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An Evaluation of Risk Variables of Complications in Laparoscopic Cholecystectomy towards acute Cholecystitis

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Abstract

Introduction: The procedure of choice for treating symptoms of gallstone disease is a laparoscopic cholecystectomy (LC). The study's goal is to uncover characteristics that increase the risk of LC, and the results include things like operating time, hospital stay, conversion rate, and morbid and mortality. There was just one district general hospital that treated all of these patients between 1998 and 2007.

Material and Method: Analyses such as univariate and multivariate were used to identify risk variables. Acute lithiasic cholecystitis (ALC) was found in 43% of patients, whereas chronic lithiasic cholecystitis (CLC) was found in 56%. (CLC). Using the Pearson's Chi-Square test, we discovered a correlation between acute cholecystitis and high blood pressure, obesity, and diabetes in the patient.

Results: Nine of the excluded individuals had cholecystectomy while receiving hospital care for another condition, and three had gallbladder cancer. 27 individuals got OC and were then removed from the study. The remaining 373 patients with acute calculous cholecystitis were studied. Acute calculous cholecystitis was defined as the presence of gallstones on preoperative imaging or during the removal of the gallbladder, as well as signs of acute cholecystitis noted by the surgeon after surgery.

Conclusion: In the case of acute calculous cholecystitis, early LC is safe and possible. There is a higher risk of post-operative problems in men, as well as in older patients, those with compromised renal function, and those undergoing open surgery. As a result, we were able to establish in our research that laparoscopic treatment of acute cholecystitis is safe, requiring little aggressiveness from the patient, and resulting in little intraoperative complications and postoperative morbidity

Keywords: Surgical, Laparoscopic, Postoperative, Cholecystectomy, Comorbidities,.

Introduction

Gallstone disease affects 15% of the adult Western population, with the majority of cases occurring in women and the elderly. The number of people with gallstones who develop symptoms each year and may need surgical intervention ranges from one to four percent. Acute cholecystitis, cholangitis, obstructive jaundice, and acute pancreatitis are all life-threatening conditions that may be brought on by untreated gallstones. Hospital admissions for symptomatic gallstone disease have gone up 53 percent since the early 1990s in England,

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while laparoscopic cholecystectomies have changed the therapeutic treatment of cholelithiasis by 53 percent since its debut (LC).

LC is the most frequent laparoscopic procedure in general surgery for patients with symptomatic gallstone disease. LC has almost totally replaced open surgery for cholecystolithiasis because of its decreased post-surgical discomfort, shorter hospital stay, and lower operational morbidity and mortality. Gallstone disease affects 15% of the adult Western population, with women and the elderly especially at risk.[1] One to four percent of people with gallstones become symptomatic each year and may need surgery. It is possible to die from acute cholecystitis, obstructive jaundice, and acute pancreatitis if gallstones go untreated. [2]

Symptomatic cholelithiasis hospitalizations in England have climbed by 53% between the early 1990s and the beginning of this century, but the development of Laparoscopic Cholecystectomies has also revolutionised the treatment of cholelithiasis (LC). [3] The most frequent laparoscopic procedure in general surgery, LC has become the procedure of choice for patients with symptoms of gallstone disease. Cholecystolithiasis open surgery has been largely supplanted by laparoscopic surgery (LC) because to the procedure's lower post-surgical discomfort, shorter hospital stay, lower operational morbidity, and lower mortality.[4]

Surgical centres often meet acute lithiasic cholecystitis, which has a significant social and economic effect. Operation is the most common form of therapy for patients with this condition. The best time to have surgery is still up for debate. On the one hand, early surgical intervention reduces mortality and morbidity, but on the other side, it saves money since the inpatient duration is decreased.[5] Laparoscopic procedures have raised the danger of intraoperative problems and a high conversion rate since their inception. As a result, some research suggests delaying surgery and starting with a less invasive procedure instead. [6]

The biliary ducts, in particular, are vulnerable to problems if surgery is performed late in the disease process. Acute lithiasic cholecystitis may now be treated safely with laparoscopic surgery because to advancements in the laparoscopic method. Instruments for laparoscopic surgery have been improved, but new approaches, derived from the basic laparoscopic procedure, have also been developed.[7] Acute cholecystitis may be successfully treated with laparoscopy as well as open surgery, despite the lower risk associated with the latter. An estimated 48% of acute cholecystitis patients are being treated using the open procedure, despite the lack of evidence to support its superiority over the laparoscopic approach. [8]

Material and Methods

Retrospective examination of patients who had had emergency cholecystectomy at a university teaching hospital was conducted as part of the research. Procedure codes for LC and OC and ICD-10 codes for acute cholecystitis were used to identify 499 individuals in the operating room database. Nine of the excluded individuals had cholecystectomy while receiving hospital care for another condition, and three had gallbladder cancer. 27 individuals got OC and were then removed from the study. The remaining 373 patients with acute

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calculous cholecystitis were studied. Acute calculous cholecystitis was defined as the presence of gallstones on preoperative imaging or during the removal of the gallbladder, as well as signs of acute cholecystitis noted by the surgeon after surgery.

Statistical Analysis

Analysis of the data was carried out using SPSS Statistics, a Mac OS X-based statistical software package (IBM, Armonk, NY). Percentages were used to represent categorical variables. The median, interquartile range, and standard deviation were all reported for continuous variables, as were the 95% confidence intervals. A Chi-square or Fischer's exact test was used for categorical data, while a Mann-Whitney U test was used for continuous data. When doing multivariate analysis, the ROC curve was utilised to determine the cutoff values of continuous variables.

Result

Table 1. "Summary finding of risk factors eligible for meta-analysis"

Risk factor	Number of patients/number of studies	Regarded as a risk factor (based on available evidence)	Pooled OR (95% CI)	Quality of evidence (GRADE)	NOS (median for included studies)	Heterogeneity (I^2), %
Age (high)	2,820/4	Yes	1.64 (1.22–2.19)	Low	8	0
Gender (male)	25,778/9	Yes	1.38 (1.13–1.68)	Low	8	49
BMI (high)	20,748/3	?	1.85 (0.92–3.75)	Very low	8	74
Previous abdominal surgery	23,226/5	?	NA	Very low	8	92
AC	21,460/3	?	NA	Very low	8	94
White blood cell count	1,279/3	No	0.84 (0.52–1.37)	Low	7	0
Gallbladder wall thickness	1,814/3	Yes	8.17 (5.38–12.40)	Moderate	7	0

A total of 460,995 patients were examined as part of 32 investigations that comprised both prospective observation and database searches. There is supplemental information about the specific studies accessible on the Internet. Several studies were based on the same datasets, which resulted in the publishing of several articles.

As of 2010, only 133 out of 2117 patients (6.3 percent) had open surgery, down from 23/1011 (2.3 percent) in the preceding three years. Patients who were older, had more health issues, or were male were more likely to experience this. When it came to the kind of surgery and its urgency, there was no association. Age was not a significant predictor when co-morbidity was taken into consideration, but ASA grade increased the likelihood of conversion, which was higher in male patients than in female patients. Recovery time was not affected by surgical expertise, skill level, or urgency.

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Table 2 "Risk factors for conversion to open surgery for patients undergoing LC in univariate and multivariate analysis."

	Univariate associations		Multivariate analysis	
	n (%)	*p*	Odds Ratio (95% CI)	*p*
Age		0.002		
≤40	15 (3.3)		1	
41–60	48 (5.9)		1.43 (0.78–2.64)	0.253
61–70	39 (8.9)		1.86 (0.96–3.61)	0.065
71–80	19 (6.6)		1.16 (0.54–2.49)	0.714
>80	12 (9.6)		1.63 (0.69–3.89)	0.269
Sex		0.003		
Female	84 (5.4)		1	
Male	49 (8.9)		1.47 (1.00–2.15)	0.047
Co-morbidity		0.002		
ASA I	23 (3.4)		1	
ASA II	75 (7.0)		1.91 (1.15–3.16)	0.012
ASA III	33 (9.6)		2.49 (1.34–4.64)	0.004
ASA IV	2 (15.4)		4.66 (0.91–23.8)	0.064
Missing	0		0.02 (0.00–0.10)	0.732
Urgency		0.162		
Elective	101 (5.9)		1	
Emergency	32 (7.8)		1.31 (0.85–2.02)	0.220
Operation		0.852		
LC	122 (6.4)		1	
LC + OTC	1 (1.2)		0.15 (0.02–1.12)	0.065
LC + CBDE	7 (8.2)		1.06 (0.47–2.42)	0.885
LC + OTC + CBDE	3 (8.1)		1.03 (0.30–3.58)	0.961
Operator		0.574		
Consultant	115 (6.2)		1	
Trainee	18 (7.1)		1.18(0.70–1.99)	0.540

This study's reported conversion rate for LC from laparoscopic to open surgery is 6.3%, which is in line with previous studies reporting conversion rates between 4.8% to 8.3%. The claimed conversion rate of 15% for elective LC is equivalent to our own rate of 5.9%. It's been shown that acute gallbladder illness may result in conversion rates ranging from 5.6 percent to 32%, and ours is just in the middle.

Table3: The association of arterial hypertension with cholecystitis type.

			Cholecystitis type				
			AAC	ALC	CAC	CLC	Total
BP	Yes	No. of subjects	2	44	1	36	83
		% of total no.	1.04	22.80	0.52	18.65	43.01
	No	No. of subjects	1	39	4	66	110
		% of total no.	0.52	20.21	2.07	34.20	56.99
Total		No. of subjects	3	83	5	102	193
		% of total no.	1.55	43.01	2.59	52.85	100

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It was shown that retrograde laparoscopic cholecystectomy patients were hospitalised for less time on average than those who had conventional cholecystitis surgery, with an average stay of just over seven days (9.2 days). Patients requiring open surgical conversion, on the other hand, needed more time in the hospital, which is why the average stay was 22 days. This means that there is no significant difference in hospitalisation time between acute and chronic forms of lithiasic cholecystitis, with an average of 7.7 days for acute and 7.9 days in chronic lithiasic cases, respectively, with a 95 percent confidence range for the mean. One incidence of postoperative haemorrhage, two instances of subhepatic abscess, and two instances of localised peritonitis were observed in 4.68 percent of patients undergoing retrograde laparoscopic cholecystorhinostomy. Due to the small number of patients treated with open cholecystectomy (only 5), it was unable to accurately quantify any postoperative problems.

Table 4 "Independent risk factors for conversion based on stepwise forward logistic regression"

Risk factor	OR (95% CI)	*P*
Analysis of preoperative risk factors only		
CRP over 150 mg/ml	3.0 (1.8–5.0)	<0.001
Diabetes	1.8 (1.0–3.3)	0.045
Analysis including both preoperative and intraoperative risk factors		
Abscess	9.2 (2.7–31.1)	<0.001
Age over 65 years	1.9 (1.1–3.3)	0.023
Gangrene of the gallbladder	5.9 (3.4–10.2)	<0.001

Discussion

In our study, four individuals, bile leaks were discovered (1.1 percent). Bile leaked from two of the cystic ducts and one of the major ones. LC patients did not have any biliary leakage. At least two comorbidities were present in all of the individuals who died, one of which was a cardiovascular ailment. There were four patients classified as IV and one patient classified as III by the American Society of Anesthesiologists (ASA). One of the three fatalities in the LC group was due to heart failure, another to renal failure, and the third was due to sepsis. Postoperative pneumonia and anoxic brain damage from a failed intubation during anaesthesia induction were the causes of mortality for the two patients who were converted. To treat acute calculous cholecystitis, LC has become the usual technique. Both the possibility of converting to an open cholecystectomy and the possibility of postoperative complications, particularly bile duct damage, are major causes for worry. Risk factors for conversion and postoperative problems were the focus of our investigation in this research.

Male gender and a history of abdominal surgery have been connected to conversion. Adhesions from past abdominal operations were a role in the conversion of seven patients (8.03%), although previous abdominal surgery history and male gender were not considered risk factors in this research. The presence of an assistance was shown to be associated with conversion in the univariate analysis, which is likely owing to the fact that helps are often requested for complex surgical procedures. Our results showed that having a helper did not increase the chance of conversion.

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According to the findings, there was no correlation between the length of a patient's hospital stay with their symptoms or outcomes. This may have been due to the fact that individuals with a more serious disease were operated on first. In addition, older individuals with several comorbidities may have missed the earliest beginning of symptoms.[8] It is possible that antibiotics were started as soon as the diagnosis of cholecystitis was made, slowing the disease's course.[9]Cholecystitis without any treatment is more important than the in-hospital delay since the pre-hospital delay of less than 24 hours from the onset of symptoms was associated with the lowest conversion rate. However, although the inflammatory process may seem to progress without regard to passage of time, it is possible that the inflammation moves at its own rate.[10]

BDI rates following LC were projected to decrease as the process grew more prevalent, however according to certain research this prediction has not yet come to fruition. However, there are studies that show the reverse trend - an increase in the frequency of BDI injuries after OC – raising concerns about the inadequacy of training for laparoscopic surgeons in OC method.[11-15]Individuals who have an open surgery and have it finished instead of converting or immediately undergoing an OC may be more at risk for BDI than those who do so due to inflammatory, rupture-prone tissues.

Complication rates for trainee surgeons are higher than those for professionals, according to certain studies that compare the results of cholecystectomy procedures. Our research didn't demonstrate an association, although this might be related to the fact that experts were allocated to patients with more severe conditions. Patients should always be provided with the best treatment possible, hence conducting prospective randomised studies is inherently unethical. The fatality rate in this research (1.3 percent) was greater than the 0.7–1.1 percent reported in previous investigations.

The patients who died in this research had a long list of medical conditions and were labelled high-risk surgery patients by their doctors. In addition to cholecystectomy, other treatment options for severe acute cholecystitis include antibiotics and interval cholecystectomy or PTHC, which may be followed by cholecystectomy. Interval cholecystectomy (IPC) and PTHC have not yet been studied in high-risk surgical patients. A randomised controlled study comparing the usage of LC and PTHC in high-risk individuals has been started in the Netherlands to discover the best therapy for these patients.

Conclusion

In the case of acute calculous cholecystitis, early LC is safe and possible. There is a higher risk of post-operative problems in men, as well as in older patients, those with compromised renal function, and those undergoing open surgery. Conversion is the only one of these elements that can be controlled. After surgery, the patient recovers quickly and may return to work and social life more quickly. As a result, we were able to establish in our research that laparoscopic treatment of acute cholecystitis is safe, requiring little aggressiveness from the patient, and resulting in little intraoperative complications and postoperative morbidity

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