

TO STUDY OCCURRENCES OF INTRA OPERATIVE DIFFICULTIES IN LAPAROSCOPIC CHOLECYSTECTOMY & THEIR EFFECTS ON POST-OPERATIVE OUTCOMES.

General Surgery

Dr Vikram Singh Yadav*	Junior Resident Department of General Surgery, Teerthankar Mahavir Medical College & Research Centre, Moradabad, U.P India. *Corresponding Author
Dr Col MS Chahal	Professor Department of General Surgery, Teerthankar Mahavir Medical College & Research Centre, Moradabad, U.P India.
Dr Naveen Kumar Singh	Head of Department, Department of General Surgery, Teerthankar Mahavir Medical College & Research Centre, Moradabad, U.P India.
Dr Abhishek Rathore	Associate Professor Department of General Surgery, Teerthankar Mahavir Medical College & Research Centre, Moradabad, U.P India
Dr Virendra Kumar Ram	Senior Resident Department of General Surgery, LLR Medical College & Research Centre, Meerut, U.P India

ABSTRACT

Background: Laparoscopic Cholecystectomy is the gold standard procedure and in spite of having all investigations done, surgeons face many difficulties while operating which also effects outcome of surgery. **Methods:** It's a 18 month prospective study, 8 parameters were decided on which study was done on randomly selected patients. **Results:** 35 surgeries were graded as easy, 35 surgeries as difficult and 9 surgeries were very difficult to operate. **Conclusions:** Out of 79 Cholecystectomy performed by laparoscopic means, in 44 cases we faced difficulty (55.69%)

KEYWORDS

Intra Operative Difficulty, Laparoscopic Cholecystectomy

INTRODUCTION

Cholecystectomy is the surgical removing of gall bladder. It is done in two ways 1. Gold standard is Laparoscopic cholecystectomy and another 2. Older invasive procedure called Open cholecystectomy.

Carl Langenbuch who performed first Cholecystectomy said that gallbladder should be removed because it forms stones and not because it contains stones.

While performing open cholecystectomy about 10 to 15 cm of incision on abdomen is given which is known as Kocher's incision that's why it is a major surgery, recovery period is very long even upto 30 days, procedure is painful with a lot of complications and it's a costly too.

In earlier days acute cholecystitis was considered as an absolute and later, a relative contraindication for laparoscopic cholecystectomy. Now a days most surgeons favour early intervention rather than delayed surgery.

In today's era of Laparoscopic surgery, patients of cholelithiasis prefer laparoscopic cholecystectomy, so is the case at our institute TMMC&RC. Some cases are quite easy to perform and others are unexpectedly difficult.

In spite of having normal pre-operative findings, a patient on the operative table may face a lot of difficulties. In this study we will find out the occurrence of intraoperative difficulties & their effect on post-operative outcomes.

The conversion rate from laparoscopic cholecystectomy to open cholecystectomy is 1.5 to 19%⁽¹⁾.

Per operative difficulties are seen during all steps⁽²⁾ of laparoscopic cholecystectomy by all experienced & skilled surgeons starting from

- Creation of pneumoperitoneum
- Removing adhesions
- Ligating & cutting cystic duct & cystic artery
- Dissecting out gall bladder from liver bed
- Gall bladder extraction from port hole

The first cholecystectomy (laparoscopic) was carried out in Germany by Professor Doctor Med E. Muhe from Boblingen, & 2nd doctor of France by Professor Mouret of Lyon, in 1987.⁽³⁾

There are many advantages of Laparoscopic Cholecystectomy, mainly

- Less recovery time⁽⁴⁾
- Cosmetically better⁽⁴⁾
- Less morbidity⁽⁵⁾
- Earlier return of bowel function⁽⁶⁾
- Less post operative pain⁽⁷⁾
- The rate of postoperative infections is lower.⁽¹⁾

Commonly, there are higher incidences of bile duct injuries⁽⁸⁾ due to loss of three dimensional [3-D] perception⁽⁹⁾ in Laparoscopic Cholecystectomy.

In cases of difficult cholecystectomies, another approach is done which is known as Dome Down approach or antegrade cholecystectomy where cystic duct is identified clearly hence the rate of open cholecystectomy conversion rate is reduced.⁽¹⁰⁾

So purpose of the study is to see Study Occurrences of Intra Operative Difficulties in Laparoscopic Cholecystectomy & Their Post-Operative Outcomes in Teerthankar Mahavir Medical College & Research Centre, Moradabad, UP.

AIM & OBJECTIVES

Aim:

To Study Occurrences of Intra Operative Difficulties in Laparoscopic Cholecystectomy & their effects on Post-Operative Outcomes.

Objective :

To study occurrences of intraoperative difficulties in spite of normal pre-operative workup.

To study the post-operative outcomes of intraoperative difficulties.

MATERIALS AND METHODS

Study Design :- Prospective study

All cases of Cholelithiasis from Surgical OPD/Emergency department of TMMC & RC, Moradabad.

This study of 18 months duration begins from the date of approval 27/12/18 by the Institutional Ethical Committee or College Research Committee.

Evaluation of study has been done with the following factors

- Age
- Sex

- Duration of illness
- History of previous hospitalisation
- Tenderness in right upper quadrant
- Palpable gallbladder
- Complete blood counts
- Liver Function Test values
- Serum Lipase & amylase.
- The patients confirmed by USG examination Gall bladder wall thickness, pericholecystic collection, Size of calculi, multiple calculi and impacted stone.

- We will observe these parameter and will see per operative points as tabulated^{(12),(14)}

S.no	Nature of intra operative difficulty			
1	Duration Of Surgery	30 minutes	30-60 minutes	>60 minutes
2	Bleeding	Mild	Moderate	Severe
3	Adhesions	No Adhesions	Few Adhesions	Severe Adhesions
4	Hepatomegaly	No Hepatomegaly	Mild Hepatomegaly	Moderate Hepatomegaly
5	Calot's Triangle Anatomy	Clear Anatomy	Obliterated Anatomy	Abnormal or not well defined or poorly visible
6	Gall Bladder Wall	Normal	Oedematous	Thickened
7	Bile Leakage	No	Minimal (soakage)	Large amount
8	Bowel Injury	No	Only serosa	Perforation

- On the basis of above table we will observe the findings, analyze and make conclusions about the occurrences of difficulties in laparoscopic cholecystectomy in form of result.
- Moderate bleeding was defined which lead to tachycardia without drop in BP and severe bleeding when tachycardia is there along with drop in BP > 10 mm Hg.
- Operating surgeon described access to peritoneal cavity, gall bladder dissection, gall bladder extraction as easy or difficult.

Inclusion & Exclusion Criteria

Inclusion Criteria

- Patients of greater than 18 years of age groups, including both males & females.
- All cases of diagnosed cholelithiasis and willing for surgery (USG being commonest investigation)

Exclusion Criteria

- Patients with CBD calculus, raised ALP, dilated CBD, where CBD exploration is needed.
- Patients with features of obstructive jaundice.
- Alcoholic pancreatitis
- Perforated / gangrenous GB
- Liver cirrhosis
- Suspected malignant gall bladder disease.
- Current Pregnancy

Methods of Collection of Data

- Patients with Cholelithiasis attending Surgical OPD or IPD at TM Medical college & Research Centre Moradabad.
- Detailed history taking & thorough clinical examination as per the structured proforma (attached)
- Routine Investigations e.g. – LFT, KFT, CBC, Clotting profile, Serum lipase & Amylase
- Diagnostic Investigations
- Ultrasound Whole abdomen
- If indicated MRCP/CECT/MRI/ERCP/EUS/FNA

Statistical Analysis

- Analysis will be done by application of appropriate statistical method as per Statistician's advice.
- Sample size : 82 (we have done on 79 patients as our hospital was declared as COVID-19 centre)
- Period Of Study : 18 Months from the date of approval of this study by the Institutional Ethical Committee or college research

centre.

- $(4PQ/L^2)^{(19)}$ where P is prevalence, Q is (100-P) and L is allowable error (5-10%)
- Prevalence Of Cholelithiasis in India is 29%⁽¹³⁾

OBSERVATIONS & RESULTS

The study was carried on 79 patients

Age Distribution

Most patients (25) were in the age group from 20 to 30. Another large group (23) were patients aged from 31 to 40. 19 patients were from 41 to 50 years old. The mean age in study is 39.96 years and SD is 12.80.

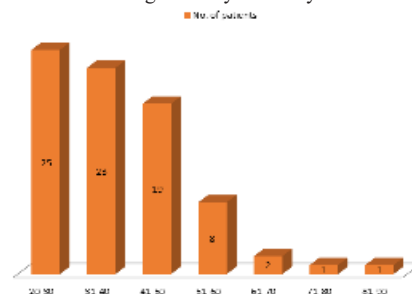


Figure-1 Distribution of patient according to their age group

Table -1 : Distribution of patients according to Age group

Age group(years)	No. of patients	Percentage
20-30	25	31.65 %
31-40	23	29.11 %
41-50	19	24.05 %
51-60	8	10.12 %
61-70	2	2.53 %
71-80	1	1.26 %
81-90	1	1.26 %
Total	79	100%

Table-2 : Distribution of patients according to another smaller age group

Age Group (years)	No of Patient	Percentage
21-25	8	10.12 %
26-30	17	21.51 %
31-35	12	15.18 %
36-40	10	12.65 %
41-45	8	10.12 %
46-50	13	16.45 %
51-55	5	6.32 %
56-60	3	3.79 %
61-65	1	1.26 %
65-70	0	0
>70	2	2.53 %

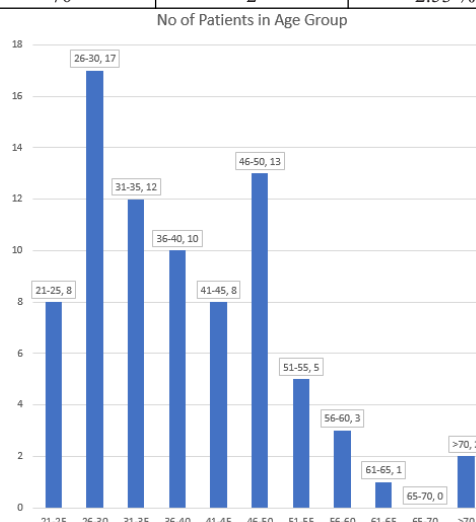


Figure-2 Distribution of patients according to another smaller age group

There is no statistically significant relationship between gender and number of difficulties. Also between age and number of difficulties there is no statistically significant relationship.

Gender Distribution

Table 3 : Distribution of patients according to their sex

Sex	No. of Patients	Percentage (%)
Male	7	8.86 %
Female	72	91.13 %
Total	79	100 %

In present study, most of the cases were females, with male to female ratio of 1:10.43.

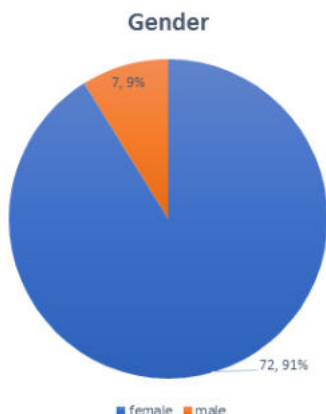


Figure-3 : Distribution of patients according to their sex

Table 4 : Distribution according to duration of surgery

Surgery Time	No. of Patients	Percentage
30 -60 Minutes	42	53.16 %
61- 120 Minutes	34	43.03 %
More than 2 Hours	3	3.79 %

In 50% of cases, the operation lasted between 30 and 60 minutes. 34 operations lasted more than an hour & 3 cases took more than 120 minutes.

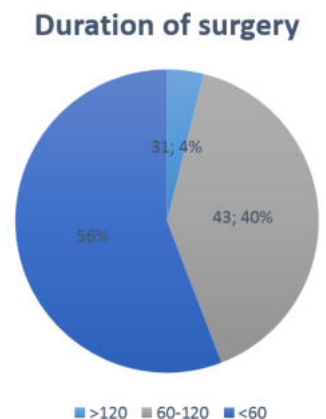


Figure-4 : Distribution according to duration of surgery

Methods

We have used the **Chi-square test** to test if there is any statistically significant relationship between several variables. It compares the expected frequencies and the observed frequencies. We know observed frequencies from the dataset, we counts expected frequencies as:

$$n_{ij} = (n_i * n_j) / n$$

"where n_{ij} is the expected frequency for the cell in the i^{th} row and the j^{th} column, (n_i) is the total number of observations in the i^{th} row, (n_j) is the total number of observations in the j^{th} column, and n is the total number of observations in the whole table."

The null hypothesis (H_0) and alternative hypothesis (H_1) of the Chi-Square Test are:

H_0 : Variable 1 is independent of Variable 2, there is no relationship
 H_1 : Variable 1 is not independent of Variable 2, there is a relationship

If there is a significant difference between the expected frequencies and the observed frequencies in different categories, p-value of Chi-square test is smaller than 0.05 and we reject zero hypothesis. If we reject zero hypothesis, we conclude that there is a statistically significant relationship between Variable 1 and 2.

Intra operative difficulties and it's frequencies:

Table-5 : Distribution of patient according to adhesions

Adhesions	No. of Patients	Percentage	P Value
No Adhesions	17	21.52 %	0.0001
Few Adhesions	42	53.16 %	
Severe Adhesions	20	25.31 %	

There is also a statistically significant relationship between duration of surgery and Adhesions the chi square value is 25.88 ($p = 0.001$) and likelihood ratio test value is 28.60 ($p = 0.001$). For patients with severe adhesion, surgery lasted longer time.

Adhesions

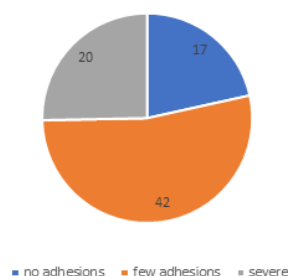


Figure 5: Distribution of patient according to adhesions

In 17 cases, no adhesions were present. Few adhesion was observed in 42 cases. 20 patients had severe adhesion. Out of these severe adhesions 12 adhesions were between gall bladder and omentum, in 4 cases gall bladder was densely adhered to liver & omentum. While in rest 4 cases dense adhesions were present with stomach and duodenum along with GB. Patients with severe adhesions took a longer time to operate. Due to severe adhesions mean average time to operate found to be 103.15 minutes. So adhesions played a vital role in delaying operative time making surgery more difficult. More adhesions when removed caused more bleeding.



Image 1- Dense Adhesions around GB

Distribution of Patients on basis of Calot's Triangle Anatomy

Table-6: Distribution of Patient according to Calot's Triangle anatomy

Calot's Triangle Anatomy	No of Patients	Percentage
Average defined	5	6.32 %
Not well defined	37	46.83 %
Well defined	37	46.83 %

37 patients had not well defined Calot's Triangle anatomy, 37 well defined and 5 average defined.

Calot's Triangle Anatomy

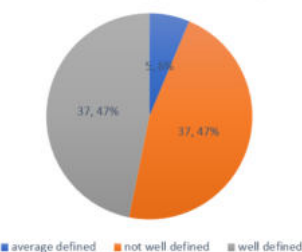


Figure -6 : Distribution of Patient according to Calot's Triangle anatomy



Image 2 - Rotated Hartmann's Pouch

Distribution of patients on basis of GB Wall status

43 patients had normal GB Wall, 30 oedematous and 6 thin.

Table-7: Distribution of patients on basis of GB Wall status

GB Wall	No of Patients	Percentage
normal	43	54.43 %
Oedematous/ thick	30	37.97 %
thin	6	7.59 %

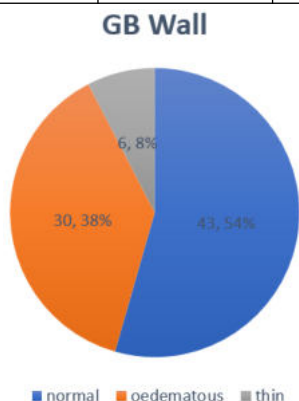


Figure-7 : Distribution of patients on basis of GB Wall status

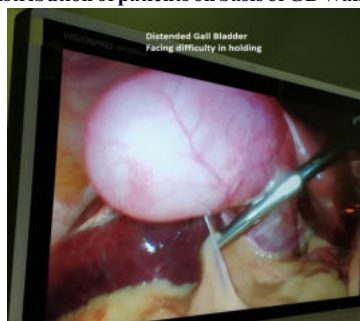


Image 3- Distended Gall Bladder

Bile Leakage

38 patients had no bile leakage, and in 41 patients bile was leaked and out of these 41, 12 cases were where stone spillage occurred.

Table-8: Distribution of patients according to Bile leakage from GB.

Bile Leakage	No of Patients	Percentage
Yes – Bile leakage present	38	48.10 %
No- Bile leakage present	41	51.89 %
Stone Spillage	12	15.18 %

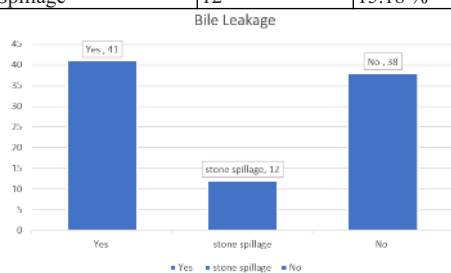


Figure-8: Distribution of patients on basis of GB Wall status

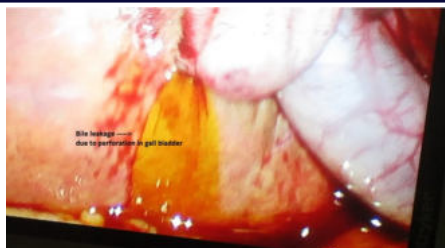


Image 4- Bile Leakage from Gall Bladder Perforation

Bowel Injury

Bowel injury was observed only in one case.

Table-9: Distribution of patient according to injury in bowel

Bowel Injury	No. of Patient
No	78
yes	1

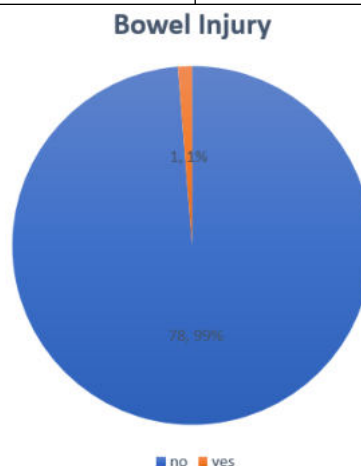


Figure-9 : Distribution of patient according to injury in bowel

Difficulty as Experienced By Surgeons**Table-10: Distribution of patients according to difficulty levels**

Difficulty Level	No of patients	Percentage
Easy	35	44.30 %
Difficult	35	44.30 %
Very Difficult	9	11.39 %

35 surgeries were graded as easy, 35 surgeries as difficult and 9 surgeries were very difficult to operate.

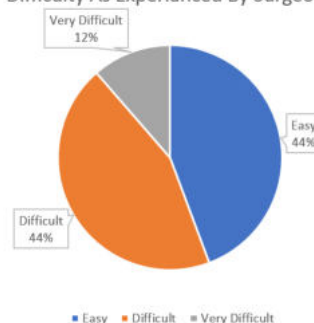
Difficulty As Experienced By Surgeons

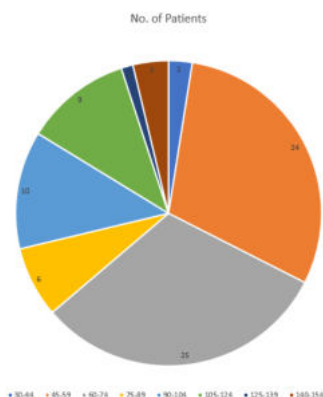
Figure 10: Distribution of patients according to difficulty levels

Others intra operative findings:**Table -11 : Distribution of patients on basis of intraoperative findings**

Other intraoperative findings	No of patients
Anomalous cystic artery	2
Emphyema	3
Accessory arterial supply to GB from Liver Bed	1
GB inflamed	3
Short cystic duct	5

Table -14 : Time of Laparoscopic Cholecystectomy another table with a span of 15 minutes

Operative duration (in minutes)	No. of Patients	Percentage
30-44	2	2.53%
45-59	24	30.38%
60-74	25	31.65%
75-89	6	7.59%
90-104	10	12.65%
105-124	9	11.39%
125-139	1	1.26%
140-154	3	3.79%
Total	79	100%



X Axis- Time in minutes

Figure 14: Time of Laparoscopic Cholecystectomy another table with a span of 15 minutes

Gall Bladder extraction according to the presence & absence of preoperative risk factors

Table-15: Gall Bladder extraction according to the presence & absence of preoperative risk factors

Pre- Operative Risk Factor		Gall Bladder Extraction					
		Total number	Easy		Difficult		
			No.	%	No.	%	
Shape of Gall Bladder	Normal	69	35	50.72	34	49.27	
	Distended	5	1	20	4	80	
Gall Bladder Thickness	Normal	43	35	81.39	8	18.60	
	Thick	30	8	26.6	22	73.32	
Number of Stones	Single	18	8	44.4	10	55.55	
	Multiple	42	30	71.4	12	28.58	

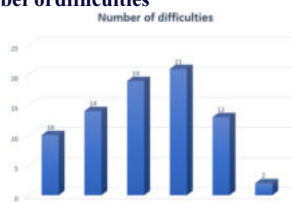
In this study, patients with single stone in gall bladder, distended gall bladder and gall bladder with thick wall has faced difficulty in extraction of gall bladder.

There is also a statistically significant relationship between duration of Pre- Operative Risk Factor and Gall Bladder Extraction the chi square value is 14.52 ($p = 0.004$) and likelihood ratio test value is 17.25 ($p = 0.005$).

Distribution of patients according to time required during laparoscopic cholecystectomy

Age & Gender : We did not find any significant relationship for the age and gender variables. Both men and women have the same incidence of intra operative difficulties. Also intra operative difficulties occur equally for patients of all ages.

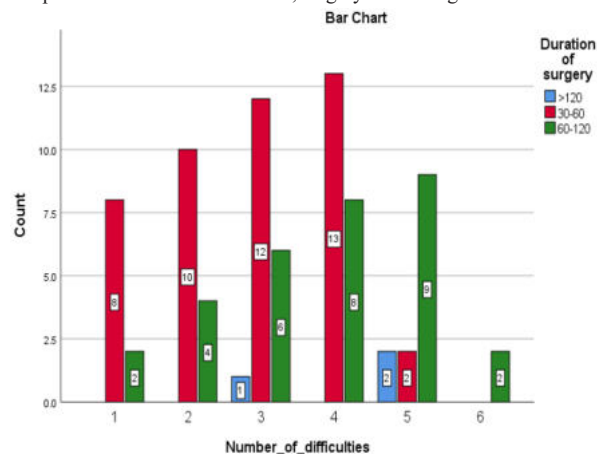
Analysis of number of difficulties

**Figure -15: X axis showing no of difficulty while y axis no of patients**

Only 1 difficulty faced during 10 operations. During 14 surgeries, in 2 patients we faced difficulties. 3 difficult cases seen in 19 cases and 4 difficulties in 21 cases. Next 13 patients we faced 5 difficult cases and 2 patients had (6 difficulties) during the surgery.

There is a statistically significant relationship between duration of surgery and number of difficulties. ($p = 0.032$)

For patients with more difficulties, surgery lasted longer time.

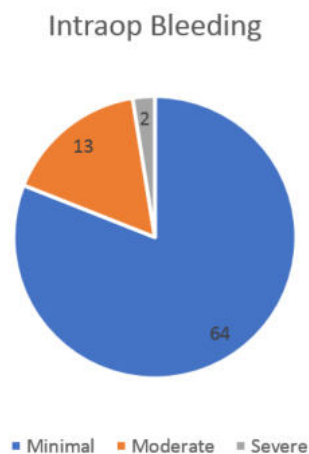
**Figure- 16: Distribution of patient according to no of difficulties (x-axis), number of patients (y-axis) and duration of surgery (coloured column)**

There is no statistically significant relationship between gender and number of difficulties. Also between age and number of difficulties there is no statistically significant relationship.

Intra Operative Bleeding

Table-16: Distribution of Patients according to intraoperative bleeding.

Bleeding	No of Cases	Percentage
Minimal	64	81.01 %
Moderate	13	16.45 %
Severe	2	2.53 %

**Figure-17: Distribution of Patients according to intraoperative bleeding.**

Severe bleeding seen in 2 cases, while moderate bleeding in 13 cases and 64 cases with minimal bleeding. In one case of severe bleeding occurred due to liver capsule getting torn & bleeding from vessels of omentum which was densely adhered to GB, so this case was converted to open cholecystectomy.

2nd case of severe bleeding which was most difficult case it took 2.5 hours (mean time of surgery in this study is 74.31 minutes, here gall bladder was stacked up with adhesions, gall bladder bleed with backflow so another clip was used, now gall bladder got ruptured and spillage of bile and stones took place, while separating gb from liver bed, bleeding from liver bed started which was controlled by giving compressions by gallbladder + gauze piece and finally abgel was

applied when bleeding stopped.



Image -9 Haematoma in liver developed due to frequent rubbing by working instruments

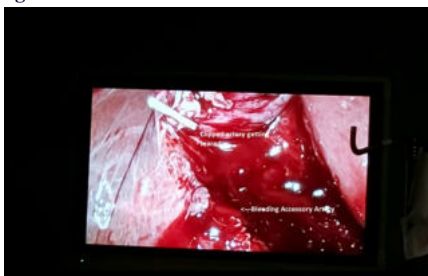


Image 10- Clipped artery getting torn and see bleeding at arrow site

Table-17: Intraoperative Hepatomegaly

Hepatomegaly	No. of Patients
no	64
yes	15

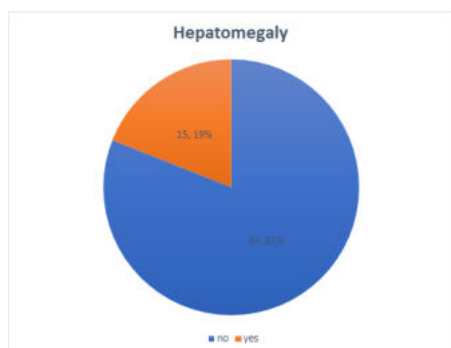


Figure-18: Intraoperative Hepatomegaly

Hepatomegaly was noticed in about 19% of cases out of which 4 cases were gross hepatomegaly, left lobe was lying in field of vision making dissection difficult.



Image 11- Hepatomegaly- see rt liver lobe

Distribution of patients on the basis of ultrasound findings

Table-18: Distribution of patients according to ultrasound findings

Ultrasound findings	No of patients	Percentage
Thickening of gall bladder wall	30	37.97%
GB wall oedema	5	6.32%
Single large stone in gall bladder	18	22.78%
Multiple stones in gall bladder	42	53.16%
Pericholecystic fluid	6	7.59%
Biliary sludge	5	6.32%
diameter of cbd >7mm	2	2.53%
Contracted GB	4	5.06%

Over Distended GB	4	5.06%
Hepatomegaly	8	10.12%

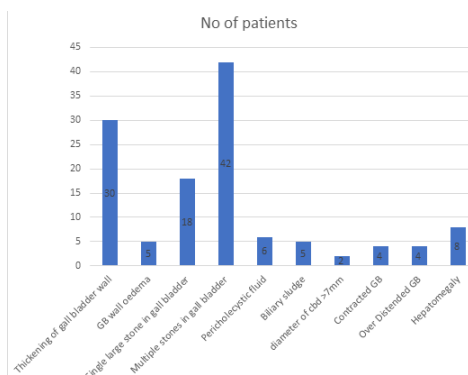


Figure 19: Distribution of patients according to ultrasound findings

In this study, it's clear from table that majority of patients have multiple stones in gall bladder (53.16%) and around 22.78% have single large stone, 10% of patients have hepatomegaly in USG. 97.47% have normal CBD diameter. Single big stones when entrapped in Hartman's pouch became difficult to hold by grasping forceps, hepatomegaly caused difficulty while operating as liver lobe falls and comes in field and restricts the movements of operating instruments.

Table-19: Operative Data in this study group (n=79)

Operative Data	Number	Percentage
Operative Difficulties		
- Omentum Obscuring the field	- 10	- 12.65%
- Hepatomegaly Obscuring the field	- 15	- 18.98 %
- Dense Adhesions	- 20	- 25.31%
- Peri Umbilical Adhesions	- 1	- 1.26%
- Cholecystoduodenal Fistula	- 1	- 1.26%
- Contracted/shrunken Gall bladder	- 8	- 10.12%
- Distended Gall Bladder	- 5	- 6.32%
- Thickened Wall of Gall Bladder	- 30	- 37.97%
- Intrahepatic Gall Bladder	- 3	- 3.79%
- Veress Needle insertion Difficulty	- 2	- 2.53%
Anatomic Variations		
- Very Short Cystic Ducts	- 6	- 7.59%
- Accessory Cystic Duct	- 1	- 1.26%
- Dilated Cystic Duct	- 1	- 1.26%
- Cystic Artery Anomaly (Bifurcated cystic artery)	- 3	- 3.79%
- Posterior Branch of Cystic Artery	- 1	- 1.26%
- Accessory Arterial Supply from Liver bed to GB	- 2	- 2.53%
- Rotated Hartman's	- 1	- 1.26%
IntraOperative Complications		
- Bleeding	-15	- 18.98%
- Gall Bladder Perforation	- 14	- 17.72%
- Stone Spillage	- 12	- 15.18%
- Difficulty in holding Hartman's due to stone	- 4	- 5.06%
- Difficulty to remove stones by ovum forcep as stones were separated in a extra compartment in GB.	- 1	- 1.26%
Conversion To Open Cholecystectomy	- 1	-1.26%

Table 20: No of patients tabulated showing post-operative complications

Complications	Laparoscopic Cholecystectomy
Fever	6
Right Shoulder pain	1
Abdomen Pain	15
Bile Leak minimal	2
Urine Retention	4
Nausea, Vomiting	11

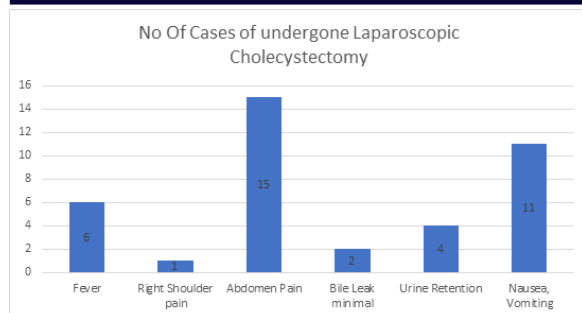


Figure- 20: Distribution of patients according to post operative complications

DISCUSSION

The present prospective study was carried out in the department of surgery of Teerthankar Mahaveer Medical College & Research Centre, Moradabad during the period of March 2019 to March 2020. In this study we have included 79 cases that underwent laparoscopic cholecystectomy.

Laparoscopic cholecystectomy is the gold standard for treatment of gall stones (symptomatic) but need more practice of surgeons and even technically sound knowledge otherwise there are chances of injuring CBD & Viscera. The aim of our study was to study occurrences of intra operative difficulties in laparoscopic cholecystectomy & their effects on post-operative Outcomes. Also it may benefit many future patients as we can inform them of possible difficulties and complications thus help patients to mentally prepare & adjust expectations. Surgeons can also decide whether to go for open or laparoscopic cholecystectomy.

Age Distribution

Most patients (36.70%) cases are in age group of 26 to 35 years while (31.65%) were in the age group from 20 to 30 year. Another large group (27.84%) were patients aged from 31 to 40 years. (26.58%) patients were from 41 to 50 years old. So around 54.43% of gall stones cases are in age group of 31 to 50 years and least cases were in late 60's and 70's which included (3.79%). The youngest patient is of 21 years female and oldest is 85 year old female.

Kapoor et al (2006)⁽²¹⁾ have reported a maximum incidence of 37.7% of gall bladder disease in the 4th decade of life. In our study mean age of patient came to be 40 years which is in accordance with Baig et al (2002)⁽²²⁾ study who reported mean age was 38 years and maximum incidence were in the 4th decade of life.

We found that most of the cases were in age of late 30's and 40's age group and most of the cases were females (91%)

There is no specific age and operative difficulty relationship still more difficulties were seen in age group of 25 to 45 years and in late years above 60.

Total minutes spent in surgery came to be 5871 minutes thus the average time spent in one surgery came to be 74.31 minutes.

Sex Distribution

In present study, majority of the cases were females (72 cases) and male (7 cases), i.e male to female ratio is 1:10.2, this ratio is varying significantly with other studies like Dr Alok Chandra Prakash et al (2016)⁽¹³⁾ in his study claimed this male :female ratio as 1:4. This study clearly suggests gall stones are more frequent in females holding a true statement that a fatty, fertile, flatulent, females of fourty is the main sufferer of gall stones. 91% of patients were female, 9% male. In 2 (28.57%) out of 7 males we faced difficulty in surgery, out of these one male is of 67 years.

We did not find any significant relationship for the age and gender variables. Both men and women have the same incidence of intra operative difficulties. Also intra operative difficulties occur equally for patience of all ages.

55.69% of total cases are found to be difficult while operating and out of these only 2.5% were males and 53.16% were females.

GB Wall Thickness

Naik CG, Kailas C (2016)⁽¹⁾ study says that GB wall thickness >3mm causes difficulty in laparoscopic cholecystectomy as thick wall of GB is difficult to hold by the forceps. Hutchinson et al, Liu et al and Kama et al considered GB wall thickness to be the most important sonographic risk factor of conversion to OC⁽²³⁾. Similarly our study 30 cases (39.7%) are found to have thick GB wall and 22 cases 73.33% cases having thick wall faced difficulty while operating.

Intra Op Bleeding

Severe bleeding seen in 2 cases, while moderate bleeding in 13 cases and 64 cases with minimal bleeding. In one case of severe bleeding occurred due to liver capsule getting torn & bleeding from vessels of omentum which was densely adhered to GB, so this case was converted to open cholecystectomy.

2nd case of severe bleeding which was most difficult case it took 2.5 hours here gall bladder was stacked up with adhesions, gall bladder bleed with backflow so another clip was used, now gall bladder got ruptured and spillage of bile and stones took place, while separating gb from liver bed, bleeding from liver bed started which was controlled by giving compressions by gallbladder + gauze piece and finally abgel was applied when bleeding stopped.

Moderate bleeding was defined which lead to tachycardia without drop in BP and severe bleeding when tachycardia is there along with drop in BP > 10 mm Hg.

Operating surgeon described whole surgery as "easy" or "difficult" or "very difficult" in all steps like access to peritoneal cavity, Calot's triangle dissection, GB bed dissection and extraction from abdominal cavity.

Ultrasound Findings of the patients

As it is clear from data under observations that majority of patients having multiple stones 43 and thick walls of gall bladder 30 out of 79. Ultrasound was performed in all cases as it is very sensitive and CBD pathology can easily be diagnosed. Preoperative USG gives information regarding thickening of gall bladder, its status whether its distended or contracted, whether have single or multiple stones, even one can know the size of stones. Majority of cases have multiple stones (53.17%) followed by single stones (22.78%). Size of stones varied from 2.5mm to 25mm in our study. We faced more difficulty in single stones cases due to difficulty in grasping the gall bladder and difficulty in dissecting gall bladder bed. We faced more difficulty in holding a thick walled gall bladder with the forceps. With USG any pathology of CBD can be detected easily & even more important information like oedema in pancreas, lymphadenopathy and some malignancies etc.

The sensitivity, specificity and accuracy of the USG method in detecting choledocholithiasis were 96.3, 100 and 96.5% respectively. (BD Boboev 2012)

In our study, patients with adhesions (20 cases) took longer time as dissection was difficult due to lack of plane between liver and gall bladder. Adhesions were mostly seen between omentum and gall bladder. Sometimes even colon and stomach were also found to be adhered and some of the most difficult cases, took about 150 minutes to complete (mean time 74.31 minutes).

In our study, patients with single large stones (cases 18-22.78%) inside gall bladder were found to have more operative time (mean 90.12 plus minus 15 minutes)

Operative Time

Mean operating time is 74.31 minutes, 3 cases took 150 minutes each, 4 cases took around 120 minutes each and 20 cases took around 60 minutes each. Least time taken was 40 minutes in one case, rest majority of cases were done between 60 to 120 minutes. We faced difficulty in 35 cases and 9 cases were very difficult. Randhawa JS, Pujahari et al 2009⁽¹⁰⁵⁾ devised an scoring system on basis of which he says its an easy surgery when its taking time <60 minutes and there is no bile spillage and there is no duct/ artery injury. While case is said to be difficult when time taken for surgery is 60-120 minutes along with this there is bile or stone spillage as well injury to duct but there is no conversion to open cholecystectomy. Case is very difficult if time taken > 120 minutes and there is conversion to open cholecystectomy.

Bile Duct Injury

No bile duct injury seen in any case.

Artery Injury

No specific arterial injury seen in any case.

CONCLUSIONS

1. Out of 79 Cholecystectomy performed by laparoscopic means, in 44 cases we faced difficulty (55.69%) at TMMC&RC, Moradabad from 28/12/2018 to March 2020.
2. Peak incidence of gall stone disease in this study was in 2nd and 3rd decade followed by 4th decade. Youngest patient is of age 21 years female and oldest is of 85 year old female.
3. In present study, majority of cases were females, with male to female ratio of 1:10.12. In our study gender does not have significant impact on prediction of difficulty in laparoscopic cholecystectomy. However 55.69% of total cases are found to be difficult while operating and out of these 53.16% were females, but in our study only 7 males patients are there and out of these 7 males we faced difficulty in 2 males, but its very clear that gall stone disease is more common in females.
4. In our present study, patients with solitary large stones (18 patients i.e 22.78%) inside gall bladder faced difficulty while operating due to difficulty in holding the gb, as it used to get frequently slip.
5. In this study mean operating time is 74.31 minutes, 3 cases took 150 minutes each, 4 cases took around 120 minutes each and 20 cases took around 60 minutes each. Least time taken was 40 minutes in one case, rest majority of cases were done between 60 to 120 minutes. We faced difficulty in 35 cases and 9 cases were very difficult.
6. In our study, patients with adhesions (20 cases) took longer time as dissection was difficult due to lack of plane between liver and gall bladder. Adhesions were mostly seen between omentum and gall bladder. Sometimes even colon and stomach were also found to be adhered and some of the most difficult cases, took about 150 minutes to complete (mean time 74.31 minutes).
7. In our present study 30 cases (39.7%) were found to have thick wall of gall bladder and out these we faced difficulty in 22 cases (73.33%) while operating.
8. In our study, patients with adhesions (20 cases) took longer time as dissection was difficult due to lack of plane between liver and gall bladder. Adhesions were mostly seen between omentum and gall bladder. Sometimes even colon and stomach were also found to be adhered, due to which there was bleeding.
9. Severe bleeding seen in 02 cases, while moderate bleeding in 13 cases and in 64 cases there was minimal bleeding. In one case, of severe bleeding, bleeding happened due to liver capsule getting torn & bleeding from vessels of omentum which was densely adhered to GB, so this case was converted to open cholecystectomy. 2nd case of severe bleeding which was most difficult case it took 2.5 hours here gall bladder was stacked up with adhesions, gall bladder bleed with backflow so another clip was used, now gall bladder got ruptured and spillage of bile and stones took place, while separating gall bladder from liver bed, bleeding from liver bed started which was controlled by giving compressions by gallbladder + gauze piece and finally abgel was applied when bleeding stopped.
10. Gall bladder got perforated in 14 cases & in 12 cases spillage of stones in abdominal cavity took place, 5 cases were of distended gall bladder and 8 cases were of fibrosed/shrunken/contracted gall bladder due to which fibrotic dense adhesions were seen which faced difficulty in separation. Perforation was due over cauterization or due to traction applied by grasping forceps, no infection was seen postoperatively in those patients with spillage of stones. 3 cases of intrahepatic gall bladder were there which also faced difficulty in separating from liver bed, causing liver injury by cautry and bleeding.
11. We faced Veress Needle insertion difficulty in two cases.
12. In our study we faced difficulty due to anatomic variations like very short cystic duct, bifurcated cystic artery, accessory arterial supply from liver bed and rotated Hartman's. In our study gross hepatomegaly was seen in 15 cases (18.98%), due to which difficulty was faced, as hanging liver was coming in field, touching instruments and causing difficulty while operating.
13. Drains were placed in 28 patients which were removed on an average of 6th day, content were serosanguinous.
14. In our study average hospital stay were 4.21 days for laparoscopic

cholecystectomy and 13 days for open cholecystectomy.

15. No CBD injury was seen in our study.

SUMMARY

Laparoscopic Cholecystectomy is the gold standard treatment of cholelithiasis and this method has been modified and improved day by day to perform cholecystectomy effectively and safely, hence further revolutionized the surgical treatment of gall stones.

This study helps in understanding the difficulty that is faced while operating irrespective of preoperative workout.

This study was done on 79 patients of gall bladder stones who were admitted in our hospital T.M.M.C & R.C Moradabad from 28/12/2018 to March 2020. After following all exclusion & inclusion criteria patients were operated.

History examination along with USG findings help to predict difficulties, still few more difficulties arises while operating patient unexpectedly, by doing this study you can understand those factors and can help the patients and doctors to prepare themselves mentally.

Along with technical problems like camera issues like camera getting fogged, poor skilled camera assistant, there are many factors which delays the time in surgery.

We noticed that abdomen pain was post-operative complain of most of patients (18.98%) followed by nausea -vomiting (13.92%) followed by fever and urine retention.

We observed peak incidence of gall stone was in age group of 25 to 35 years followed by 4th decade and majority were females (91.13%).

We observed more difficulty in those patients who had dense adhesions (25.31%) due to unclear Calot's triangle anatomy thickened gall bladder wall (37.97%) and hepatomegaly (18.98%)

We also observed that gall bladder containing single big sized stone (22.78%) was more difficult to operate, as it was difficult to hold with forceps.

In this study mean operating time is 74.31 minutes, 3 cases took 150 minutes each, 4 cases took around 120 minutes each and 20 cases took around 60 minutes each. Least time taken was 40 minutes in one case, rest majority of cases were done between 60 to 120 minutes. We faced difficulty in 35 cases and 9 cases were very difficult.

No CBD injury was seen in any case.

In our study average hospital stay were 4.21 days for laparoscopic cholecystectomy and 13 days for open cholecystectomy.

If all of the above problems are taken care of we can better counsel the patients and can have better outcomes of laparoscopic cholecystectomy.

LIMITATIONS OF OUR STUDY

1. Time bound study with less number of patients (less sample size) especially male patients and children.
2. Better technical equipment may have saved more time in surgery.

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