (18.7)
	Laparoscopic converted to Open Sub-total Cholecystectomy	2 (2.1)

Table 6



Graph 7

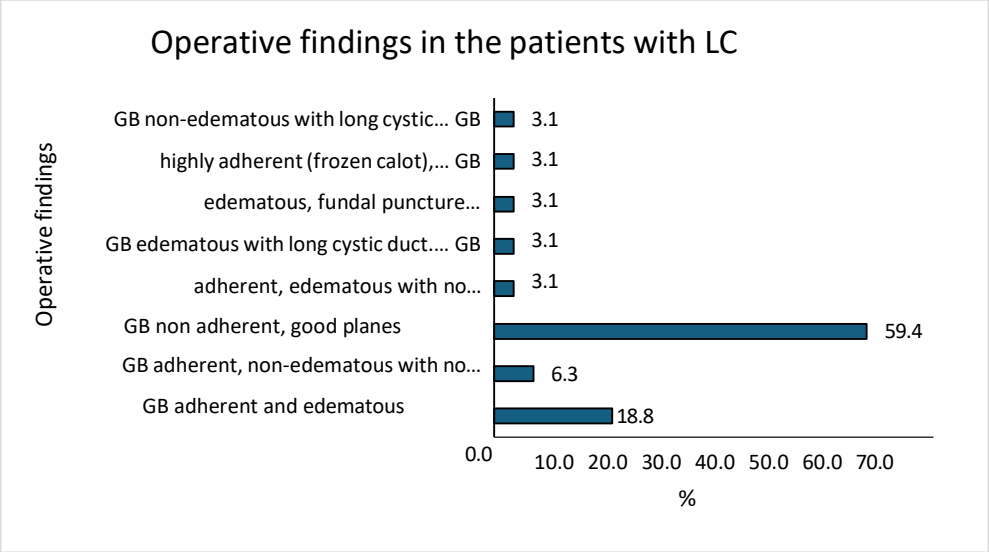
Table 6 and graph 7 shows that in 79.1% of patients, laparoscopic cholecystectomy was the main surgical procedure. Nonetheless, 2.1% had an open subtotal cholecystectomy and 18.7% needed conversion to open cholecystectomy.

Operative findings	GB adherent and edematous	18 (18.8)
	GB adherent, non-edematous with no collection	6 (6.3)
	GB non-adherent, good planes	57 (59.4)
	GB adherent, edematous with no collection	3 (3.1)
	GB edematous with long cystic duct. No collection	3 (3.1)
	GB edematous, fundal puncture suggestive of empyema. No collection	3 (3.1)
	GB highly adherent (frozen calot), perforated GB with pericholecystic fluid collection	3 (3.1)
	GB non-edematous with long cystic duct. No collection	3 (3.1)
Type	Easy	60 (62.5)
	Difficult	36 (37.5)
Antibiotics	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD	81 (84.4)
	Inj Meropenem 1g IV TID and Inj Ornidazole 100ml IV BD	15 (15.6)

Table 7

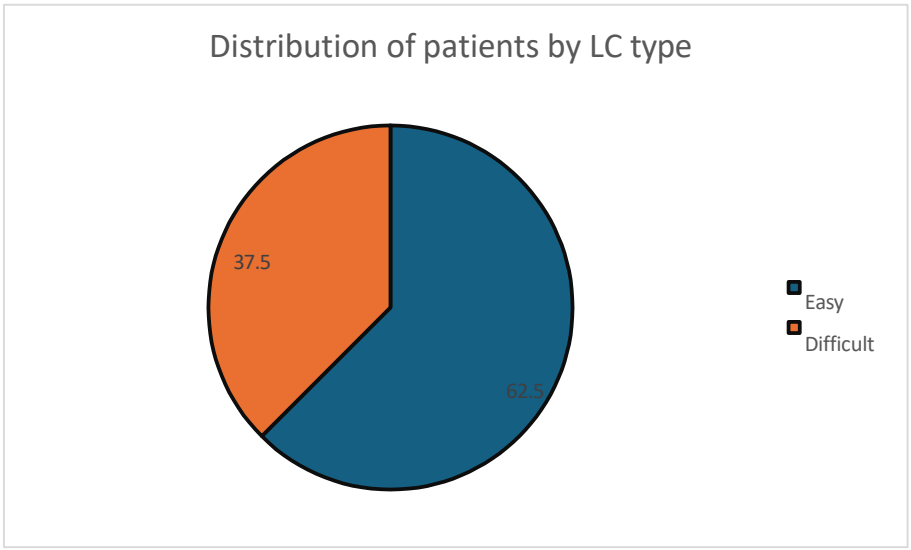
Table 7 describes the operative findings, type of difficulty and antibiotics used. Inference drawn is that 59.4% of patients had a non-adherent gallbladder with excellent surgical planes, according to intraoperative results. Other patients exhibited different levels of inflammation, oedema, or adhesion, including frozen Calot's triangle in 3.1% of instances.

The majority of patients (84.4%) had intravenous ceftriaxone and metronidazole after the surgery, whereas 15.6% needed meropenem and ornidazole. The procedure was categorised as straightforward in 62.5% of patients and difficult in 37.5% of patients.



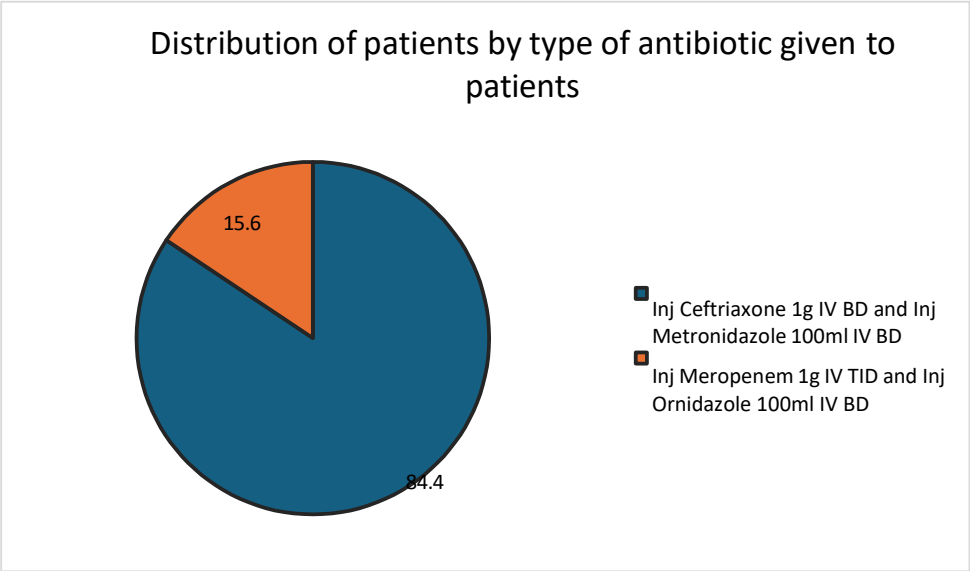
Graph 8

Graph 8 shows operative findings in patients with LC (59.4%) of patients had a non-adherent gallbladder with excellent surgical planes, according to intraoperative results. Other patients exhibited different levels of inflammation, oedema, or adhesion, including frozen Calot's triangle in 3.1% of instances.



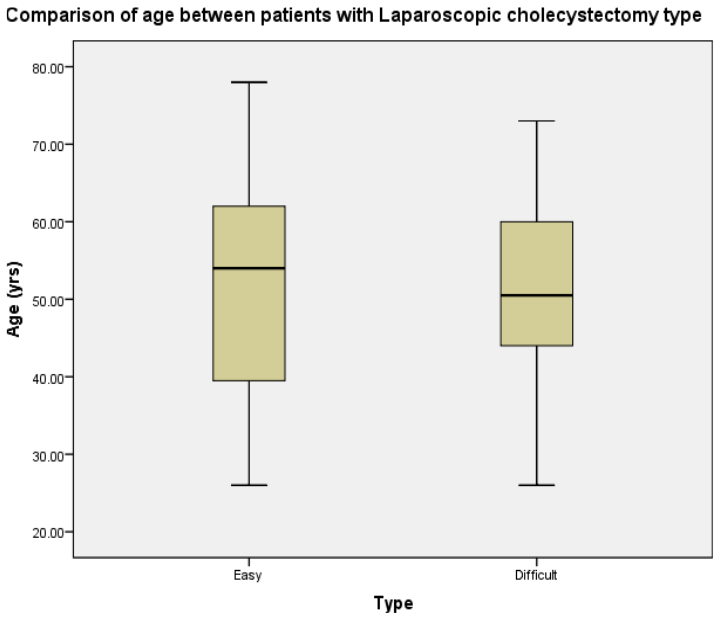
Graph 9

Graph 9 shows the procedure was categorized as straightforward in 62.5% of patients and difficult in 37.5% of patients.



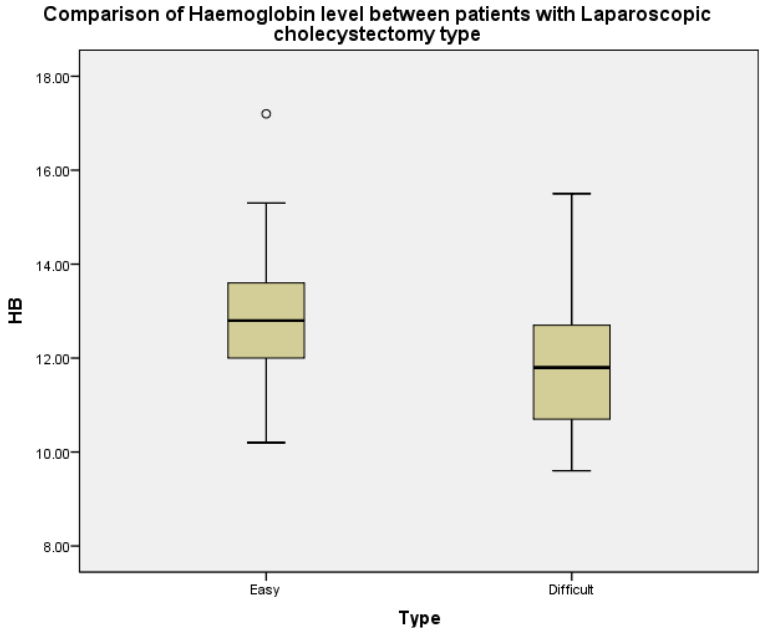
Graph 10

Graph 10 shows that majority of patients (84.4%) had intravenous ceftriaxone and metronidazole after the surgery, whereas 15.6% needed meropenem and ornidazole.



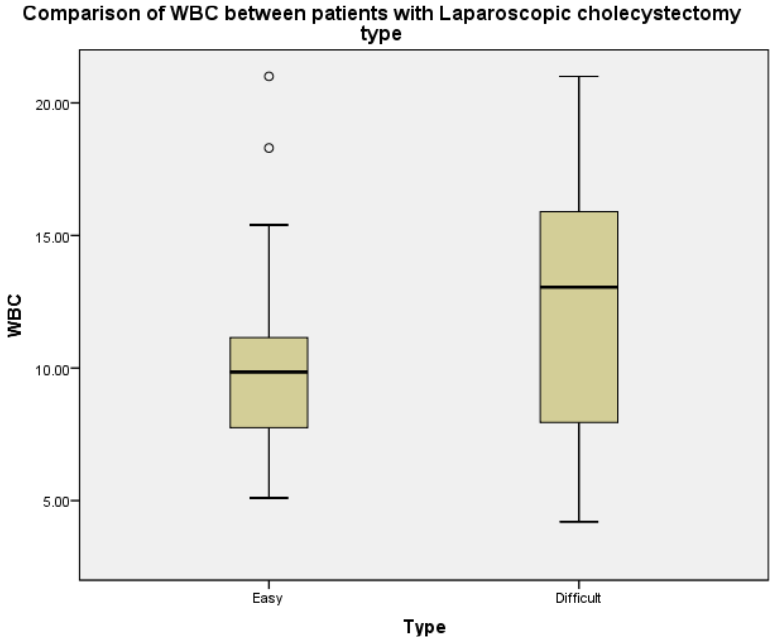
Graph 11

Graph 11 shows the median age (50 years) for both easy and difficult laparoscopic cholecystectomy (LC) patients is similar, according to the box plot. Although there is a somewhat larger age range in the easy group, age does not seem to have a major influence on surgical difficulty overall.



Graph 12

Graph 12 shows Haemoglobin (HB) levels in cases of easy and difficult laparoscopic cholecystectomy (LC) are contrasted in the box plot. The median HB level in both groups is comparable, but the easy group has an outlier exceeding 16 g/dL and somewhat more variability. The general distribution is similar, suggesting that haemoglobin levels have little effect on how challenging LC techniques are.

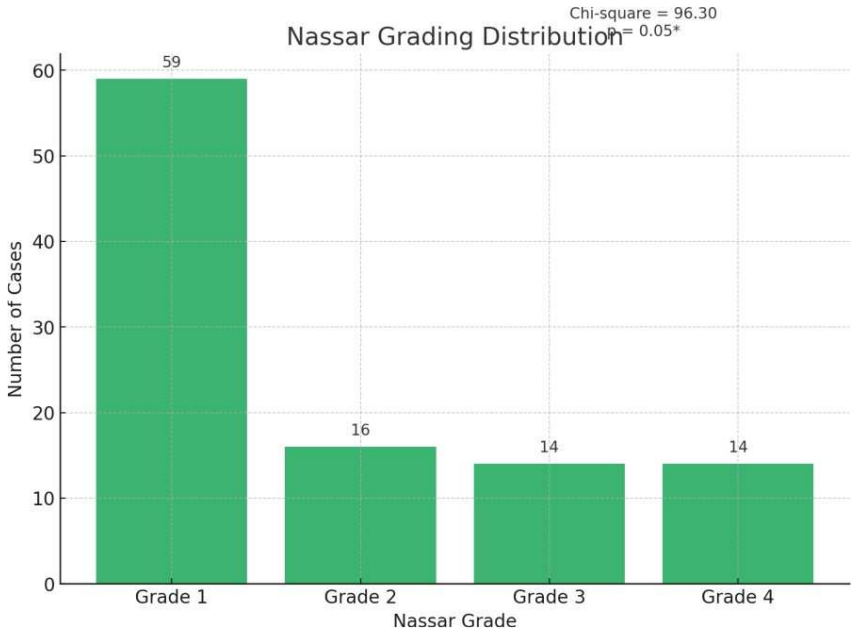


Graph 13

Graph 13 shows White blood cell (WBC) counts in easy and difficult laparoscopic cholecystectomy (LC) cases are compared using a box plot. The easy group has a lower median and fewer extreme values, indicating that elevated WBC levels may be linked to more challenging LC cases, while the difficult group has a higher median WBC count and a wider range, indicating greater variability, with values extending above 20.

Nassar Grading	Number (%) and type		Chi Square p value
Grade 1	59 (61.4%)	Easy	96.30 (0.05)*
Grade 2	16 (16.6)	Easy	
Grade 3	14 (14.5%)	Difficult	
Grade 4	14 (14.5%)	Difficult	

Table 8



Graph 14

The above table 8 and its graph 14 denotes that –

1. Grade 1 has the highest frequency, with 59 cases (61.4%) –
    - This indicates that the majority of patients had a relatively easy or straightforward surgery.
2. Grades 2, 3, and 4 are much less common –
    - Grade 2 – 16 cases (16.6%)
    - Grade 3 – 14 cases (14.5%)
    - Grade 4 – 14 cases (14.5%)

    These suggest more complex or difficult surgeries, but they occur far less frequently.

3. The Chi-square value (96.30) and p-value (0.05*) indicate that the distribution of grades is statistically significant, meaning the variation among these grades is unlikely to be due to chance. The asterisk usually denotes significance at the 0.05 level.

This implies that the probability of running into a difficult instance rises noticeably with an increase in the Nassar grade.

Chi-Square Analysis and significance –

Clinical parameters		LC type		Chi-square (Sig.)
		Easy n (%)	Difficult n (%)	
Chief Complaint	RUQ abdominal pain	48 (76.2)	15 (23.8)	43.294 (<0.05) *
	RUQ abdominal pain with fever	0 (0.0)	8 (100.0)	
	RUQ abdominal pain with fever and vomiting	1 (9.1)	10 (90.9)	
	RUQ abdominal pain with nausea	11 (100.0)	0 (0.0)	
	RUQ abdominal pain with vomiting	0 (0.0)	3 (100.0)	
Past Medical History	No comorbidities	36 (65.5)	19 (34.5)	11.750 (0.007) *
	Hypertension	3 (23.1)	10 (76.9)	
	Type II DM	6 (60.0)	4 (40.0)	
	Hypertension, DM	15 (83.3)	3 (16.7)	
Diagnosis	Acute Calculous Cholecystitis	2 (12.5)	14 (87.5)	42.579 (<0.05) *
	Acute on Chronic Calculous Cholecystitis	0 (0.0)	6 (100.0)	
	Cholelithiasis	58 (81.7)	13 (18.3)	
	Empeyma Gall bladder	0 (0.0)	3 (100.0)	

*chi-square value & significance is obtained fisher exact test

Table 9

Table 9 suggests that –

- Certain clinical presentations, such as fever/vomiting with RUQ pain, and acute or complex diagnoses, are highly associated with Difficult LC.
- The presence of comorbidities, especially hypertension, also increases surgical difficulty.
- All comparisons show statistically significant differences, highlighting their potential use in preoperative risk assessment.

Clinical parameters		Easy	Difficult	Chi-square (Sig.)
USG	Acute Calculous Cholecystitis	0 (0.0)	5 (100.0)	33.774 (<0.05) *
	Acute on Chronic Calculous Cholecystitis	0 (0.0)	12 (100.0)	
	Cholelithiasis	57 (75.0)	19 (25.0)	
	Empyema Gall Bladder	0 (0.0)	3 (100.0)	
CECT A + P	None	57 (81.4)	13 (18.6)	43.020 (<0.05) *
	Cholecystitis, edematous with wall thickening and no collection	0 (0.0)	3 (100.0)	
	GB adherent, edematous with wall thickening, no collection	0 (0.0)	3 (100.0)	
	GB distended, multiple calculi, no wall thickness or collection	0 (0.0)	3 (100.0)	
	GB distended, no wall thickness or collection	3 (60.0)	2 (40.0)	
	GB distended, thickened wall (7 mm), edematous with collection	0 (0.0)	1 (100.0)	
	GB distended, thickened wall (4mm), edematous with collection	0 (0.0)	2 (100.0)	
	GB distended, thickened wall (4mm), edematous, no collection	0 (0.0)	2 (100.0)	
	GB distended, thickened wall (5 mm) with collection	0 (0.0)	1 (100.0)	
	GB distended, thickened wall (6mm), edematous with collection	0 (0.0)	5 (100.0)	
	GB distended, thickened wall (9 mm), edematous with collection	0 (0.0)	1 (100.0)	

*chi-square value & significance is obtained fisher exact test

Table 10

According to table 10, radiological parameters in which USG suggested that patients with cholelithiasis mostly had Easy LC. All patients with other findings had 100% Difficult LC. Chi-square shows this is highly statistically significant, indicating a strong association between USG findings and LC difficulty. The findings included the presence of wall thickness, evidence of pericholecyctic collection, presence of edema and adhesions which would suggest an ongoing infection caused was the stasis of bile causing empyema further complicating the surgery. Whereas no significant CECT findings were present when LC was categorised as easy. Any evidence of wall thickening, edema, or collection in CECT was strongly associated with 100% Difficult LC. Suggests that CECT is predictive of surgical difficulty important for pre-op planning.

USG and CECT findings both correlate strongly with surgical difficulty. Particularly, wall thickening, edema, and collection are key predictors of Difficult LC. Statistically significant chi-square values in both sets of data validate the reliability of imaging in pre-surgical assessment.

Clinical parameters		Easy	Difficult	Chi-square
Procedure	Laparoscopic Cholecystectomy	60 (78.9)	16 (21.1)	43.767 (<0.05) *
	Laparoscopic converted to Open Cholecystectomy	0 (0.0)	18 (100.0)	
	Laparoscopic converted to Open Sub-total Cholecystectomy	0 (0.0)	2 (100.0)	
Operative findings	GB adherent and edematous	0 (0.0)	18 (100.0)	109.700 (<0.05)*
	GB adherent, non-edematous with no collection	0 (0.0)	6 (100.0)	
	GB non-adherent, good planes	57 (100.0)	0 (0.0)	
	GB adherent, edematous with no collection	0 (0.0)	3 (100.0)	
	GB edematous with long cystic duct. No collection	0 (0.0)	3 (100.0)	
	GB edematous, fundal puncture suggestive of empyema. No collection	0 (0.0)	3 (100.0)	
	GB highly adherent (frozen calot), perforated GB with pericholecystic fluid collection	0 (0.0)	3 (100.0)	
	GB non-edematous with long cystic duct. No collection	3 (100.0)	0 (0.0)	

*chi-square value & significance is obtained fisher exact test

Table 11

In terms of surgical results, all cases needing conversion to open cholecystectomy or open subtotal cholecystectomy were in the difficult LC group ($p < 0.05$), whereas 78.9% of easy LC patients were successfully performed laparoscopically. Similarly, the presence of GB adherence, oedema, or perforation were linked to a difficult LC requiring the need for conversion to open surgery. This

included the overall 20 patient that underwent open surgery based on the above-mentioned operative findings. While patients with non-adherent GB and excellent planes (100%) had easy LC ($p < 0.05$), all patients with adherent or oedematous GB (100%) had difficult LC.

Conversion rate –

Surgical type	Number of patients	Conversion rate
Number of Laparoscopic surgeries	76	20.83%
Number of open surgeries	20	
Total	96	

Table 12

Table 12 reveals that Laparoscopic surgery was performed on 76 (79.2%) of the 96 patients, with a 20.83% conversion rate to open surgery. Furthermore, 20 patients (20.8%) underwent open surgery immediately, underscoring the difficulties associated with laparoscopic cholecystectomy and the necessity of cautious case selection.

Final Analysis –

Clinical symptoms, imaging findings, comorbidities, and intraoperative anatomy are all strong predictors of LC difficulty. Imaging (USG/CECT) and operative findings were especially precise in predicting Difficult LC. This can inform preoperative risk stratification, surgical planning, and patient counselling.

DISCUSSION

The present study aimed to evaluate the socio-demographic, clinical, and operative factors influencing the difficulty of laparoscopic cholecystectomy (LC) in a cohort of 96 patients. The findings revealed several significant associations between clinical parameters and the complexity of the surgical procedure, which are consistent with previous studies in the field.

Socio-Demographic and Clinical Characteristics

The study population comprised an equal distribution of male and female patients (48 each, 50.0%), with a median age of 52 years. The most common presenting symptom was right upper quadrant (RUQ) abdominal pain, reported by 65.6% of patients, followed by RUQ pain with fever (8.3%), nausea (11.5%), and vomiting (3.1%). These findings align with previous studies, which have also identified RUQ pain as the predominant symptom in patients with gallbladder disease, often accompanied by fever and vomiting in more severe cases[22,23].

In terms of comorbidities, 57.3% of patients had no significant medical history, while 18.8% had both hypertension and diabetes mellitus (DM). Hypertension alone was present in 13.5% of patients, and DM alone in 10.4%. The presence of comorbidities, particularly hypertension and DM, has been previously associated with increased surgical difficulty due to factors such as poor tissue healing and higher rates of inflammations[24,25]. This was reflected in our study, where patients with hypertension alone had a significantly higher likelihood of difficult LC (76.9%) compared to those with no comorbidities (34.5%).

Diagnostic Findings and Surgical Difficulty

The most common diagnosis in this study was symptomatic cholelithiasis (74.0%), followed by acute calculous cholecystitis (16.6%) and acute on chronic calculous cholecystitis (6.3%).

Empyema of the gallbladder with chronic cholecystitis was rare (3.1%). These findings are consistent with previous studies, where cholelithiasis has been reported as the most frequent diagnosis in patients undergoing LC[26,27]. However, our study also highlighted that patients with acute calculous cholecystitis and acute on chronic cholecystitis were more likely to experience difficult LC (87.5% and 100%, respectively), which is in line with earlier research suggesting that acute inflammation significantly increases surgical complexity[28,29].

Ultrasonography (USG) findings further supported these observations. Patients with acute calculous cholecystitis, calculous cholecystitis, and chronic cholecystitis on USG were all associated with difficult LC (100% in each case). In contrast, cholelithiasis was associated with easier LC in 75.0% of cases. These findings are consistent with previous studies that have identified USG as a reliable tool for predicting surgical difficulty, particularly in cases of gallbladder wall thickening and pericholecystic fluid collections[12,30].

Contrast-enhanced computed tomography (CECT) findings also played a significant role in predicting surgical difficulty. Patients with gallbladder distention, wall thickening, and pericholecystic collections were more likely to have difficult LC, which is consistent with prior studies that have highlighted the importance of preoperative imaging in assessing surgical complexity[31,32].

Operative Findings and Antibiotic Usage

In terms of surgical outcomes, 79.1% of patients underwent successful laparoscopic cholecystectomy, while 18.7% required conversion to open cholecystectomy, and 2.1% underwent open subtotal cholecystectomy. These conversion rates are comparable to those reported in previous studies, where conversion rates typically range from 5% to 20%, depending on the severity of gallbladder inflammation and adhesions[33,34].

Operative findings revealed that gallbladder adherence, edema, and perforation were strongly associated with difficult LC. Patients with non-adherent gallbladders and good surgical planes had easier LC (100%), while those with adherent or edematous gallbladders had difficult LC (100%). These findings are consistent with previous studies that have identified gallbladder adhesion and inflammation as key predictors of surgical difficulty[35,36].

The choice of postoperative antibiotics also varied between easy and difficult LC cases. Patients who received ceftriaxone and metronidazole had a lower likelihood of difficult LC (25.9%), while all patients who required meropenem and ornidazole had difficult LC (100%). This suggests that more severe infections, requiring broader-spectrum antibiotics, are associated with increased surgical complexity, which is consistent with previous research[37,38].

Comparative Analysis with Previous Studies

Di Buono et al. (2021) identified several preoperative factors associated with difficult laparoscopic cholecystectomy. Their study emphasized the importance of imaging findings, particularly gallbladder wall thickening and pericholecystic fluid collection, in predicting surgical difficulty. This study supports these findings, as

ultrasonographic and CECT findings were strongly correlated with difficult cases in our cohorts[14].

Hussain (2011) discussed various strategies for managing difficult laparoscopic cholecystectomy, highlighting the significance of intraoperative assessment and decision- making. Our study aligns with these recommendations by emphasizing the role of preoperative imaging in predicting difficulty and the importance of surgeon expertise in managing complex cases[39].

Hayama et al. (2016) identified risk factors for difficult laparoscopic cholecystectomy in cases of acute cholecystitis. Their findings showed that acute inflammation significantly increased the complexity of surgery, leading to higher conversion rates. Similarly, this study found that patients diagnosed with acute cholecystitis had a significantly higher likelihood of experiencing difficult laparoscopic cholecystectomy[40].

Bhandari et al. (2021) explored predictors of difficult laparoscopic cholecystectomy and found that comorbidities, including diabetes mellitus and hypertension, were associated with increased surgical difficulty. This study further supports this by demonstrating a higher rate of difficult laparoscopic cholecystectomy among hypertensive patients, emphasizing the impact of systemic conditions on surgical outcomes[11].

Griffiths et al. (2019) proposed an operative difficulty grading scale for laparoscopic cholecystectomy. Their study highlighted the importance of standardized grading to assess and predict surgical complexity. This study's findings reinforce the need for such scales, as preoperative assessments correlated well with intraoperative findings in our cohort[8].

Gupta et al. (2018) focused on preoperative predictive factors for difficult laparoscopic cholecystectomy, emphasizing imaging findings and patient comorbidities. This study aligns with their conclusions, demonstrating a strong correlation between gallbladder distention, wall thickening, and the likelihood of a difficult surgery[16].

In summary, our findings are consistent with previous studies, highlighting the role of preoperative imaging, comorbidities, and intraoperative factors in predicting surgical difficulty. The comparative analysis underscores the need for thorough patient evaluation and careful surgical planning to optimize laparoscopic cholecystectomy outcomes.

Our findings are in line with several previous studies that have explored the factors influencing the difficulty of LC. For instance, a study by Gupta et al. (2018) found that acute cholecystitis, gallbladder wall thickening, and the presence of comorbidities were significant predictors of

difficult LC[16]. Similarly, a study by Kama et al. (2001) reported that preoperative imaging findings, such as gallbladder distention and wall thickening, were strongly associated with increased surgical difficulty.

This study aligns with prior research in identifying acute cholecystitis, gallbladder wall thickening, and pericholecystic fluid as key predictors of difficult LC. However, a unique finding was the strong association between hypertension and surgical difficulty, which has not been extensively explored in previous literature.

CONCLUSION

In conclusion, this study provides valuable insights into the factors influencing the difficulty of laparoscopic cholecystectomy. The presence of acute inflammation, gallbladder wall thickening, and comorbidities such as hypertension were significant predictors of surgical complexity. Preoperative imaging, particularly USG and CECT, played a crucial role in assessing surgical difficulty. These findings are consistent with previous studies and underscore the importance of thorough preoperative evaluation and planning to optimize surgical outcomes.

This study provides a comprehensive evaluation of the socio-demographic, clinical, and operative factors influencing the difficulty of LC. Our findings align with previous research, confirming that acute inflammation, gallbladder wall thickening, pericholecystic fluid collection, and comorbidities such as hypertension and diabetes mellitus are significant predictors of surgical complexity.

Preoperative imaging, particularly ultrasonography (USG) and contrast-enhanced computed tomography (CECT), played a crucial role in assessing surgical difficulty. Patients with acute calculous cholecystitis, chronic cholecystitis, or gallbladder distention had a significantly higher likelihood of experiencing a complex LC procedure. This study further supports these findings, demonstrating that ultrasonographic markers such as gallbladder wall thickening and pericholecystic fluid collection were strongly associated with increased surgical difficulty.

Operative findings also highlighted key predictors of surgical complexity. Gallbladder adhesion, edema, the presence of a frozen calot and perforation were observed in cases requiring conversion to open cholecystectomy. Moreover, the role of systemic conditions such as hypertension in predicting surgical difficulty was particularly significant in our study.

While our study reaffirms many established predictors of LC difficulty, it also introduces new perspectives, particularly regarding the influence of hypertension on surgical complexity. This finding underscores the need for further research to explore the impact of metabolic disorders on LC outcomes.

In conclusion, the clinical factors that affected the conversion to open surgery included presence of fever, along with vomiting and long durational symptoms over a period of time. The radiological factors identified for the need for conversion to open surgery were the presence of complex adhesions and edema leading the difficulty in creating the critical window of dissection. Another pertinent factor associated to high risk for predicting a difficult LC was the presence of empyema leading the impending rupture or perforation of the gall bladder.

Finally, the study highlights the necessity of thorough preoperative assessment, including imaging and comorbidity evaluation, to predict and manage surgical difficulty in LC. The findings underscore the importance of adopting a structured approach to patient selection and surgical planning, ultimately improving patient outcomes and reducing intraoperative complications. Future studies should focus on refining predictive models for LC complexity, integrating both clinical and imaging parameters to enhance surgical decision-making.

SUMMARY

This study evaluates the factors influencing the difficulty of laparoscopic cholecystectomy (LC), emphasizing socio-demographic, clinical, and operative elements. It confirms that acute inflammation, gallbladder wall thickening, pericholecystic fluid collection, and comorbidities like hypertension and diabetes are key predictors of surgical complexity. Preoperative imaging, especially ultrasonography (USG) and contrast-enhanced computed tomography (CECT), plays a crucial role in identifying cases that are likely to be more complex.

Operative findings, such as gallbladder adhesion, edema, and perforation, were linked to cases requiring conversion to open cholecystectomy. Additionally, hypertension was identified as a significant factor influencing surgical difficulty, an area not extensively studied before. Postoperative antibiotic use, particularly broad-spectrum antibiotics, was also associated with greater surgical complexity and complications.

While confirming many known predictors, this study introduces new insights, particularly regarding hypertension's role in increasing LC complexity. It stresses the need for a thorough preoperative evaluation, integrating imaging and comorbidity assessment to improve patient outcomes and reduce complications. Future research should focus on refining predictive models for LC complexity to enhance surgical planning and decision-making.

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KAHERs JNMC BELAGAVI

INFORMED CONSENT FORM

"CLINICORADIOLOGICAL MARKERS IN PREDICTING A DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY – AN OBSERVATIONAL STUDY, AT A TERTIARY CARE TEACHING HOSPITAL IN BELAGAVI REGION OF NORTH KARNATAKA"

Introduction – Laparoscopic Cholecystectomy is the gold standard for treating gall bladder stones. Only in rare instances the procedure becomes difficult which prolongs the operative time, post-operative pain and hospital stay.

Explanation of procedure – This study aims to find and predict preoperative risk factors to know if the surgery which will be performed will be difficult or not.

Withdrawal from participation in the study – Participation in this study in voluntary. You will be free to decide whether to participate in this study or continue participation once enrolled. In case you decide to withdraw your participation, you are free to do so. However, please convey the decision to the principal investigator.

Possible benefits from participating in the study – You will not get any benefits by participating in this study. The data gathered will help population at large.

Possible risks from participating in the study – There are no risks involved in participating in this study.

Privacy and confidentiality – The information collected from you will be coded, to prevent any person to identify you. Your identity will never be revealed. The data collected from you will be kept confidential and only processed or aggregated data will be used for publication.

Financial incentives – You will not receive any payment for participating in this study.

Cost of investigations – done during the course of study will be paid by the participant.

Authorization for publication of aggregated data – Results obtained after processing of the aggregated data will be published for scientific purpose and or presented to scientific groups. However, your identity will never be revealed.

Questions – In case of any questions with regard to this study, you are free to contact – "Dr. Harsh M. Soneji, 9148335444/7892576917, harshsoneji@gmail.com"

If you have any question or complaints with regard to your right as study participant you may contact Dr Harsha Hegde, Chairperson, Ethical committee of JNMC, 0831-2473777 Extension 4052.

Legal rights: By signing this consent form, we are not waving any of your legal rights

CONSENT STATEMENT

I am making a voluntary decision to participate in the study, "CLINICORADIOLOGICAL MARKERS IN PREDICTING A DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY – AN OBSERVATIONAL STUDY, AT A TERTIARY CARE TEACHING HOSPITAL IN BELAGAVI REGION OF NORTH KARNATAKA". My signature below indicates that I have decided to participate, and I have read the information provided above or the information provided above has been read to me in the language that I understand best. I was given the opportunity to ask questions and that they have been answered to my satisfaction.

Name of the participant –

Signature or left thumb impression of the participant –

Name of the witness –

Signature or left thumb impression of the witness –

Name of the investigator –

Signature of the investigator –

PROFORMA

Case No.		
Name		
Age		
Sex		
IP No.		
Date of Admission		
Date of Surgery		
Date of Discharge		
Chief Complaint	Pain in RUQ Vomiting Nausea Fever Duration	+/- +/- +/- +/-
Past Medical History		
Diagnosis		
Investigations	CBC USG CECT Abdomen and Pelvis	
Surgical Procedure		
Conversion to Open	Yes/ No	
Operative Findings	GB adhesions Edematous Planes GB wall thickness Pericholecystic collection	+/- +/- Easy/ Difficult +/- +/-
Nassar Grading		
Ease of Dissection	Easy/ Difficult	
Post Operative Complications		
Antibiotics		

S no.	Age (yrs)	Sex	IP No	DOA	DOS	DOD	Chief Complaint	Past Medical History	Diagnosis	HB	WBC	USG	CECT A + P	Procedure	Operative findings	Nassar Grading	Type	Antibiotics
1	43	Male	1173878	28/02/23	08-03-23	18/03/23	RUQ abdominal pain with fever	No comorbidities	Acute Calculous Cholecystitis	13.1	4.2	Calculous Cholecystitis	GB distended, no wall thickness or collection	Laparoscopic converted to Open Cholecystectomy	GB adherent with significant adhesions	Grade 3	Difficult	Inj Meropenem 1g IV TID and Inj Ornidazole 100ml IV BD
2	60	Female	1177703	20/03/23	29/03/23	09-04-23	RUQ abdominal pain	No comorbidities	Cholelithiaisis	12.3	5.1	Cholelithiasis	None	Laparoscopic converted to Open Cholecystectomy	GB adherent and edematous	Grade 3	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
3	58	Male	1E+07	13/03/23	15/03/23	24/03/23	RUQ abdominal pain with fever	No comorbidities	Acute Calculous Cholecystitis	12.3	8.4	Cholelithiasis	None	Laparoscopic converted to Open Cholecystectomy	GB highly adherent (frozen calot), perforated GB with pericholecystic fluid collection	Grade 4	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
4	67	Female	1E+07	06-03-23	14/03/23	17/03/23	RUQ abdominal pain	Hypertension, DM	Cholelithiasis	12	10.9	Cholelithiasis	GB distended, no wall thickness or collection	Laparoscopic Cholecystectomy	GB non-edematous with long cystic duct. No collection	Grade 2	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
5	52	Male	1E+07	24/03/23	27/03/23	10-04-23	RUQ abdominal pain with fever and vomiting	No comorbidities	Acute on Chronic Calculous Cholecystitis	12.2	6.7	Calculous Cholecystitis	GB distended, thickened wall (6mm), edematous with collection	Laparoscopic converted to Open Cholecystectomy	GB adherent and edematous with collection	Grade 3	Difficult	Inj Meropenem 1g IV TID and Inj Ornidazole 100ml IV BD
6	39	Female	1181935	10-04-23	15/04/23	19/04/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	9.6	12	Cholelithiasis	GB distended, multiple calculi, no wall thickness or collection	Laparoscopic Cholecystectomy	GB edematous with long cystic duct. No collection	Grade 2	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
7	50	Male	1174986	06-03-23	09-03-23	12-03-23	RUQ abdominal pain	No comorbidities	Acute Calculous Cholecystitis	13.2	6.4	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
8	35	Female	1176109	12-03-23	13/03/23	17/03/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	11.4	7.7	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
9	52	Female	1176254	13/03/23	15/03/23	20/03/23	RUQ abdominal pain with fever and vomiting	Hypertension	Acute Calculous Cholecystitis	11.8	15.1	Cholelithiasis	GB distended, thickened wall (4mm), edematous, no collection	Laparoscopic Cholecystectomy	GB adherent and edematous with adhesions	Grade 2	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
10	60	Female	1179704	30/03/23	31/03/23	03-04-23	RUQ abdominal pain	Type II DM	Cholelithiasis	15	9.2	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
11	63	Female	1181865	06-04-23	07-04-23	10-04-23	RUQ abdominal pain with nausea	Hypertension, DM	Cholelithiasis	12.2	14.9	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
12	51	Male	1184415	04-05-23	06-05-23	18/05/23	RUQ abdominal pain with fever and vomiting	Type II DM	Acute on Chronic Calculous Cholecystitis	10.9	15.5	Cholelithiasis	GB distended, thickened wall (6mm), edematous with collection	Laparoscopic converted to Open Sub-total Cholecystectomy	GB highly adherent and edematous walls, adhesions and collection	Grade 4	Difficult	Inj Meropenem 1g IV TID and Inj Ornidazole 100ml IV BD
13	26	Female	1193503	05-06-23	06-06-23	10-06-23	RUQ abdominal pain with nausea	No comorbidities	Cholelithiasis	10.5	9.2	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
14	64	Female	1195025	13/06/23	15/06/23	19/06/23	RUQ abdominal pain	Hypertension, DM	Cholelithiasis	12.8	7.5	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
15	57	Male	1203873	19/07/23	20/07/23	24/07/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	14.9	5.3	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
16	26	Male	1E+07	28/08/23	29/08/23	10-09-23	RUQ abdominal pain	No comorbidities	Acute Calculous Cholecystitis	14	15.1	Calculous Cholecystitis	GB distended, thickened wall (4mm), edematous with collection	Laparoscopic converted to Open Cholecystectomy	GB adherent and edematous with adhesions	Grade 3	Difficult	Inj Meropenem 1g IV TID and Inj Ornidazole 100ml IV BD
17	50	Female	1E+07	31/08/23	01-09-23	04-09-23	RUQ abdominal pain	No comorbidities	Cholelithiasis	12.4	8.1	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
18	63	Female	1E+07	29/09/23	03-09-23	09-10-23	RUQ abdominal pain with fever	Hypertension, DM	Empeyma Gall bladder with chronic cholecystitis	10.2	11.2	Chronic Cholecystitis	Cholecystitis, edematous with wall thickening and no collection	Laparoscopic Cholecystectomy	GB edematous, fundal puncture suggestive of empyema. No collection	Grade 2	Difficult	Inj Meropenem 1g IV TID and Inj Ornidazole 100ml IV BD
19	27	Female	1E+07	09-10-23	10-10-23	13/10/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	12.3	7	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
20	58	Male	1E+07	15/10/23	16/10/23	21/10/23	RUQ abdominal pain	Hypertension	Cholelithiasis	15.5	18.2	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB adherent, non-edematous with no collection	Grade 2	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD

21	40	Female	1E+07	20/10/23	21/10/23	27/10/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	10.7	6.5	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB adherent, non-edematous with no collection	Grade 2	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
22	40	Female	1E+07	31/10/23	02-11-23	06-11-23	RUQ abdominal pain	No comorbidities	Cholelithiasis	13	9.9	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
23	59	Male	1E+07	06-11-23	07-11-23	10-11-23	RUQ abdominal pain	Hypertension	Cholelithiasis	11.1	9.7	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
24	62	Male	1E+07	06-12-23	07-12-23	10-12-23	RUQ abdominal pain	Type II DM	Cholelithiasis	13.6	21	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
25	58	Male	1E+07	16/11/23	17/11/23	20/11/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	15.3	11.8	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
26	48	Male	1E+07	20/12/23	21/12/23	26/12/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	15.3	10.9	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
27	67	Female	1E+07	24/01/24	25/01/24	28/01/24	RUQ abdominal pain with nausea	Hypertension, DM	Cholelithiasis	12	5.4	Cholecystitis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 2	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
28	46	Female	1E+07	05-02-24	06-02-24	10-02-24	RUQ abdominal pain with vomiting	Hypertension	Acute Calculous Cholecystitis	11.9	16	Acute Calculous Cholecystitis	GB adherent, edematous with wall thickening, no collection	Laparoscopic Cholecystectomy	GB adherent, edematous with no collection	Grade 2	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
29	39	Female	1E+07	12-02-24	13/02/24	16/02/24	RUQ abdominal pain	No comorbidities	Cholelithiasis	17.2	10	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
30	35	Female	1E+07	13/02/24	14/02/24	17/02/24	RUQ abdominal pain	No comorbidities	Cholelithiasis	12	9.9	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
31	68	Male	1E+07	20/02/24	21/02/24	26/02/24	RUQ abdominal pain	No comorbidities	Cholelithiasis	14.2	8.5	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
32	78	Male	1E+07	04-03-23	05-03-24	08-03-24	RUQ abdominal pain with nausea	Hypertension, DM	Cholelithiasis	13.8	14	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
33	56	Female	1173345	01-03-23	04-03-23	18/03/23	RUQ abdominal pain with fever	No comorbidities	Acute Calculous Cholecystitis	14.3	15	Calculous Cholecystitis	GB distended, no wall thickness or collection	Laparoscopic converted to Open Cholecystectomy	GB adherent with significant adhesions	Grade 3	Difficult	Inj Meropenem 1g IV TID and Inj Ornidazole 100ml IV BD
34	45	Male	1177605	20/03/23	29/03/23	09-04-23	RUQ abdominal pain	No comorbidities	Cholelithiaisis	12.3	5.1	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
35	60	Male	1E+07	16/03/23	17/03/23	26/03/23	RUQ abdominal pain with fever	No comorbidities	Acute Calculous Cholecystitis	11	12	Cholelithiasis	None	Laparoscopic converted to Open Cholecystectomy	GB highly adherent (frozen calot), perforated GB with pericholecystic fluid collection	Grade 4	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
36	54	Female	1E+07	06-03-24	14/03/24	17/03/24	RUQ abdominal pain	Hypertension, DM	Cholelithiasis	12	10.9	Cholelithiasis	GB distended, no wall thickness or collection	Laparoscopic Cholecystectomy	GB non-edematous with long cystic duct. No collection	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
37	50	Male	1E+07	25/03/23	26/03/23	04/23/01	RUQ abdominal pain with fever and vomiting	No comorbidities	Acute on Chronic Calculous Cholecystitis	10.5	6.7	Calculous Cholecystitis	GB distended, thickened wall (6mm), edematous with collection	Laparoscopic converted to Open Cholecystectomy	GB adherent and edematous with collection	Grade 3	Difficult	Inj Meropenem 1g IV TID and Inj Ornidazole 100ml IV BD
38	45	Female	1182000	09-04-23	15/04/23	19/04/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	11.3	14.2	Cholelithiasis	GB distended, multiple calculi, no wall thickness or collection	Laparoscopic Cholecystectomy	GB edematous with long cystic duct. No collection	Grade 1	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
39	53	Female	1175286	06-04-23	09-04-23	12-04-23	RUQ abdominal pain	No comorbidities	Cholelithiasis	13.2	6.4	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
40	35	Female	1176109	12-03-23	13/03/23	17/03/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	11.4	7.7	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
41	67	Male	1176524	13/03/23	15/03/23	20/03/23	RUQ abdominal pain with fever and vomiting	Hypertension	Cholelithiasis	11.8	9	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB adherent and edematous with adhesions	Grade 2	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD

42	38	Male	1179909	26/03/23	27/03/23	31/03/23	RUQ abdominal pain	Type II DM	Cholelithiasis	13.2	10.2	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
43	55	Male	1183812	12-04-23	13/04/23	19/04/23	RUQ abdominal pain with nausea	Hypertension, DM	Cholelithiasis	12.2	9.8	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
44	48	Female	1185522	04-04-23	06-04-23	13/04/23	RUQ abdominal pain with fever and vomiting	Type II DM	Acute on Chronic Calculous Cholecystitis	10.9	16.9	Cholelithiasis	GB distended, thickened wall (9 mm), edematous with collection	Laparoscopic converted to Open Cholecystectomy	GB highly adherent and edematous walls, adhesions and collection	Grade 3	Difficult	Inj Meropenem 1g IV TID and Inj Ornidazole 100ml IV BD
45	38	Female	1195645	05-04-23	06-04-23	10-04-23	RUQ abdominal pain with fever and vomiting	No comorbidities	Cholelithiasis	10.5	11.5	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
46	68	Female	1195026	13/05/23	15/05/23	19/05/23	RUQ abdominal pain	Hypertension, DM	Cholelithiasis	12.8	7.5	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
47	70	Male	1197845	19/06/23	20/06/23	24/06/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	14.9	10.2	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
48	33	Female	1207898	28/08/23	29/08/23	10-09-23	RUQ abdominal pain	No comorbidities	Acute Calculous Cholecystitis	14	20.3	Calculous Cholecystitis	GB distended, thickened wall (7 mm), edematous with collection	Laparoscopic converted to Open Cholecystectomy	GB adherent and edematous with adhesions	Grade 3	Difficult	Inj Meropenem 1g IV TID and Inj Ornidazole 100ml IV BD
49	50	Male	1E+07	31/08/23	01-09-23	04-09-23	RUQ abdominal pain	No comorbidities	Cholelithiasis	12.4	8.1	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
50	45	Female	1E+07	15/09/23	16/09/23	23/09/23	RUQ abdominal pain with fever	Hypertension, DM	Empeyma Gall bladder with chronic cholecystitis	10.2	18.4	Chronic Cholecystitis	Cholecystitis, edematous with wall thickening and no collection	Laparoscopic converted to Open Cholecystectomy	GB edematous, fundal puncture suggestive of empyema. No collection	Grade 4	Difficult	Inj Meropenem 1g IV TID and Inj Ornidazole 100ml IV BD
51	27	Male	1E+07	03-10-23	4-10-23	10-10-23	RUQ abdominal pain	No comorbidities	Cholelithiasis	13.2	8.5	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
52	58	Male	1E+07	15/10/23	16/10/23	21/10/23	RUQ abdominal pain	Hypertension	Cholelithiasis	15.5	18.2	Acute Calculous Cholecystitis	None	Laparoscopic Cholecystectomy	GB adherent, non-edematous with no collection	Grade 2	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
53	62	Female	1001709	20/09/23	21/09/23	27/09/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	10.7	6.5	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB adherent, non-edematous with no collection	Grade 2	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
54	40	Female	1E+07	31/10/23	02-11-23	06-11-23	RUQ abdominal pain	No comorbidities	Cholelithiasis	13	9.9	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
55	59	Female	1E+07	01-11-23	02-11-23	7-11-23	RUQ abdominal pain	Hypertension	Cholelithiasis	11.1	9.7	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
56	62	Male	1E+07	06-11-23	07-11-23	10-11-23	RUQ abdominal pain	Type II DM	Cholelithiasis	13.6	6.7	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
57	54	Male	1E+07	17/11/23	18/11/23	21/11/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	15.3	10.6	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
58	44	Male	1E+07	20/11/23	21/11/23	26/11/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	13.2	10.9	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
59	67	Male	1E+07	24/01/24	25/01/24	28/01/24	RUQ abdominal pain with nausea	Hypertension, DM	Cholelithiasis	12	7.7	Cholecystitis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
60	40	Male	1E+07	05-03-24	06-03-24	10-03-24	RUQ abdominal pain with vomiting	Hypertension	Acute Calculous Cholecystitis	9.8	16	Acute Calculous Cholecystitis	GB adherent, edematous with wall thickening, no collection	Laparoscopic Cholecystectomy	GB adherent, edematous with no collection	Grade 2	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
61	49	Female	1E+07	12-01-24	13/01/24	16/01/24	RUQ abdominal pain	No comorbidities	Cholelithiasis	12.3	10	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
62	33	Female	1E+07	13/02/24	14/02/24	17/02/24	RUQ abdominal pain	No comorbidities	Cholelithiasis	12	13.2	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD

63	65	Male	1E+07	20/01/24	21/01/24	26/01/24	RUQ abdominal pain	No comorbidities	Cholelithiasis	14.2	12.5	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
64	55	Male	1E+07	04-03-23	05-03-24	08-03-24	RUQ abdominal pain with nausea	Hypertension, DM	Cholelithiasis	14.5	11.4	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
65	73	Female	1174598	28/02/24	08-03-24	18/03/24	RUQ abdominal pain with fever and vomiting	Hypertension	Acute Calculous Cholecystitis	13.1	18.2	Calculous Cholecystitis	GB distended, thickened wall (5 mm) with collection	Laparoscopic converted to Open Cholecystectomy	GB adherent with significant adhesions	Grade 3	Difficult	Inj Meropenem 1g IV TID and Inj Ornidazole 100ml IV BD
66	60	Female	1177690	20/03/24	29/03/24	09-04-24	RUQ abdominal pain	No comorbidities	Cholelithiasis	12.3	5.1	Cholelithiasis	None	Laparoscopic converted to Open Cholecystectomy	GB adherent and edematous	Grade 3	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
67	49	Male	1E+07	13/03/24	15/03/24	24/03/24	RUQ abdominal pain with fever	No comorbidities	Acute Calculous Cholecystitis	12.3	7.5	Cholelithiasis	None	Laparoscopic converted to Open Cholecystectomy	GB highly adherent (frozen calot), perforated GB with pericholecystic fluid collection	Grade 4	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
68	67	Female	1E+07	06-03-24	14/03/24	17/03/24	RUQ abdominal pain	Hypertension, DM	Cholelithiasis	12	10.9	Cholelithiasis	GB distended, no wall thickness or collection	Laparoscopic Cholecystectomy	GB non-edematous with long cystic duct. No collection	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
69	34	Male	1E+07	24/03/24	27/03/24	10-04-24	RUQ abdominal pain with fever and vomiting	No comorbidities	Acute on Chronic Calculous Cholecystitis	10.5	5.4	Calculous Cholecystitis	GB distended, thickened wall (6mm), edematous with collection	Laparoscopic converted to Open Cholecystectomy	GB adherent and edematous with collection	Grade 2	Difficult	Inj Meropenem 1g IV TID and Inj Ornidazole 100ml IV BD
70	43	Female	1181445	10-04-24	15/04/24	19/04/24	RUQ abdominal pain	No comorbidities	Cholelithiasis	11.6	11.2	Cholelithiasis	GB distended, multiple calculi, no wall thickness or collection	Laparoscopic Cholecystectomy	GB edematous with long cystic duct. No collection	Grade 2	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
71	50	Male	1174800	06-03-24	09-03-24	12-03-24	RUQ abdominal pain	No comorbidities	Acute Calculous Cholecystitis	13.2	15.4	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
72	38	Female	1176110	12-03-24	13/03/24	17/03/24	RUQ abdominal pain	No comorbidities	Cholelithiasis	11.4	7.7	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
73	50	Female	1176234	13/03/24	15/03/24	20/03/24	RUQ abdominal pain with fever and vomiting	Hypertension	Acute Calculous Cholecystitis	11.8	13.8	Cholelithiasis	GB distended, thickened wall (4mm), edematous, no collection	Laparoscopic Cholecystectomy	GB adherent and edematous with adhesions	Grade 3	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
74	55	Female	1179456	30/03/24	31/03/24	03-04-24	RUQ abdominal pain	Type II DM	Cholelithiasis	10.2	9.2	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
75	60	Female	1181867	06-04-24	07-04-24	10-04-24	RUQ abdominal pain with nausea	Hypertension, DM	Cholelithiasis	13.4	18.3	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
76	67	Male	1184333	04-05-24	06-05-24	18/05/24	RUQ abdominal pain with fever and vomiting	Type II DM	Acute on Chronic Calculous Cholecystitis	10.9	12.3	Cholelithiasis	GB distended, thickened wall (6mm), edematous with collection	Laparoscopic converted to Open Sub-total Cholecystectomy	GB highly adherent and edematous walls, adhesions and collection	Grade 4	Difficult	Inj Meropenem 1g IV TID and Inj Ornidazole 100ml IV BD
77	34	Female	1193569	05-06-24	06-06-24	10-06-24	RUQ abdominal pain with nausea	No comorbidities	Cholelithiasis	10.5	9.2	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
78	64	Male	1195165	13/06/24	15/06/24	19/06/24	RUQ abdominal pain	Hypertension, DM	Cholelithiasis	12.8	7.5	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
79	57	Male	1203873	19/06/23	20/06/23	24/06/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	14.9	7.8	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
80	45	Female	1E+07	28/06/23	29/06/23	10-07-23	RUQ abdominal pain	No comorbidities	Acute Calculous Cholecystitis	10.1	15.1	Calculous Cholecystitis	GB distended, thickened wall (4mm), edematous with collection	Laparoscopic converted to Open Cholecystectomy	GB adherent and edematous with adhesions	Grade 3	Difficult	Inj Meropenem 1g IV TID and Inj Ornidazole 100ml IV BD
81	50	Male	1E+07	31/07/23	01-08-23	04-08-23	RUQ abdominal pain	No comorbidities	Cholelithiasis	11.2	8.1	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
82	63	Female	1E+07	29/08/23	03-08-23	09-09-23	RUQ abdominal pain with fever	Hypertension, DM	Empeyma Gall bladder with chronic cholecystitis	10.2	15.6	Chronic Cholecystitis	Cholecystitis, edematous with wall thickening and no collection	Laparoscopic converted to Open Cholecystectomy	GB edematous, fundal puncture suggestive of empyema. No collection	Grade 3	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
83	33	Male	1E+07	09-09-23	10-9-23	13/09/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	12.3	12.5	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD

84	58	Female	1157856	15/09/23	16/09/23	21/09/23	RUQ abdominal pain	Hypertension	Cholelithiasis	13.2	11.5	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB adherent, non-edematous with no collection	Grade 2	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
85	40	Female	1E+07	20/09/23	21/09/23	27/09/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	10.7	8.7	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB adherent, non-edematous with no collection	Grade 2	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
86	40	Male	1E+07	31/05/23	02-06-23	06-06-23	RUQ abdominal pain	No comorbidities	Cholelithiasis	13	14.1	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
87	59	Male	1E+07	06-05-23	07-05-23	10-5-23	RUQ abdominal pain	Hypertension	Cholelithiasis	11.1	9.7	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
88	62	Male	1E+07	06-12-23	07-12-23	10-12-23	RUQ abdominal pain	Type II DM	Cholelithiasis	13.6	21	Acute Calculous Cholecystitis	None	Laparoscopic converted to Open Cholecystectomy	GB adherent, edematous, frozen calot	Grade 4	Difficult	Inj Meropenem 1g IV TID and Inj Ornidazole 100ml IV BD
89	56	Male	1E+07	16/11/23	17/11/23	20/11/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	11.1	9.2	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
90	48	Male	1E+07	20/11/23	21/11/23	26/11/23	RUQ abdominal pain	No comorbidities	Cholelithiasis	13.2	10.9	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
91	60	Male	1E+07	24/01/24	25/01/24	28/01/24	RUQ abdominal pain with nausea	Hypertension, DM	Cholelithiasis	10.9	6.7	Cholecystitis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
92	45	Male	1E+07	05-01-24	06-01-24	10-01-24	RUQ abdominal pain with vomiting	Hypertension	Acute Calculous Cholecystitis	11.9	15.8	Acute Calculous Cholecystitis	GB adherent, edematous with wall thickening, no collection	Laparoscopic Cholecystectomy	GB adherent, edematous with no collection	Grade 3	Difficult	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
93	39	Male	1E+07	12-01-24	13/01/24	16/01/24	RUQ abdominal pain	No comorbidities	Cholelithiasis	14.6	10	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
94	35	Female	1E+07	13/02/24	14/02/24	17/02/24	RUQ abdominal pain	No comorbidities	Cholelithiasis	12	12.1	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
95	68	Female	1004234	20/02/24	21/02/24	26/02/24	RUQ abdominal pain	Type 2 DM	Cholelithiasis	13.5	12.6	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD
96	67	Male	1E+07	04-03-23	05-03-24	08-03-24	RUQ abdominal pain with nausea	Hypertension, DM	Cholelithiasis	13.8	14	Cholelithiasis	None	Laparoscopic Cholecystectomy	GB non adherent, good planes	Grade 1	Easy	Inj Ceftriaxone 1g IV BD and Inj Metronidazole 100ml IV BD