

# Incidents and Complications in Laparoscopic Cholecystectomy: A Retrospective Analysis of 336 Cases

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## A B S T R A C T

**Introduction:** Laparoscopic cholecystectomy (LC) has become gold standard treatment for symptomatic gall stone disease. Still some incidents and complications are seen more commonly with LC than open cholecystectomy (OC). Various aspects of these complications and their treatment possibilities are discussed. This study was done to analyze the frequency of various complications and possible method of its treatment.

**Material and methods:** During 2 years 11 months period 336 LCs have been performed at this centers. Of which 88.98% patients were women and 83.6% cases were of chronic cholecystitis. Four cases were of hypothyroidism. The age ranged between 11 to 55 years.

**Results:** Out of 336 cases, 93.75% (315) cases were successfully operated laparoscopically while 21 (6.25%) cases developed complications. Of 21 cases, 95.23% (20) cases developed operative and early postoperative complications. The frequent operative incidents and complications were gall bladder (GB) perforation (15.47%), stone spillage (10%), hemorrhage (2.3%), common bile duct injuries (0.89%). Conversions to open cholecystectomies were done in 2.3% cases. Most common reason of conversion was acute inflammation with obscure anatomy. The frequent postoperative complications were bile leak, hemorrhage and retained bile duct stone. Two cases required help of minimally invasive procedure. One death was recorded.

**Conclusion:** The better outcome achieved by LCs permits us to recommend the procedure as suitable alternative in selected patients.

**Keywords:** Retrospective analysis, incidents, complications, Laparoscopic cholecystectomy

## INTRODUCTION

The prevalence of gall stones ranges from 10-20% and it is the major cause of morbidity.<sup>1</sup> Open cholecystectomy has been the cornerstone of the treatment of cholelithiasis for about more than 100 years, since it was introduced by Carl August Langenbuch in 1882.<sup>2</sup> Other alternative therapies like oral stone dissolution agents and lithotripsy were tried without any intended influence on the treatment of cholelithiasis and therefore seldom used in clinical practice.<sup>3,4</sup> With the introduction of LC in 1985 by Erich Muhe of Germany, there was gradual change in the treatment of cholelithiasis. Majority of the surgeons and patients accepted this technique and it almost replaced OC. Now this method of treatment of GB stone and inflamed gallbladder has become the 1<sup>st</sup> choice Worldwide.<sup>5-6</sup>

LC is associated with a number of advantages, but is not without risk as was with OC. Advantages includes early postoperative pain relief, early return to normal activity, decrease hospital stay.<sup>7</sup> Disadvantages are increase bile duct injuries, longer operative time, longer learning curve and carbon dioxide insufflation side effects.<sup>8</sup> Some incidents and

complications are more frequently associated with LC than OC. This study was done to analyze the frequency of various complications and possible method of its treatment.

## MATERIAL AND METHODS

This was a retrospective study conducted on 336 cases operated laparoscopically for symptomatic gall stone disease at CIMS and hospital between December 2014 and October 2017. Pre-operative diagnosed cases of acute cholecystitis and choledocholithiasis were excluded from the study as these cases were not operated laparoscopically at this center. Both male and female, aged between 11-55 years old with chronic cholecystitis and cholelithiasis who were undergone LC were included in this study. The operations were performed with standard four port technique<sup>9</sup> after hematological, biochemical and radiological investigation and divided into different categories according to pre-operative diagnosis as shown in table 1. These cases were also categorized into different grades according to the level of difficulty encountered during operation as proposed by Cuschieri<sup>10</sup> (Table-2). Conversion to open operation were done where ever needed. Sub hepatic bile collection

was treated by ultrasound guided percutaneous drainage. Some cases of bile duct injuries required biliary stenting while others treated by laparotomy with repair and T-tube drainage. Generalized biliary peritonitis were treated with laparotomy and repair. Retained stones were removed by endoscopic sphincterotomy with the help of ERCP.

## STATISTICAL ANALYSIS

Collected data was tabulated, analyzed and following observation were made.

## RESULTS

Thirty-seven (11.01%) patients were male and 299 (88.98%) patients were female. Age ranged from 11 to 55 years. Per-operative diagnosis was made as shown in table 1.

### Technical difficulties

Acute cholecystitis, shrunken fibrotic gall bladder, presence of

Diagnosis	Number of cases (%)
Chronic cholecystitis	281(83.63%)
Sclero-atrophic cholecystitis	30 (8.92%)
Acute calculous cholecystitis	14 (4.16%)
GB mucocele	10 (2.97%)
Chronic cholecystitis with cholecysto-duodenal fistula	01 (0.29%)
Total	336(100%)

**Table-1: Operative Diagnosis**

Grade	Number of cases (%)
Grade I	253(75.29%)
Grade II	39(11.60%)
Grade III	36(10.76%)
Grade IV	08(2.38%)

**Table-2; Degree of Difficulty at operation**

Grade	Definition
I	Suppuration at umbilical trocar site on day 5-7
IIA	Required conservative treatment and prolong hospitalization but leave no sequelae.
IIB	Complication that require laparotomy or laparoscopic re-intervention or endoscopic manoeuvres, but heal without sequelae.
III	Complication other than bile duct stricture, developing after surgical or lap or reoperation
IV	Death

**Table-3: Early post-operative complication after LC**

Obligatory conversions	CBD injury	03
	Biliary leak from cystic duct stump	01
	Pericholecystitis	01
Elective conversions	Scleroatrophic cholecystitis	01
	Cholecysto-duodenal fistula	01
	Technical reason (sword fighting)	01

**Table-4: Causes of conversion (8 cases, 2.3%)**

cirrhosis and long duration and uncontrolled hypothyroidism caused difficulty in particular. Some required conversion operation. Great difficulties were associated with Cuschieri's grade III and IV, male sex, presence of inflammatory syndrome and hypothyroidism. Grade III and IV difficulties were observed in 13.65% cases and patients with history of fever with biliary colic and increased thickness of GB wall reported on ultrasonography. Increase of wall thickness is either caused by inflammation or adhesion of omentum to gall bladder (Table 2).

### Intraoperative incidents and accidents

Perforation of GB, gall stone spillage, hemorrhage, bile duct injury and conversion to open cholecystectomy were observed and discussed.

Perforation of GB and gall stone spillage were the common problem during LC. It occurred either during dissection or extraction of GB in 52(15.47%) cases. The incident of stone spill was more difficult than serious, especially when removal of lost gall stones from the peritoneal cavity necessary. This incident prolongs operation time.

Hemorrhage from cystic artery was not observed but bleeding from gall bladder bed were noted in 18 (5.35%) cases especially in acute cholecystitis. In all cases hemostasis were achieved by mono or bipolar cauterization laparoscopically. None of the patient required hemostatic patch or conversion. Bile duct injuries were noted in 3 (0.89%) cases per-operatively. These cases were converted and bile duct injuries were treated either primary repair (1 case) or repair with T-tube insertion. Peritoneum was drained in all cases by sub-hepatic drain. Patient with primary biliary repair who developed sub hepatic bile collection which was treated by endoscopic biliary stenting and USG guided PCD. All these cases were recovered. There was no case of right hepatic duct injury in this series.

Biliary peritonitis was noted in 2 cases. First case was due to bile duct injury and second case was due to leakage from cystic duct stump. In second case stone was removed by cutting Hartman's pouch and sutured by continuous running suture intracorporeally. But it leaked and treated by laparotomy with re-suturing of stump and drainage. Both cases were of acute cholecystitis with impacted stone at Hartman's pouch. Both patients were recovered.

Conversion operation were performed in 8 (2.3%) cases (Table 4). Of 8 cases, 3 were of CBD injuries, one case of each of bile leak from cystic duct stump, pericholecystitis, Scleroatrophic cholecystitis, cholecysto-duodenal fistula and technical problem (sword fighting). The commonest reason of conversion was acute cholecystitis with impacted stone in Hartman's pouch with obscured anatomy. Two cases of CBD injuries were associated with acute cholecystitis and one cases associated with Scleroatrophic cholecystitis. In scleroatrophic cholecystitis, injury of CBD occurred due to ligation in confusion between cystic duct and CBD. All cases were recovered.

### Early postoperative complications (Table 5)

Complications associated with LCs were graded based on Clavien's classification<sup>11</sup> (Table 3). Ten cases (2.9%) were of grade I. These cases were cured with local treatment in few

Complications	Conservative treatment	Minimally invasive treatment	Open surgery	Others	Total
Port site hematoma and infection	10	-	-	-	10
Bile leak	01	02	-	-	03
Choleperitoneum	-	-	01	-	01
Postoperative hemorrhage ( except port wound)	04	-	-	-	04
Retained duct stone	-	01	-	-	01
Umbilical hernia	01	-	-	-	01
Death	-	-	-	01	01
Total	16 (76.19%)	03 ( 14.28%)	01 (4.76%)	01 (4.76)	21 (100%)

**Table-5:** Early and late post-operative complications (21 cases, 6.25%) and their treatment

days. This complication was frequently associated with acute cholecystitis (8 of 10 cases) and fatty patients (2 of 10 cases). There were 6 cases of grade IIA complication. Of 6 cases 3 cases were of biliary leak and 3 cases of hemorrhage. All the cases were of acute cholecystitis. Hemorrhage and biliary leak stopped spontaneously within 3-5 days. Two cases were of grade IIB complications. One case was managed by endoscopic biliary stenting and USG guided PCD of sub-hepatic biliary collection while another case was under went laparotomy with re-suturing of Hartman's stump. Both cases were recovered well. These cases were of acute cholecystitis with impacted stone at Hartman's pouch. No case was recorded of grade III while one case was of grade IV. This case was hypothyroidism which diagnosis missed before operation and patient was drug defaulter. Patient after surgery went into irreversible shock and died.

Four LCs were done on hypothyroid patients. Preoperative diagnosis was known in 2 cases while it was missed in 2 cases. There was aggravation of neuropsychiatric symptoms in early post-operative period in 2 cases and one case died. Out of 4 patients, 3 cases recovered.

#### Late postoperative complications

On follow-up, up to 1 year, one case of residual calculi observed. Per-operatively there was no clinical or radiologic evidence of ductal stone. The calculi were extracted with endoscopic sphincterotomy. Umbilical hernia was present in one case. This developed in the case who had port site infection. Patient was counselled for operation but patient refused.

## DISCUSSION

Incidents and complications associated with LCs should neither overestimated nor underestimated. This operative procedure not easy. The surgical outcome can be improved by good skill and proper selection of cases especially in the beginning. Reports of recent data show a lower morbidity rates (LC: OC:1.9%:7.7%) and mortality rates (LC: OC: 1%:5%) in LC in contrast to initial reports.<sup>12-16</sup>

Certain important conditions like acute cholecystitis, shrunken and fibrotic GB, cirrhosis and obesity increases the risk of complications. Pericholecystitis changes local anatomy that causes loss of dissection plane between GB and liver and difficulty in identifying CBD and structures of Calot's triangle. Often it is impossible to perform duct first method cholecystectomy in most cases. Therefore, there

is risk of injury to the CBD and liver parenchyma. This increases postoperative chances of hemorrhage from liver, biliary leak and sub hepatic collection and abscess formation, if not drained. Fibrotic gall bladder has contracted GB and short cystic duct. Excessive fundal traction may cause CBD tenting and injury. Cirrhosis with regenerating nodule extending into GB bed may pose difficulty and may be injured. In a few obese cases marked fatty infiltration of the Calot's triangle increases chances of complications. In spite of this, the maximum advantage of LC goes to these patients due to low rate of wound infection, wound dehiscence, and incisional hernia.

Hemorrhage, bile duct injury, choleperitoneum, sub hepatic collection and abscess are the main concern with LC. Hemorrhage during LCs can occur from, port wound, cystic artery, gall bladder bed and omentum. Per-operative arterial hemorrhage is one of the reason for conversion.<sup>13,14,17,18</sup> In this study one case of port site bleeding encountered which was treated by cauterization. Some authors have observed that panic reaction of the surgeons is more dangerous than bleeding. Losing patience and blind application of clip or cautery hook, can cause severe injury to the bile duct. Grasping of bleeder provides good temporary hemostasis followed by clipping or bipolar cautery can be done.

Hemorrhage from gall bladder bed commonly encountered in acute cholecystitis, shrunken GB, cirrhosis and in partial cholecystectomy.<sup>17-19</sup> Hemostasis was achieved in majority of these cases by laparoscopic electro-cauterization.<sup>17-19</sup> In the present study, hemostasis was achieved from cauterization in all cases and did not required hemostatic patch or conversion as reported by previous workers.<sup>17</sup>

Injury to extrahepatic bile duct which can occur at any level apart from injury of duct of Luschka if present.<sup>20-23</sup> More serious problem is associated with injury to the main extra hepatic ductal system. This type of injury is more frequently associated with 1% cases in LC than OC (0.5%)<sup>10,13,17,21,29</sup> This difference is statistically not significant but clinically troublesome. Acute cholecystitis with difficult anatomy and inexperience surgeon were the two main reason identified in a study analyzed 15 bile duct injuries.<sup>27</sup> We have also come across this situation in 2 cases. we resorted to conversion. Lack of surgeon's experience is the 2<sup>nd</sup> factor for ductal injury in the beginning observed in a study where 1.7% injuries were reported. These incidences occurred among the first 10-15 laparoscopic operations.<sup>15</sup>



Duct of Luschka may be opened if present in the GB bed. It is reported in 3-5% individuals in a postmortem study.<sup>20</sup> Knowledge of this duct will decrease the incidence of morbidity. During surgery this can be suspected with appearance of bile in GB fossa without GB perforation. If it is encountered it should be either clipped or ligated. Some of the studies have reported biliary peritonitis due to leakage of bile from these ducts. If bile leakage is >500 mL/24 hours and persists in the early postoperative period, endoscopic sphincterotomy or trans papillary stenting is recommended.<sup>23-26</sup> This will decompress biliary ductal system and gradually stop bile leak, thus avoid reoperation. If doubt arises and duct is not found during operation sub hepatic drain should be placed. Biliary peritonitis without sub hepatic drain are either treated by USG guided PCD at well-equipped centre with or without sphincterotomy or biliary stenting. Laparotomy with peritoneal drainage are done where advance facilities are not available. We have two case of postoperative sub hepatic peritoneal collection. One case was managed by USG guided PCD along with confirmation of any major duct injury by MRCP and second case was treated with USG guided PCD with endoscopic biliary stenting. Gradually bile leak stopped and both patients recovered. The use of similar technique along with laparoscopic reintervention with clipping of duct, were also reported. Many of these cases were in whom lack dissection plane between GB and liver and often the liver capsule has been damaged<sup>17,23-25</sup>, Choleperitoneum after OC from cystic duct is rare, but this is more frequent in LCs. Some studies have reported 50% (17/34) cases with biliary complication.<sup>22</sup> We have encountered one case of bile leak from cystic duct stump. This case was of empyema GB with impacted stone in Hartman's pouch which was removed by cutting it. The cut end was sutured intracorporeally but leaked. This case was managed by laparotomy and re-suturing of the stump. Ligation or clipping in LC is specific to CBD. It occurs during application of first clip to the cystic duct. In our series ligation of CBD occurred in one case with shrunken and fibrotic gall bladder but on suspicion due to its size, conversion was done and corrected. Clipping or ligation near to the Hartman's pouch may leave long cystic duct stump. Leaving long cystic duct stump without stone is not the true cause of post cholecystectomy syndrome.<sup>30</sup> Bile leakage and bleeding is the reason of sub-hepatic abscess formation in cases of acute cholecystitis as reported in some studies.<sup>15,17</sup> We have not observed a single case in this series. It could be because of a few cases of acute cholecystitis. Hemorrhage and bile leak from GB bed were 2.7 times more in LC, with no sub-hepatic abscess in OC.<sup>17,31</sup> This is because of routine practice of peritoneal suturing or placing sub-hepatic drain.<sup>31</sup> Suturing of peritoneum is commonly practiced after OC which is not possible in LC might be the reason of increase incidence of this complication.<sup>31</sup> Retained bile duct stone was not observed at early postoperative period but one case was diagnosed after 3 months of LC in this series. It was extracted by endoscopic sphincterotomy. Bile duct calculi can be suspected pre-operatively by presence of multiple calculi, dilated cystic and bile duct. Full investigation for CBD not possible at operation

due to local inflammation or hypertrophied Heister's valve. Endoscopic sphincterotomy with extraction of stone done in both early and late diagnosed cases.<sup>18</sup>

Surgical stress of laparoscopic surgery can alter thyroid function and significantly decrease production of T3 and T4 in normal functioning thyroid patients during first 24 hours after surgery.<sup>32</sup> In hypothyroid patient's there may be further decrease in production of thyroid hormone. Due to this, complications like neuropsychiatric symptoms and hypotension are significantly increased.<sup>33</sup> In the present study 3 cases developed hypothermia were treated by warming and intravenous corticosteroid and one case developed irreversible shock and died.

Twenty-one (6.25%) patients developed complications. Of 21 patients, conversion was done in 8 (40%), endoscopic manoeuvres in 2 cases, USG guided PCD in 2 cases.

## CONCLUSION

The better outcome achieved by LCs permits us to recommend the procedure as suitable alternative in selected patients.

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