

A PROSPECTIVE STUDY OF PREOPERATIVE RISK FACTORS FOR PREDICTING DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY.

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BACKGROUND:

Cholecystectomy is the most common elective procedure performed on the biliary tract and the second most common abdominal operation performed today. With more and more endeavors being made in the field of laparoscopy, more and more complicated cases which were relatively contraindicated a few years ago are now being tackled laparoscopically. In spite of increasing expertise and advances in technology, conversion rate is still 1.5 to 35% in different centers. This conversion is neither a failure nor a complication, but an attempt to avoid complications. So the identification of parameters predicting conversion would be useful to improve preoperative patient counseling, provide for better perioperative planning, optimize operating room efficiency, and to avoid laparoscopic-associated cost & complications by performing an open operation when appropriate.

AIM AND OBJECTIVE:

Pre-operative risk factors for prediction of difficult laparoscopic cholecystectomy using clinical, biochemical & ultrasonographic parameters.

1. To evaluate clinical parameters as one of the predictors of conversion.
2. To evaluate ultrasonography parameters as one of the predictors.
3. To evaluate biochemical parameters as one of the predictors.
4. To calculate the conversion rate.

PATIENTS AND METHODS:

All indoor patients admitted for Laparoscopic cholecystectomy during the study period (from November 2018 to October 2020) in Department of General Surgery M K C G Medical college and Hospital Berhampur, Ganjam, Odisha, India. Total 60 patients were included in this Descriptive prospective cross-sectional study.

RESULTS:

The operative parameters taken to assess the difficulty of the laparoscopic cholecystectomy were total time taken to operate from the insertion of the trocar to the extraction of the gallbladder (more than 90mins), tear of gallbladder with spillage of bile and stones, and conversion to open cholecystectomy. The rate of conversion was found to be 8.3%. Overall, 12 out of 60 patients were predicted to be difficult cases based on clinical parameters out of which 8 were difficult on surgery and 5 out of the 12 cases got converted. Out of 60 patients 5 patients were predicted to be difficult based on biochemical parameters of which 4 were difficult on surgery. Out of 4 difficult cases 2 got converted to open procedure. Out of 60 patients 7 were predicted to be difficult of which 5 were found to be difficult on ultrasonographic parameters. Out of these 5 difficult cases 2 got converted to open procedure.

CONCLUSION:

From this study, we can conclude that preoperative clinical, biochemical and ultrasonographic parameters are good predictors of difficulty in laparoscopic cholecystectomy in the majority of cases and should be used as a screening procedure. It can help surgeons to get an idea of the potential difficulty to be faced in a particular patient.

INTRODUCTION:

Cholecystectomy is the most common elective procedure performed on the biliary tract and the second most common abdominal operation performed today.¹ Over the past years, removal of gall bladder has been the primary mode of therapy for gall stone disease. Alternative modes include gallbladder dissolving agents, biliary lithotripsy and percutaneous cholecystolithotomy . The main disadvantage with these techniques is that the stone forming organ i.e., gall bladder is left in situ resulting in recurrence.

With more and more endeavors being made in the field of laparoscopy, more and more complicated cases which were relatively contraindicated a few years ago are now being tackled laparoscopically. However, one should be very careful in the cases with complicated gallstone disease to avoid any disastrous complication. Safe dissection is the key to complete laparoscopic cholecystectomy successfully. Every case should be considered as difficult until completed successfully. Level of difficulty may vary with the skill and experience of the surgeon. An inexperienced surgeon ascending the learning curve may find conditions like intra-abdominal adhesions, acutely inflamed friable gall bladder, gangrenous gallbladder and fibrotic Calot's triangle to be of insurmountable difficulty. However, some conditions are really difficult to tackle irrespective of the experience and skill of the surgeon. Though there is no consistent definition for difficult Laparoscopic cholecystectomy, many studies have considered Laparoscopic cholecystectomy to be difficult when we encounter 1) dense adhesions at the triangle of Calot's (frozen triangle of Calot's prohibiting proceeding laparoscopically without risk), 2) contracted and fibrotic gallbladder, 3) previous upper abdominal surgery, 4) gangrenous gallbladder, 5) acutely inflamed gallbladder, 6) empyema gallbladder including Mirizzi's syndrome, 7) previous cholecystostomy and 8) cholecystogastric or cholecystoduodenal fistula.²⁻¹⁴

Access to the peritoneal cavity to create the pneumoperitoneum may be difficult in the previously operated cases. In such cases, creating pneumoperitoneum by open technique or use of veress needle through the Palmer's point (2cm below the left costal margin in the midclavicular line) may be the useful alternatives to the umbilical point.

The safest entry can be made into the peritoneal cavity by adhering to the basic principle of lifting the anterior abdominal wall with the help of two towel clips placed on the either side of umbilical incision into the rectus sheath and then pushing the spring loaded veress needle through the sheath.

Anatomic variations in the cystic duct and hepatic ducts are common. This variation should be borne in mind during dissection of the hepatocystic triangle.

Laparoscopic cholecystectomy may need conversion in the following conditions:

1. Unclear anatomy
2. Failure to progress in dissection
3. Injury to major blood vessel
4. Injury to abdominal viscous
5. Injury to bile duct
6. Doubtful pathology

A recent report emphasizes the fact that the outcome of the patient is not influenced by the rank of the surgeon performing the surgery.¹⁵ However, the consensus has been that every surgeon has to undergo a learning curve for the laparoscopic procedure and develop his dexterity in laparoscopy.²⁻¹⁴

In spite of increasing expertise and advances in technology, conversion rate is still 1.5 to 35% in different centers.²⁻¹⁴ This conversion is neither a failure nor a complication, but an attempt to avoid complications. Conversion from laparoscopic to open cholecystectomy is required when safe completion of the laparoscopic procedure cannot be sured . The identification of parameters predicting conversion would be useful to improve preoperative patient counseling, provide for better perioperative planning, optimize operating room efficiency, and to avoid laparoscopic- associated cost & complications by performing an open operation when appropriate.

This study has been conducted on certain clinical and investigation parameters to look for their reliability as predictors of difficult laparoscopic cholecystectomy.

AIM AND OBJECTIVE OF THE STUDY:

Pre-operative risk factors for prediction of difficult laparoscopic cholecystectomy using clinical, biochemical& ultrasonographic parameters.

Specific objectives of the study:

1. To evaluate clinical parameters as one of the predictors of conversion.
2. To evaluate ultrasonography parameters as one of the predictors.
3. To evaluate biochemical parameters as one of the predictors.
4. To calculate the conversion rate.

- 1) STUDY AREA : Department of General Surgery
- 2) STUDY POPULATION : All patients admitted for laparoscopic cholecystectomy
- 3) STUDY PERIOD: November 2018 to October 2020
- 4) SAMPLE SIZE: 60 patients
- 5) SAMPLE DESIGN: All indoor patients admitted for Laparoscopic cholecystectomy during the study period.

Inclusion criteria

All patients with symptomatic gallstone disease admitted for laparoscopic cholecystectomy.

Exclusion criteria

1. Patients of <14 years of age.
2. Patients with common bile duct stone/ cholangitis.
3. Patients with known carcinoma of the gallbladder.
4. Acute cholecystitis more than one week.
5. ASA score III/IV
6. Combined with other surgery.

6) STUDYDESIGN: Descriptive prospective cross-sectional study.

7) PARAMETERSSTUDIED: The following parameters of the study sample was studied to predict a difficult laparoscopic cholecystectomy:

- Age
- Present acute attack
- Number of attacks
- Past upper abdominal operation
- Total & differential WBC count
- Alkaline phosphataselevels
- Total bilirubin
- USG findings

Age \geq 65 Yrs., Male gender, Acute cholecystitis, \geq 2 previous acute attacks, past upper abdominal surgery, WBC \geq 10000/cumm, raised alkaline phosphatase $>$ 310 IU/L, raised total bilirubin $>$ 1mg/dl and USG findings of pericholecystic fluid collection, GB wall thickness \geq 4mm, contracted GB, stone impaction at neck/cystic duct, Mirizzi's syndrome were considered as predictors of difficult laparoscopic cholecystectomy in this study. Cases which got converted to open cholecystectomy were considered as difficult cases.

8) STUDYTOOLS :

- Predesigned pretestedschedule
- Laboratory reports
- AbdominalUSGreports
- Individual patient file

- Discharge certificates

- 9) **STUDYTECHNIQUES:** The indoor patients admitted for laparoscopic cholecystectomy were included in this study. Informed consent was taken from the sample group after explanation and before inclusion into the study. Then after interviewing the patient a predesigned pretested schedule as given in the annexure was filed in.
- 10) **PLANFORANALYSISOFDATA:** The collected data was compiled in a Microsoft Excel sheet, and subsequently suitable multivariate logistic regression analysis using SPSS 16.0 version was done according to different appropriate statistical methods.

RESULTS AND DATA ANALYSIS:

A series of 60 cases undergoing laparoscopic cholecystectomy for gall stone disease were selected for study. All the cases were predicted to be either difficult or easy for laparoscopic cholecystectomy based on preoperative clinical, biochemical and USG parameters. Causes of conversion to open cholecystectomy were assessed and analysed both preoperatively and peroperatively. Results of the study were analysed as follows:-

1) Total incidence of conversion

Table- I

no of cases	No of conversion	Percentage
60	5	8.3

In this study a case series of 60 patients who underwent laparoscopic cholecystectomy were prospectively analysed. Laparoscopic cholecystectomy was successfully carried out in 55 patients and 5 patients needed conversion to open cholecystectomy. Rate of conversion was 8.3%.

2) Age distribution

Table- II

Age	No of patients (%)	No of conversions (%)
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21-30	8(13.3)	0 (0)
31-40	16 (26.6)	0(0)
41-50	23 (38.3)	1(1.6)
51-60	10(16.6)	2(3.3)
61-70	2(3.3)	1(1.6)
70-80	1(1.6)	1 (1.6)
Total	60	5 (8.3)

In the series of 60 cases the age of patients varied from range of 21 –74 years. The majority of patients were in the age group of 41 – 50 years. Their mean age was 41.9 with standard deviation of 9.9. The conversion rate is high in the age group of 51-60 years. The conversion rate in the age group of ≥ 70 years in this study is 100%. So, it is observed that with increasing age risk of conversion increases.

3) **Sex Ratio**

Table–III

	Number of Patients(%)	Number of Conversion(%)
Male	11(18.3)	2 (3.3)
Female	49(81.6)	3 (5.0)
Total	60	5 (8.3)

Out of 60 patients, 11 were male and 49 were female. Male: Female = 1: 4.4. Out of 5 converted patients 2 (3.3% of 60) were males and 3 (5% of 60) were female patients. Out of 11 male patients 2 got converted which accounts for 18.1% of male patients whereas out of 49 females 3 got converted which accounts for 6.1% of female patients. From this we can conclude that conversion rate is 3 times higher in male patients in this study.

4) **ACUTE CHOLECYSTITIS**

Table–IV

	Number of Patients (%)	Number of conversion (%)
Male	1 (1.6)	0 (0)
Female	2 (3.3)	1 (1.6)
Total	3(5.0)	1 (1.6)

Out of 3 patients who presented with acute cholecystitis 1 were male and 2 females. Among these only 1 female patient got converted to open cholecystectomy. Overall, 1 out of 3 (33.3% of 3) patients got converted.

5) **No of Acute attacks (≥ 2)**

Table-V

	Number of Patients	Number of Conversion
Male	1	0
Female	2	1
Total	3	1

Out of 60 patients 3 had ≥ 2 acute attacks of which 1 (0 conversions) were male and 2 (1 conversions) females. 33.3% (1 out of 3) of the patients with ≥ 2 acute attacks got converted.

6) **History of Upper Abdominal Surgery**

Table-VI

	Number of Patients	Number of Conversion
Male	1	1
Female	0	0
Total	1	1

Out of 60 patients only 1 male patient had history of upper abdominal operation which got converted due to dense adhesions.

7) **White Blood Cell $\geq 10000/\text{cumm}$**

Table-VII

	Number of patients	Number of conversion(%)
Male	4	2 (0.8)
Female	6	1 (0.4)
Total	10	3 (1.2)

Out of 60 patients 3 had WBC $\geq 10000\text{cu}/\text{mm}$ of which 1 (1.6% of 60) patient got converted to open cholecystectomy.

8) **Gall Bladder Wall Thickness $\geq 4\text{mm}$**

Table-VIII

	Number of Patients	Number of Conversions(%)
Male	1	0 (0)
Female	1	1 (1.6)

Total	2	1(1.6)
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Out of 60 patients 2 had GB wall thickness \geq 4 mm of which 1(1.6%) got converted to open cholecystectomy.

9) **Contracted gallbladder:**

Table-IX

	Number of Patients(%)	Number of Conversion(%)
Male	2(3.3)	1 (1.6)
Female	3 (5.0)	1 (1.6)
Total	5 (8.3)	2 (3.3)

Out of 60 patients 5 (8.3%) had contracted GB of which 2 (3.3%) got converted to open cholecystectomy.

10) **Stone Impacted at Neck/ Cystic Duct:**

Table- X

	Number of Patients	Number of Conversions
Male	1	0
Female	1	1
Total	2	1

Out of 60 patients 2 had stone impacted at neck/ cyst icducton USG of which 1 got converted to open cholecystectomy.

11) **Per operative causes of conversion**

Table-XI

Per operative causes of conversion	No.of conversions(%)
Denseadhesi on saroundCalot's triangle	2(40%)
Anatomicvariationofcysticduct	1(20%)
DistendedHartman'spouchwithadhesions	1(20%)
ContractedGB	1(20%)
Total cases converted	5 (100%)

In the study of 60 cases, 5 cases were converted to open cholecystectomy. Causes of peroperative conversion were as given above.

12) **Pre operative prediction with clinical parameters:**

Table-XI

Preoperative parameters	Predictedas difficult	Concludedas difficult	Conversion
Clinical	12	8	5
Age(≥ 65 years)	3	3	2
Sex(Male)	5	3	2
Acute cholecystitis	3	2	1
No of acuteattack (≥ 2) And hospitalization	3	3	1
H/oupperabd.surgery		1	

	1		1
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Overall, 12 out of 60 patients were predicted to be difficult cases out of which 8 were difficult on surgery and 5 out of all difficult cases got converted.

13) **Preoperative prediction with biochemical parameter.**

Table-XIII

Preoperative parameters	Predicted as difficult	Concluded as difficult	Conversion
Biochemical	5	4	2
WBC ($\geq 10000/\text{cumm}$)	3	2	1
Total Bilirubin ($\geq 1\text{mg/dl}$)	1	1	0
ALP ($> 310\text{IU/L}$)	1	1	1

Out of 60 patients 5 patients were predicted to be difficult based on biochemical parameters of which 4 were difficult on surgery. Out of 4 difficult cases 2 got converted to open procedure.

14) **Preoperative prediction with USG parameters**

Table-XIV

Preoperative parameters	Predicted as difficult	Concluded as difficult	Conversion
Ultrasonography	7	5	3

Peri cholecystic collection	1	1	0
GB wall thickness (≥4mm)	2	1	1
Stone impaction at neck	1	1	1
Mirizzi's syndrome	1	1	0
GB contracted	2	1	1

Out of 60 patients 7 were predicted to be difficult of which 5 were found to be difficult on laparoscopic cholecystectomy. Out of these 5 difficult cases 3 got converted to open procedure. There were 2 cases with GB wall thickness ≥ 4 mm of which 1 were found to be difficult on surgery and were converted to open procedure. Out of 1 cases of stone impaction at neck/cystic duct 1 were predicted to be difficult of which 1 were converted to open procedure. There were 2 cases of contracted GB out of 1 were difficult on surgery and 1 got converted to open procedure. There was only 1 case of Mirizzi's syndrome which was found to be difficult but did not need conversion.

15) Association of clinical findings with difficult laparoscopic cholecystectomy using multivariate logistic regression analysis

Table-XV

Clinical parameters	Odd ratio (OR)	95% CI OR	pvalue
Age in years	Reference		
<65 years	NA		>0.05
≥65 years			
Sex	Reference		
Female	0.044	0.013– 0.144	0.000
Male			
Acute cholecystitis	Reference		
No	0.021	0.004– 0.111	0.000
Yes			
No of acute attacks	Reference		

<2	NA	>0.05
≥2		
H/o upper abd. Surgery		
No		Reference
Yes	NA	>0.05

The table above shows the male sex and acute cholecystitis to be the significant predictors of difficult laparoscopic cholecystectomy among the clinical parameters.

16) Association of biochemical parameters with difficult laparoscopic cholecystectomy using multivariate logistic regression analysis

Table-XVI

Biochemical parameters	Odd sratio (OR)	95%CI OR	pvalue
WBC			Reference
Normal	0.055	0.225	0.000
Raised			
Totalbilirubin (1mg/dl)		NA	>0.05
Alkalinephosphatase (310IU/L)		NA	>0.05

The above table shows only raised WBC count to be significant predictive factor among the biochemical parameters. Total bilirubin and alkaline phosphatase has p value >0.05 which is insignificant.

17) Association of USG parameters with difficult laparoscopic cholecystectomy using multi variate logistic regression analysis

Table-XVII

USG parameters	Odd ratio (OR)	95% CI OR	p value
Stone impaction in neck/cystic duct	Reference		
No	0.023	0.004– 0.127	0.000
Yes			
GB contracted	Reference		
No	0.019	0.005– 0.067	0.000
Yes			
GB wall thickness	Reference		
<4mm		– 0.765	
≥4mm			
Mirizzi's syndrome	NA		
Pericholecystic collection	>.05		

The above table shows contracted GB and stone impaction at neck/ cystic duct to be highly significant predictive factors followed by GB wall thickness. Mirizzi's syndrome and pericholecystic collection were not shown to be significant factors for conversion.

DISCUSSION:

Gall stone disease is indeed a very common disease and the incidence of the disease is on the rise. Cholecystectomy is the second most common operation performed in the United Kingdom, being only marginally exceeded by appendicectomy (Maingot 1774)¹ and it remains the gold standard for treatment of gallstone disease. The classical open cholecystectomy is performed through 10 to 15 cm incision either through the Kocher's sub-costal incision or through the right para-median incision. Few of the disadvantages of classical open cholecystectomy are increased post operative pain, ugliness and increased recovery time as compared to laparoscopic cholecystectomy. Laparoscopy has seen maximum progress in the last decade. Laparoscopic cholecystectomy has now become the gold standard for the treatment of symptomatic gall stone disease. In MKCG Medical College also it is one of the most common operations

performed. The main aim of the study is to detect preoperative predictors and the rate of conversion of laparoscopic cholecystectomy to open cholecystectomy in our institute.

Laparoscopic cholecystectomy can be difficult in cases with dense adhesions and distorted anatomy. The various features that can increase the technical difficulty are adhesions in the Calot's triangle, distorted anatomy, empty gallbladder, contracted gallbladder, Mirizzi's syndrome, previous upper abdominal surgery and acute cholecystitis. The conversion rate in various studies ranges from 1.5 to 35%.^{10-14,16}

In this study 60 patients have been included in which clinical, biochemical and ultrasonographic parameters for predicting difficult laparoscopic cholecystectomy were analysed.

The various preoperative parameters in literature for predicting difficult laparoscopic cholecystectomy are: age, sex, acute attacks, previous upper abdominal surgery, jaundice, obesity, raised WBC, low albumin, gallstone size, gallbladder wall thickness, gallbladder volume, and number of stones, common bile duct size and stone impaction in the neck. Of these age > 65 years, male sex, previous upper abdominal surgery, gallbladder wall thickness, contracted gallbladder and stone impaction shows the maximum correlation with difficult laparoscopic cholecystectomy and/or conversion of laparoscopic cholecystectomy to open cholecystectomy.^{2-9,11-14,16}

In this study out of 60 cases 5 got converted to open cholecystectomy with conversion rate of 8.3%. This conversion rate is comparable to several other studies.^{11-14,16}

The age of the patients varied from 21 – 74 years. The majority of patients were in the age group of 41 – 50 years. The mean age was 41.9 years with standard deviation of 9.9. The conversion rate was highest in the age group of 51 - 60 years.

The conversion rate in the age group of ≥ 60 years in this study was 100%. So, it is observed that with increasing age risk of conversion increases. However, in this study, in multivariate logistic analysis age ≥ 65 years was not found to be a significant predictor of conversion. The observed disparity may be due to less number of patients above 65 years of age in this study. H. J. J. van der Steeg et al (2011)¹⁷ found age more than 65 years to be significant independent predictive factors for conversion on multi

variate logistic regression analysis.

Out of 60 patients, 11 were male and 49 were female. Male:Female ratio is 1: 4.45 which corroborates with the study of Ajay Anand et al (2007)¹⁸ who also found female preponderance. Out of 11 male 2 got converted which accounts for 18.1% of male patients whereas out of 49 female 3 got converted which accounts for 6.1% of female patients. From this we can conclude that conversion rate is 2.96 times higher in male patients in this study which corroborates with the study of H. J. J. van der Steeg et al (2011) and Volcan et al (2011).^{17,19}

Overall, 12 out of 60 patients were predicted to be difficult cases based on clinical parameters out of which 8 were difficult on surgery and 5 out of all difficult cases got converted. Among the clinical parameters, male sex and acute cholecystitis were found to be significant predictors on multivariate logistic regression analysis. This corroborates with the study of H. J. J. van der Steeg et al (2011)¹⁷ who found male sex and acute cholecystitis to be significant independent predictive factors for conversion on multivariate logistic regression analysis. Volcan et al (2011) also found male sex to be the only statistically significant risk factor for conversion in the series.¹⁹

In this study number of acute attacks more than two was not significant predictor for conversion on multivariate analysis which was found to be significant in the study of Wing-Hong Li et al (2009).⁹

Among clinical parameters previous upper abdominal operation was not found to be significant in this study. However, Fanaei S A et al (2009) found previous upper abdominal operation to be significant predictive factors. This disparity may be due lesser number of cases with upper abdominal operation in this study.

Out of 60 patients 5 patients were predicted to be difficult based on biochemical parameters of which 4 were difficult on surgery. Out of 4 difficult cases 2 got converted to open procedure. Amongst the biochemical parameters taken in this study, raised WBC count was the only significant preoperative predictor on multivariate logistic regression analysis which corroborates with the study of Jeremy M. Lipman et al (2007).²⁰ Raised bilirubin was not significant in this study whereas Wing-Hong Li (2009) et al found raised bilirubin to be significant in their study.⁹

Raised alkaline phosphatase was not found significant in this study however Changiz Gholipour et al (2009) found it to be significant predictor in their study.²¹

Out of 60 patients⁷ were predicted to be difficult based on ultrasonographic parameters of which 5 were found to be difficult. Out of these 5 difficult cases 3 got converted to open procedure. In this study, a good correlation between gallbladder wall thicknesses with conversion to the open procedure was found which is in accordance with reports in other studies.^{4,5} In study by Carmody E et al (1994), however, the opposite is reported.²²

This study shows that stone impaction at the gallbladder neck is a good predictor of conversion to the open procedure, which is contrary to the findings in other studies in which stone impaction is shown to have a moderate correlation. The main difficulty with stone impacted at the neck or Hartman's pouch is that it hinders holding of the gall bladder during dissection, and also due to impacted stone, the gallbladder is distended with mucus forming mucocele of the gallbladder, which is even more difficult to hold. In these cases, the gallbladder was emptied of its contents by aspirating the contents making the gallbladder more manageable.

The contracted gallbladder on ultrasonography was found to be significant predictive factor in multivariate logistic regression analysis in this study which corroborates with study of Pervez Iqbal et al (2008) who found contracted gallbladder to be insignificant.²³ However, pericholecystic collection and Mirizzi's syndrome was not found to be significant predictive factor in this study. This disparity was due to lesser number of cases.

Difficult dissection secondary to adhesions was the most common cause for difficult laparoscopic cholecystectomy and/or conversion to open cholecystectomy in this study. The other causes of conversion were short & dilated cystic duct leading to inability to apply clips, bleeding from gallbladder bed and tear of cystic artery, tear of gallbladder with spillage of stones and bile. These various difficulties leading to operative time more than 90 minutes were taken as difficult cases. The laparoscopic cholecystectomy in expert hands should not take more than 45 to 50 minutes.⁶

The policy of our institute is early conversion if there is difficulty in progress in dissection of the Calot's triangle. This probably accounts for the high conversion rate in our study. Another reason for high conversion could be due to the reason that our patients usually are from the low socio-economic group and come to seek medical advice only after years of neglect of the disease and after repeated

attacks. Since the surgeries were done by surgeons experienced in laparoscopic cholecystectomy of our institute, therefore the learning curve statistics do not apply to this study.

This study shows that preoperative clinical, biochemical and ultrasonographic parameters can predict operative difficulty for laparoscopic cholecystectomy to a good extent. These parameters can also aid in recognition of cases where an open cholecystectomy should be considered and the patient counselled preoperatively.

CONCLUSION:

Laparoscopic cholecystectomy has rejuvenated general surgery and in very short time has become the gold standard operation for benign gallbladder disease, but the procedure is technically more demanding than the classical open cholecystectomy. Although introduction of laparoscopic cholecystectomy has dramatically affected the management of patients with biliary disease, but even to day there are numerous challenges and unanswered questions that remain, regarding issues related to application of laparoscopic techniques to this very common clinical disorder. Greater chances of damage to the common bile duct and surrounding viscera exist.

The aim of our study was to evaluate some preoperative factors, which can reliably predict the chances of conversion to the open procedure and the complications during laparoscopic cholecystectomy. This may benefit the patients because beforehand information about the possibility of complications and conversion to the open procedure can be made available. The patient can be mentally prepared and can adjust his or her expectations accordingly. In addition, the surgeon can directly perform the classical open cholecystectomy in the patients with presumed difficult surgery thus saving operating time and the conversion rate.

This prospective study was conducted on 60 patients undergoing laparoscopic cholecystectomy in the department of Surgery, MKCG Medical College & Hospital, over a period of 24 months from November 2018 to October 2020, to evaluate and correlate the clinical, biochemical and ultrasonographic findings with the operative findings for anticipating difficult laparoscopic cholecystectomy. The parameters which were studied are age ≥ 65 years, sex, acute cholecystitis, number of acute attacks in the past, history of upper abdominal surgery, WBC count (≥ 10000), total bilirubin (≥ 1.5 mg/dl), ALP (≥ 310 IU/L), gallbladder wall thickness (≥ 4 mm), pericholecystic collection, gallbladder size

(contracted gallbladder), stone impaction at neck/cystic duct and Mirizzi's syndrome.

The risk of organ injury was minimized in our study by using open trocar placement (a Hasson cannula was used). Patients with previous lower abdominal surgeries were also included in our study.

The operative parameters taken to assess the difficulty of the laparoscopic cholecystectomy were total time taken to operate from the insertion of the trocar to the extraction of the gallbladder (more than 90 mins), tear of gallbladder with spillage of bile and stones, and conversion to open cholecystectomy. The surgeons' experience in laparoscopic cholecystectomy performed the surgeries. The results of the above study were:

- 1) The rate of conversion was found to be 8.3%
- 2) Male to female ratio was 1:4.45
- 3) The majority of patients were in the age group of 41–50 years. The mean age was 41.9 with standard deviation of 9.9. The conversion rate is high in the age group of 51–60 years.
- 4) Overall, 12 out of 60 patients were predicted to be difficult cases based on clinical parameters out of which 8 were difficult on surgery and 5 out of the 12 cases got converted.
- 5) Out of 60 patients 5 patients were predicted to be difficult based on biochemical parameters of which 4 were difficult on surgery. Out of 4 difficult cases 2 got converted to open procedure.
- 6) Out of 60 patients 7 were predicted to be difficult of which 5 were found to be difficult on ultrasonographic parameters. Out of these 5 difficult cases 2 got converted to open procedure.
- 7) In this study, on multivariate logistic regression analysis male sex, acute cholecystitis, WBC more than 10000/cumm, contracted gallbladder and stone impaction at neck region were found to be significant predictive factors for conversion of laparoscopic cholecystectomy to open cholecystectomy.
- 8) Most common reason for difficult laparoscopic cholecystectomy and conversion to

open procedure was adhesion in the Calot's triangle and with the surrounding structures.

- 9) The intra-operative complications that occurred in this study were cystic artery tear, bleeding from gallbladder bed, tear of gallbladder and spillage of stones and bile.

From this study, we can conclude that preoperative clinical, biochemical and ultrasonographic parameters are good predictors of difficulty in laparoscopic cholecystectomy in the majority of cases and should be used as a screening procedure. It can help surgeons to get an idea of the potential difficulty to be faced in a particular patient.

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