Incidence and reasons for conversion of laparoscopic cholecystectomy to open cholecystectomy

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ABSTRACT

Introduction: Cholelithiasis is one of the most common problems affecting the gastrointestinal tract. The objective of the study was to find the incidence of cases converted to open cholecystectomy from laparoscopic cholecystectomy and find the association with other intra-operative and preoperative findings. **Methods:** This is a prospective observational study. One hundred elective laparoscopic cholecystectomy cases in the institution of the study were the study sample. Pre-operative and intra-operative findings were noted. Conversion in surgery from laparoscopic cholecystectomy to open cholecystectomy was also recorded and the association was tested through Fisher's exact test. **Results**: The rate of conversion from laparoscopic cholecystectomy to open cholecystectomy was 5%. which was significantly related to sex, time duration of the surgery, bleeding, and anatomical difficulties. **Conclusions:** The conversion rate is only 5% which was significantly associated with sex, time duration of surgery, intraoperative bleeding, and anatomical difficulties.

Keywords: Cholelithisis, conversion, laparoscopic choleystectomy.

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INTRODUCTION

Cholelithiasis is one of the most common problems affecting the gastrointestinal tract. Approximately 20 million cases of cholelithiasis are reported in the United States, out of which one million new cases of cholelithiasis develop each year.[1] In Nepal, cholelithiasis is mainly attributed to the westernization of diet and diverse socioeconomic structure. The practice of laparoscopic cholecystectomy (LC) is gaining popularity in Nepal as equipment and trained surgeons are now available in most of tertiary hospitals. LC is the gold standard technique nationally and internationally for treatment of gallbladder disease in both elective and emergency surgery because it is associated with fewer postoperative complications and shorter hospital stay as compared to open surgery.[2,3] At times LC becomes difficult, takes longer times due to bleeding and bile leakage, which requires conversion to open cholecystectomy. Conversion rate of laparoscopy to open cholecystectomy ranges from 5 to 10%.[4]

Incidence of biliary injury is twice that as with open cholecystectomy.[5] Conversion to open cholecystectomy is not a failure of surgery, it carries a high morbidity, so it should only be performed if other strategies for safe surgery have failed.[6] There are different reasons reported for conversion of LC to open cholecystectomy like difficult anatomy, gall bladder wall thickness more than 4 mm, recent history of cholecystitis, males, bile duct injury and bile leak, etc.[7]

The main objective of the study was to find the incidence of cases converted to open cholecystectomy from laparoscopic cholecystec-

tomy and to find the association with other intra-operative and preoperative findings.

METHODS

This was a prospective observational study conducted for six months. This study was conducted at Pokhara Academy of Health Sciences, Western Regional Hospital, Pokhara, Kaski, Nepal. All the patients who underwent elective laparoscopic cholecystectomy in this institution were the study population. Precision based sample size formula was used for the sample size calculation of sample size. Required sample size calculated for the study was about 73. However, having the large number of cases of cholecystectomy in the institution, we included 100 consecutive cases of elective laparoscopic cholecystectomy. All the LC were performed by experienced surgeons who had completed at least 25 LC independently. The intraoperative findings of all the cases were recorded in separate performa. Causes for conversion of LC to open cholecystectomy were recorded with intraoperative findings like bleeding, difficult anatomy, bile leak etc.

Outcome variable for this study was conversion of the surgical technique from laparoscopic cholecystectomy to open cholecystectomy. We made two categories of the outcome variable as "not converted to open" and "converted to open". Similarly, all the independent variables were used as binary variables. Variable age was grouped as "less than or equal to 60 years" as one category and "more than 60 years" as another category. We categorized age into such two categories because open cholecystectomy leads to greater period of hospital stay and also out of active workforce which may have greater impact over people below 60 years. We also distributed duration of surgery as "less than an hour" and "more than an hour" because average time taken for the surgery in this institution is one hour.

Ethical clearance was obtained from Institutional Review Committee (Ref. No: 129/079). Data were entered into Microsoft Excel and all the statistical analysis was performed through STATA 15.1. Fisher's exact test or Chi Square test was used where applicable to analyze the relationship between conversion of cholecystectomy surgical technique and other predicting variables. The level of statistical significance was set at a p-value <0.05.

RESULTS

A total of 100 participants were included in the study. Therefore, frequency and percentage being same, we presented only frequency to show the distribution of variables in table 1. Rate of conversion of surgical technique from laparoscopic cholecystectomy to open cholecystectomy was 5%. Duration of the surgery was less than an hour in 97% of cases and 79% of the patients who underwent the surgery were females.

Table1: Distribution of exposure and outcome variables for the data of 100 patients

Variables	Category	Total (N=100)
Age	≤60 years	71
	>60 years	29
Sex	Female	79
	Male	21
Past history of cholecystitis	No	88
	Yes	12
Difficult anatomy	No	97
	Yes	3
Pulsatile bleeding	No	97
	Yes	3
Bile duct injury	No	99
	Yes	1
Duration of surgery	Less than one hour	97
	More than one hour	3
Conversion to open	No	95
	Yes	5

The relationship of the conversion of surgical technique from laparoscopic cholecystectomy to open cholecystectomy with other preoperative and intraoperative findings. (Table 2)

Table 2: Relationship between exposure variables and the outcome, surgical technique conversion (N=100)

Variables	Category	Not Converted to open (n=95)		Converted to open (n=5)		P-value
		Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	
Age (years)	<60	68	(71.58%)	3	(60%)	0.62
	>60	27	(28.42%)	2	(20%)	
Sex	Female	78	(82.11%)	1	(20%)	0.007
	Male	17	(17.89%)	4	(80%)	
Past history of Cholecystitis	No	85	(89.47%)	3	(60%)	0.10
	Yes	10	(10.53%)	2	(40%)	
Difficult Anatomy	No	95	(100%)	3	(60%)	0.002
	Yes	0	0	2	(40%)	
Pulsatile Bleeding	No	95	(100%)	2	(40%)	< 0.001
	Yes	0	0	3	(60%)	
Bile duct injury	No	95	(100%)	4	(80%)	0.05
	Yes	0	0	1	(20%)	
Duration of Surgery (hour)	<1 hour	95	(100%)	2	(40%)	< 0.001
	>1 hour	0	0	3	(60%)	

Fisher's exact test was used to analyze the association between outcome variable and other covariates. Result has

shown that there was a statistically significant association (p-value <0.001) between the conversion of surgical technique and other three covariates bleeding (p-value<0.001), duration of surgery (p-value<0.001), difficult anatomy (p-value=0.002), and sex (p-value=0.007). There was no statistically significant association between surgery conversion and bile duct injury (p-value=0.05), between conversion of surgical technique and variables 'age' and 'cholecystitis' suggested by p-value 0.626 and 0.108 respectively.

DISCUSSION

Cholelithiasis is one of the most common problems affecting the gastrointestinal tract. The prevalence of cholelithiasis varies from place to place. Approximately 20 million cases of cholelithiasis are reported in United states out of which one million new cases of cholelithiasis develop each year.[1] Professor Dr. Med Erich Muhe of Boblingen, Germany, performed the first laparoscopic cholecystectomy in September 12, 1985.[8]

In this study, female population had undergone LC more than male population which were 82.11% and 17.89% respectively. There were no cases of third sex. The conversion to open cholecystectomy was 5%, which lies in the same range one to 15% as in other studies.[9,10] Different studies at different institution showed that the most common reasons for conversion to open cholecystectomy were inflammation, recent history of cholecystitis and difficult anatomy.[11] In this study, 80% were male among conversion population. The conversion was common among male due to dense fibrosis and inflammation.[12,13] Gall bladder wall thickness more than 4 mm is one of the causes for conversion of LC to open cholecystectomy but during our study period not a single patient found to have gall bladder wall thickness more than 4 mm.

In this study, 40% of cases among conversion group had past history of cholecystitis and difficult anatomy. Difficult anatomy is more significant statistically than history of cholecystitis in this study. Sixty percentage among conversion group had pulsatile intraoperative bleeding which is statistically significant because trying to control bleeding is difficult laparoscopically. If delayed in controlling bleeding may threaten life of the patient so conversion is high among bleeding conditions.

In this study, only 20% among conversion group had bile duct injury. Increased risk of conversion with statistical significance was found among bile duct injury patients. Biliary injury is common among difficult callot's anatomy patients which is same in our study.[15] Surgeons should be aware of difficult cholecystectomy to decrease complications and conversion to open cholecystectomy.

CONCLUSIONS

Conversion of surgical technique from laparoscopic cholecystectomy to open cholecystectomy had relationship with sex, anatomical difficulties, duration of surgery, and pulsatile bleeding. Surgeons should be aware of different reasons for difficulties of laparoscopic cholecystectomy. We need further large-scale studies for further verification of the reasons for conversion of laparoscopic cholecystectomy to open cholecystectomy.

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AUTHORS CONTRIBUTION

AA did concept designing, definition of intellectual content, literature search, data acquisition and analysis, manuscript preparation, review and editing; NVG and SRP did concept designing, literature search, data analysis and manuscript review.

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