



Complication of open versus Laparoscopic Cholecystectomy: A Comparative Study

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Abstract

Introduction: *The aim of the study was to compare complication of cholecystectomy i.e. open cholecystectomy and laparoscopic cholecystectomy according to Toronto system and to find out whether laparoscopic cholecystectomy was safer with least postoperative discomfort and hospital stay.*

Design: *Retrospective study*

Methodology: *Study was conducted on 100 patients undergoing cholecystectomy. 50 patients of open cholecystectomy and 50 patients of laparoscopic cholecystectomy in Surgical Ward, J.A. Group of Hospitals, G.R. Medical College, Gwalior.*

Result: *Maximum number of patients (24%) were belongs to 30-55 years of age. Male:female ratio was 9:41 for open cholecystectomy and 4:46 for laparoscopic cholecystectomy. Gall bladder stone disease were 6-9 times more common in female patients. Intraoperative complication was 10% in open cholecystectomy and 8% in laparoscopic cholecystectomy and postoperative complication were higher in open cholecystectomy. Grade I complication rate was 26% in open cholecystectomy and 12% in laparoscopic cholecystectomy. Grade II complication was 4% in open cholecystectomy and 8% in laparoscopic cholecystectomy i.e. grade II complication rate was higher in laparoscopic cholecystectomy, and conversion rate was 16%, operating time was higher in laparoscopic cholecystectomy group and hospital stay was shorter in laparoscopic cholecystectomy group.*

Conclusion: *Thus we concluded that laparoscopic cholecystectomy was superior procedure for treatment of gall bladder stone disease. As it was associated with decrease complication, decrease postoperative pain, decrease hospital stay and improve cosmetic outcome.*

Keywords: *Common bile duct laparoscopic cholecystectomy, open cholecystectomy.*

Introduction

During the last several centuries numerous techniques have taken introduced in an effort to manage patients with symptomatic discuss gall stone disease. Open cholecystectomy becomes the

gold standard for the treatment of cholelithiasis. The pain associated with the long incision & its effect on post -operative chest complication and also wound complication of traditional open cholecystectomy added to the morbidity of this

procedure. The first laparoscopic cholecystectomy recorded in the medical literature was performed in March 1987 by Mouret in Lyon, France². The Management of Patient with gall bladder stone disease has been revolutionized with laparoscopic cholecystectomy. This technique is rapidly emerging as the gold standard for treatment of patients with symptomatic gall stone disease and is now available throughout most of the world. The small incision with greatly reduce post-operative pain and better cosmetic result as well as shorter period of hospitalization and early return to routine activities have made laparoscopic cholecystectomy, the preferred surgical treatment for patient with symptomatic cholelithiasis. Increasingly cholecystectomy is being carried out using the laparoscopic technique but open cholecystectomy may still be necessary if access to gall bladder impossible laparoscopically, if a complication occurs during laparoscopic, which requires conversion to an open procedure.

Disadvantage of laparoscopic cholecystectomy are complications like injury to CBD, bowel, iliac vessels etc., costly equipment, high conversion rate, (6-35%), difficulty in management of simultaneous common bile duct stone and limitation of access to tertiary health care. It is difficult to state that weather laparoscopic cholecystectomy is truly superior to standard open cholecystectomy particularly in term of safety. Purpose of this study was to compare the outcome of open cholecystectomy and laparoscopic cholecystectomy focusing on complication and also grading of severity of complication, when both procedure were perform by different consultant surgeon in Department of Surgery, J.A. Group of Hospitals, G.R. Medical College Gwalior.

Aims and Objectives

1. To compare complication of cholecystectomy i.e. open cholecystectomy and laparoscopic cholecystectomy according to Toronto system-

Group I: Deviation from the ideal post-operative course, non-life threatening with no lasting

disability, do not significantly extend the hospital stay.

Group II: Potentially life threatening but with or without residual disability, invasive procedures may or may not be needed.

Group III: Complication with residual disability including organ resection or persistence of life threatening conditions.

Group IV: Death due to complications.

2. To find out whether lap cholecystectomy offer less post op discomfort than open cholecystectomy.
3. To determine whether laparoscopic cholecystectomy is safer than open cholecystectomy.
4. To compare the hospital stay in both procedures.

Material and Methods

Study design: Retrospective study, **Sample size:** n=100 Total 100 patients undergoing cholecystectomy admitted at Department of Surgery, J.A. Group of Hospitals, Gajra Raja Medical College, Gwalior fulfilling the inclusion criteria.

Study period: December 2015 to November 2016

Inclusion criteria: For both procedure open and laparoscopic cholecystectomy. All patients with complication with symptomatic gall bladder stone disease all ages and both sexes.

Exclusion criteria:

1. Patient with CBD stone
2. Patient with acute cholecystitis
3. Patient with empyema of gall bladder
4. Patient with acute pancreatitis
5. Patient with bleeding disorder

Preoperative assessment: In all patients detailed history and physical examination, investigations, complete hemogram, liver function test, serum amylase was done. Preoperative ultrasonography for

1. Gall bladder wall thickness < 3 mm or > 3 mm and size
2. Common bile duct diameter < 6 mm or > 6 mm

3. Evidence of acute pancreatitis

Intraoperative assessment

Intraoperative findings

1. Gall bladder thickness
2. Gall bladder size
3. Adhesions
4. Vascular abnormality

Postoperative Assessment: Postoperative complication rate related to grading of complication

1. Overall complications rate in Open Cholecystectomy and Laparoscopic Cholecystectomy related to grade of complications.
2. Total duration of procedure
3. Total duration of hospital stays

All patients was told about the procedure and written informed consent was taken and also informed about conversion to open cholecystectomy.

Observation and Analysis

This retrospective study was conducted on 100 patients undergoing cholecystectomy, 50 patients

open and 50 patient’s laparoscopic cholecystectomy in J.A Group of Hospitals, Gwalior during the period from July 2013 to 2015. Observation and Analysis of all the parameters studied were as follows:

1. Age distribution

(a) For lap Cholecystectomy- The age group of patients ranged from 21-65 years. The maximum incidence was seen in the age group of 30-55 yrs.

(b) For open cholecystectomy- The age group ranged from 24-70 yrs. The maximum incidence was seen in the age group of 30-35 years.

2. Sex distribution-

(a) For lap cholecystectomy- out of 50 pts. only 4 pts. (8%) were male rest 46 pts. (92%) were female

(b) For open cholecystectomy- out of 50 patient only 9 patient (18%) was male, rest 41 patients (82%) were female.

Table 1: Showing USG findings and operative findings in both the groups

Finding		Intra operative findings		USG findings	
		OC (%) n=50	LC (%) n=50	OC (%) n=50	LC (%) n=50
Adhesions	Yes	22(44)	27(54)		
	No	28(56)	23(46)		
Surrounding Oedema	Yes	15(30)	12(24)		
	No	35(70)	38(76)		
Gall bladder wall thickness	>3mm	8(16)	7(14)	11(22)	11(22)
	<3mm	42(84)	43(86)	39(78)	39(78)
G B size	Cont.	9(18)	13(26)	11(22)	9(18)
	Non Cont.	41(82)	37(74)	39(78)	41(82)
CBD diameter	> 6 mm	9(18)	6(12)	6(12)	3(6)
	< 6 mm	41(82)	44(88)	44(88)	47(94)
Vascular anomalies	YES	0(0)	0(0)	0(0)	0(0)
	NO	0(0)	0(0)	0(0)	0(0)

When we compared USG findings with operative findings, USG findings did not help in the showing adhesions and oedema. But it was useful in showing GB wall thickness, GB contraction and CBD diameter.

Table 2: showing intra-operative complications in both the groups

Complication	No. of patients		Complication in grade
	OC (%) n=50	LC (%) n=50	
Hemorrhage	3(6)	2(4)	I
GB perforation	2(4)	1(2)	I
Bowel perforation	0(0)	1(2)	II
CBD injury	0(0)	0(0)	II
Vascular injury	0(0)	0(0)	II
Total	5(10)	4(8)	

Hemorrhage was seen in 6% (3/50) patients OC group and 4% (2/50) patients in LC group. Blood loss was <250 ml. 4% (2/50) patients had GB perforation in OC group and 2% (1/50) patients in

LC group. 2% (1/50) patients had bowel perforation in LC group due to adhesion. This patient was converted to open surgery. No CBD or vascular injury occurred in our study.

Table 3: Showing Post-operative complications in both the groups

Complications	No. of patients		Complications in grade
	OC (%) n=50	LC (%) n=50	
Pyrexia	2(4)	2(4)	I
Retention of urine	1(2)	0(0)	I
Pulmonary complications	1(2)	0(0)	I
Bile leak	1(2)	2(4)	II
Wound infection	4(8)	1(2)	I
Intra –abdominal infection	0(0)	0(0)	II
Residual lithiasis	0(0)	0(0)	II
Billiary pancreatitis	0(0)	1(2)	II
Post cholecystectomy Syndrome	1(2)	0(0)	II
Total	10(20)	6(12)	

This table shows that post-operative fever was more common in OC group. 2% (1/50) patients had postoperative urinary retention in OC group. It was not seen in LC group. 2% (1/50) patients had chest infection in OC group. It was not seen in LC group. 2% (1/50) patients had postoperative bile leak in OC group and 2 (4/50) patients in LC group. But in both the group there was no bile duct injury and the leak subsided in few days in all patients.

26% (13) patients in OC group developed grade I complications while in LC group 12% (6) patients developed grade I complications. Therefore, grade I complication was significantly low in LC group. 4% (2) patients develop grade II complications in OC group while 8% (4) patients developed grade II complication in LC group. Therefore, LC was associated with more grade II complication but this data was not statistically significant (as the number of patient in study was small). None of the patient in both the groups developed grade III or IV complications.

Table 4: Showing over all complications rates related to grade of Complications for all patients in both the groups

Complications in grade	No. of complications		Total
	OC (%) n=50	LC (%) n=50	
I	13 (26)	6(12)	19(38)
II	2(4)	4(8)	6(12)
III	0(0)	0(0)	0(0)
IV	0(0)	0(0)	0(0)
Total	15(30)	10(20)	25(50)

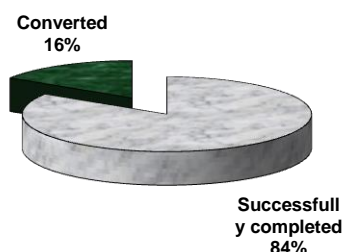
Table 5: Showing conversion rate LC to OC

	No. of patients (%) n=50
Successfully completed LC	42(84)
Converted	8(16)
Total	50(100)

Out of 50 patients, 8(16%) patients were converted to open procedure and remaining 42 (84%) patients the LC was completed

successfully. The rate of conversion to open procedure was (16%). The cause of conversion from LC to OC mostly it was because of adhesion in patient 4(8%) and loss of pneumoperitoneum 2 (4%).

Conversion rate LC to OC



Duration of Operation

The mean duration of operation was 74.5 min (range 45-120) for open OC group.

The mean duration of operation was 804.5 min (range 60-130) for LC group.

The mean duration of operation was 103.75 min (range 90-130) for converted group

The Length of Hospital Stay

The mean hospital stay was significantly shorter in LC group than the OC group (3.98 day's versus 8.12 day's). In patients where laparoscopic cholecystectomy was converted to open procedure duration of hospital stay increased (9.625 days).

Table 6: Advantage of LC

	OC n=50	LC n=50
Complications	30%	20%
Operative time	74.5 min	84.5 min
Total Hospital stay	15.86	12.22
Postoperative Hospital stay	8.12	3.98

Discussion

The purpose of the present study was particularly focusing on complications of both the procedures included in this study, which were divided in two groups of 50 patients in OC and 50 patients in LC. Minimally invasive surgical procedure generate less postoperative pain and offer several benefits to the patients but are associated with increased common bile duct and vascular injuries in LC as compared to OC. In our study mean age of patients operated laparoscopically was 39.96 years

(range 21-65 years) and those operated by open procedure was 44.44 years (range 24-70 years). As reported by Peters et al¹. Male female ratio in our studies was in OC 9:41 and in LC 4:46. USG finding in others studies has not been correlated to the complications of the procedures. In our study G.B. wall thickness, GB size and CBD diameter was correlated to the complications of both the procedures. These USG finding and operative finding were compared with intra operative complications. When USG finding was compared with intra-operative finding, GB wall thickness was over reported in USG. GB size was seen contracted in more number Patients in the LC groups as reported by the USG.

Others criteria to assessed intra-operatively were adhesions, surrounding oedema and vascular anomalies, when these have been correlated with complications. Hemorrhage was more common in open cholecystectomy. When there were no adhesions, no oedema, GB wall thickness was <3mm and GB size was not contracted and CBD diameter was < 6 mm. Whereas in laparoscopic cholecystectomy it was more common with contracted GB with surrounding oedema and adhesions. As reported by Deziel et al (2007)². GB perforation was more in OC, when GB wall thickness was < 3mm and Gall bladder was non-contracted. Whereas in LC group it was more common in patients those GB had adherent with surrounding oedema. Over all GB perforation was more common in OC as compared to LC. Bowel perforation was seen in only LC group in one patient where GB was adherent with surrounding structure and gall bladder was thin walled. No CBD injury was reported in present study. Intra-operative complications in our study pain 10 cases in OC and 8 cases in LC as also reported by Axel Rose et al (2001)³.

Intra-operative complications were equal both in OC and LC groups. GB perforation were more common in open and bowel perforation was seen in LC group. Postoperative complications in our studies 20 cases in OC and 12 cases in LC as also reported by Lujan et al (2007)⁴. The postoperative

wound infection was the most common complication, which was more common in OC group as compared to LC group (8% versus 2%) Overall complications rate in the OC were I-5.1%, II-1.9, III-0, IV-0, and LC groups I-.3, II-1.7, III-0, IV-0 as also reported by Jatzko et al (2001)⁵. In our study most of the complications were grade I and II which was not life threatening. as also reported by Trond et al 2005⁶. In our study conversion rate was 16% i.e. 8 cases were converted to open procedure. The most common cause of conversion was GB adhesion with surrounding area, bleeding with poor vision and instrument failure as also reported by Dubois F. et al⁷. The operative times in our study was more in LC group than OC group (84.5 min. versus 74.5min.). When LC was converted to open procedure the operative time increased as also reported by Gerhard R. et al 1999⁸. Mean hospital stay in our studies was 8.12 days in OC and 3.98 days in LC as also reported by Sabiston 2011⁹. Mean hospital stay in various other studies was less compared to our study because of the better health services and patient's awareness in other countries than our own. Time duration of hospitalization also increased because patients were admitted 2-3 days before the operation. Patients were discharged after stitch was removed. This study showed they following advantage of the laparoscopic cholecystectomy where it was compared to open cholecystectomy less complications rate (30% versus 20%), less hospital stays, less pain and scar formation as also reported by Schachner et al¹⁰.

Summary and Conclusions

After analysis of the data, the following conclusion were made

- 1) Maximum number (24%) of the patients operated were belonging to 30-35 years in both the groups.
- 2) Male to female ratio was 9 :41 for OC and 4:46 for LC i.e. gall stone were 6-9 times more common in female patients.

- 3) Gall bladder size, GB wall thickness, CBD diameter were not associated with intra-operative complications
- 4) Intra operative complications rate was 10% in OC and 8% in LC group. This difference was not statistically significant.
- 5) Postoperative complications rate was higher in OC group (20%) as compared to LC where it was (12%). Over all complication rate was significantly higher in OC group 30% versus 20% in LC group.
- 6) Grade 1 complication rate was 26% in OC groups as compared to 12% in LC group i.e. minor complications rate was significantly higher in OC group.
- 7) Grade 2 complications rate was 8% in LC group as compared to 4% in OC group i.e. grade 2 complications rate was higher in LC groups.
- 8) Conversion rate was 16% in LC group.
- 9) Operative time was higher in LC group i.e. 84.5 min. as compared to 74.5 min. in OC.
- 10) Hospital stay was shorter in LC group i.e. 3.98 days as compared to 8.12 days in OC group
- 11) Thus, we can concluded that laparoscopic cholecystectomy is a superior procedure for the treatment of gall stone disease, as it is associated with decreased complications, decreased postoperative pain, decreased hospital stay and improved cosmetic outcome.

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