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Original Article

Corelation of Pre-operative Parameters with Conversion Rate and Duration of Post-operative Hospital Stay in Patients Undergoing Laparoscopic Cholecystectomy: A Prospective Observational Study

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Abstract

Introduction: Laparoscopic cholecystectomy (LC) continues to be the choice of treatment for cholelithiasis. Conversion to open surgery may be necessary to prevent injury (e.g. bile duct injury), treat an intraoperative complication (e.g., bleeding, bowel injury, bile duct injury), or due to failure to progress. Therefore, the aim of this study is to determine the rate of conversion to open cholecystectomy (OC) and identify the associated factors, and subsequently post-operative hospital stay.

Materials and Methods: Ethical clearance was obtained by the institute. The study was conducted in total of 311 patients, with complains of the upper abdominal discomfort and sonography diagnosis of cholelithiasis, or incidentally detected cholelithiasis on ultrasonography. A written informed consent was obtained from all the participants. The collected data was recorded in a predesigned pro forma. All $P < 0.05$ were considered to be statistically significant.

Result: The rate of conversion was 12.5% and the mean age was 48.0900 ± 14.8818 years. A higher incidence of conversion was seen among individuals in the age group of 31–60 years and 61–90 years. Women are twice as likely as men to develop gallstones. Out of 311 patients, 199 (63.98%) were female and 112 (36.01%) were male. Thirty-nine patients underwent conversion and 25 of them were female. Similarly, conversion to OC was seen to be high in patients with deranged liver function test.

Conclusion: Within the given limitations of study, we can conclude that the rate of conversion was 12.5% and the mean post-operative hospital stay in laparoscopic group was 1 day, whereas for the conversion group, it was 4 days.

Key words: Acute cholecystitis, Associations with various parameters, Conversion to open surgery

INTRODUCTION

Laparoscopic cholecystectomy (LC) continues to be the choice of treatment for cholelithiasis.[1] It has been the standard approach for symptomatic gallstones for more than two decades and is associated with improved recovery and lower morbidity.[2] It is preferred due to its safety, reliability, cost-effectiveness, negligible mortality, shorter duration of hospitalization (early return to work), better cosmesis, minimal wound complications, and temporary paralytic ileus. However, in certain situations, it might not be feasible and a surgeon may have to move to a safer choice: An open cholecystectomy (OC).[1]

LC today can be as straightforward operation, but may also be an operative approach faught with underlying complexities necessitating conversion, leading to longer operative time, longer hospital stay, and more post-operative morbidity and higher hospital costs.[3]

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Some studies have shown that certain factors are associated with an increased risk of conversion from laparoscopic to OC. These include pre-operative factors such as age, sex, body mass index >30, emergency admission, previous abdominal surgeries, history of diabetes, high white blood cell count, high alkaline phosphatase (ALP) level, high bilirubin level, and signs of acute cholecystitis on ultrasound, and intraoperative factors such as difficulty in defining the anatomy, adhesions, and increased gallbladder wall thickness.[4]

Some of these complications and several other factors can necessitate the conversion from LC to OC.[5]

Conversion to open surgery may be necessary to prevent injury (e.g., bile duct injury), treat an intraoperative complication (e.g., bleeding, bowel injury, and bile duct injury), or due to failure to progress. Several other pre-operative factors may also increase the risk of open conversion, prolonging operating time and hospital stay. Pre-operative identification would improve consent, scheduling and identify cases.[2]

Therefore, the aim of this study is to determine the rate of conversion to OC and identify the associated factors, and subsequently post-operative hospital stay.

MATERIALS AND METHODS

Study Area

General Surgery department of Apollo Multispecialty Hospitals Limited, Kolkata.

Study Population

1. Inclusion criteria – Complains of the upper abdominal discomfort and sonography diagnosis of cholelithiasis, or incidentally detected cholelithiasis on ultrasonography were included in the study.
2. Exclusion criteria – Patient voluntarily choosing to undergo OC or patient not willing to share their medical reports for evaluation purpose were excluded from the study.

Sample Size

Three hundred and eleven patients selected for the study.

Study Design

This study was prospective observational study

Study Duration

All the cases from July 2019 to June 2020.

Since the study intends to assess the corelation of pre-operative parameters with conversion rate and duration of post-operative hospital stay in patients undergoing LC. A prospective observational research design was adopted for the study.

A total of 311 patients presenting to the General Surgery department of Apollo Multispecialty Hospitals Limited, Kolkata with complains of the upper abdominal discomfort and sonography diagnosis of cholelithiasis, or incidentally detected cholelithiasis on ultrasonography were included in the study. Period of study was from July 2019 to July 2020. Before the commencement of the study, ethical clearance was obtained from the Institutional Ethical Committee. After explaining the purpose of the study, a written informed consent was obtained from all the participants. The collected data were recorded in a predesigned pro forma.

Statistical Analysis

For statistical analysis, data were entered into a Microsoft Excel spreadsheet and then analyzed by SPSS (version 27.0; SPSS Inc., Chicago, IL, USA) and GraphPad Prism version 5. Data had been summarized as mean and standard deviation for numerical variables and count and percentages for categorical variables.

The significance will be calculated using mean, standard deviation, and calculated "*P*" value. The Chi-square will be used to find the correlation with selected demographic factors and the findings will be documented in tables, graphs, and diagrams and $P \leq 0.05$ was considered for statistically significant.

RESULTS AND DISCUSSION

The rate of conversion was 12.5% and the mean age was 48.0900 ± 14.8818 years. A higher incidence of conversion was seen among individuals in the age group of 31–60 years and 61–90 years as shown in Table 1. Women are twice as likely as men to develop gallstones which is highlighted in Table 2. Out of 311 patients, 199 (63.98%) were female and 112 (36.01%) were male. Thirty-nine patients underwent conversion and 25 of them were female.

Ultrasonography is the simplest, easiest, and an early tool for the evaluation of gallbladder diseases. Pre-operative USG can dictate the rate of conversion.[6] In this study, it was observed that 32 (82.1%) patients in the conversion group had a thick and edematous gallbladder wall with stone in conjunction with multiple gallbladder stones seen in 35 (89.7%) patients in the conversion group was an ideal predictor for conversion to OC as shown in Figure 1. Moreover, the presence of Common bile duct (CBD) stones seen in 21 3.85%) patients on Magnetic resonance

cholangiopancreatography (MRCP) in the conversion group as shown in Figure 2.

Among blood parameter, increased total blood count: 23 (59%) patients, along with increased neutrophil count in differentiated leukocyte count patients, were found to be significant factors contributing toward conversion of LC to OC as shown in Table 3.

Deranged pancreatic enzymes represented by Serum Amylase and Lipase did not contribute toward conversion of LC.

The following parameters were included in liver function test for this study: serum glutamic-oxaloacetic transaminase (SGOT) – 19 (48.7%) patients, ALP – 33(84.6%) patients as Respectively shown in Tables 4 and 5. Deranged

Table 1: Association between age and conversion

Age	Laparoscopic cholecystectomy	Percentage (%)	Conversion	Percentage	Total	Chi-square value	*P*-value
≤30	30	11.03	2	5.1	32	16.1655	0.0003
31–60	193	70.96	19	48.7	212		
61–90	49	18.01	18	46.2	67		
Total	272	100	39	100	311		

Table 2: Association between sex and conversion

Sex	Laparoscopic cholecystectomy	Percentage	Conversion	Percentage	Total	Chi-square value	Risk estimate	Confidence interval	*P*-value
Female	174	63.97	25	64.1	199	0.0003	0.9943	0.4940–2.0013	0.9871
Male	98	36.03	14	35.9	112				
Total	272	100	39	100	311				

Table 3: Association between TLC and conversion

TLC (/cumm)	Laparoscopic cholecystectomy	Percentage	Conversion	Percentage	Total	Chi-square value	Risk estimate	Confidence interval	*P*-value
4000–10,000	221	81.25	16	41.03	237	30.4363	6.2292	3.0718–12.6320	<0.0001
>10,000	51	18.75	23	58.97	74				
Total	272	100	39	100	311				

ALP: Alkaline phosphatase

Table 4: Association between SGOT and conversion

SGOT (U/L)	Laparoscopic cholecystectomy	Percentage	Conversion	Percentage	Total	Chi-square value	Risk estimate	Confidence interval	*P*-value
10–42 U	203	74.63	20	51.28	223	9.1662	2.7949	1.4093–5.5431	0.0024
>42	69	25.37	19	48.72	88				
Total	272	100	39	100	311				

SGOT: Serum glutamic-oxaloacetic transaminase

Table 5: Association between ALP and conversion

ALP (U/L)	Laparoscopic cholecystectomy	Percentage	Conversion	Percentage	Total	Chi-square value	Risk estimate	Confidence interval	*P*-value
42–98	162	59.55	6	15.4	168	26.7970	8.1000	3.2835–19.9816	<0.0001
>98	110	40.45	33	84.6	143				
Total	272	100	39	100	311				

ALP: Alkaline phosphatase

Table 6: Distribution of mean hospital stay

Hospital stay	Number	Mean	SD	Minimum	Maximum	Median	*P*-value
Laparoscopic cholecystectomy	272	1.2096	0.4340	1.0000	3.0000	1.0000	< 0.0001
Conversion	39	4.1026	0.3074	4.0000	5.0000	4.0000	

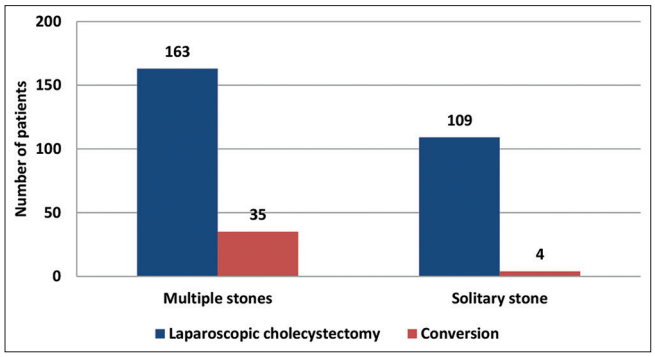

Figure 1: Association between GB stone and conversion

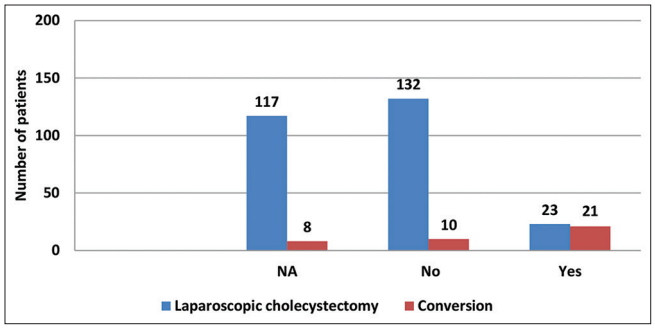

Figure 2: Association between MRCP finding (CBD stone) and conversion

value of each parameter contributed significantly and individually toward the conversion of LC to OC.

The mean post-operative hospital stay in laparoscopic group was 1.2096 days, whereas for the conversion group, it was 4.1026 days as shown in Table 6.

CONCLUSION

The rate of conversion was 12.5% and the mean age was 48.0900 ± 14.8818 years. A higher incidence of conversion was seen among individuals in the age group of 31–60 years and 61–90 years. Women are twice as likely as men to develop gallstones. Out of 311 patients, 199 (63.98%) were female and 112 (36.01%) were male. Thirty-nine patients underwent conversion and 25 of them were female. Similarly, conversion to OC was seen to be high in individuals with diabetes mellitus.

In ultrasonography, it was observed that a thick and edematous gallbladder wall in conjunction with multiple gallbladder stones was an ideal predictor for conversion to OC. Moreover, the presence of CBD stones on MRCP followed by stenting during ERCP sustainably increased the chances of conversion.

Among bloods, decreased hemoglobin, increased total blood count along with increased neutrophil count in differentiated leukocyte count, and decreased platelet count were found to be significant factors contributing toward conversion of LC to OC.

The following parameters were included in liver function test for this study: Total protein, serum albumin, total bilirubin, direct bilirubin, SGOT, SGPT, GGT, and ALP. Deranged value of each parameter contributed significantly and individually toward the conversion of LC to OC.

This finding coincided with the those of Yetkin *et al.*[7] Among 108 patients, 19 required conversion to OC and the average hospital stay period was 1.48 days for the LC group and 5.79 days for the conversion group. Studies by Kim *et al.*[6] and Peters *et al.*[8] also showed similar findings. In this study, the hospital stay of the patients that were converted was 4.1026 ± 0.3074.

The mean post-operative hospital stay in laparoscopic group was 1.2096 days, whereas for the conversion group, it was 4.1026 days.

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