Original Research Article

Perioperative complications of laparoscopic cholecystectomy: a cross-sectional observational study

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ABSTRACT

Background: Laparoscopic cholecystectomy (LC) has now become the gold standard in treatment of benign gall bladder disease. The intraoperative and immediate postoperative complication cannot be disregarded and remain of concern. The study aims to evaluate the perioperative complications of LC in patients undergoing the surgery.

Methods: A total of 100 patients were included in this prospective analytical study from a June 2017 to September 2019. They were adequately evaluated and underwent LC in General surgery department of Geetanjali Medical College and Hospital, Udaipur. The relevant clinical details of all the patients were recorded and analysed.

Results: Among the patients who underwent LC, majority were females. In case of 86 patients, LC was done due to chronic calculous cholecystitis. The conversion rate from laparoscopic to open was 6%. The most frequent intraoperative complication was trocar site bleeding and liver bed injury, 7%, followed by bile leakage from gallbladder 6%, bleeding from calots triangle in 4% and spilled gallstones in 2% cases. There was no case of injury to common bile duct, bowel injury or major vascular injury. Amongst the post-operative complications, wound infection was in 1% case. No perioperative mortality was present. The overall rate of complication was 18%.

Conclusions: LC is a safe and effective procedure in almost all patients presenting with symptomatic gallbladder disease and remains one of the most frequently performed laparoscopic operations. It has a low rate of mortality and morbidity making this operation a safe procedure with favourable results.

Keywords: Complications, Gallbladder, Laparoscopic cholecystectomy, Outcome

INTRODUCTION

Laparoscopic cholecystectomy (LC) has travelled a long journey and has stood the test of time to establish itself as the gold standard treatment for benign gall bladder diseases the most commonly being gall bladder calculi. There is little doubt that laparoscopic cholecystectomy has revolutionized the surgical management of cholelithiasis and has become the mainstay of management of uncomplicated gallstone disease. With improved instrumentation, advanced procedures, previously regarded as controversial, have also become fully accepted. There has been an increasing evidence base showing the short-term benefits of laparoscopic

surgery over open surgery with regards to postoperative pain, length of stay, earlier return to normal activities, but maintaining equivalence of the benefits of the long-term outcomes. During its evolution, complications associated with the operative procedure have stood like a rock in the operative experience of surgeons. Though the spectrum of complications are expected to show some change and the innovation of energy devices, further putting an extra pressure, the evaluation of the same intends to give an extra edge.¹

The intraoperative and immediate postoperative complication cannot be disregarded. With the widespread

acceptance of this surgery the spectrum of complications in gallbladder surgery has changed.²

The intraoperative complications like bowel and vascular injury (trocar site), biliary leak and bile duct injuries decrease with the passage of time, because of increased experience of the surgeons, popularity of the procedure and introduction of new instruments.³

This study will represent our experience of laparoscopic cholecystectomy along with the aim to evaluate the perioperative complications of laparoscopic cholecystectomy in patients undergoing the surgery for gallbladder disease.

METHODS

A total of 100 patients admitted in surgery unit 3, department of general surgery at Geetanjali Medical College and Hospital from a period of June 2017 to September 2019 were included by consecutive sampling technique in this prospective analytical observational study. The study was initiated after approval from IRRC (Institutional research review committee) and IEC (Institutional Ethics Committee). Consenting adult patients who fit the Inclusion/Exclusion criteria constituted the study population. Inclusion criteria: Age above 18 years and benign gallbladder disease. Exclusion criteria: Common Bile duct (CBD) stone or dilatation features of obstructive jaundice and malignancy of Gall Bladder (GB).

They were adequately evaluated with physical examination, relevant laboratory and radiological investigations and underwent LC in General surgery department of Geetanjali Medical College and Hospital, Udaipur. LC was performed by single consultant surgeon.

The relevant clinical details of all patients and perioperative complications were recorded and analysed. Descriptive analysis was done using proportion, number and percentage. For the comparative analysis chi square was used for non-parametric data and student's 't' test and ANOVA were applied for parametric data wherever applicable. The data were then subjected to descriptive statistics using SPSS. The results were calculated with the help of statistics, tables and graphs.

RESULTS

The age and sex distribution of the study population is presented in table 1 which suggests that majority of the patients were females (70%). Maximum numbers of patients were in age group 40-59 years (50%). The mean age was 46.58 ± 12.81 years, with youngest patient 25 years of age and oldest 75 years of age.

Abdominal pain was the most common presenting symptom followed by dyspepsia, vomiting and nausea. The mean duration of presenting complains was 65.44

days with, as recent as 4 days history of symptoms and as long as almost a year long history. The mean post-operative stay was 2.34 ± 1.82 days and the mean total hospital stay duration was 5.40 ± 2.07 days.

Table 1: Age and sex of patients (n=100).

	No. of cases	Percentage (%)
Age group (years)		
<40	30	30
40-59	50	50
>60	20	20
Gender		
Male	30	30
Female	70	70

Figure 1: Histopathological evaluation report.

Table 2: Perioperative complications (n=100).

Peri-operative Complications	Total	%
Intraoperative		
Trocar site bleeding	7	7
Liver bed injury	7	7
Bile leakage from GB	6	6
Bleeding from calots	4	4
Spilled gallstones	2	2
Injury to common bile duct	0	0
Bowel injury	0	0
Major vascular injury	0	0
Postoperative		
Port site infection	1	1
Hemorrhage	0	0
Biliary leak	0	0
Mortality	0	0

The conversion rate from laparoscopic to open was 6%. Gallbladder was sent for histopathology in all 100

patients and reported as shown in Figure 1. Majority of the laparoscopic cholecystectomy were due to chronic calculous cholecystitis (86%).

The overall peri-operative complications of laparoscopic cholecystectomy in our study are shown in Table 3. The most frequent intraoperative complication was trocar site bleeding and liver bed injury, n=7 (7%). Followed by bile leakage from gallbladder n=6 (6%) and bleeding from calots triangle n=4 (4%). Spilled gallstones were present in n=2 (2%) cases. Post-operative wound infection occurred in 1 case (1%).

DISCUSSION

Laparoscopic cholecystectomy (LC) is now the standard treatment for symptomatic gall bladder disease. Large scale randomized control trials have shown that the long term outcome in terms of abdominal pain, cosmetic outcomes and overall patient satisfaction is much better as compared to the open technique.

LC leads to more rapid improvement in the quality of life than open surgery. There are various complications which can occur during the laparoscopic cholecystectomy and can have deleterious effects on the patient's health.

Sex wise distribution

In our study, majority of the patients were females (70%) out of total 100 patients and the remaining were males (30%). A higher incidence of gall stone disease was seen in female patients with a sex ratio of 2.33:1. Faruquzzaman et al and all the other studies also confirmed increased incidence of gall bladder disease was seen in females similar to our study.⁴

Age

In our study minimum age of patient undergoing LC was 25 years and the maximum age was 75 years. Majority of the patients (50%) were in the age group of 40-59 years and 20% of patients were 60 years or above age. The mean age of patients undergoing laparoscopic cholecystectomy was 46.81 ± 12.47 years. The mean age of patients who had complications was 52.38 ± 6.01 years Vs mean age of patients who did not have any complications was 45.31 ± 12.57 years and this difference was statistically significant (p value 0.01). Similar findings were observed by Faruquzzaman et al and in the study by Ravindra Nidoni et al the mean age of patients undergoing LC was 44.1 years.^{4,5}

Duration of surgery

The mean duration of surgery in our study for n=100 was 92.15 ± 36.42 minutes. For patients that had complication (n=26/100) 98.85 ± 44.21 minutes and patients that did not have any complications (n=74/100) 89.79 ± 33.29 minutes. It was increased in patients who had complications than those who did not have complications (98.85 ± 44.21

minutes vs 89.79 ± 33.29 minutes) but was not statistically significant (p value 0.342).

Post-operative stay

The mean post-operative stay was 2.34 ± 1.82 days for all the patients. However the mean post-operative stay was increased to 2.62 ± 1.83 days in the patients who had complications and was increased to 4.83 ± 2.79 days (p value <0.05) in patients who underwent conversion to open cholecystectomy which was statistically significant. Abdulmohsen A. et al in his study had mean post-operative stay of 3.2 ± 3.1 days in males 2.4 ± 1.8 days in females which were higher than our study. The patients in our study had a postoperative stay which was comparable to other studies in literature.⁶

Conversion

Conversion rate to open cholecystectomy in our study was 6%. This compares favourably with the rates reported in the literature.

Table 3: Conversion rate.

Studies	Conversion rate (%)
Present study	6
Rooh-ul-Muqim et al ⁷	3.6
Shaun et al ⁸	5.37
Ghnnam et al ⁹	5.30
Daniel et al ¹⁰	7
Shankar et al ¹¹	7.80
Nidoni et al ⁵	6
Lee et al ¹²	8.5
Miodrag et al ¹³	3.90
Faruquzzaman et al ⁴	7.00

Conversion from LC to open cholecystectomy should be based on the sound clinical judgment of the operating surgeon and not be because of lack of expertise.

Histopathological study

In the present study 88.46% of the patients show chronic gall bladder disease on histopathology and 11.53% show acute gallbladder disease amongst the patients who had complications. Similarly, Faruquzzaman et al in his study reported that majority of the patients of laparoscopic cholecystectomy were due to chronic cholecystitis followed by acute cholecystitis. Miodrag et al and Ryan et al had similar reports.^{4,8,13}

Complications

Laparoscopic cholecystectomy can be associated with serious potentially life-threatening complications. These may be categorized as biliary complications referring to those due to injury to part of the biliary tree or non-biliary complications resulting from procedure-related injury to other organs. Biliary complications occurring

after LC increase the morbidity of the procedure (bile collections, fistulae and other complications of bile stasis) and usually require re-operation to reconstruct and drain the biliary tree adequately. While the non-biliary injuries, although reported with a variable incidence can be equally dangerous and devastating as their biliary counterparts. These injuries can range from minor to major injuries of the intra-abdominal hollow or solid organs with the potential to cause significant morbidity and mortality.

Trocar site bleed

Laparoscopic access related injuries includes trocar site bleed, trocar related bowel injuries, preperitoneal space inflation and surgical emphysema. The trocar site bleeding can occur from trocar site muscular vessels, inferior epigastric artery or omental vessels. Prakash Kumar et al presented a series on laparoscopic access related injuries where they had 22 cases (0.14%) of port site bleeding from muscular arteries (n = 12), omental vessel bleed (n=8) and inferior epigastric artery bleed (n=2).¹⁹ Muqim et al reported bleeding from trocar site in 9.97% cases.⁷ Miodrag et al reported 1.2% (n=9) patients who had bleed from the abdominal wall during the placement of ports.¹³ Faruquzzaman et al in his study had port site bleeding 3.8% and 4.4% in the two hospital groups he analyzed.⁴ In the present study trocar site bleeding was present in 7 cases. It was managed with pressure hemostasis from the trocar itself, diathermy or suture. Omental vessel injury from umbilical trocar site occurred in one patient and was managed with laparoscopy energy device.

Bleeding from Calot's

Major vascular injury is said to occur when there is injury to the aorta, vena cava, iliac vessels, right hepatic artery or the portal vein. Intraoperative bleeding can occur during dissection of the gallbladder and the structures of the Calot's triangle. Cystic artery can sometimes be difficult to identify in the setting of inflamed, edematous or adherent tissue in the calot's triangle. Cystic artery bleed can obscure the vision of the operative field and cause unnecessary panic to the operating surgeon. It is best controlled by energy device like harmonic scalpel. In the present study, bleeding from calot's triangle was present in 4% of the total patients. Muqim et al reported 16.23% rate of vascular injury from calot's which was much higher than that of the present study.⁷ Miodrag et al reported a rate of 3.5% similar to that of the present study.¹³ Farkas et al reported a rate of 7.8% in his study. Faruquzzaman et al reported slightly lower rates of 2.5% and 2.8% in his two groups.^{4,10}

Liver bed injury

Dissection of the gallbladder from the liver bed often leads to liver bed injury in the form of bleeding from the liver bed. It was more common in cases where the gallbladder was partially intrahepatic or firmly adherent

to the liver bed and the plane of dissection was not clearly defined. In the present study the reported liver bed injury is 7% which is comparable to the other studies having 11.11% rate by Muqim et al and Faruquzzaman et al had 2.51% and 3.4 % in his two groups.^{4,7}

Bile spillage

Spillage of bile may occur inadvertently during the surgical dissection due to gall bladder handling either by grasper or electrocautery dissection of the gallbladder with the laparoscopic instruments. It may also occur at the time of gall bladder retrieval from the abdomen. In the present study, bile spillage occurred in 6% of the patients and was managed with proper saline irrigation and suctioning of the peritoneal cavity. All the patients were given adequate added antibiotic coverage and none of the patient developed post-operative fever, sepsis or collection in the peritoneal cavity. Faruquzzaman et al reported 1.9% and 2.3% rate of bile spillage in his two study groups.⁴ Shankar et al reported 6.9%, Daniel et al reported 9.4% and S Duca et al reported 15.9% of the same.^{10,11,14}

Spilled gallstones

Iatrogenic perforation of the GB is most of the times associated with spilled gallstones in the peritoneal cavity. In present study spilled gallstones were present in 2% of cases. All the stones spilled were retrieved laparoscopically and none of the stones were left behind. Similar antibiotic coverage was also followed for and none of the patient had any further complication in post-operative period. Muqim R et al reported spilled gallstones in 5.54% cases, Triantafyllidis et al reported in 1.39% cases and Faruquzzaman et al reported in 2.5% and 2.8% of the cases in his two study groups.^{4,7,15}

Common bile duct injury

We have no case of injury to common bile duct, bowel injury or injury to any major vessels. The present study result outstands most of the other studies in literature. Miodrag et al reported 0.6% of injury to CBD, Sang-III Lee et al, Wagih et al, Triantafyllidis et al, Ryan et al and Rooh-ul-Muqim et al reported 1.1%, 0.6%, 01%, none and 1.42% respectively.^{7-9,12,13,15} However the present study result outstands most of the other studies in literature.

Bowel injury

Faruquzzaman et al reports 1.1% and 1.8% rate of bowel injury in his study groups, Shankar et al reported 3.5%, Farkas DT et al reported 3.1%, Triantafyllidis et al reported 0.51% and Muqim et al reported 0.28% bowel injury rate. Present study has no cases of bowel injury.^{4,7,10,11}

Biliary leak

There was not a single case of postoperative bile leak in the present study which was similar to study by Sang-Il Lee et al who reported none.¹² This may be attributed to careful dissection and recognition of proper operative plane of dissection, proper application of cystic duct clip and of appropriate size. In doubtful cases, suture ligation of cystic duct stump is advisable, which was done in our study and likely appears to contribute to our excellent result of no case of post-operative bile leak. Faruquzzaman et al reported post-operative bile leakage in 1.9% in group 1 and 2.3% cases in group 2, Terho et al in 1.1% cases, Radunovic et al in 1.89%, Shankar et al in 6.9%, Farkas et al in 9.4%.^{4,7,10,11,13,16}

Port site infection

In the present study, only one case of post-operative wound infection at the epigastric port site was present in a female patient. It was managed conservatively with daily dressing, continued oral antibiotic coverage and the wound healed with secondary intention.

The port site infection rate was reported by Miodrag et al as 0.94%, Faruquzzaman et al, as 3.0% in group 1 and 4.9% in group 2, 0.8%, Ghnnam et al, 0.9%. Triantafyllidis et al 1.39%, Ryan et al 2.68% and Muqim et al, as 4.84%. Present study shows similar result that is comparable to the mentioned studies.^{4,7-9,13,15}

Certain studies showed presence of post-operative haemorrhage but in the present study, no cases of post-operative haemorrhage were present.

Mortality

Mortality in the present study was 0% and few other studies showed similar results. Faruquzzaman et al, Petra et al, Muqim et al, Abdulmohsen et al, Ryan et al, Lee et al, Prakash et al had mortality 1.1%, 2.3%, 1.3%, 0.56%, 0%, 0%, 0% and 0%.^{4,6-8,12,16,17} The overall rate of complication in our study is 18%.

In spite of the above mentioned complications, the overall outcome was satisfactory, with better patient acceptance of the procedure.

CONCLUSION

Laparoscopic cholecystectomy is one of the most frequently performed laparoscopic operations. It has a low rate of mortality and morbidity. It is a safe and effective procedure in almost all patients presenting with symptomatic gallbladder disease. Most of the complications are due to lack of experience or knowledge of typical error or over enthusiastic approach with heroic goals in mind. However precise knowledge of surgical anatomy, procedural steps, a balanced mind, proper preoperative workup, knowledge of possible

complications and a surgical approach in the best interest of treating a patient, with minimum anticipation of complications and conversions should be followed which makes this operation a safe procedure with favourable results.

Laparoscopic cholecystectomy remains the 'gold standard'. Conversion from laparoscopic to open cholecystectomy should be based on the sound clinical judgment of the surgeon and not be due to a lack of individual expertise. It should not be perceived as a failure, but instead as a necessary procedure that will increase patient safety and likelihood for a favourable outcome. Also enough attention should be paid to surgeons in training and learning appropriate technique for performing open cholecystectomy.

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