

Abstract

Objective: To evaluate the complications of laparoscopic cholecystectomy in symptomatic and asymptomatic cholecystolithiasis.

Design and duration: Prospective study from 1st June 2005 to 30th June 2007.

Setting: Surgical "D" Unit, Khyber Teaching Hospital, Peshawar.

Patients: All patients with cholecystolithiasis who had laparoscopic cholecystectomy.

Methodology: All patients with gallstone disease both symptomatic and asymptomatic, of both sexes and any age were evaluated by history, examination and investigations and the data collected on a proforma. Patients with chronic liver disease or those deferred by the anesthetist were excluded from the study. All patients underwent laparoscopic cholecystectomy, outcome and complications were analyzed.

Result: 351 patients underwent laparoscopic cholecystectomy in the study period. 314 (89.46%) were females and 37 (10.54%) were males. Common age group was between 21-40 years (56.41%), bleeding was the commonest complication, occurring from trocar site in 35 (9.97%), vascular injury in Callot's triangle in 57 (16.23%) and liver bed in 39 (11.11%) cases. Spilled gallstones occurred in 37 (10.54%), biliary leak in 14 (3.98%) including CBD injury in 2 cases. Port site infection was seen in 17 (4.84%), while bowel injury was seen in only one (0.28%) cases. Conversion to open surgery was in 11 (3.13%) cases. Late complications CBD stricture and Port hernia were seen in 5 (1.42%) and 3(0.85%) cases respectively. Mortality was only 2 (0.56%).

Conclusion: LC is a safe and effective procedure in almost all patients with cholelithiasis. Proper preoperative work up, knowledge of possible complications and adequate training makes this operation a safe procedure with favorable result and lesser complications.

Keywords: Laparoscopic cholecystectomy, complications, outcome, gallstones.

INTRODUCTION

Laparoscopic cholecystectomy (LC) has replaced open surgery in the treatment of cholecystolithiasis. 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 experience in the use of LC.³ In USA approximately one million patients are newly diagnosed annually with gall disease and approximately 600,000 operations are performed a year more than 75% of them by laparoscopy.⁵ 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 complications of LC 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.

This study presents a 2-years experience of laparoscopic cholecystectomy with the aim to evaluate the complications of laparoscopic cholecystectomy in cholecystolithiasis, both symptomatic and asymptomatic.

MATERIAL AND METHODS

This prospective study was carried out in surgical-D-Unit of Khyber Teaching Hospital Peshawar from 1st June 2005 to 30th June 2007. Data was collected on a proforma designed to include demographic information, history, examination findings, investigations, operation technique and procedure, complications and their management as well as follow up. All patients undergoing laparoscopic cholecystectomy were included while patients deferred by the anesthetist or

undergoing open surgery were excluded from the study. Preoperative prophylactic antibiotics were given to all patients. Mainly three port entry procedure was adopted while the classical 4-port approach was also done in a few cases. One port was made just below the umbilicus for the telescope and camera. The other port was made in the epigastrium 4 cm below the xiphisternum for dissection in the callot's triangle. The third port was along the right mid-clavicular line at the level of umbilicus for holding the gallbladder. In some cases where the gallbladder was long and the fundus was obscuring the dissection field another port was formed for holding the fundus of the gallbladder. Drain was put through the right sided port where ooze was suspected in dissection area or in difficult cases. The average operation time was 40 minutes. Three doses of injectable antibiotics were given till the next morning. Patients were mobilized on the same evening while they were discharged home the next morning or the second day with advice for follow up visit after 2 weeks to assess the patient for complication.

RESULT

A total of 351 patients had laparoscopic cholecystectomy during the study period. Majority (56.4%) of the cases were aged between 21-40 years, 33.33% were in 41 -60 age while 25 patients were below 20 years and 11 patients had age more than 60 years as shown in Table 1. 89.46% were females. Table 2 shows the investigation. Routine preoperative investigation were done in all cases, liver function tests (LFTs) were performed in 21 cases who looked jaundiced. Serum amylase was done in 11 cases. Ultrasonography was done in all cases while CT scan was done in 17 cases due to a doubtful mass in the epigastrium. ERCP (endoscopic retrograde cholangiopancreatography) in 13 patients who had clinical jaundice or had deranged LFTs. Also MRCP (Magnetic resonance cholangiopancreatography) was done postoperatively in 4 cases which reported a partial injury of the common bile duct in one case while in another case there was complete resection of the common bile duct (CBD).

TABLE 1: Age and sex of patients (n = 351)

Characteristic	No. of Patients	% age
<i>Age</i>		
< 20 years	25	7.12
21-40 Years	198	56.4%
41-60 years	117	33.33%
> 60 Years	11	3.14%
<i>Sex</i>		
Male	37	10.54
Female	314	89.49

TABLE 2: Investigations (n = 351)

Investigations	No of Patients	%
Live function tests	21	5.98
Serum amylase	31	8.83
Ultrasonography	351	100
CT scan	17	4.84
ERCP	13	3.70
MRCP	4	1.13

Gallbladder was sent for histopathology in all cases, 203 patients reported for follow up with biopsy report. 171 cases were reported as chronic cholecystitis, 27 as acute cholecystitis and 5 were reported as adenocarcinoma of gallbladder as shown in Table 3.

TABLE 3: Biopsy report (n = 351)

Histopathology	No. of cases	%
Bladder sent for histopathology	351	
Report available	203	57.83
• Chronic Cholecystitis	171	48.71
• Acute Cholecystitis	27	7.69
• Adenocarcinoma	5	1.42

Bleeding during the procedure was the commonest complication as shown in Table 4. Bleeding from trocar site occurred in 35 (9.97%) cases, from vascular injury in the callot's triangle in 57 (16.23%) and from liver bed in 39 (11.11%) cases. Spilled gallstones was the second common complication occurred in 37 (10.54%) cases where maximum number of stones were recovered during the procedure. Port site infection in 17 (4.84%) cases while patients with biliary leak were 14 (3.98%) and in 12 patients it stopped spontaneously on 5th day while 2 patients needed intervention, with T-tube and Roux-en Y hepaticojejunostomy. Bowel injury occurred only in one (0.28%) patient and was unfortunately not recognized during the procedure and the patient required exploration on the 3rd day. Three patients developed basal pneumonia postoperatively. Common bile duct (CBD) stricture was reported in 5(1.42%) cases latter on during follow-up. Port site hernia was also a late complication and occurred in 3 (0.85%) cases. 11 (3.13%) cases out of 351 were converted to open cases due to adherent gallbladder in 3 cases, 3 due to distorted anatomy and 5 due to bleeding during procedure which was uncontrolled with conventional methods.

Mortality was low in our study with only 2 cases (0.56%), and both were females with high-risk for surgery and anesthesia. 203 patients reported for follow-up after 2 weeks while 148 were lost to follow-up.

TABLE 4: Complications (n = 351)

Complications	No. of cases	%
Bleeding trocar site	35	9.97%
Vascular injury	57	16.23%
Liver Bed	39	11.11%
Spilled gallstones	37	10.54%
Biliary leak	14	3.98%
Bowel injury	1	0.28%
Port site infection	17	4.84%
CBD stricture	5	1.42%
Port hernia	3	0.85%
Conversion to open surgery	11	3.13%
Pneumonia	3	0.85%
Mortality	2	0.56%

DISCUSSION

Laparoscopic cholecystectomy has virtually replaced conventional open cholecystectomy as the gold standard for symptomatic cholelithiasis and chronic cholecystitis.^{6,7} In acute cholecystitis the reports are scanty and conflicting.⁷

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 complication rate especially in training facilities.⁶

This study was specially aimed to focus on the different preoperative and other complications of LC. In our study majority (59.4%) of the patients were in the age group 21-40 years while 25(7.12%) were less than 20 years of age mainly children with hemolytic anemia referred by pediatrician for elective cholecystectomy. 89.4% were females. However in a study of LC in acute cholecystitis the mean age was 43.7 years with a female to male ratio of 4.5:1.⁷ In another study of 281 cases of LC there were 140 men and 141 women with a mean age of 56.9 years (range 23-89 years).⁸ Curro et al, recommend elective early LC in children with chronic hemolytic anemia and asymptomatic cholelithiasis in order to prevent the potential complications of cholecystitis and choledocholithiasis which lead to major risks, discomfort and longer hospital stay.⁹

We used the three port approach for LC in 311 (88.6%) of our cases while classical 4-port approach was also used in the remaining difficult cases. However recently a two port needlescopic cholecystectomy using all 3 mm miniaturized instruments is considered feasible and may further improve the surgical outcomes in terms of pain and cosmosis.¹⁰ In our cases

we used the veress needle for creating pneumoperitoneum, while in one of the studies on LC, direct trocar insertion without pneumoperitoneum was shown to be safe, efficient, rapid and easily learned alternative technique, reducing the number of procedure related complications.¹¹ The reported incidence of injuries from trocars or veress needle is up to 0.2%.⁵

Bile duct injury is a severe and potentially life threatening complication of LC and several studies report 0.5% to 1.4% incidence bile duct injuries.¹² Cystic duct leak is an infrequent but potentially serious complication of LC and can be reduced by using locking clips instead of simple clips.¹³ In our series bile duct injury was minimum and biliary leak occurred in only 14 (3.98%) cases. In 12 cases the leak stopped after the 5th day of operation without any intervention while in 2 cases of common bile duct CBD injury, T tube was placed after ERCP in one cases while in the other laparotomy with Roux-en-Y hepatico-jejunostomy was performed.

Vascular injury was encountered commonly in our series. There were 35 (9.97%) cases of trocar site bleeding, of these 26 cases were controlled with pressure alone while 9 cases required port site exploration and ligation of vessels. Vascular injury in the callots triangle during dissection occurred in 57(16.23%) cases and in 52 cases bleeding was controlled with clip application while 5 cases were converted to open cholecystectomy. Liver bed bleeding was controlled with diathermy while drain was put in few cases small ooze. Only few data are available on the real incidence of bleeding complication from the liver however 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 LC increase the overall morbidity.¹⁴

Spillage of gallstones into the peritoneal cavity during LC occurs frequently due to gallbladder perforation and may be associated with complications, and every effort should be made to remove spilled gallstones but conversion is not mandatory.¹⁵⁻¹⁷ Incidence is estimated between 10% and 30%.⁵ Abscess and fistula formation in the abdominal wall after stone spillage has been reported.¹⁶ In a retrospective study from Switzerland, only 1.4% of patients with spillage of gallstones during LC developed serious postoperative complications.⁵ In our study gallstone spillage occurred in 37(10.4%) cases and maximum number were retrieved during the procedure, and no postoperative complications due to spilled gallstones was recorded.

Port site infection occurred in 17(4.84%) cases and were treated with antibiotics daily dressings and debridements. Significant reduction in the postoperative infection is one of the main benefits of minimally invasive surgery as the rates of surgical site infection is 2% versus 8% in open surgery.¹⁸ In another study it is reported as 1.4% in laparoscopic surgeries versus 14.8% in open cases.¹⁹

Bowel injuries incidence in LC is 0.07-0.7% and most probably occur during the insertion of the trocars, seldom during

dissection or adhesiolysis and they often remain undetected during operations.⁵ There was only one (0.28%) case of bowel injury in our study and it was recognized postoperatively when the patient developed abdominal distension, rigidity and had a toxic look. She was initially treated conservatively but laparotomy was performed on the 3rd day, where a perforation in ileum with edematous gut covered with slough was found. So resection of affected segment with end to end anastomosis was performed. Intestinal ischemia and small bowel evisceration after LC have also been reported.^{20,21} Bowel injury can be prevented by trocar placement under direct vision and inspection of abdomen before withdrawing laparoscope.⁵

In our study LC was converted to open surgery in 11(3.13%) patients. In 3 cases the gallbladder was adherent, 5 cases of vascular injury during LC where bleeding could not be controlled with routine methods, and in 3 cases with disturbed anatomy, Tayab M et al, in their study identified two preoperative risk factors for conversion, ultrasonographic signs of inflammation and age more than 60 years.²² Al Salamah, has reported disturbed anatomy in the region of Callot's triangle as the most common cause of conversion observed in 41.5% of converted cases while male gender, age over 65 years, high leukocytes count, gallbladder wall thickness more than 4 mm on USG were observed as the most significant determinants for conversion to open procedure.⁷ A conversion rate of 1.88% has been reported in a series of 1220 patients from a single center.²³

Bile duct injury during LC is a dreaded complication and may lead to post LC benign biliary strictures after few months, increasing the morbidity and mortality related to the procedure.²⁴ Late postoperative strictures are usually the result of biliary reconstruction for injuries after cholecystectomy or excessive use of electrocautery near CBD.²⁵ CBD stricture occurred in 5(1.42%) of our cases. ERCP was done in these cases, in 2 cases surgical repair with Roux-en-Y Hepaticojejunostomy was done with good results. Three cases were lost to follow up, probably went to higher center for treatment.

Other minor complications in our study were Port-site hernia in 3 cases, 1 at epigastric site and 2 at umbilical port site. Repair was done at an interval of 4-6 months. Holes greater than 5 mm diameter should be closed at facial level and also removal of gallbladder from epigastric hole is important to prevent enlargement of umbilical port.²¹

Mortality was fortunately low in our series with only 2 cases (0.56%). Both were females and high risk patients with multiple organ disease. One of them developed cardiac arrest during anesthesia on the table and the other expired on the 1st postoperative's day in the ICU. Others have reported a morbidity of 2.9% with no mortality.⁷

Three of our patients developed basal pneumonia and were treated with antibiotics and chest physiotherapy. Average hospital stay was 2 days in our study while it has been reported as 2.29 days including the prolonged stay in complicated cases

in a study from a single center by Vagenas K et al.²³ In spite of the above mentioned complications the overall outcome was satisfactory, with better patient acceptance of the procedure.

CONCLUSIONS

LC is one of the most frequently performed laparoscopic operations. It has a low rate of mortality and morbidity. LC is a safe and effective procedure in almost all patients presenting with cholelithiasis. Most of the complications are due to lack of experience or knowledge of typical error.

A rational selection of patients and proper preoperative work up as well as knowledge of possible complications, a low threshold for conversion, in combination with adequate training makes this operation a safe procedure with favorable results.

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. *Hepatobiliary Pancreat 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, Gerace C, et al. A prospective study of bile leaks after laparoscopic cholecystectomy. *Surg Endosc* 2001;15:1299-1300.
5. Shamiyeh A, Wanyand W. Laparoscopic cholecystectomy: early and late complication and their treatment, *Langenbecks arch. Surg* 2004;389:164-17.
6. 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.
7. Al-Salamah SM. Out come of laparoscopic cholecystectomy in acute cholecystitis. *J Coll Physicians Surg Pak* 2005;15(7):400-3.
8. Chau CH, Siu WT, Tang CN, Ha PY, et al. Laparoscopic cholecystectomy for acute cholecystitis: the evolving trend in an institution. *Asian J Surg* 2006;29(3):120-4.
9. 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? *Surg Endosc* 2006;20(2):252-5.
10. 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.
11. Prieto Diazchavez E, Median Chavez J, L Gonzalez Ojeda A, et al. Direct trocar insertion without pneumoperitoneum and the veress needle in laparoscopic cholecystectomy: a comparative study. *Acta Chir Belg* 2006;106(5).
12. 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.

13. Rohatgi A, Widdison AL. An audit of cystic duct closure in laparoscopic cholecystectomies. *Surg Endos* 2006;20(6):875-7.
14. Tzovaras G, Dernvenis C. Vascular injuries in laparoscopic cholecystectomy: an underestimated problem. *Dig Surg* 2006;23(5-6):370-4.
15. Lin CH, Chu HC, Hsieh HF, Jin JS, 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.
16. Loffeld RJ. The consequences of lost gallstones during laparoscopic cholecystectomy. *Neth J Med* 2006;64(10):364-6.
17. Zehetner J, Shamiyeh A, Wayand W. Lost gallstones in laparoscopic cholecystectomy: all possible complications. *Am J Surg* 2007;193 (1):73-8.
18. Boni L, Benevento A, Rovera F, Dionigi G, et al. Infective complications in Laparoscopic surgery. *Surg Infect (Larchmet)* 2006;7 supply 2:5109-11.
19. Chuang SC, LeeKT, Chang WT, Wand SN, et al. Risk factors for wound infection after cholecystectomy. *J Formos Med Asso* 2004;103(8).
20. Leduc LJ, Metcchell A. Intestinal ischemia after laparoscopic cholecystectomy. *JLS* 2006;10(2):236-8.
21. Baldassarre GE, Valenti G, Torino G, Prosperi Porta I, et al. Small bowel evisceration after laparoscopic cholecystectomy: report of an unusual case. *Minerva Chir* 2006;6 (2):167-9.
22. Tayab M, Raza SA, Khan MR, Azami R. Conversion from Laparoscopic to open cholecystectomy: multivariate analysis of preoperative risk factors *J Postgrad Med* 2005;51(1):17-20; discussion 21-2.
23. Vagenas K, Karacanakos SN, Spyropoulos C, et al. Pararoscopic cholecystectomy: a report from a single center. *World J Gastroenterol* 2006;12(24):3887-90.
24. Sikora SS, Pottakkar B, Srikanth, et al. Postcholecystectomy benign biliary strictures—long-term results. *Dig Surg* 2006; 23(5-6):304-12.
25. Hochstader H, Bekavac Beslin M, Doko M, et al. Functional Liver damage during laparoscopic cholecystectomy as the sign of the late common bile duct structure development. *Hepato Gastroenterology* 2003;50:676-9.