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Original Research Article

Prospective study of predictive factors for conversion of laparoscopic cholecystectomy to open surgery

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ABSTRACT

Background: Gallstone diseases are a common gastrointestinal illness in the general population that frequently requires hospitalization with a prevalence of around 11% to 36% The goal of this study was to determine the conversion rate and identify the factors responsible for the conversion of laparoscopic cholecystectomy (LC) to open cholecystectomy (OC).
This study intends to evaluate the causes of conversion from LC to OC and to establish the efficacy and safety of the procedure.
Methods: This case series was conducted in the department of general surgery at Gujarat Adani institute of medical science, Bhuj, Gujarat from October 2018 to July 2020. Patients more than 18 years of age presenting with OPD with symptomatic gallstones and patients with acalculous cholecystitis were included in the study. Patients with dilated CBD (>8 mm in diameter), jaundice, gallbladder malignancy, and perforated gallbladder were excluded.
Results: A total of 100 patients were included in the study; 68 were females and 32 were males. Eleven (11%) patients were converted to OC. The most common cause of conversion was dense adhesions followed by obscure anatomy at Calot's triangle. Other common causes were bleeding, bile leakage, visceral injuries, and instrument failure
Conclusions: Most common cause of conversion from LC to OC was dense adhesions causing obscure anatomy at Calot's triangle followed by bleeding and CBD injury.

Keywords: Conversion, LC, Open surgery, Risk factors

INTRODUCTION

Laparoscopic cholecystectomy (LC) is a standard treatment for gallstone disease.[1] LC results in a lower overall complication rate and shorter postoperative hospital stay compared to OC. In situations where LC is dangerous, a surgeon may be forced to change from laparoscopy to an open procedure.

Literature data show that 2 to 15% of laparoscopic cholecystectomies are converted to open surgery during surgery for various reasons.[2] Plausible reasons for conversion include inflammation and dense fibrosis of the Calot's triangle, ambiguous anatomy, life-threatening bleeding, and bile duct injury.[3]

Converted cases are associated with an increased number of infectious and other postoperative complications, an increased risk of additional procedures, and a higher rate of readmission within 30 days.

Additionally, the conversion from laparoscopic to open surgery results in longer postoperative stays and higher morbidity and mortality rates in this group of patients.[4]

Identifying preoperative patient-related factors, and anticipating the need to convert from LC to open surgery, can help identify high-risk patients and redefine surgical strategy in this group.

Objectives

Objectives were to identify the risk factors predictive of conversion of LC to open surgery, to determine the rate of conversion of LC to open surgery and to analyse and assess feasibility, safety and potential benefits of LC compared to conventional cholecystectomy

METHODS

Data collection

This prospective observational study was conducted at Gujarat Adani medical college hospital, Gujarat, India. A total of 100 patients presenting with symptomatic gallstone disease without choledocholithiasis were included. Study conducted over a period from Oct 2018-July 2020.

Ethical approval was taken from committee after presentation of initial idea.

Written and informed consent was taken. Patients with other known concomitant infective aetiology, immunocompromised state, and any proven malignancy were excluded from study. All patients planned for LC.

Every patient included in study subjected to following assessments and records maintained on standard proforma: Patients characteristics, history and detailed clinical examination, radiological investigations, operative findings and post op stay and complication.

Inclusion criteria

Patients above the age of 18 years, symptomatic and indicated patient having biliary colic, acute and chronic cholecystitis, cholelithiasis, adults with acalculous cholecystitis and patient willing for investigation and surgery were included in the study.

Exclusion criteria

Patients with age <18 years, gall bladder malignancy, adults with choledocholithiasis, perforated gallbladder 57, patients unfit for general anesthesia and pregnant female were excluded.

All the patients had detailed clerking and data recorded on standard proforma. A routine general physical, abdominal and systemic examination was performed.

Pre-operative workup included routine lab investigations like full blood count, renal function test, liver function tests, chest-X-ray and ultrasound of the abdomen.

The number and size of the calculus, as well as the size of gallbladder, its wall thickness, pericholecystic collection, and CBD calculi or CBD dilatation, noted on ultrasound.

A fully explained well informed consent was taken from all patients undergoing surgery and with an explanation of the risk of conversion to OC.

Also placed nasogastric tube in all patients for gastric decompression to prevent trocar injury. All cases received prophylactic pre-op antibiotics keeping in mind allergies.

The procedure was performed by different senior surgeons. A standard four-port technique was performed in the operation, using carbon dioxide insufflation. The Veress technique was used to obtain pneumoperitoneum. During surgery, the cystic artery and cystic duct were skeletonized and clamped separately with metallic clips. Operative findings, as noted by the operating surgeon, were compared to identify factors related to conversion.

Follow-up of patients done at regular intervals Once a week-1st month, monthly for 3 months.

Collected all data in excel sheet and simple calculation in 100 patient was done. Results compared to prev studies.

RESULTS

A prospective study was carried out from Oct 2018-July 2020 in the department of general surgery for 100 patients undergoing LC. The patients belonged to various surgical units in Gujarat Adani medical college hospital, Bhuj, India and full details of the patients were recorded in the proforma. Complete observations and analysis of all the parameters studies are as follows.

Age incidence

The age group of the patients in this study ranged from 21 years to 79 years. The highest incidence is seen in the age group of 31-40 years.

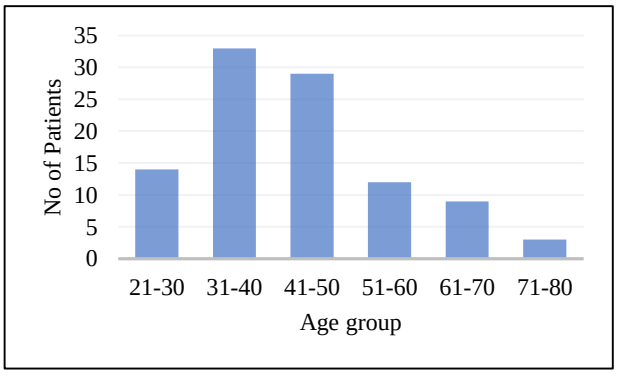

Figure 1: Presentation of no of cases and age group.

Max. conversion noted in 5th and 6th decade (27.7%).

Sex incidence

Among a total of 32 male patients, 2 converted (6.25%), among 68 female patients, 9 converted (13.24%).

Table 1: Sex and surgery outcome.

Sex	N	Surgery outcome			
		Successful		Converted	
		N	%	N	%
Male	32	30	93.75	2	6.25
Female	68	59	86.76	9	13.24

Co-morbidities

The 26% of patients suffered from diabetes mellitus whereas 12% of patients were hypertensive.

Table 2: Co-morbidities.

Co-morbidity	N	Percentage (%)
DM	26	26
HTN	12	12
IHD	2	2

Pre-operative diagnosis

Out of 100 patients, 66 patients presented with a diagnosis of cholelithiasis of which 4 cases were converted (6.06%), and 34 patients presented with acute cholecystitis of which 7 underwent conversion (20.58%).

Table 3: Pre-operative diagnosis.

Indications	N	Surgery outcome			
		Successful		Converted	
		N	%	N	%
Cholilithiasis	66	62	93.93	4	6.06
Acute cholecystitis	34	27	79.41	7	20.58

Reasons for conversion

Total 100 LC performed amongst them 11 cases converted to open procedure-11 (11%).

Table 4: reasons for conversion.

Reason for conversion	N	%
Difficult anatomy due to		
Dense adhesions of Calot‟s triangle	4	36.36
Anatomical variation	2	18.18
Bleeding from		
Calot‟s triangle (Cystic artery)	3	27.27
Injury to right gastric artery	0	0
Common bile duct injury	2	18

DISCUSSION

LC is currently considered the gold standard in the surgical treatment of gallbladder stones.[5]

Cholelithiasis is a very common disease entity. Complications of cholelithiasis are frequent and serious and this has made this disease one of the most important for study.

It is important to keep in mind that conversion from laparoscopic surgery to open surgery is not seen as a complication, but rather a matter of sound surgical judgment as the safety of the patient is of foremost importance.

The well-documented advantages and safety of LC have made it the standard of care for the management of patients with symptomatic gallstones. Despite these advantages, conversion to open procedure is required in a varying proportion of patients which ranges from 2% to 15% in different studies.[6-8] In our study,100 patients were planned for elective LC. Eleven out of the 100 patients i.e., 11 % were converted to OC.

It is said that gallbladder disease affects all ages, however, they were more common in the 3rd and 4th decades of life as 62% of the cases in our study belonged to these decades.

Maximum patients converted were in the age group of 61-70 years i.e., 3 patients (27.7%) followed by the age group of 51-60 years 3 (27.7%) patients. Advancing age, more than 65 years, was associated with a high conversion rate Sippey et al also reported increasing age as a factor for conversion.[9]

Uncontrolled diabetes also has an association as a risk factor for conversion. In our study of 100 cases of LC, conversion from laparoscopic to OC was required in 7 of 74 patients in the non-diabetic group (9%) and 4 of 26 patients in the diabetic group (15%).[10-12]

Perioperative factors that influence the risk of unplanned laparotomy immediately before or during the procedure were also analysed. The most important include acute cholecystitis, the presence of peritoneal adhesions, and chronic cystitis. Other researchers studying the factors responsible for the conversion of laparoscopic procedures to open surgery also propose a division into surgical factors, factors related to the patient's health condition, related to the equipment used, and emphasize that the experience of the surgeon is also very important.[13,14]

In our study of 100 patients, 34 patients (34%) had acute cholecystitis, out of which 7 patients (20.58%) were converted.

The reasons for conversion were the inability to identify anatomical structures correctly secondary to severe inflammation or dense adhesions, haemorrhage, bile duct injury, choledocholithiasis, and gallbladder cancer. The incidence of bile duct injury was high; the occurrence of 11 bile duct injuries indicates that the threshold for conversion should have been lower. A thickened gallbladder wall is known to predict difficulty with anatomic exposure during LC.[15-17]

Our study limitations included an observational study design pattern and a limited sample size of open cholecystectomies.

CONCLUSIONS

This study identifies the preoperative risk factors for conversion from laparoscopic to OC in our setting. Patient factors, presentation, and preoperative ultrasonographic findings can all contribute to the prediction of conversion. The conducted research revealed many significant risk factors related to conversion. LC is the surgery of choice for mild gallbladder disease. However, in the minority of LC patients, it will have to be converted to OS. The results are in line with previous studies that found male gender, old age, and comorbidities such as diabetes and neurological diseases to be the main risk factors for the conversion. The use of predictive risk assessments or nomograms can be the most helpful tool for risk stratification in a clinical scenario. With such predictive tools, clinicians can optimize care based on known risk factors for the conversion, and patients can be better informed about the risks of their surgery.

Recommendations

Recognition of these factors is important for understanding the characteristics of patients at a higher risk of conversion since they require a longer hospital stay and place more demands on the healthcare facilities. The knowledge of these risk factors might help in better psychological preparation of the patient for open surgery and prolonged convalescence. It will also allow for better organization of the operating room schedule ultimately leading to a reduction in procedure-related costs.

Before doing surgery to have good training in simulation centre minimises surgeon related risk factors. It is always better to ask for help and senior opinion in case of difficult anatomy.

Good preoperative knowledge of anatomy and ultrasound help in deciding plan of surgery.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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