

Original Article

Operative and Postoperative Complications of Laparoscopic Cholecystectomy: Experience from a Tertiary Care Hospital of Bangladesh

Tapash Kumar Maitra¹, Mahmud Ekram Ullah², Faruquzzaman³, Samiran Kumar Mondol⁴

Abstract

Background: The technique of laparoscopic surgery has rapidly become popular because of its several advantages over conventional open surgery. The reduction of postoperative pain provided positive human impact, and the reduction of length of hospital stay as well as the earlier return to work generated a positive socioeconomic impact. However, in spite of being a minimally invasive technique, this procedure has different preoperative and postoperative complications which cannot be disregarded.

Objective: To evaluate the complications of laparoscopic cholecystectomy in symptomatic and asymptomatic cholelithiasis and other benign gall bladder diseases.

Methodology: 172 patients who underwent laparoscopic cholecystectomy were included in this prospective study on the basis of non-randomized convenient sampling from a period of September 30, 2014 to September 30, 2016 in BIRDEM General Hospital, Dhaka, Bangladesh. Data of the patients regarding outcomes and complications were analyzed.

Result: Results of this study suggests that 35.5% cases were male and 64.5% patients were female. In male group, most of the patients (18.0%) were in 41-50 years of age group followed by 9.9% in 51-60 years age group, whereas among the female patients these were 33.1% and 15.7% respectively. Mean±SD of age were 46±1.7 and 42±1.3 years in case of male and female patients respectively. In 119 (69.2%) out of total 172 cases, laparoscopic cholecystectomy was done for chronic cholecystitis and in 18.6% (32 out of total 172) cases, it was performed for acute cholecystitis. Intra-operative bile leak (11.0%) was found to be the most frequent complications during laparoscopic cholecystectomy. The incidence rates of perforation of gall bladder, stone spillage were 9.3% and 5.2% respectively. Trocar site, vascular, and hepatic bed hemorrhages were 7.0%, 4.7% and 4.0% respectively. Open conversion was done in 17 cases (9.9%). Port site infection and post cholecystectomy syndrome developed in 5.2% and 4.7% cases respectively. The overall mortality was approximately 1.1%. Serious complications like bowel injury and bile duct injury were recorded in 0.6% and 1.2% cases respectively. The results of this study suggest that gender, age, co-morbidities, previous abdominal surgery, acute cholecystitis, obesity, thickened gall bladder wall on ultrasound, history of preoperative ERCP are probably important and clinically significant relevant factors for open conversion of laparoscopic cholecystectomy.

Conclusion: In our study, complications of laparoscopic cholecystectomy were similar to those of different centres in western countries. We found laparoscopic cholecystectomy as a safe and effective procedure in almost all patients with cholelithiasis. Proper preoperative work up, awareness of possible complications and adequate training on laparoscopic technique make this operation a safe procedure with favorable result and lesser complications.

Keywords: Laparoscopic cholecystectomy, complications, outcome, gallstones, conversion.

Introduction:

Laparoscopic cholecystectomy (LC) has replaced open surgery in the treatment of cholelithiasis. It is now considered the first option and has become the “gold standard” in treating benign gallbladder disease^{1,2}. The risk of intraoperative injury during laparoscopic cholecystectomy is higher than in open cholecystectomy^{3,4}. It has been anticipated that this will diminish with increasing surgeon’s experience in the use of LC³. In USA, approximately one million patients are newly diagnosed annually with gall stone disease and approximately 600,000 operations are performed a year of which more than 75% by laparoscopy⁵.

Laparoscopic cholecystectomy offers the patients the advantages of minimal invasive surgery. However with the widespread acceptance of LC the spectrum of complications in gallstone surgery has changed. The intraoperative serious

complications of LC like bowel and vascular injury 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 instruments⁵. This study represents our experience of laparoscopic cholecystectomy with the aim to evaluate the complications of laparoscopic cholecystectomy in cholelithiasis and other benign gallbladder diseases, both in symptomatic and asymptomatic patients.

Material and Methods:

This prospective study was carried out on 172 patients in Surgery Unit 1 of Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM) General Hospital, Dhaka, Bangladesh from September 30, 2014 to September 30, 2016. BIRDEM is a centre of excellence and pioneer for laparoscopic surgery in Bangladesh with highly experienced surgeons, trained staff

and modern operating room (OR) setup which also provides training on laparoscopic technique for postgraduate doctors of other hospitals. The population of this study was selected on the basis of non-randomized convenient sampling. Data was collected on a proforma designed to include demographic information, history, examination findings, investigations, operation technique, complications etc. Patients of 20 years or above who underwent laparoscopic cholecystectomy for cholelithiasis and other benign gall bladder diseases were included in this study. ASA Grade I to III⁶, BMI < 35 kg/m² were inclusion criteria here whereas, patients who never attended in follow up, refusal of the patient at any stage, patients with carcinoma of gall bladder or concomitant intra-abdominal malignancy like carcinoma of pancreas, liver etc, patients with severe sepsis or comorbid state requiring intensive care facility preoperatively were excluded from the study. In case of 09 patients with cholelithiasis with choledocholithiasis, ERCP was done first to extract the stone or stones from the common bile duct (CBD). Then laparoscopic cholecystectomy was done on next available OR schedule and were included as study population. Preoperative prophylactic injection Ceftriaxone 1 gm intravenously was given to all patients. Pneumoperitoneum was created by trocar technique⁷. Standard 4-ports entry procedure⁷ was adopted with the exception of few cases who required additional port. Duration of procedure was between 25 to 90 minutes with an average time of 40 minutes. The majority of surgery were done by the principle author as the head of the surgical team and the rest were done by his associates under his supervision. Postoperatively single dose of injection Ceftriaxone 1 gm intravenously was given in the next morning. Most of the patients (88.6%), were discharged from the hospital within 48 hours of surgery. All study subjects were monitored closely to detect any complications until discharge, then on the 7th day following discharge and finally on 30th postoperative day. All data were processed, compiled and presented in tabulated form using MS excel software. Differences in proportions were compared by Chi-square or t-test as appropriate. P value <0.05 indicates statistically significant result.

1. Dr. Tapash Kumar Maitra, Associate, FCPS (Surgery), Professor & Head of the Department of Surgery, BIRDEM General Hospital, Dhaka.
2. Dr. Mahmud Ekram Ullah, FCPS (Surgery), MRCS, Assistant Professor, Department of Surgery, BIRDEM General Hospital, Dhaka.
3. Dr. Faruquzzaman, MBBS, BIRDEM General Hospital, Dhaka.
4. Dr. Samiran Kumar Mondol, FCPS (Surgery), Associate Professor, Department of Surgery, BIRDEM General Hospital, Dhaka.

Corresponding Author:

Dr. Tapash Kumar Maitra
Associate Professor & Head of the Department of Surgery
BIRDEM General Hospital
Dhaka 1000, Bangladesh.
Email: tapashkm1965@gmail.com

Results:

A total of 232 laparoscopic cholecystectomy were done during the 2 years study period out of which 172 were included in this study. Majority of the patients were female (64.5%) whereas male patients were 35.5%. Mean ± SD of age was 46 ± 1.7 and 42 ± 1.3 in case of male and female patients respectively (Table I).

Table I: Age distribution of study patients

Age in years	Male		Female	
	n	%	N	%
20-30	00	00	02	1.2
31-40	07	4.1	13	7.6
41-50	31	18.0	57	33.1
51-60	17	9.9	27	15.7
>60	06	3.5	12	7.0
Total	61	35.5	111	64.5
Mean±SD	46±1.7		42±1.3	

Most common indications of laparoscopic cholecystectomy were chronic cholecystitis (69.2%) followed by acute cholecystitis (18.6%) (Table II & III). In approximately 12.2% patients, it was performed for other pathology like gall bladder polyp, porcelain gall bladder, cholesterosis and adenomatosis of gall bladder.

Table II:

Final diagnosis	Male (61)		Female (111)		Total (172)	p value
	n	%	n	%		
Chronic cholecystitis	39	63.9	80	72.1	119	69.2
Acute cholecystitis	15	24.6	17	15.3	32	18.6 >0.05
Other Pathology	07	11.5	14	12.6	21	12.2

Table III:

Final diagnosis	41-50 years (88)		51-60 years (44)		Total (132)	P value
	n	%	n	%		
Chronic cholecystitis	60	68.2	29	66.0	89	67.4
Acute cholecystitis	19	21.6	11	25.0	30	22.7 >0.05
Other Pathology	09	10.2	04	9.1	13	9.9

Table IV & V show different peroperative and postoperative complications of laparoscopic cholecystectomy in relation to gender and age.

Table IV:

Complications*	Male (61)		Female (111)		Total (172)		P value
	n	%	n	%	n	%	
Trocar site bleeding	05	8.2	07	6.3	12	7.0	
Vascular injury	04	6.6	04	3.6	08	4.7	
Liver Bed (opening of sinus)	03	4.9	04	3.6	07	4.0	
Gall bladder perforation	07	11.5	09	8.1	16	9.3	
Spilled gallstones	04	6.6	05	4.5	09	5.2	
Intra-operative bile leak	08	13.1	11	9.9	19	11.0	
Bile duct injury	01	1.6	01	0.9	02	1.2	
Bowel injury	01	1.6	00	00	01	0.6	>0.05
Peroperative mortality	00	00	00	00	00	00	
Conversion to open surgery**	07	11.5	10	9.0	17	9.9	
Port site infection	05	8.2	04	3.6	09	5.2	
Surgical emphysema	02	3.8	02	1.8	04	2.3	
Post cholecystectomy syndrome	03	4.9	05	4.5	08	4.7	
Postoperative mortality (due to co-morbidity)	01	1.6	01	0.9	02	1.2	

*Some of the patients may have more than one complication.

**Some conversions are due to iatrogenic injuries or complications and some are due to difficult anatomy of Calot's triangle on exploration which reflects the judicious judgement of the operating surgeons, rather than a complication.(as shown in Table-6).

Table V:

Complications*	41-50 years (88)		51-60 years (44)		Total (132)		p value
	n	%	n	%	n	%	
Trocar site bleeding	05	5.7	05	11.4	10	7.6	
Vascular injury	04	4.5	02	4.5	06	4.5	
Liver Bed (opening of sinus)	03	3.4	02	4.5	05	3.8	
Gall bladder Spilled gallstones	08	9.1	05	11.3	13	9.8	
Intra-operative bile leak	05	5.7	03	6.8	08	6.1	
Intra-operative bile leak	09	10.2	06	13.6	15	11.4	
Bile duct injury	01	1.1	01	2.3	02	1.5	
Bowel injury	00	00	01	2.3	01	0.8	>0.05
Peroperative mortality	00	00	00	00	00	00	
Conversion to open surgery**	08	9.1	06	13.6	14	10.6	
Port site infection	05	5.7	03	6.8	08	6.1	
Surgical emphysema	02	2.3	01	2.3	03	2.3	
Post cholecystectomy syndrome	04	4.5	03	6.8	07	5.3	
Postoperative mortality (due to co-morbidity)	00	00	02	4.5	02	1.5	

*Some of the patients may have more than one complication.

**Some conversions are due to iatrogenic injuries or complications and some are due to difficult anatomy of Calot's triangle on exploration which reflects the judicious judgment of the operating surgeons, rather than a complication (Table VI).

The results of this study suggest that (Table VI) difficulties to define the anatomy of the intended site (Calot's triangle) initially or after trial dissection are the most important reason for conversion to open surgery (58.8%).Table VII shows clinical characteristics of subjects requiring open conversion.

Table VI:

Reason	n	%
Difficult to define anatomy of Calot's triangle	10	58.8
Cystic artery bleeding	04	23.5
Bile duct injury	02	11.8
Bowel injury	01	5.9
Total	17	100

Table VII:

Variable		Conversion (%)	P value
Gender	Male (61)	8 (13.1)	<0.05
	Female (111)	09 (8.1)	
Age	≥ 50 years (62)	8 (12.9)	
	<50 years (110)	09 (8.2)	
Concomitant diseases	Present (117)	12 (10.3)	
	Not present (55)	5 (9.1)	
Previous abdominal surgery	Yes(26)	4 (15.4)	
	No (146)	13 (8.9)	
Previous abdominal surgery	Upper abdominal (09)	2 (22.2)	
	Lower abdominal (17)	2 (11.8)	
Acute cholecystitis	Yes (32)	5 (15.6)	
	No (140)	12 (8.6)	
Obesity	Yes (34)	5 (14.7)	
	No (138)	12 (8.7)	
Gall bladder wall thickness on USG	Thick (46)	7 (15.2)	
	Normal (126)	10 (7.9)	
Preoperative ERCP	Yes (09)	1 (11.1)	
	No (163)	16 (9.8)	

Discussion:

Laparoscopic cholecystectomy (LC) has virtually replaced conventional open cholecystectomy as the gold standard for symptomatic cholelithiasis and chronic cholecystitis^{7,8}. The application of laparoscopic technique for cholecystectomy is expanding very rapidly and now performed in almost all major cities and tertiary level hospitals in our country. The laparoscopic approach brings numerous advantages at the expense of higher rate of procedure specific complications especially in training facilities⁷.

In this study majority of the patients were female (64.5%) patients. In male group, 18.0% patients were in 41-50 years of age group followed by 9.9% were in 51-60 years age group, whereas among the female patients it was 33.1% and 15.7% respectively (table 1). In a study majority (59.4%) of the patients were in the age group 21-40 years and 89.4% were females⁹. In our study, the age of study population in males and females were 46±1.7 and 42±1.3 years respectively. However in another study of laparoscopic cholecystectomy, the mean age was 43.7 years with a female to male ratio of 4.5:1.7. In another clinical study of 281 cases of laparoscopic cholecystectomy, there were 140 men and 141 women with a mean age of 56.9 years (range 23-89 years)^{9,10}.

In this study, among the total 172 patients of laparoscopic

cholecystectomy, in case of 69.2% patients, laparoscopic cholecystectomy was done for chronic cholecystitis and in 18.6% cases, it was performed for acute cholecystitis. There found no significant variations of results among the male and female patients and almost the same results were observed according to the age distribution. P values are quite insignificant here. There found no significant difference in incidence rate relating to the age and sex (Table 2 & 3). P values (using the Chi square test) are more than >0.05 here, hence suggest insignificant results statistically. In a research study, the incidence rates of chronic and acute cholecystitis for which majority (89.7%) of laparoscopic cholecystectomy was done were 77.5% and 12.2% respectively¹⁰.

In our study, it was found that most frequently observed peroperative complication was bile leak and the incidence rates of intra-operative bile leak, perforation of gall bladder, trocar site, vascular, hepatic bed hemorrhage were 11.0%, 9.3%, 7.0%, 4.7% and 4.0% respectively. Conversion to open procedure was done in approximately 9.9% cases. Post cholecystectomy syndrome was eventually developed in 4.7% of all cases. The postoperative mortality was approximately 1.1%. Among the two cases of postoperative mortality, one patient died in postoperative respiratory failure (who was a known case of smoker and COPD in preoperative assessment) and another patient died in acute MI during

postoperative period. Peroperative mortality was found nil in this clinical study. The incidence of spilled stone, bowel injury, port site infection, surgical emphysema were 5.2%, 0.6%, 5.2% and 2.3% respectively (table IV and V). P values were >0.05 and there found no significant differences in findings here in relation to the age and sex. The reported most frequent complications were port site bleeding and intra-operative bile leakage in another clinical study and the recorded incidence rate were 8.9% and 7.5% respectively¹¹. In contrast, in a RCT, these were perforation of peroperative gall bladder (6.7%) and hepatic bed hemorrhage (5.1%)¹².

Bile duct injury is a severe and potentially life threatening complication of laparoscopic cholecystectomy and several studies report 0.5% to 1.4% incidence bile duct injuries.^{11,13,14}. In another large case series, bile duct injury was minimum and occurred in only 14 (3.98%) cases⁹. Vascular injury was encountered in another series. There were 35 (9.97%) cases of trocar site bleeding. Vascular injury in the Calot's triangle during dissection occurred in 57(16.23%) cases⁹. Only few data are available on the real incidence of bleeding complication from the liver bed. In a meta-analysis by Shea, 163 patients out of 15,596 suffered vascular injury required conversion with a rate of 8%.⁵ Concomitant vascular injuries during laparoscopic cholecystectomy increase the overall morbidity¹⁵.

Spillage of gallstones into the peritoneal cavity during laparoscopic cholecystectomy occurs frequently due to gallbladder perforation and may be associated with complications, but conversion is not required in most of the cases, efforts should be made to remove spilled gallstones, reflected in different research study¹⁶⁻¹⁸. Prevalence is estimated between 10% and 30%.³ In a retrospective study from Switzerland, only 1.4% of patients were with spillage of gallstones during laparoscopic cholecystectomy⁷.

In our study, surgical site infection such as port site infection was recorded in 5.2% cases. Significant reduction in the postoperative infection is one of the main benefits of minimally invasive surgery⁷ as the rate of surgical site infection is 2% versus 8% in open surgery¹⁹. In another study it is reported as 1.4% in laparoscopic surgeries versus 14.8% in open cases²⁰. In our study, the incidence rate of visceral injury such as bowel injury was found 0.6%. The incidence of bowel injuries in laparoscopic cholecystectomy is 0.07-0.7%, a seldom complication during operations^{21,22}.

The overall conversion rate was 9.9% in our study. Difficult to define anatomy of the intended site prior to dissection is found to be the most important contributed factor (58.8%) for the conversion to open cholecystectomy (table 6) followed by haemorrhage from cystic artery (23.5%), bile duct injury (11.8%) and bowel injury (5.9%). Similar finding was reported in a RCT. In that particular research study, dense adhesion and obscure anatomy of Calot's triangle was found as the most important and leading cause of open conversion of laparoscopic cholecystectomy¹².

In this study, gender, age, co-morbidities, previous abdominal surgery, acute cholecystitis, obesity, gall bladder wall thickness on ultrasound, history of preoperative ERCP are

also found to be important and relevant clinical factors for open conversion of laparoscopic cholecystectomy (table 7). The conversion rates are relatively higher in male sex, age \geq 50 years, in presence of co-morbidities, H/O upper abdominal surgery, acute cholecystitis, obesity, thickened gall bladder wall on ultrasound and preoperative ERCP which are approximately 13.1%, 12.9%, 10.3%, 22.2%, 15.6%, 14.7%, 15.2%, 11.1% of the respective subgroup of population (table 7). P values reflects significant results here (<0.05).

Prieto DE et al found in a study that patients who underwent previous abdominal surgery were found to have increased difficulty during laparoscopy in terms of adhesions in the upper abdomen. There was more conversion rate in upper abdominal surgery (20%) comparing to lower abdominal surgery (4.7%)¹². This is probably because of many adhesions attached to area of gall bladder and to the anterior abdominal wall. But according to them, with increased experience, surgeons would overcome this difficulty.^{11, 12} In another study, male gender was found to be associated with increased risk of conversion and the rate was 2.07% in women and 8.9% in men, and the reason why men have a higher conversion rate is not clear¹³.

Our study was done in a comparatively limited number of study population and within a narrow time scale. More studies in this regard involving multiple centers should be performed with larger number of study population with longer follow up to assess actual outcome of our population.

Conclusions:

Laparoscopic cholecystectomy is one of the most frequently performed laparoscopic operations in our hospital and other tertiary level hospitals in Bangladesh. Across the globe, it is considered as the gold standard procedure in patients presenting with cholelithiasis and other benign gall bladder diseases. Most of the complications are due to lack of experience or knowledge regarding procedure related complications. Proper evaluation of the patients in terms of history taking, physical examination and investigations like ultrasonography and relevant biochemical test and preoperative work up in combination with adequate background training is required for a better outcome. Laparoscopic cholecystectomy is a safe and effective technique for the treatment of cholelithiasis with favourable results provided the surgeon makes careful and timely decision to convert the procedure to open cholecystectomy in cases where he encounters peroperative complications or obscure anatomy of Calot's triangle.

References:

1. Ros A, Carlsson P, Rahmqvist M, Bachman K, Nilsson E. Nonrandomized patients in a cholecystectomy trial: characteristics, procedure, and outcomes. *BMC Surge* 2006;6:17.
2. Ji W, Li LT, Li JS. Role of Laparoscopic subtotal cholecystectomy in the treatment of complicated cholecystitis. *HepatobiliaryPancreat Dis Int* 2006;5(4):584-9.

3. Hobbs MS, Mai Q, Knuimam MW, et al. Surgeon experience and trends in intraoperative complications in laparoscopic cholecystectomy. *BJS* 2006; 93:844-53.
4. Hasl DM, Ruiz OR, Baumert J, et al. A prospective study of bile leaks after laparoscopic cholecystectomy. *SurgEndosc* 2001; 15:1299-1300.
5. Shamiyeh A, Wanyand W. Laparoscopic cholecystectomy: early and late complication and their treatment, *Langenbecks ArchSurg* 2004;389:164-71.
6. John FB, David CM, John DW. Preoperative Assessment, Premedication & Perioperative Documentation, In Morgan & Mikhail's *Clinical Anaesthesiology*. 5th edition. Lange publication: 2013, United States, 295-308.
7. Cawich SO, Mitchell DI, Newnham MS, Arthurs M. A comparison of open and laparoscopic cholecystectomy done by a surgeon in training. *West Indian Med J* 2006;55(2):103-9.
8. Al-Salamah SM. Outcome of laparoscopic cholecystectomy in acute cholecystitis. *J Coll Physicians Surg Pak* 2005;15(7):400-3.
9. Chau CH, Siu WT, Tang CN, et al. Laparoscopic cholecystectomy for acute cholecystitis: the evolving trend in an institution. *Asian J Surg* 2006;29(3):120-4.
10. Curro G, Lapichino G, Lorenzini C, Palmeri R, Cucinotta E. Laparoscopic cholecystectomy in children with chronic hemolytic anemia. Is the outcome related to the timing of the procedure? *SurgEndosc* 2006;20(2):252-5.
11. Lee KW, Poon CM, Leung KF, Lee DW, Ko CW. Two Port needlescopic cholecystectomy: Prospective study of 100 cases. *Hong Kong Med J* 2005;11(1):30-5.
12. Prieto DE, Median CJ, L Gonzalez OA, et al. Direct trocar insertion without pneumoperitoneum and the veress needle in laparoscopic cholecystectomy: a comparative study. *ActaChirBelg* 2006;106(5).
13. Frilling A, Li J, Weber F, Fruhaus NR, et al. Major bile duct injuries after laparoscopic cholecystectomy: a tertiary center experience. *J Gastrointest Surg* 2004;8(6):679-85.
14. Rohatgi A, Widdison AL. An audit of cystic duct closure in laparoscopic cholecystectomies. *Surg Endos* 2006;20(6):875-7.
15. Tzovaras G, Dernvenis C. Vascular injuries in laparoscopic cholecystectomy: an underestimated problem. *Dig Surg* 2006;23(5-6):370-4.
16. Lin CH, Chu HC, Hsieh HF, et al. Xanthogranulomatous panniculitis after spillage of gallstones during laparoscopic cholecystectomy mimics intra-abdominal malignancy. *Surg Laparosc Endosc Percutan Tech* 2006;16(4):248-50.
17. Loffeld RJ. The consequences of lost gallstones during laparoscopic cholecystectomy. *Neth J Med* 2006; 64(10):364-6.
18. Zehetner J, Shamiyeh A, Wayand W. Lost gallstones in laparoscopic cholecystectomy: all possible complications. *Am J Surg* 2007;193 (1): 73-8.
19. Boni L, Benevento A, Rovera F, et al. Infective complications in Laparoscopic surgery. *Surg Infect (Larchmet)* 2006;7 supply 2:109-11.
20. Chuang SC, LeeKT, Chang WT, et al. Risk factors for wound infection after cholecystectomy. *J Formos Med Asso* 2004;103(8).
21. Leduc LJ, Metchell A. Intestinal ischemia after laparoscopic cholecystectomy. *JSLs* 2006;10(2): p. 236-8.
22. Baldassarre GE, Valenti G, Torino G, et al. Small bowel evisceration after laparoscopic cholecystectomy: report of an unusual case. *Minerva Chir* 2006;6(2):167-9.