

Original Research Article

A study of factors associated with conversion of laparoscopic cholecystectomy to open cholecystectomy

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ABSTRACT

Background: Gall stones are among the most common gastrointestinal illness requiring hospitalization. Laparoscopic cholecystectomy is the procedure of choice for majority of patients. Factors responsible for conversion to open cholecystectomy are adhesions, obscure anatomy at Calot's triangle, CBD injury etc. Aim was to study patients admitted in surgery department and undergoing laparoscopic cholecystectomy in GMCH, Udaipur. Primary objective was to determine factors of conversion of laparoscopic to open cholecystectomy in tertiary care center. Secondary objectives were to evaluate the age, sex and etiological factors of cholelithiasis.

Methods: It is a prospective observational study done in 100 patients admitted in GMCH during January 2020 to June 2021 after informed consent and ethical clearance approval from IRRC. Patients having cholelithiasis were diagnosed with USG, MRCP and/or ERCP and laparoscopic cholecystectomy was planned. Factors associated for conversion from laparoscopic to open cholecystectomy were studied.

Results: Out of 100 patients 9 were converted to open, adhesion was the most common (8%), (2%) CBD injury, bleed of cystic artery, (1%) bowel injury, (3%) presence of unclear anatomy.

Conclusions: Laparoscopic cholecystectomy is a safe and minimally invasive technique, with only low conversion rate and the commonest cause of conversion in this study was the presence of dense adhesions at Calot's triangle.

Keywords: Cholelithiasis, Cholecystectomy, Adhesions, Conversion, Calot's triangle

INTRODUCTION

Gallstones are among the most common gastrointestinal illness requiring hospitalization.¹ Gall stones are present in 10-15% of the general population and asymptomatic in the majority. Obesity have been identified as strong risk factor for development of symptomatic cholelithiasis. Ultrasound of the abdomen is an extremely useful and accurate method for identifying gallstones.²

The optimal treatment for patients with symptomatic cholelithiasis is cholecystectomy.¹ Open cholecystectomy was once upon a time the gold standard for the treatment of cholelithiasis.³ With evolution, in the present time laparoscopic cholecystectomy is the procedure of choice

for majority of patients with gall bladder disease.¹ Philip Mouret from France performed the first human laparoscopic cholecystectomy in 1987.⁴ The first laparoscopic cholecystectomy was done in India by Prof. T. E. Udwadia in 1989.³ Laparoscopic cholecystectomy has avoidance of large incision, decreased post-operative pain, reduced post-operative ileus, earlier oral fluid and food intake, better cosmesis, reduced patient's hospital stays, fastened post-operative recovery and lowered morbidity and mortality.⁵ General anesthesia with muscle relaxation is required for performing a laparoscopic cholecystectomy. The contraindication for laparoscopic cholecystectomy is the inability to tolerate general anesthesia.² Because most of the pneumoperitoneum in laparoscopy procedure is performed using CO₂ which has

a number of adverse physiologic effects, with poor ability for gas exchange and congestive heart failure, recent myocardial infarction is considered relative contraindications.² The first step in successful laparoscopic cholecystectomy is the recruitment of a good operating team. This includes a well-trained laparoscopic surgeon, a first assistant with equivalent skills, and a camera operator who is familiar with the anatomy and technique of laparoscopic cholecystectomy.

A high-flow carbon dioxide insufflator, four trocars (one or two 10 or 12-mm trocars and two or three 5-mm trocars), and approximately 10 specialized laparoscopic hand instruments are required. Once the patient is anesthetized and intubated, a nasogastric tube is generally placed for decompression of the stomach.¹ Access to the peritoneal cavity and creation of pneumoperitoneum can be performed by the closed or open technique according to the expertise and discretion of the surgeon.² Generally, the pneumoperitoneum is obtained by sliding a specialized needle (Veress needle) through the umbilicus, confirming the needle position by allowing saline to run through the needle from a plunger less syringe, and then attaching the needle to tubing from the carbon dioxide insufflator.¹

A 10- mm trocar is inserted through the supraumbilical or infraumbilical incision. A brief exploration is performed and additional 5-mm ports are placed in the right anterior axillary line, right midclavicular line and subxiphoid location (level of the inferior liver edge just to the right of the falciform ligament) under direct vision.² Exposure of the porta hepatis requires maximal elevation of the gallbladder fundus and liver edge.¹ Stripping of the peritoneum over the gallbladder should reveal the presumed cystic duct insertion into the gallbladder. Continued dissection at this interface, first with a fine dissector and then with a monopolar L-hook between the cystic duct and cystic artery, provides the anatomic definition of important cystic duct anatomy.¹ There are different cystic duct variations based on length, course and site of insertion with CHD.⁶ A useful landmark for the cystic artery is the overlying lymph node, known as the lymph node of Lund. The view of the liver bed through the space between cystic duct and cystic artery and above the cystic artery is known as the critical view of safety, and minimizes the risk of inadvertent iatrogenic bile duct injury.² Two clips are placed on the cystic duct immediately below its junction with the gallbladder, and the cystic duct is divided. Two hem clips are placed on the cystic artery as it crosses onto the gallbladder and the cystic artery is divided. The sterile retrieval bag is introduced through either the umbilical or the epigastric port, whichever is at least 10 mm in size.¹ Conversion from laparoscopic cholecystectomy to open cholecystectomy is still required in certain circumstances.⁴ All the patients for laparoscopic cholecystectomy should be informed preoperatively and there should be adequate assessment of the preoperative risk factors for the estimation of the chance of conversion

of a laparoscopic cholecystectomy to open cholecystectomy.⁷ Conversion of laparoscopic to open surgery should not be regarded as a complication but as an attempt to prevent complications.⁷ Factors usually responsible for conversion from laparoscopic cholecystectomy to open cholecystectomy are: Pericholecystic adhesions, Intra-operative bleeding, common bile duct injury, visceral injury, instrumentation failure, empyema of gall bladder, spillage of gall stones, impacted large stone, liver bed injury, unclear biliary anatomy, surgeon's knowledge, laparoscopic fellowship training, operative experience and skill in laparoscopic surgery plays an important role.

Identification of these risk factors before the procedure can prevent possible conversion to open cholecystectomy and this would be beneficial for both surgeon and patient.⁷

Aim and objectives

For patients admitted in surgery department and undergoing laparoscopic cholecystectomy at Geetanjali medical college and hospital, Udaipur.

Aim

The aim of the study was to evaluate the factors associated with conversions of laparoscopic cholecystectomy to open cholecystectomy.

Primary objective

The primary object of this study was to determine factors of conversion of laparoscopic to open cholecystectomy in tertiary care center

Secondary objective

The secondary objective of this study was to evaluate the age, sex and etiological factors of cholelithiasis.

METHODS

This is a prospective observational study conducted in 100 admitted patients in Geetanjali medical college and hospital (GMCH) from January 2020 to June 2021 with symptomatic gallbladder disease and scheduled for laparoscopic cholecystectomy. Study was conducted after taking ethical clearance approval and informed consent from each patient.

Inclusion criteria

Patients of both genders aged 18 years and above with gall bladder disease and patients willing to participate in our study and ready to give written and informed consent for converting laparoscopic to open cholecystectomy were included in the study.

Exclusion criteria

Patients with clinical features of obstructive jaundice, palpable gall bladder lump, pregnant females, perforated gall bladder and carcinoma of gall bladder or any other malignancy were excluded from study.

Patients who refused to give written and informed consent. cholecystectomy vs those patients with converted to open cholecystectomy.

In all patients a detailed clinical history, previous treatment record was obtained and a thorough clinical examination was performed. Preoperative investigations including CBC, BT/CT, RBS, LFT, RFT, S. amylase, S. lipase, urine routine, HIV, HBsAg, HCV, ECG, chest x-ray (PA view) was performed. In all cases, an abdominal ultrasound was performed. In some cases, magnetic resonance cholangiopancreatography (MRCP) and endoscopic retrograde cholangiopancreatography (ERCP) were also performed. The consultant surgeon performed the laparoscopic cholecystectomies. The operative findings and reason for conversion were recorded and carefully analyzed. All cholecystectomy gall bladder specimens were sent for histopathological examination.

Descriptive analysis will be done using descriptive tools like-1) mean and 2) standard deviation.

RESULTS

From January 2020 to June 2021, out of the 100 cases underwent laparoscopic cholecystectomy. The 56% were males and 44% females. Gender wise distribution showed increased incidence of conversion in male 66% patients compare to female 33% patients.

Table 1: Gender wise distribution of cases.

Gender	N	%
Male	56	56
Female	44	44
Total	100	100

Nine conversions were obtained yielding a conversion rate of 9%. Max no. of patients between 30 to 60 years 72%, 25% of patients were above 60 years of age and 3% of patients were under 30 years of age. Patients having age group of 30-60 years had more conversion rate 77%.

Out of the total 100 patients, duration of surgery was less than 59 minutes in 10% patients, between 60 minutes to 90 minutes in 54% patients and more than 90 minutes in 36% patients. Only 9 patients which were converted to open surgery had longer duration time for surgery and increased post-operative stay.

The causes of conversions are distributed as follow: Out of total 9 patients who underwent conversion, the most common reason for conversion was intraoperative adhesions which was found in 8 patients. CBD injury and bleeding from cystic artery was found in 2 patients each. Only one patient each had bowel injury and unclear anatomy and spillage of gallstones.

Table 2: Age wise distribution of cases.

Age (years)	N	%
<30	3	3
30-60	72	72
>60	25	25
Total	100	100

Table 3: Duration of surgery and post-operative stay in laparoscopic and open converted cases.

Duration	Total (n=100)	Open conversion (n=9)	Laparoscopic (n=91)	P value
	Mean±SD			
Surgery (min)	92.8±35.83	123.89±27.47	89.73±35.20	2.823 (0.006)
Post-operative stay (days)	1.93±1.46	5.89±1.17	1.54±0.70	16.61 (<0.001)

Table 4: Causes of conversion.

Variables	Open conversion (n=9)		Laparoscopic (n=91)		P value
	N	%	N	%	
Adhesion	8	88.89	65	71.43	1.36 (<0.244)
CBD injury	2	22.22	0	0	10.854 (<0.001)
Bowel injury	1	11.11	0	0	2.073 (0.150)
Cystic artery bleeding	2	2.2	0	0	0.636 (0.428)
Unclear anatomy	1	11.11	1	1.1	0.638 (0.424)
Spillage of gallstones	1	11.11	2	2.2	0.222 (0.638)

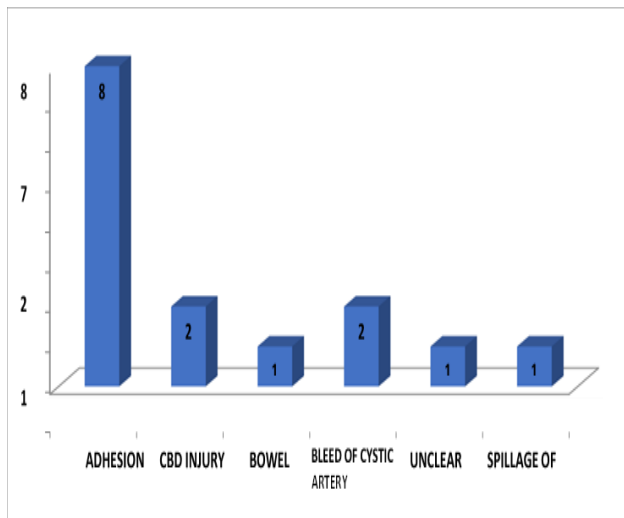


Figure 1: Reasons for conversion.

DISCUSSION

Treatment for gall bladder disease is laparoscopic cholecystectomy, which is now the gold standard treatment. The need for converting a laparoscopy to open technique is not failure, but done to avoid complications.

In our study, majority of the patients were males (56%) out of total 100 patients and the remaining were females (44%). A higher incidence of gall stone disease was seen in male patients in our study. The ratio found in our study was male:female is 1.36:1 sex ratio. In our study out of 9 patients converted to open surgery, 6 patients (66.67%) were male and 3 patients (33.33%) were females. In our study we found that male patients were converted more in comparison to female patients with no significant p value. Thyagarajan et al in their study found that conversion rate was 17.67% in male population and 5.64% in female population, with $p=0.048$, this factor (Male gender) was statistically moderately significant.⁸ This was different from study of Mallik et al who observed that conversion rate was more common in female.⁹ Out of total of 112 patients converted, 18 were male and 94 females with a ratio of male:female being about 1:5. Al Ghadhbhan et al did a similar study on patients undergoing laparoscopic cholecystectomy to open cholecystectomy and also found more conversion in female (10) patients compared to male (2) patients, the percentage being (83.3% vs 16.7%).¹⁰

No age is said to be immune to gallbladder disease, however they were more common in the fourth, fifth and sixth decades of life as 72% of the cases belonged to these decades.¹¹ In our study minimum age of patient undergoing laparoscopic cholecystectomy was 19 years and the maximum age was 83 years. Majority of the patients 72% were in the age group of 30-60 years and 25% of patients were from 60 years and above age and 3% of patients were under 30 years.

In our study, out of 9 patients converted for open technique, 7 (77%) patients were from the age group 30-60 years, 2 (22%) patients were above 60 years of age, no patient below the age of 30 years with no significant p value. The chronicity of gallbladder disease and fibrotic adhesions in patients above 60 years seems to be the main causative factor for conversion. Various studies demonstrate increased conversion in elderly due to recurrent attacks of cholecystitis and complications arising from metabolic decompensation. Awan et al in their study found that the total number of patients those above the age of 60 years were 10.3% and below 60 years were 4.7% which needed conversion to open cholecystectomy.¹² Reddy et al concluded that above the age of 60 years, patients require more conversion compared to those below 60 years of age, showing that age was one of the risk factors for conversion.¹³

In our study out of total 9 converted patients, 8 (88.88%) patients had adhesions and require conversion from laparoscopic cholecystectomy to open cholecystectomy.

Table 5: Conversion rate in different studies.

Studies	Conversion rate (%)
Present study	9
Santhanalakshmi et al¹⁴	13
Mallik et al⁹	11.6
Reddy et al¹³	8.3
Rashid et al¹⁵	7
Agarwal et al¹⁶	6
Awan et al¹²	5.8
Simopoulos et al¹⁷	5.2
Dalal et al¹⁸	1.27

In our study total 100 patients, duration of surgery was less than 59 minutes in 10 (10%) patients and in between 60 minutes to 90 minutes in 54 (54%) patients and more than 90 minutes in 36 (36%) patients. The mean duration of surgery in our study was increased in patients who had conversions than those who did not have conversions (123.89 ± 27.47 vs 89.73 ± 35.20 mins). This association was found statistically significant with $p < 0.006$. A study conducted by Dalal et al found in their study, the mean duration of operation in converted cases was 128 min and for successful laparoscopic cholecystectomy it was 48.3 minutes.¹⁸ Similarly, Santhanalakshmi et al found that the average duration of surgery in their study was 75 minutes, the mean duration of surgery in converted cases was 101.2 minutes and successful laparoscopic surgery it was 79.4 minutes.¹⁴

Limitations

The present study like any other prospective has its limits. Data on intra-operative and post-operative complications can be better assessed with a separate study with larger sample size. Different risk factors correlate with different complications and the severity of

complications. Such a correlation of all the parameters goes beyond the scope of the study.

CONCLUSION

The 'gold standard' procedure for cholecystectomy is still laparoscopic cholecystectomy. Conversion from laparoscopic to open cholecystectomy should be based on the surgeon's sound clinical judgement, not on a lack of individual expertise. It should not be viewed as a failure, but rather as a necessary procedure that will improve patient safety and the likelihood of a positive outcome. Surgeons should also be given adequate attention in terms of training and learning appropriate techniques for performing open cholecystectomy.

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