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Original Research Article

Per-operative conversion of laparoscopic cholecystectomy to open surgery: prospective study at JSS teaching hospital, Karnataka, India

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ABSTRACT

Background: Laparoscopic cholecystectomy has become the standard treatment for symptomatic gall bladder disease. However, there still a substantial proportion of patients in whom Laparoscopic cholecystectomy cannot be successfully performed, and for whom conversion to open surgery is required.
Methods: In this study, 800 laparoscopic cholecystectomy performed at JSS teaching hospital from September 2014 to September 2016, were prospectively analyzed. The patients studied included 800, 518 were females (65%) and 282 were males (35%) with a mean age of 44.8 years. From the data collected, only factors available to surgeon preoperatively were considered for analysis. These factors included: age, gender, history of acute cholecystitis, jaundice, previous abdominal surgery, obesity and concomitant disease, ultrasound preoperatively and amp; ERCP.
Results: Of the 800 patients who were subjected to laparoscopic cholecystectomy, 23 patients (2.9%) required conversion to open surgery. The most common reason for conversion was dense adhesions, followed by suspicion of CBD injury and inability to define anatomy of calot's triangle in patients with inflamed, contracted gall bladder (n = 42).Significant predictor factors for conversion were chronic calculous cholecystitis, previous upper abdomen surgeries and CBD injuries .
Conclusions: Laparoscopic cholecystectomy has indeed become the gold standard for gall bladder diseases, however a conversion rate of up to 5% is internationally accepted. The conversion rate at our institute was 2.9%. This study shows the pre-operative parameters which enables a surgeon to anticipate need for conversion and hence be prepared.

Keywords: Cholecystectomy, Gall bladder, Laparoscopy, Open surgery, Risk factors

INTRODUCTION

Gallstones remain one of the commonest surgical problems especially in the developed world. Prevalence of gallstones in North India population in various series has been estimated to be from 6% (Chandigarh, Kashmir) to as high as 13% (Varanasi). Common bile duct stones are frequent sequelae of cholelithiasis. The frequency of coexisting bile duct stones increases with advancing age. At the time of cholecystectomy for symptomatic cholelithiasis, 8-25% of patients under 60 years and 15-16% of patients over 60 years also have choledocholithiasis. The pathogenesis of gallstones is a complex process involving factors affecting bile content and bile flow. Major organ solutes in bile are bilirubin, bile salts, phospholipids and cholesterol. Gall stones represent a failure to maintain a certain biliary solutes in a solubilised state. Gall stones can be categorised as cholesterol, black pigment, or brown pigment stones on the basis of their composition. Each category has unique epidemiological features, characteristic risk factors and a distinct mechanism of formation.

Elective laparoscopic cholecystectomy (LC) is a present gold standard for management of symptomatic gall stone disease.[1] The advantages of LC over open surgery are a shorter hospital stay, less postoperative pain, faster recovery, better cosmoses.[2] The complications encountered during LC are numerous: some that are specific to this unique technique and some that are common to laparoscopic surgery in general. Specific complications of LC are hemorrhage, gall bladder perforation, bile leakage, bile duct injury.

Some of these complications and several other factors can necessitate the conversion from LC to open cholecystectomy.[3] The conversion from LC to open cholecystectomy results in a significant change in outcome for the patient because of the higher rate of postoperative complications and the longer hospital stay in addition to the effect and the long term sequel of the cause of conversion itself as in bile duct injury.[4] Therefore, aim of this study was to determine the rate of conversion to open cholecystectomy and associated factors.

METHODS

This is a prospective study in JSS teaching hospital, Mysore, India on cases of laparoscopic cholecystectomy. The aim was to identify the risk factors and the rate of conversion to open cholecystectomy in the period between September 2014 to September 2016. 800 cases were evaluated under this study. The preoperative data collected was gender, age, concomitant illness, history of acute cholecystitis and jaundice, previous abdominal surgeries, obesity, ultrasound findings of the gall bladder and preoperative endoscopic retrograde cholangiopancreatatography (ERCP). All patients gave informed consent. The study was approved by the ethic committee.

RESULTS

Summary statistics are done by using proportion, mean, median, standard deviation. Inferential statistics is done using chi-square test. All calculations are done using SPSS version 21.0. p <0.05 is considered as significant. Graphical representation is done using Microsoft Excel. Majority of the patients belonged to age group of 31-50 years with a mean of 44.8 years. Second most common age group was 51-70 years. 65% of the patients were female. Thus the age and sex affected with gall stones were predominantly middle aged female population.

Table 1: Age incidence.

		N	Percentage
Age	<30	159	19.9%
	31-50	375	46.9%
	51-70	252	31.5%
	>71	14	1.8%

Table 2: Age statistics.

Mean	Median	Standard deviation
44.8	45.0	14.2

Table 3: Sex distribution.

Sex	Count	Column N %
Male	282	35.3%
Female	518	64.8%

The age and sex affected with gall stones were predominantly middle aged female population.

Table 4: Comorbidities assessed preoperatively.

Comorbidities	n	Percentage
Diabetes	64	8.0
Hypertension	90	11.3
Obesity	31	3.9
Previous upper abdominal surgeries	5	0.6

The co-morbid conditions were analyzed and it was found that 11.3 % of the patients had hypertension,also, 8% of the study population suffered from diabetes. Other significant comorbidity seen was obesity.

Table 5: Preoperative diagnosis and their incidence

Gallbladder	n	Percentage
Acute calculous chlecystitis	22	2.8
Acute acalculous cholescystitis	0	0.0
Chronic calculous cholescystitis	30	3.8
Chronic acalculous cholescystitis	0	0.0

In the study population out of 800, incidence of acute calculous cholecystitis is 2.8% and chronic calculous cholecystitis is 3.8%.

Table 6: Gallstone disease associated complications assessed preoperatively and their incidence.

Present symptoms signs	Count	Column total N %
Jaundice	20	2.5
Gall stone induced pancreatitis	4	0.5
Per-operative ERCP	35	4.4
Cholelithiasis	763	95.4
Choledocholithiiasis	35	4.4

23 out of the 800 cases studied were converted to open surgery. The most common reason was owing to dense adhesions (2.1% of study population). This was associated with chronic calculus cholecystitis.

Table 7: Intra-operative reasons for conversion of laparoscopic to open cholecystectomy.

Reasons for conversion	n	Percent
Dense adhesions	17	2.1
Inability to delineate anatomy of calots triangle	2	0.3
Suspicious of CBD injury	4	0.5
Duodenal injury	2	0.3
Cystic artery bleeding	0	0.0

CBD injury or suspicion of the same accounted for 0.5% of cases. Other significant reasons were duodenal injury and inability to delineate anatomy of Calot's triangle.

Table 8: Incidence of conversion.

Converted to open	n	Percent
No	777	97.1
Yes	23	2.9

Table 9: Conversion rates in comorbidities.

		Converted_to_open				
		No		Yes		
		N	%	n	%	P- value
Diabetes	No	716	97.3	20	2.7	0.4
	Yes	61	95.3	3	4.7	
Hypertension	No	694	97.7	16	2.3	0.003
	Yes	83	92.2	7	7.8	
Obesity	No	746	97.0	23	3.0	0.3
	Yes	31	100.0	0	.0	
Previous upper abdominal surgeries	No	772	97.1	23	2.9	0.7
	Yes	5	100.0	0	.0	

Table 10: Conversion rate in gallstone disease associated complications.

Associated complications		Converted to open				
		No		Yes		
		n	%	n	%	P- value
Jaundice	No	763	97.8	17	2.2	<0.0001
	Yes	14	70.0	6	30.0	
Gallstone induced pancreatitis	No	774	97.2	22	2.8	0.008
	Yes	3	75.0	1	25.0	
Peroperative ERCP	No	750	98.0	15	2.0	<0.0001
	Yes	27	77.1	8	22.9	
Cholelithiasis	No	26	70.3	11	29.7	<0.0001
	Yes	751	98.4	12	1.6	
Choledocholithiasis	No	750	98.0	15	2.0	<0.0001
	Yes	27	77.1	8	22.9	

Table 11: Conversion rate - preoperative diagnosis.

Preoperative diagnosis		Converted to open				
		No		Yes		
		n	%	n	%	P- value
Acute calculous cholescystitis	No	756	97.2	22	2.8	0.6
	Yes	21	95.5	1	4.5	
Acute acalculous cholescystitis	No	777	97.1	23	2.9	NA
	Yes	0	0.0	0	0.0	
Chronic calculous cholescystitis	No	756	98.2	14	1.8	<0.001
	Yes	21	70.0	9	30.0	
Chronic acalculous cholescystitis	No	777	97.1	23	2.9	NA
	Yes	0	0.0	0	0.0	

Among the medical co-morbid conditions, hypertension was found to be the most common association, however it was not statistically or clinically significant risk factor for conversion to open surgery (p >0.05). Other co-morbid conditions such as diabetes, previous abdominal surgeries etc were also not found to be significant. The presentation of patients were found to be important factor to consider as risk factor for conversion to open surgery. The patients with initial presentation of jaundice, gall stone induced pancreatitis, patients undergoing ERCP were found to be associated with significantly higher conversion rates.

The patients subjected to laparoscopic cholecystectomy with diagnosis of chronic calculous cholescystitis were the group found to be associated with highest conversion rates. This was also proven significant by statictical analysis (chi square test). This correlated clinically with the most common intra-op cause for conversion being dense adhesions.

DISCUSSION

Laparoscopic cholecystectomy has become the gold standard treatment for gall bladder stone disease.[6-10] The advantages to the patient and the economic benefits to society have been reported.[11] However the risk of conversion to open surgery is always present. The actual rates of conversion reported in the literatures are quite variable ranging from 0% to 20%.[6-10] In our study the conversion rate was 2.9% of the 800 attempted laparoscopic cholecystectomies.

Although conversion to open surgery is not a complication, laparotomy is associated with greater morbidity and prolonged convalescence than laparoscopy. Therefore, understanding the risk of conversion allows the patient to make a better informed decision about surgery. From the surgeons' perspective, understanding the factors associated with an increased likelihood of conversion allows more objective selection of patients.

Most of the conversions the reason was anatomic difficulty related to inexperience of the surgeon. Early in a surgeon experience with laparoscopic cholecystectomy, patient selection is likely to be more restricted. In these early cases, surgeon would benefit from having a good idea preoperatively about predictors of an "easy" case as compared with a case more likely to require conversion.

Table 13: Reasons for conversion.

		Converted to open				
		No		Yes		
		n	%	n	%	P- value
Dense Adhesions	No	777	99.2	06	0.8	<0.0001
	Yes	0	0.0	17	100.0	
Inability to delineate anatomy of calots triangle	No	777	97.4	21	2.6	<0.0001
	Yes	0	0.0	02	100.0	
Suspicious of CBD injury	No	777	97.6	19	2.4	<0.0001
	Yes	0	0.0	04	100.0	
Duodenal injury	No	777	97.4	21	2.6	<0.0001
	Yes	0	0.0	02	100.0	
Cystic artery bleeding	No	777	97.1	23	2.9	NA
	Yes	0	0.0	00	0.0	
Suspicious of gallbladder cancer	No	777	97.1	23	2.9	NA
	Yes	0	0.0	00	0.0	

The decision about when to convert to laparotomy is an individual one, often subjective, made by the surgeon in the course of the procedure. In our study, the main reason for conversion was inability to define the anatomy clearly due to dense adhesions (17 out of 23) this finding was noted in similar studies.[12-14]

Two limitations worth mentioning that may affect interpretation of the results. First, that data comes from one centre which may limit generalization of the results. Secondly, data about BMI was not collected and the obesity classification was made subjectively by the surgeon.

CONCLUSION

Conversion rate in present study is within the lower limits and accepted internationally. Dens fibrous adhesion is the main cause of conversion. History of acute cholecystitis is independent risk factor for conversion from laparoscopic to open procedure. Gender, age and history of jaundice or ERCP are not independent risk factor for conversion.

An appreciation for these predictors of conversion will allow appropriate planning by the patient, the institution and the surgeon.

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