ORIGINAL ARTICLE

Early Complications of Laparoscopic Cholecystectomy: A Prospective Study

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Abstract :

Background: Laparoscopic cholecystectomy (LC) has been established as the gold standard procedure for the symptomatic gallstone disease since 1996. It offers the patients faster return to work, lesser postoperative pain and much improved cosmetic results as compared to open procedure. **Aims:** to evaluate the spectrum of complications of laparoscopic cholecystectomy, methods of identification of complications and appropriate measures to be taken to combat these complications. **Methods:** An observational prospective type study was done in Shaheed Monsur Ali Medical College Hospital and in certain Private Hospital settings at Uttara, Dhaka during January 2011 to December 2017. In total 300 patients were selected irrespective of age and sex, on the basis of having symptomatic gallstone disease in the form of biliary colic and chronic cholecystitis. LC performed by using standard Phillips laparoscopic procedure. Per operative and post operative complications were measured. **Results:** Laparoscopic cholecystectomy was done in 296 (98.67%) cases and in 4 (1.33%) cases conversion was needed. Per operative complication rate was 45 (15%). Among these, one case (0.33%) developed major complication, i.e. injury to the common bile duct and conversion was done. Other complications were perforation of gallbladder with spillage of bile in 17 (5.67%) cases, spillage of stones in 6 (2%) cases, total per operative bleeding in 17 (5.67%) cases, which were due to cystic artery bleeding in 2 (0.67%) cases, bleeding from gallbladder bed in 10 (3.33%) cases, trocar site bleeding in 5 (1.67%) cases, bile oozing from the gallbladder bed in 2 (0.67%) cases, which continued through drain up to second postoperative day. Postoperative complications rate was 32 (12%), where 2 (0.67%) developed major postoperative complications and laparotomy were done to manage these complications. Postoperative wound infection occurred in 9 (3 %) cases. **Conclusion:** Complication rate of laparoscopic cholecystectomy is not higher than that for open cholecystectomy. Most of the complications are preventable if LC is performed following strict precautions, especially optimum exposure of Calot's triangle, judicious use of diathermy and safe clip application and the use of peroperative cholangiography can prevent late diagnosis of bile duct injury.

Key words: Laparoscopy, Cholecystectomy, Cholelithiasis

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Introduction:

Open cholecystectomy has been performed for more than 100 years throughout the world as the standard treatment modality for Cholelithiasis and symptomatic gallstone disease. It has been demonstrated to have acceptability, low morbidity, high efficacy and minimal mortality rate[1]. Laparoscopic cholecystectomy (LC) was officially recognized in 1994 as the treatment of choice for symptomatic gallbladder lithiasis. Since 1996, laparoscopic cholecystectomy is the gold standard for symptomatic cholelithiasis[2] Although the mortality and morbidity rates of laparoscopic cholecystectomy are similar to those of open cholecystectomy, it has advantages over open abdominal surgery. Studies

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have been pointed to significant shorter hospital stay, lesser postoperative pain and earlier return to work[2-6].

During introduction of laparoscopic cholecystectomy, there were a list of contraindications including previous abdominal surgery, major coagulopathy, choledocholithiasis, acute cholecystitis and obesity. With the increasing experience and improvement of technical aspect, however, the preliminary reports suggest that laparoscopic cholecystectomy can safely be performed in this conditions[13-16].

Though laparoscopic cholecystectomy is measured as a safe procedure, it has got some disadvantages.18. Many studies have described advantages and disadvantages of laparoscopic cholecystectomy. It may be dangerous if improperly performed[7-10, 11-12].

Recent studies reported operative mortality rate of laparoscopic cholecystectomy is 0-0.9% and overall morbidity ranged from 2 to 6%[17]

As the laparoscopic cholecystectomy is gradually been popularized in Bangladesh, it is necessary to evaluate spectrum of peroperative and postoperative complications. So that preventive and other measures can be taken to minimize the complications and maximize the safety of the operative procedure.

This study was taken with following objectives. Special attention was paid to short-term and early complications.

• To determine the type and incidence of per operative complications.

• To find out the early postoperative complications.

• To find out the method of identification of complications and their management.

Patients and Methods:

Study time and place: January 2011 to December 2017 in the department of surgery, Shaheed Monsur Ali Medical College Hospital and certain Private Hospital, Uttara Dhaka. The study was prospective observational type. Sample size was 300 patients selected irrespective of their age, sex.

Inclusion criteria:

Patients having symptomatic gallstone diseases in the form of biliary colic, acute or chronic cholecystitis and/or having ultrasonographic evidence of gall stone were included.

Exclusion criteria:

Patients having history of jaundice, common bile duct dilatation (>8 mm in diameter on ultrasound), choledocholithiasis, pancreatitis, bleeding disorders, positive hepatitis B and hepatitis C viruses, sepsis, malignancy, history of upper abdominal surgery were excluded.

Preoperative work up included a complete blood count, blood urea, blood sugar, electrolytes, X-ray chest, and ultrasound of abdomen, liver function test and hepatitis profile.

Detailed clinical history of illness, routine and special investigations findings was recorded on preformed data collection sheet.

All preparations were done under general anesthesia using standard laparoscopic procedure preceded by creating pneumoperitoneum. Any trouble or complications during operation with management details were noted. Conversion to open procedure with their reasons was pointed out. Postoperative course and complications, if any, and overall outcome of the operation procedures were recorded.

Results:

Table-1. Demographic characteristics of the study patients (n=300)

Age (years)	Frequency (%)
Up to 20	4(1.33)
21-30	45(15.00)
31-40	113(37.67)
41-50	77(25.67)
51-60	47(15.67)
61-70	11(3.67)
71 and above	3(1.00)

Out of the 300 cases studied, majority (37.7%) were in the age group 31-40 years. 25.7% cases were in the age group 41-50 years and 16.7% in 51-60 years.

Table-2: Ultrasonographic findings of hepatobiliary system and pancreas of the patients (n=300)

Ultrasonographic findings	Frequency (%)
Normal appearance gallbladder with stones	239 (79.67)
Fibrosed and contracted gallbladder with stones	51 (17.0)
Distended gallbladder with stones	5 (1.67)
Evidence of acute inflammation with stones	21 (7.0)
Fibrosed and contracted gallbladder without stone	6 (2.0)

Table-2 shows that all the patients in this study had undergone ultrasonographic examination of hepatobiliary system and pancreas. Out of 300 cases, 239 (79.67%) cases had normal appearance gallbladder with stones, 51 (17%) cases had fibrosed and contracted gallbladder with stones, 5 (1.67 %) cases had distended gallbladder with stones, 21 (7 %) cases had evidence of acute inflammation with stones, 6 (2%) cases had fibrosed and contracted gallbladder without stone. No patient had dilated common bile duct and no patient had stone in the common bile duct.

Table-3: Per operative problems (measures taken) at laparoscopy (n=300)

Per operative problems (measures taken)	Frequency (%)
Large tense gallbladder (aspiration required)	8 (2.67)
Dense adhesion (Dissection required)	19 (6.33)
Too big gallbladder/stone to deliver (enlargement of umbilical port)	6 (2.00)
Gallbladder contracted and densely adherent to liver seemed to be carcinoma gallbladder (conversion required)	1 (0.33)
Total problem	34 (11.33)
No problem	266 (88.67)

Table-3 shows that out of 300 patients, peroperative problems had in 34 (11.33 %) patients, 8 (2.67%) cases had large tense gallbladder (needle aspiration required), 19 (6.33%) cases had dense adhesion (dissection required), 6 (2%) cases had too big gallbladder/stone to de1ivery (enlargement of umbilical port required). In 1 case (0.33%) it was found that gallbladder was contracted and densely adherent to liver, clinically seemed to be carcinoma gallbladder. In this case, conversion was required. None of the 266 cases had peroperative problems.

Table-4 shows various peroperative complications in 45 (15%) cases. Perforation of gallbladder with spillage of bile in 17 (5.67%) cases, spillage of stones occurred in 6 (2%) cases, cystic artery bleeding in 2 (0.67%) cases, bleeding from gallbladder bed after dissection in 10 (3.33%) cases, trocar site bleeding in 5 (1.67%) cases, bile oozing from gallbladder bed in 2 (0.67%) cases, dense adhesion and obscure anatomy in 2 (0.67%) cases. In one case, injury to the common bile duct was recognized during operation and conversion was done.

Table-4: Per operative complications at laparoscopy (n=300)

Type/nature of complications (measures taken)	Frequency (%)
Gallbladder perforation with spillage of bile (suction and clipping)	17 (5.67)
Spillage of stones (picked and removed by sterile gloves):	6 (2.00)
Cystic artery bleeding (ligation)	2 (0.67)
Bleeding from gallbladder bed after dissection (suction, cleaning, cautery)	10 (3.33)
Trocar site bleeding (pressure /diathermy coagulation)	5 (1.67)
Bile oozing from gallbladder bed (suction, cleaning, cautery, drain given)	2 (0.67)
Dense adhesion and obscure anatomy (conversion done)	2 (0.67)
Injury to the common bile duct recognized during operation (conversion done)	1 (0.33)
Total complication	45(15.00)
No complication	255(85.00)

Table-5 shows postoperative shoulder tip or back pain in 18 (6%) cases, postoperative bile leak through drain in 2 (0.67%) cases, wound infection in 9 (3 %) cases,

Table-5: Postoperative complications (n=300)

Complications	Frequency (%)
Postoperative shoulder tip or back pain	18(6.00)
Postoperative bile leak through drain (up to 2nd POD)	2(0.67)
Wound infection	9(3.00)
Preperitoneal /subcutaneous emphysema	1(0.33)
Prolonged ileus	1(0.33)
Mild chest infection	2(0.67)
Subhepatic collection (subhepatic incision and drainage done)	1(0.33)
Postoperative intra abdominal biliary leakage due to slipped clip of cystic duct (laparotomy done)	1(0.33)
Postoperative biliary peritonitis due to unrecognized common bile duct injury (laparotomy done)	1(0.33)
Postoperative complications	36(12.00)
No postoperative complication	264 (88.00)

subcutaneous emphysema in l(0.33 %) case, prolonged ileus in 1 (0.33%) case, mild chest infection in 2 (0.67%) cases, subhepatic hepatic collection in 1 (0.33 %) case, postoperative intra abdominal biliary leakage due to slipped clip of cystic duct in 1 (0.33%) case, postoperative biliary peritonitis due to unrecognized common bile duct injury in 1 (0.33%) case.

Table-6 shows that in laparoscopic cholecystectomy, there were much reduced postoperative pain requiring analgesic (mean 1.40 days) and feeding started on mean 1.30 days. There was short hospital stay (mean 2.5 days).

Table-6: Recovery of the patients from laparoscopic cholecystectomy (n=300).

Parameters	Range (days)	Mean (days)
Postoperative pain requiring analgesic	1-3	1.40
Feeding started	1-2	1.30
Hospital stay (postoperative)	1-8	2.50

Discussion:

Age distribution of 300 patients included in the present study ranged from 18 to 70 years with highest number of patients in the third decade, which is classical description of gallstone disease. Females were 3.6 times more commonly affected than males. Out of 300 patients, laparoscopic cholecystectomy was done in 296 (98.67 %) cases, and in 4 (1.33%) cases conversion was needed. Two (0.67 %): cases out of 296 patients developed postoperative complications and laparotomy was done to manage these complications.

Peroperative problems were experienced in 34 (11.33%) patients. Most common problems were strong adhesion in 19 (6.33%) patients requiring slow and careful dissection. Aspiration was needed in 8 (2.67%) cases of large, tense and distended gallbladder. Too big gallstone was seen in 6 (2%) cases and problems during passing through umbilical port were solved by enlarging the port. In 1 (0.33 %) case, the gallbladder was found contracted and densely adherent to liver and laparoscopically seemed to be carcinoma gallbladder. In this case, immediate conversion was done (biopsy proved it as adenocarcinoma of gallbladder). Peroperative problems were more with fibrosed and thick-walled cases. Peroperative problems could largely be avoided by proper selection of patients for laparoscopic cholecystectomy.

Morbidity for laparoscopic cholecystectomy ranged from 2-6%. These complications included those related to laparoscopy and those related to actual

cholecystectomy. The most common procedure related complications of laparoscopic cholecystectomy included bile duct injury, bile leakage, retained common bile duct stones, gallbladder perforation, intraoperative and postoperative haemorrhage and wound infection[17, 19].

Common bile duct injury to the extrahepatic biliary tree remains one of the most devastating complications. A bile duct injury subjects the patient to the immediate risk of a major biliary reconstruction as well as lifelong risk of recurrent stricture formation. The reported incidence of bile duct injury following laparoscopic cholecystectomy ranged from 0 to 0.7 percent[17, 20]. In the present series, common bile duct injury occurred in 2 (0.67%) cases, which is quite consistent with many reported ranges[7, 11, 21,] but lower than the some reports [22, 23, 24] . The cause of such lower value of present series may be due to selection criteria and experienced surgeon in laparoscopic cholecystectomy.

In both the cases of common bile duct injuries, laparotomy was done and T-tubes were given in common bile duct. The patients' recovery was smooth and discharged on 18th postoperative day. The causes were in these cases diathermy injury and short cystic duct with excessive traction. Measures to prevent bile duct injury during laparoscopic cholecystectomy are (a) use of the 30° laparoscope, (b) firm cephalad retraction of gallbladder fundus, (c) lateral retraction of infundibulum of gallbladder, (d) dissection on neck of gallbladder, (e) complete mobilization of the neck of gallbladder, (f) visualization of junction of gallbladder and cystic duct, (g) avoidance of blind clip application or cautery to control bleeding in porta hepatis, (h) early conversion to open procedure if anatomy is unclear[17], (i) to use of peroperative cholangiography can prevent late diagnosis of bile duct injury[25].

Postoperative bile leakage has been reported to occur in 0.2 to 1.5 percent of the patients managed by laparotomy[17,26]. Such leakages usually originate from the cystic duct and may occur as a result of dislodgement of loosely packed haemoclip or necrosis of the cystic duct stump. Bile leakage may also originate from an unrecognized accessory hepatic duct or directly from liver bed[17]. In the present study, bile leakage was encountered in about 3 (1%) cases, which is almost consistent with other reports (0.3-0.9%) [11, 19, 27]. The present value is lower than the reported value of Ihasz M et al (1.3 %) [11]. The cause of bile leakage were clue to oozing from gallbladder bed through drain in 2 cases (0.67 %) which were continued up to 2nd postoperative day and in 1 (0.33 %) case due to slipped clip from cystic duct (managed by laparotomy, ligation of cystic duct by silk, peritoneal toileting and drain tube near cystic duct).

Gallbladder perforation was encountered in 17 (5.67%) cases in the present series which were managed by proper suction of bile from peritoneal cavity, clipping of perforation sites. The present value was much lower than some other reports[17, 22, 24,] but consistent with study of Khondoker MS [23]. The causes of gallbladder perforation in present series were during retraction or dissection of gallbladder from liver bed or during its removal through umbilical port. Spillages of gallstone were encountered in 6(2%) cases and were managed by picking up and removal by sterile gloves. During laparoscopic cholecystectomy, gallbladder perforation with leakage of bile and/or gallstone into abdominal cavity occurred frequently due to secondary to traction applied by grasping forceps or because of thermal injury during removal of gallbladder from its bed. It prolonged the operation time in variable lengths (due to time required for aspiration, cleaning of bile from abdominal cavity) [28]. The present value is much lower than the reported values[22, 23].

In our study peroperative bleeding was found in 17 (5.67%) cases where cystic artery bleeding was in 2 (0.67%) cases, managed by ligation of cystic artery, bleeding from gallbladder bed in 10 (3.33%) cases and managed by suction, cleaning and cautery, trocar site bleeding in 5(1.67%) managed by pressure and diathermy cautery. The finding is higher, even more than two times higher than some other reported studies[11, 22, 23, 29].

An incidence of wound infection is not uncommon following laparoscopic cholecystectomy. In the present series, it was seen in 18 (6%) cases, which is consistent with reports of Khondoker[23] but lower than reports of Huang et al.[7] and Erfan[22]. They were self-limiting and in most of the cases, pain was relieved by usual analgesic.

Among the most common complications of laparoscopic cholecystectomy is wound infection, typically at the umbilical trocar site, the usual site for gallbladder removal[30]. Wound infections were controlled by giving antibiotic after culture and sensitivity of wound swab. An incidence of wound infection after laparoscopic cholecystectomy was reported as 0.9 to 1.3%[11, 19, 31]. The incidence of the present series was 3 percent and higher than other reports[7, 11, 23, 29,] but comparable to Elder et al.[24] The cause of such higher rate of infection may be due to failure to achieve proper sterilization in our hospital.

Prolonged ileus developed in 1 (0.33%) case which was managed by conservative treatment, and which is comparable to Huang et al.[7] and Morlang et al.[21] but lower than Kondoker.[23]

Mild chest infection occurred in 1 (0.33 %) case which was managed by chest physiotherapy and which is much lower than Watson et al.[29].

Table-7. Comparison of complications of LC (reported by some authors)

Parameters	Elder et al.[24] (1996)	Huang et al.[7] (1992)	Watson et al.[29] (1995)	Ihasz et al.[11] (1997)	Morlang et al.21 (1995)	Erfan[22] (1997)	Kondoker[23] (1995)	Present study
Major complications	6.00	3.50	-	-	-	1.00	1.00	-
Main complication	-	0.50-1.0	-	-	-	20.00	10.00	-
Common bile duct injury	1.20	0.50	1.00	0.58	0.70	1.00	1.00	0.67
Bile leakage	-	-	-	-	-	-	-	1.00
Gallbladder perforation	16.00	10.00	-	-	-	10.00	5.01	5.67
Subhepatic collection	-	0.50	-	-	-	-	-	0.33
Spillage of stones	-	-	-		-	6.00	5.00	2.00
Peroperative Bleeding	-	-	2.00	1.40	-	4.00	4.00	5.67
Shoulder tip/back pain	-	10.00	-	-	-	8.00	6.00	6.00
Wound infection	3.50	1.50	1.00	0.80	-	6.00	1.00	3.00
Subcutaneous emphysema	-	1.50	-	-	-	-	2.00	0.33
Prolonged ileus	-	0.50	-	-	0.20	-	1.00	0.33
Chest infection	-	-	5.00	-	-	-	-	0.33

(All values are in percentages)

In the present series, out of 300 patients, 4(1.33%) suffered from conversion into open cholecystectomy. The conversion rate of the present series was lower than the reported 2%[32], 5.3&, 6.9%[2], and 8.2%.[33] Conversion was needed in 2 cases due to much

adhesion and obscuring anatomy of Calot's triangle and one case due to peroperative recognition of common bile duct injury. Lastly, one case was laparoscopically seemed to be a carcinoma of gallbladder (proved adenocarcinoma of gallbladder).

Among the laparoscopically treated 296 cases, 2 patients developed postoperative biliary (2nd and 3rd postoperative day, respectively) complications and laparotomy were needed. One case was due to slipped clip of cystic duct and managed by suction of bile, ligation of cystic duct and drain placed in liver bed. Another was due to unrecognized common bile duct injury and. managed by suction and cleaning of bile, repair of common bile duct over T-tube and drain kept in liver bed.

Average time required for laparoscopic cholecystectomy was 40 minutes with a range of 35-115 minutes. Longer time was required in cases having strong adhesion. The result is significantly lower than other reports, but consistent with the report of Zahangir[32]. The cause of lower value was patient selection criteria and experience of surgeon in laparoscopy and technique.

The overall complication rate in the present series is 45 (15%) and can be compared favorably with morbidity rate from conventional cholecystectomy rate (6-35 %) [34, 35]. There was no mortality in the present series, which is comparable to open cholecystectomy (0-4.8%)[28,35] and consistent with other studies[1,12,14,16].

If we look at Table-7 and 8, we found that rate of complications and mortality of laparoscopic cholecystectomy can be compared favorably with open cholecystectomy much improved results were obtained with shorter hospital stay (2.5 days), less postoperative pain.

Table-8. Comparison of recent studies

Study	No. of patients	Average operative time (min)	Average hospital stay (days)	Return to work (days)	Overall complication rate (%)	Conversion rate (%)	Mortality (%)
Acosta et al.1 (1992)	100	115	1.8	4-10	3.4	11.0	0
Martin et al.35(1992)	162	90	1.0	-	9.0	1.0	0
Weisen et al.13 (1992)	100	97	2.4	3-7	17.0	8.0	0
Phillips et al.14 (1992)	25	119	3.8	8	28.0	8.0	0
Schermer15 (1992)	270	126.3±2.4	4.9±5.0	-	4.1	9.6	0
Elder et al.24 (1996)	213	88	-	-	16.0	11.5	0
Mallik31 (1992)	50	65.04	3.02	5.48	10.0	2.0	0
Erfan22(1997)	100	84.05	5.5	5.58	10.0	2.0	0
Kondoker23 (1995)	100	91.05	3.0	5.48	10.0	1.0	0
Present study (2001)	300	40.00	2.5	---	15.0	2.33	0

The spectrum and rate of complications of present study were lower in most of the components of complications than other reports of the world and of our country[22, 23], but per operative bleeding and wound infection were higher than other world reports[11,29] (Table-7).

In the present series, there was low morbidity (15%) (Table-8) and zero mortality with very low conversion rate (1.33%). The complications faced were managed

successfully with uneventful recovery, except a few days more hospital stay.

Careful dissection of the critical view is essential to avoid technical errors, and intraoperative cholangiography may further clarify anatomical relationship. Most cases of

symptomatic gallstone disease can be treated safely by laparoscopy[28].

Conclusion:

Laparoscopic cholecystectomy is safe and the complication rate is not higher than that for open cholecystectomy. Most of the complications are preventable and could be minimized if laparoscopic cholecystectomy is performed by qualified biliary surgeons having thorough knowledge of complications and had strictly followed the principles and precautions of laparoscopic cholecystectomy. Especially optimum exposure of Calot's triangle, judicious use of diathermy and safe clip application are important. The use of peroperative cholangiography can prevent late diagnosis of bile duct injury.

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