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Original Research Article

Our experience of laproscopic cholecystectomy with associated complications and their treatment: a study of 200 cases

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ABSTRACT

Background: The aim of this study was to evaluate the intraoperative and postoperative complications of laparoscopic cholecystectomy along with their treatment.
Methods: The study was conducted in a tertiary care government teaching hospital in central Gujarat, India. And conventional laparoscopic cholecystectomy was performed after all relevant investigations.
Results: In our analysis of 200 cases of planned laparoscopic cholecystectomy, we have found that the median age of patients undergoing operation was 47 years. In our study, 140 (67%) of the patients were female and 60(33%) male cases. It is noted that there were more complications in male patients (OR=2.95, CI 95%, 1.42-4.23, p<0.001). The total number of complications were 60 (30%) out of which 45 (22%) were found to be
intraoperative complications and rest were post operative complications. In our study, most common complication encountered was iatrogenic perforation which caused spillage of stones or bile 35 (17.5%) followed by bleeding from gallbladder fossa 12 (6%). CBD injury which is one of the most dreaded complications of laparoscopic cholecystectomy occurred in only 1 patient (0.5%). Among the post operative complications bleeding from abdominal cavity 12 (6%), bilioma 7 (3.5%) and infection of surgical wounds 4 (1.5%) were common. There was a total rate of 5% conversions to open surgery.
Conclusions: Adopting laparoscopic cholecystectomy as a new technique for treatment of cholelithiasis, introduced a new spectrum of complications. Major biliary and vascular complications are life threatening, while minor complications cause patient discomfort and prolongation of the hospital stay. It is important recognizing IOC complications during the surgery so they are taken care of in a timely manner during the surgical intervention.

Keywords: Laparoscopy, Cholecystectomy, Cholelithiasis

INTRODUCTION

Adopting laparoscopic cholecystectomy in a treatment of symptomatic cholelithiasis introduced a new spectrum of associated intraoperative and postoperative complications. Minor complications (biliary and non-biliary) are usually treated conservatively. Major complications (biliary and vascular) are life threatening and increase mortality rate, therefore creating the need for conversion to open surgical approach in order to treat them. The frequency of complications associated with laparoscopic cholecystectomy varies from 0.5 to 6%.[1-4] The most serious complications are associated with high mortality rate: injury of common bile duct with an incidence of 0.1-0.6%, injuries of large blood vessels 0.04-1.22% depending on the study.[5-7] The most common complication is iatrogenic perforation of the gallbladder with spilt gallstones with an incidence of 10-30%.[8] Injuries during the laparoscopic cholecystectomy can be prevented by precise operative technique, clear

visualization of anatomical landmarks, and careful dissection of tissues. Intraoperative cholangiography should be used in case of a dilemma.[4,9,10] Male gender, age, presence of systemic inflammatory response syndrome (defined by elevated inflammatory parameters-elevated white blood cell count and C- reactive protein), acute inflammation of the gallbladder and preoperative ultrasonographic finding of increased thickness of the gallbladder wall, and/or presence of gallbladder empyema, are all factors that increase risk for possible development of intraoperative laparoscopic complications, and the possibility of needing a conversion.[11-14]

Aim of this study is to analyze and evaluate each complication, both intra operative and post operative with investigation required and management after laproscopic cholecystectomy.

METHODS

Study type

The study was prospective observational study.

Study place

The study was conducted at Sir Sayaji Rao General Hospital, Vadodara.

Study period

The study period was from July 2014 - July 2024.

Sample size

Sample size taken was total 200 cases.

Inclusion criteria

Inclusion criteria were all elective LC cases performed from July 2014 to July 2019.

Exclusion criteria

Any emergent surgical procedure performed during this time period was excluded.

Patients were allocated to surgeons independently from the expected difficulty of the cholecystectomy.

Procedure

induction of anesthesia and intubation, insufflation of the abdomen is achieved to 15 mmHg using carbon dioxide. Next, four small incisions are made in the abdomen for trocar placement (supraumbilical×1, subxiphoid×1, and right subcostal×2). Utilizing a camera (laparoscope) and long instruments the gallbladder is retracted over the liver. This allows for exposure of the proposed region of the hepatocystic triangle. Careful dissection is carried out to achieve the critical view of safety. This view is defined as clearance of fibrous and fatty tissue from the hepatocystic triangle, the presence of only two tubular structures entering into the base of the gallbladder, and the separation of the lower third of the gallbladder from the liver to visualize the cystic plate. Once this view is adequately achieved, the operating surgeon can proceed with confidence that he/she has isolated the cystic duct and cystic artery.

Both structures are carefully clipped and transected. Electrocautery or harmonic scalpel is then used to separate the gallbladder from the liver bed completely. Hemostasis should be achieved after the abdomen is allowed to deflate to 8 mmHg for 2 minutes. This technique is employed to avoid missing potential venous bleeding that can be tamponaded by elevated intra-abdominal pressure (15 mmHg). The gallbladder is removed from the abdomen in a specimen pouch. All trocars should be removed under direct visualization. Closure of port sites is surgeon specific; this author recommends fascial closure of trocar sites greater than 5 mm to avoid incisional hernias in the postoperative period.

Ethical approval

Ethical approval given by Institutional ethics committee.

Statistical analysis

All data was collected and analyzed on Microsoft Excel. Data was primarily analyzed as incidence (%), median, and interquartile ranges. Thereafter, statistical package for the social sciences (SPSS) software was used. A p value <0.05 was considered statistically significant. One team of surgeons operated on every patient during the course of this trial. Before surgery, a thorough history and examination of the patient were carried out. Every required inquiry was conducted (X-ray chest, blood group, abdominal ultrasound, CT scan, MRCP, ECG, Liver function test s.creat, and CBC).

In postoperative period, patient was observed meticulously, presence/absence of fever. Pain in right hypochondrium, abdominal distension, vomiting, delayed onset of peristalsis, shoulder pain, drain output, drain output- colour, bile leak:drain site/surgical site, duration of leak. Time of complication in term of study duration was recorded for which study period (of 5 years) was divided into five equal period of one year each.

On developing any of the above-mentioned complication, thorough investigations (blood, USG, MRCP, ERCP) were performed and depending upon the cause it was treated (conservative/endoscopic sphincterotomy with CBD stenting/USG guided drainage tube insertion/ laparoscopic drainage/open surgery)

RESULTS

We analysed 200 cases of planned laparoscopic cholecystectomy performed at a government teaching hospital in central Gujarat and all the cases were operated by single set of surgeons. Our observations are as follows.

In our analysis of 200 cases of planned laparoscopic cholecystectomy, we have found that the median age of patients was 47 years. In our study 140 (67%) of the patients were female and 60 (33%) male cases. It is noted that there were more complications in male patients (OR=2.95, CI 95%, 1.42-4.23, p<0.001). The total number of complications were 60 (30%) out of which 45(22%) were found to be intraoperative complications and rest were post operative complications.

In our study, most common complication encountered was iatrogenic perforation which caused spillage of stones or bile 35 (17.5%) followed by bleeding from gallbladder fossa 12 (6%). CBD injury which is one of the most dreaded complications of laparoscopic cholecystectomy occurred in only 1 patient (5%) usually complications were detected intraoperatively in both sexes (Table 1).

Table 1: Table showing sexwise distribution of complications.

Complication	Male out of 60	Female out of 60
Bleeding from GB fossa	3	9
Bleeding from cystic artery	1	3
Button hole in CBD	2	7
CBD-partial cut	0	0
CBD-total cut	0	1
CBD complete clipping	0	1
Difficulty in isolation of cystic	4	10
Spillage of bile/sludge/stones	10	25
Localized peritonitis	2	10
Generalized peritonitis	0	1
Biliomas	1	10
High output fistula	0	3
Low output fistula	1	7
Conversion to open	5	15
Intraoperative diagnosis	15	29
Postoperative diagnosis	4	12

Among the post operative complications bleeding from abdominal cavity 12 (6%), bilioma 7 (3.5%) and infection of surgical wounds 4 (1.5%) were common (Table 2). We observed that rate of all complications decreases as our experience increases after few years of experience there is slight increase in complications which again decreases afterwards, this may be due to overconfidence created in the surgeon. In senior surgeons' type of complications are also different (Table 3).

Table 2: Complication and time (in relation to surgery) of diagnosis.

Complication	Postoperative diagnosed
Bleeding from GB fossa	N
Bieeding from cystic artery	N
Button hole in CBD	N
Cbd-partial cut	0
Cbd –total cut	Y
Cbd complete clipping	Y
Difficulty in isolation of cystic duct	N
Spillage of bile/sludge/stones	N
Localized peritonitis	Y
Generalized peritonitis	Y
Biliomas	Y
High output fistula	Y
Low output fistula	Y
Bile leak from gall bladder fossa	Y

Table 3: Complication in different years of study (relating the experience of surgeon).

Year of study	No. of cases having complication
First year	10 including CBD and cystic duct injuries
Second year	4
Third year	0
Fourth year	01 bleeding from GB fossa
Fifth year	0

Table 4 shows that in difficult cases many complications can occur in the same patient and they are interrelated to each other.

Likewise, we found that in all the 14 cases there were difficulty in isolation of cystic duct, in 12 cases out of 14 there were difficulty in gallbladder dissection. In our study, we found that multidisciplinary approach is required to handle the complications arising from laparoscopic cholecystectomy (Table 5).

There is no one investigation available to detect all the complications and we have to decide the group of investigations required depending upon the suspected complication (Table 6). Table 7 shows that once the complication is detected we have to resolve it with the best available option.

Table 4: Case with various complications encountered.

Case no.	Bleeding from gall blader fossa	Bleeding from cystic artery	Button hole injury to CBD	Partial transaction of the CBD	Total transaction of the CBD	Clip ping of the CBD	Difficulty in isolation of custic duct	Spill age of bile/ sludge /stones	Localized peritonitis	Gene ralized peritonitis	Bilioma	High out put fist ula	Low out put fist ula
1	+		+				+	+					
2	+		+				+	+	+				
3	+						+						
4	-	+					+	+	+		+		+
5	+		+				+						
6	+		+				+						
7	+		+				+		+				
8	+		+				+						
9	+		+				+	+	+				
10	+		+				+						
11	+	+	+				+	+	+				
12	+	+					+						
13	+				+		+	+	+				
14		+				+	+		+	+		+	

Table 5: Investigations required to diagnose the condition.

Complication	Blood investigations	Ultrasound of abdomen	MRCP	ERCP	CT scan of
Bleeding from GB	Y	Y	N	N	N
Bleeding from cystic	Y	N	N	N	N
Button hole	Y	N	N	N	N
Cbd-partial	--	-	-	-	-
Cbd-total	Y	Y	Y	Y	
Cbd complete	Y	Y	Y	Y	Y
Difficulty in isolation of	N	N	N	N	N
Localized	Y	Y	N	N	Y
Generalized peritonitis	Y	Y	Y	Y	Y
Biliomas	Y	Y	Y	Y	Y
High output	Y	Y	Y	Y	Y
Low output	Y	Y	Y	N	Y
Conversion	Y	N	N	N	N

Table 6: Complication in different years of study (relating the experience of surgeon).

Year of study	No. of conversion of cases to open	No. of cases having complication
First year	5	9
Second year	2	4
Third year	0	0
Fourth year	1	1
Fifth year	0	0

Table 7: Complication and their treatment.

Complication	Conservative	Intraoperative	ERCP sphincter	USG guided	Laparoscopic drainage (REP)	Laparotomy
Bleeding from gb	NA	Pressure with gall-bladder				
Bleeding from cystic artery	NA	Pressure with GB and clip application/ bipolar cauterization				
Button hole in cbd	NA	Intracorporeal suturing with				
Cbd-partial	NA	-	-	-	-	-
Cbd –total cut	No					Laparotomy with roux ny
Cbd complete clipping	No				Day of identification of injury	Laparotomy with t-tube drainage of cbd with
Difculty in isolation of cystic duct	Na	Slow and gradual dissection/ taking				
Spillage of bile/sludge/	Yes	Thorough picking of				
Localized	Yes					
Generalized peritonitis	No			If associate		Surgery according to
Biliomas	No			Yes		Open drainage with peritoneal
High output fistula	No					Laparotomy with correction of
Low output fistula	Yes			Yes (if no drainage		

DISCUSSION

Laparoscopic cholecystectomy became the preferred method for the treatment of symptomatic cholelithiasis. Laparoscopic cholecystectomy has many advantages over the standard open cholecystectomy: minimal trauma, decreased pain, shorter hospital stays, satisfactory cosmetic outcome, quick recovery, and return to work. However, numerous studies have shown this that laparoscopic cholecystectomy is associated with a higher frequency of complications compared to the standard open cholecystectomy including lesions to the common bile duct, injury to the vascular and visceral structures during the application of a Veress needle, and a trocar with fatal outcomes.[1] Review of recent literature shows that the incidence of injuries to the common bile duct is 0.1-0.6%. Although recent publications lead to the conclusion that injuries of the common bile duct are more commonly encountered with the laparoscopic procedure, the controversy related to this issue is still present.[2,3]

As laparoscopic cholecystectomies gained wider acceptance, the spectrum of complications associated with this procedure also became wider. Vascular injuries are the most common ones, and after the complications of anesthesia, they are the second leading cause of mortality and morbidity in laparoscopic surgery.[4] Our study shows that there were 12 patients with bleeding from the tissues adjacent to the gallbladder, 4 from the cystic artery, 4 with bleeding from the ligaments of liver, and 9 from the abdominal wall during the placement of ports. Although we did not have major vascular complications, we had 23 conversions because of the bleeding.

Both biliary and nonbiliary complications take an important place in the published studies. The most common biliary complications described are lesions of the common bile duct, lesions of the right hepatic duct, and perforation of the gallbladder with spilt calculi. Vascular injuries, injuries to the intestine, diaphragm, and iatrogenic pneumothorax represent the most important non-biliary complications. In our study, there were 60 patients with the bile leak >50-100 ml/24 hours in the postoperative period. Other studies have shown that the injuries that are most commonly seen are minor injuries to the gallbladder, and ducts of Luschka with bile leaks, smaller bleeds with hematomas of the abdominal wall at the place of port, or in the tissues adjacent to the gallbladder. Although major injuries to the great blood vessels like the aorta, inferior vena cava, or iliac artery are rare, they are associated with high mortality rate.[5] Intraoperative bleeding can be caused by insertion of the trocar, dissection of the gallbladder and the structures of the Calot's triangle. Postoperative bleeding can be caused by the removal of clips or ligatures and due to necrosis of the wall caused by effects of term cauterization. The experience of the surgical team with the operative technique and equipment are important factors in preventing the complications. Surgeons who performed less than 100 laparoscopic cholecystectomies had more complications compared to surgeons with the greater number of surgeries.[8] Contrary to that, there are other studies that show that surgeons with the greater number of laparoscopic surgeries have more complications.[9] This is also true in our study.

Perforation of a gallbladder with gallstones spilt into the peritoneal cavity is a frequent complication, especially when associated with acute cholecystitis and larger gallstones.[9] Studies show that the most common complications after spilt and retained calculi in the abdominal cavity are: intra-abdominal abscesses, fistulas, and tumefactions of the abdominal wall.[10]

Surgical wound infection is a complication that occurs with higher frequency in open cholecystectomy compared to laparoscopic cholecystectomy.[11] In our prospective study, we report 7 (0.94%) patients with the operative wound infection. Three patients (0.40%) had the incisional hernia, which agrees with studies published by other researchers. Hernias at the port insertion site have been reported in many papers with the incidence between 0.14% and 22%. The most common causes for the development of an incisional hernia were increased BMI, a diameter of the trocar duration of the surgery, a presence of a preexisting hernia, severity of inflammation, widening of the port for extraction of a gallbladder, and the age of the patient.[12]

In modern laparoscopic surgery, conversion is not considered to be a complication, but instead a way for the surgeon to safely finish the surgery. This analysis shows that older age, male gender, acute cholecystitis, a gallbladder wall thickness >3 mm and history of previous surgeries is all predictive factors for conversion. In cases with acute inflammatory process reported rates of conversion increase up to 35%.[13]

The findings of this study may not be entirely generalizable to other healthcare institutions due the retrospective, single-institution nature of the study. In addition, there cannot be an assumption of uniformity amongst the surgeons included in this study with regard to their surgical training, technique, and capability

CONCLUSION

In conclusion, intraoperative complications and postoperative complications associated with laparoscopic cholecystectomy have their own specific characteristics. They are more common in patients with older age, male gender, with increased levels of markers of inflammation (white blood cell count and CRP), and in cases of acute cholecystitis confirmed by pathohistology. In addition, a preoperative ultrasonographic finding of gallbladder empyema, or gallbladder wall thickness >3 mm, suggests that there might be an increased probability for the development of complications.

Major vascular complications like the injury of the common bile duct, bleeding from the aorta, inferior vena cava or iliac blood vessels, are life threatening, and the surgeon is required to do a conversion. Conversions in these cases should not be perceived as a failure, but instead as a necessary procedure that will increase patient safety and likelihood for a favorable outcome. The risks and complications of LC must be neither over-rated nor under-rated. Laparoscopy is not easy for the surgeon, thorough instruction as well as experience being crucial for improvement of results. Contrary to initial reports of an increased complication rate, recent data show that LC entails lower morbidity and mortality rates than open operation.[5,6,7,8]

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