Section: General Surgery

Original Research Article

TO IDENTIFY THE FACTORS LEADING TO CONVERSION OF LAPAROSCOPIC CHOLECYSTECTOMY TO OPEN SURGERY

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Abstract

Background: The aim of the present study was to identify the factors leading to conversion of laparoscopic cholecystectomy to open surgery. **Materials and Methods:** This prospective observational study was conducted at the Department of Surgery, Maharishi Markandeshwar Medical College & Hospital, Kumarhati, Solan (H.P.). A total of 60 Patients who undergo laparoscopic cholecystectomy for gallbladder disease were included in the study. **Result:** The mean age of the participants was 45.6±8.95 years, 25 (41.7%) were male, and 35 (58.3%) were female. The mean BMI observed was 26.78, Hypertension was present in 4 individuals (6.7%), while diabetes was present in 2 individuals (3.3%). Among the cases, 50 (83.4%) had gallstones, 10 (16.6%) were diagnosed with acute calcular cholecystitis, A history of biliary colic was present in 40 participants (66.7%), while 20 participants (33.3%) did not have a history of biliary colic. Out of the total cases, 58 cases (96.6%) were successfully completed as laparoscopic cholecystectomies. There were 2 cases (3.3%) that required conversion from laparoscopic cholecystectomy to open surgery. The most prevalent reason for conversion was dense adhesions of Calot's triangle, accounting for 50% of the cases that were converted. Anatomical variation and injury to the common bile duct accounted for 50% of the cases that required conversion, while no cases experienced injury to the right hepatic artery necessitating conversion. **Conclusion:** There was a 3.3% rate of conversion from laparoscopic to open cholecystectomy in this analysis. According to the study, the reasons for conversion of laparoscopic cholecystectomy to open cholecystectomy were due to Obesity, previous abdominal surgeries, previous ERCP, contracted GB volume, GB wall thickness>4 mm, stone position (Impacted in the neck), signs of pericholecystitis, dense adhesions of Calot's triangle, anatomical variation and common bile duct injury. It is important to note that these factors can vary in different studies and also depend on the surgeon's expertise, patient's anatomy and condition, and other factors.

INTRODUCTION

Symptomatic gallstones are usually effectively managed with laproscopic cholecystectomy.[1,2] There have been ongoing discussions about whether laparoscopic cholecystectomy (LC) or open cholecystectomy (OC) is the better approach for acute cholecystitis; however, based on the Tokyo Guidelines 2018, LC is preferred for the treatment of acute cholecystitis.[3,4] The rate of conversion from LC to OC ranges from 1% to 24%.[1,3,4] Bile duct injury is a feared complication of LC (two to five times higher in LC compared to OC) has become more widely performed.[5]Laparoscopic cholecystectomy (LC) is widely used worldwide and has become the standard approach for the treatment of symptomatic cholelithiasis in recent years.[6] Major advantages of LC including reduced postoperative pain, early return to normal physical activity and improved cosmetic outcomes have made this method the first-line intervention over open cholecystectomy (OC). Several factors, which were previously definitive contraindications for LC are currently diminished due to the recent improvements both in basic surgical concepts and in the technique used.

Nonetheless, conversion from laparoscopic cholecystectomy to open cholecystectomy is sometimes necessary to ensure the success and safety of the procedure. Some studies have shown that certain factors are associated with an increased risk

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of conversion from laparoscopic to open cholecystectomy. These include preoperative factors such as age, sex, body mass index (BMI) >30, emergency admission, previous abdominal surgeries, history of diabetes, high white blood cell count, high alkaline phosphatase 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.[6-8]

Many specialists in order to reduce the rate of conversion have investigated the reasons for conversion. Authors of many studies in this field mainly focused on the risk factors that can be identified and diagnosed before surgery to prevent the risk of conversion. Advanced age, male gender, high body mass index (BMI), previous upper abdominal surgery, choledocholithiasis, thicker gallbladder wall, raised white cell count (WBC) and raised alkaline phosphatase (ALP) were found as predictable risk factors for conversion in laparoscopic cholecystectomy.[9,10]

The aim of the present study was to identify the factors leading to conversion of laparoscopic cholecystectomy to open surgery.

MATERIALS AND METHODS

Study Design: This prospective observational study was conducted at the Department of Surgery, Maharishi Markandeshwar Medical College & Hospital, Kumarhatti, Solan (H.P.).

Participants: A total 60 Patients who undergoes laparoscopic cholecystectomy for gallbladder disease were included in the study.

Exclusion criteria involved patients with contraindications to laparoscopic surgery and individuals who declined to participate.

Data Collection: A structured protocol was utilized to gather comprehensive data. Patient demographics including age, gender, body mass index (BMI), and comorbidities were recorded. Preoperative factors such as diagnosis, history of biliary colic, acute cholecystitis, or other gallbladder pathologies were documented.

During surgery, intraoperative findings were meticulously noted, encompassing anatomical variations, degree of inflammation, presence of adhesions, and difficulty encountered in dissecting the gallbladder. Details regarding the operative time, reasons for conversion, and any intraoperative complications were systematically documented.

Surgeon-related variables encompassed the experience level of the operating surgeon, defined by the number of laparoscopic cholecystectomies performed and any specialized training in laparoscopic surgery.

Outcome Measures: The primary outcome measure was the rate of conversion from laparoscopic cholecystectomy to open cholecystectomy. Secondary outcomes included the identification of specific factors leading to conversion, analyzing their frequency and significance in the decision-making process.

RESULTS

The mean age of the participants was 45.6±8.95 years, 25 (41.7%) were male, and 35 (58.3%) were female. The mean BMI observed was 26.78, Hypertension was present in 4 individuals (6.7%), while diabetes was present in 2 individuals (3.3%). Among the cases, 50 (83.4%) had gallstones, 10 (16.6%) were diagnosed with acute calcular cholecystitis, a history of biliary colic was present in 40 participants (66.7%), while 20 participants (33.3%) did not have a history of biliary colic.

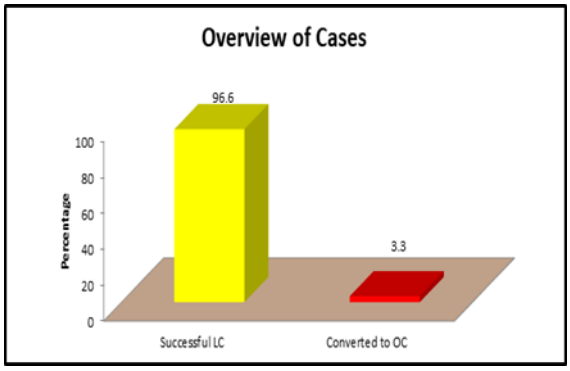

Figure 1:

Out of the total cases, 58 cases (96.6%) were successfully completed as laparoscopic cholecystectomies. There were 2 cases (3.3%) that required conversion from laparoscopic cholecystectomy to open surgery.

The most prevalent reason for conversion was dense adhesions of Calot's triangle, accounting for 50% of the cases that were converted. Anatomical variation, injury to the bile duct, and injury to the common bile duct each accounted for 50% of the cases that required conversion, while no cases experienced injury to the right hepatic artery necessitating conversion.

Table 1: Preoperative Factors (n=60).

Preoperative Factors	Values
Age (years)	Mean: 45.6±8.95
Gender	Male: 25(41.7%) ; Female: 35(58.3%)
Body Mass Index (BMI)	Mean: 26.78±2.41
Comorbidities	Hypertension: 4(6.7%) ; Diabetes: 2(3.3%)
Diagnosis	Gallstones: 50(83.4%); Acute Cholecystitis: 10 (16.6%)
History of Biliary Colic	Yes: 40(66.7%); No: 20(33.3%)

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Table 2: Overview of Cases(n=60).

Total Cases	Successful LC	Converted to OC
60	58 (96.6%)	2 (3.3%)

Table 3: Reasons for Conversion (n=2).

Reason	Number of Cases	Percentage
Dense adhesions of Calot's triangle	1	50.0%
Anatomical variation	1	50.0%
Injury to the bile duct	1	50.0%
Injury to the common bile duct	1	50.0%
Injury to right hepatic artery	0	0.0%

Table 4: Chief complaint, Symptoms, Co-morbidities and ultrasound findings.

Chief complaint	N
Right hypochondrium	45
Epigastric pain	10
Asymptomatic	5
Symptoms	
Nausea with pain abdomen	20
Vomiting	10
Both	11
Co-morbidities	
Diabetes Mellitus	2
Hypertension	4
Ultrasound findings	
Single calculi	42
Multiple calculi	18

Out of 60 patients, 45 patients had a chief complaint of pain in the right hypochondrium, 10 patients presented with epigastric pain and the remaining 5 patients were asymptomatic (incidental cholelithiasis). 20 patients presented with nausea along with pain abdomen and 10 patients presented with vomiting, whereas 11 patients presented with both. 2 patients suffered from Diabetes mellitus whereas 4 of patients were Hypertensive. On ultrasound, single calculi were noted in 42 patients whereas remaining 18 patients presented with multiple calculi.

DISCUSSION

Despite excessive development in surgical skills and methods as well as improvement in surgical instruments, the rate of conversion in laparoscopic cholecystectomy to open surgery is still common. In fact, conversion increases perioperative time, the number of complications, costs of intervention and perioperative arrangements, the length of hospital stay, and other costs.[9,11] Unfortunately, conversion is also associated with severe complications including death, bile duct injury, bile leak, or bleeding, that frequently requires reintervention or transfusion.[9] Conversion rates in laparoscopic cholecystectomy vary widely across different medical centers, from 1 to 30 percent.[11]

In the present study, out of the total cases, 58 cases (96.6%) were successfully completed as laparoscopic cholecystectomies. There were 2 cases (3.3%) that required conversion from laparoscopic cholecystectomy to open surgery. According to a study conducted by Salama et al,[12] in Egypt, the overall conversion rate of laparoscopic cholecystectomy to open surgery was 7.9%. In the present study, the most prevalent reason for conversion was dense adhesions of Calot's triangle, accounting for 50% of the cases that were converted. Anatomical variation, injury to the bile duct, and injury to the common bile duct each accounted for 50% of the cases that required conversion, while no cases experienced injury to the right hepatic artery necessitating conversion.

A study by Khan et al,[13] in Pakistan found that the presence of comorbidities was significantly associated with an increased risk of conversion from laparoscopic cholecystectomy to open cholecystectomy. They reported that the most common comorbidities were diabetes mellitus, hypertension, and cardiovascular disease. The overall conversion rate in their study was 6.4%. The results of our study align with those reported by Khan et al,[13] Specifically, we observed a prevalence of hypertension in 4 persons (6.7%) and diabetes in 2 individuals (3.3%). Out of the observed instances, a total of 50 individuals (83.4%) were found to have gallstones, whereas 5 individuals (16.6%) received a diagnosis of acute cholecystitis. Out of 60 patients, 45 patients had a chief complaint of pain in the right hypochondrium, 10 patients presented with epigastric pain and the remaining 5 patients were asymptomatic (incidental cholelithiasis). 20 patients presented with nausea along with pain abdomen and 10 patients presented with vomiting, whereas 11 patients presented with both. 8 patients suffered from Diabetes mellitus whereas 12 of patients were Hypertensive. On ultrasound, single calculi were noted in 42 patients whereas remaining 18 patients presented with multiple calculi.

In the case series of Shurkalin et al,[14] bleeding has been noted in 0.7% of the patients, and the most

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common causes of bleeding have been determined intraoperative injuries accompanied by anatomic variations of the vessels. Epigastric vessel injury occurred due to trocar entry in two cases in this study; these complications were noticed and successfully treated during the operation. Mortality due to LC is similar to OC and has been reported to vary between 0 and 0.9%.[15-17] Mortality frequently occurs due to concomitant diseases and peritonitis which develop as a result of intraabdominal organ injuries. None of the patients died in our patient series. In the study of Tocchi et al,[18] cholelithiasis complications have been more frequently observed in men, and male sex, as well as ages over 65 years, have been found to be factors negatively effecting operative mortality. Based on some series, higher rates of conversion to open surgery, morbidity and mortality have been reported among older patients.[15-19] This is mostly associated with the frequency of cholecystitis episodes and concomitant diseases. Elective LC is recommended for older patients with symptomatic gallbladder stones before they experience an acute cholecystitis episode.[20]

CONCLUSION

There was a 3.3% rate of conversion from laparoscopic to open cholecystectomy in this analysis. According to the study, the reasons for conversion of laparoscopic cholecystectomy to open cholecystectomy were due to Obesity, previous abdominal surgeries, previous ERCP, contracted GB volume**,** GB wall thickness>4 mm, Stone position (Impacted in the neck), signs of pericholecystitis, Dense adhesions of Calot's triangle, anatomical variation, common bile duct injury etc. It is important to note that these factors can vary in different studies and also depend on the surgeon's expertise, patient's anatomy and condition and other factors.

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