ORIGINAL PROF-639

LAPAROSCOPIC V/s OPEN CHOLECYSTECTOMY; COMPARISON MORBIDITY

DR. JAVAID IQBAL, FCPS
Assistant Professor of Surgery
Surgical Unit IV
Punjab Medical College Faisalabad

DR. QAMAR IQBAL
Surgical Specialist
Aziz Fatima Trust Hospital
Faisalabad

DR. BASHIR AHMAD
Registrar Surgical Unit -IV
DHQ Hospital Faisalabad

Dr. Major Abdul Rashid (TI),
Professor of Surgery
Punjab Medical College Faisalabad

ABSTRACT

OBJECTIVE: To find out the morbidity and its determinants with L.C and to compare it with that OC. **STUDY DESIGN:** Surgical unit-IV, DHQ Hospital, Punjab Medical College, Faisalabad; the study of both OC and LC groups was conducted from January 1st to December 31st, 2000 and from January 1st to December 31st 2001 respectively. **SUBJECT & METHODS:** 123 patients underwent surgical treatment for gallstones disease by LC and 58 patients were subject to elective OC. The patients of two groups were matched regarding their age, sex Anesthetic risks, and difficulties during surgery, postoperative complications and hospital stay. **RESULTS:** Average age of the patients was 44.13 years and 42.90 years in LC and OC groups with female to male ratio 91.06% : 8.94% and 93.10% : 6.9% in LC and OC groups, respectively. Per-operatively, 3.45% (two) patients developed common bile duct injury in OC group and morbidity due to this complication remained 0% in LC group. 4.06% (five) patients of LC and 5.17% (three) cases of OC had non-significant hemorrhage and slight bile leak from gall bladder bed. In laparoscopic group, conversion to OC was required in 7.31% (nine) patients. Post operatively, morbidity due to pain, fever, nausea and vomiting, respiratory and wound complications were significantly less in LC group as compared to OC group. Mean durations for tolerating oral feedings and post-operative hospital stay were found to be shorter in LC group than in OC group. **CONCLUSION:** We conclude that with low threshold of conversion laparoscopic cholecystectomy is the safe choice than open cholecystectomy with low morbidity and shorter hospital stay. It is replacing the OC as a new gold standard against which new therapies will be compared in future.

KEYWORDS: Morbidity comparison of LC with OC. Laparoscopic Vs opens cholecystectomy

INTRODUCTION

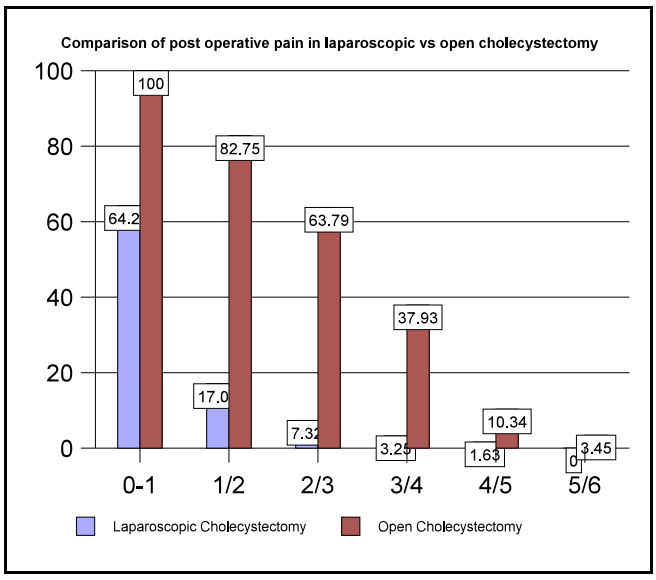
With the growing interest of using endoscopic and laparoscopic equipment fitted with new electronic devices, the pendulum has swung towards less invasive surgery. The scope of minimal access therapy is to minimize the traumatic insult to the patient without compromising the safety and efficacy of the treatment compared with conventional open surgery[1].

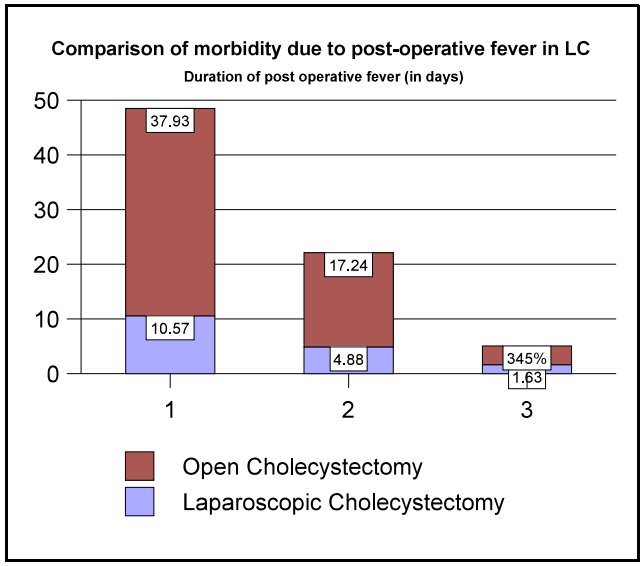
Conventional cholecystectomy remains the gold standard treatment of cholelithiasis but the emergence of laparoscopic technique has provided a new modality in the surgical therapy and the introduction of LC has changed the treatment strategies for the patients undergoing biliary surgery[2]. It was LC that provided the cornerstone around which minimally invasive surgery units were built and since the patients and the surgeons enthusiasm is going uphill[3]. The LC has matured into more efficient operation, yet remains safe with low morbidity when performed by residents at an academic institution[4].

The popularity of LC both with patients and surgeon is such that this procedure now, exceeds OC and with the introduction of this technique, the annual frequency of cholecystectomies has increased[5]. Because of its promise for reduced morbidity, LC has challenged the OC as the therapeutic gold standard for symptomatic cholelithiasis. LC is today the treatment of choice for symptomatic gallstone disease and has replaced the OC as the new gold standard against which new therapies should be compared[6].

It was our personal impression that cases of cholecystectomies in our population have more morbid anatomy and difficult to dissect as compared to western countries. To analyze the hypothesis that in our setup besides surgical access, more morbid anatomy, late presentation, different nature of biliary calculi and certain other factors such as age, sex, diabetes mellitus, hypertension, I.H.D and chronic liver disease etc which may have a significant impact and influence on per operative and post operative morbidity, need to be studied closely. Such as a critical study may help us to know the morbidity figures and influencing factors in laparoscopic cholecystectomy, by which we will be able to compare it with morbidity figures of OC and hence declare it a safe choice.

In our surgical unit IV, in the year 2000 a study was performed to record in detail the morbidity of all cases of open cholecystectomies with description of anatomical difficulties during the procedure. To evaluate and compare the morbidity of LC with that of OC, we started this prospective study of cases of the same team of surgeons to determine the morbidity and influencing factors in all the cases for LC admitted for the year 2001.





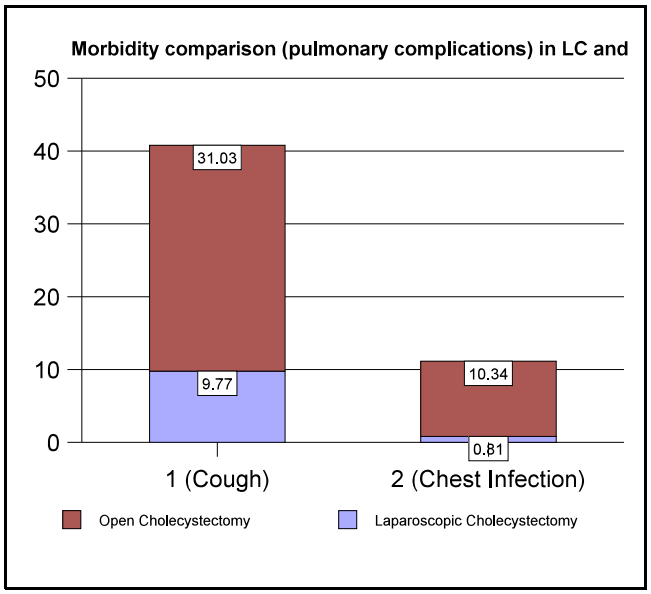
SUBJECT & METHODS

This study was carried out in surgical unit IV at DHQ hospital, Punjab Medical College Faisalabad from Ist Jan 2000 to 31st Dec 2000 and the same team of surgeons operating for LC during the period Ist Jan 2001 to 31st Dec 2001. Cases presented with symptomatic gallbladder disease were included in this study.

It was a prospective analytic type of study in which we tried to establish causes or risk factors responsible for

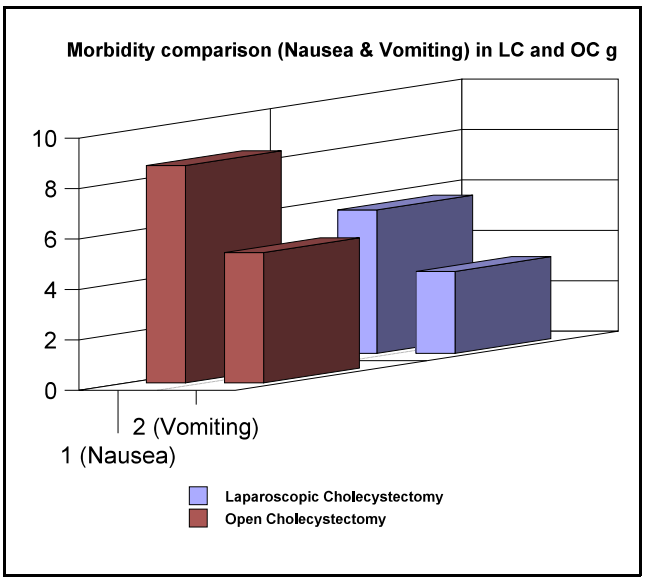
mortality and morbidity in cholecystectomy.

In the first study, 58 patients were included for open cholecystectomy and 123 patients , who had laparoscopic cholecystectomy, were included in the second study by the same group of surgeons. Detailed history, general physical examination and systemic examination were carried out. Each patient investigated for any other disease like hypertension, ischemic heart disease, diabetes mellitus, renal failure and hepatic insufficiency.



In the ward, all the necessary investigations were done for diagnosing and screening purposes. For the patients having hypertension, anti-hypertensive treatment was started i.e. ACE inhibitor. Beta blockeretc the patients found diabetic were started on short acting insulin therapy (Regular insulin) 8 hourly subcutaneous for control of diabetes mellitus.

Ultrasonography was done to see gallbladder, stones in gallbladder, CBC size and any other associated pathology in liver like cirrhotic changes, intrahepatic dilatation. The patients with common bile duct dilatation and intrahepatic dilatation are not included in the study. No patient required oral cholecystogram and C T scan.



All the patients were operated under general anesthesia. All the patients were given prophylactic antibiotics i.e. ampicillin 250 mg + cloxacillin 250 mg half an hour before surgery. Povidone iodine (Pyodine) was used to clean the local area.

All the cases included in the first study had undergone open cholecystectomy with right subcostal incision. Peritoneum was opened cystic duct and artery ligated after identification with chromic catgut NO 1 and 2/0. Gallbladder was removed with infundibulum first in cases where anatomy was not clear, fundus first technique was used to remove gallbladder. Bleeding points were cauterized. In the cases where haemostasis was ideal (40 cases). they were closed with out drain. Other (18 cases) were closed after putting drain.

In the next study, LC was performed through four ports after CO2 insufflations and hook dissection was carried out. In case of multiple stones, empyema or gangrenous gall bladder, it was removed with the help of wound expander through the epigastric port.

In case of spillage of gall bladder contents (8 cases 13.79%) stones and debris removed and wound was washed with 0.9% saline before closure. Vicryl and chromic catgut were used in deeper layer to close abdomen, skin closed with black silk.

Post operatively antibiotic ampicillin + cloxacillin and

gentamycin were given for three doses. In case of empyema, excessive spillage of gall bladder content and gangrenous gall bladder, oral antibiotics were given for five days.

All cases enjoyed full analgesia with injectable Diclofenac sodium + local bupivacain infiltration. Intravenous fluids were administered for first 24 hour until bowl sounds were audible and patient had passed flatus. Then they were allowed to start orally and discharged in case of LC.

Patients with drain were checked daily for volume and nature of fluid drained and drain removed when outcome was nil within 2 hours in almost all the cases. All the patients were examined for chest complication, fever and wound complication and managed accordingly.

The patients with OC were discharged when ever it was safe. Postoperative follow up was continued for 3 months. The patients were advised to visit outdoor weekly (2 week) and monthly for next two month. In case of emergency, they could consult any time

RESULTS

This prospective study for morbidity comparison in LC versus OC was conducted in surgical unit IV, Punjab Medical College , affiliated hospital Faisalabad, comprising 123 patients who underwent LC and 58 patients in which OC was performed. The study was conducted to know the morbidity and factors, which influenced the morbidity figures in LC and to compare them with that of OC.

Every case in both groups of LC and OC was evaluated critically before surgical intervention for any risk factor, which may influence morbidity. Age of 123 patients who underwent LC ranged from 20 to 7 2 years while age range of 58 cases that had primary OC remained 25 to 70 years. Mean age of the patients in LC group and OC group was 44.13 years and 42.90 years respectively.

Incidence of death remained zero in our both LC and OC groups. Furthermore, no patient developed major vascular or visceral injury per operatively in our both studies and no evidence of post operative complications like abdominal distension, sepsis, pancreatitis, deep vein thrombosis, jaundice and persistent pain in right hypochondrium was observed. However, morbidity due to pre operative and postoperative complications was observed in both series.

Per operatively, 3.45% (two) patients developed common bile duct injury in our OC group and incidence of this complication remained 0% in the LC group. However, in our LC group 7.3% (9) patients required conversion to open cholecystectomy. Reasons and rate of conversions is shown in the table I.

Morbidity due to post operative complications was observed in both groups. More often observed complications were post operative pain, fever, respiratory complications, nausea and vomiting. Among these complications, post operative pain was most common. Average duration of post operative pain remained 1.51 days (range 1-5 days) and 2.28 days (range 1-6 days) with LC and OC respectively. Only one case in our OC group developed wound infection and that patient was known diabetic . All the patients with post operative complications were managed symptomatically. Comparison of morbidity due to post operative pain, fever, respiratory complications and nausea and vomiting in LC verus OC groups is shown in graphs 1,2,3 and 4 respectively.

Further, all the patients in whom morbidity due to post operative complications was present, their influencing risk factors were studied. Comparison of morbidity due to post operative complications in patients along with their risk factors is shown in the table II.

Drains were placed in most of the cases with acute cholecystitis an empyema of gallbladder, in cases with vascular adhesions difficult to dissect and when hemorrhage or bile leak from the dissected area of gallbladder bed was suspected. Quantity of drain was found to be either 100 ml or less than 100 ml after 24 hrs of operation. In majority of cases, drains were removed on first post operative day and after 3rd post operative day, in no patient it was considered to have a drain except two cases of OC in which T-tube were inserted for bile duct injuries. T-tubes, in these two patients (3.45%) cases of OC were removed on 12th post operative day after satisfactory. T-tube cholangiogram. Comparison of patients with drains along with nature of drain on LC and OC groups is presented in table III.

Table-I. Reasons and rate of conversion to open Cholecystectomy

Reasons of conversion	No of patients	%age
Acute cholecystitis with friable adhesions	3	2.44%
Cirrhosis and obscure anatomy	2	1.63%
Elderly patient with acute cholecystitis	1	0.81%
Chronic cholecystitis + vascular adhesions	1	0.81%
Light source failure	1	0.81%
Bleeding from cystic artery	1	0.81%
Total patients with conversion	9	7.32%

Table -II. Comparison of morbidity due to post operative complication in patients along with risk factors in LC versus OC groups.

Co-morbid risk factors	Nausea & Vomiting		Pain		Fever		Chest Complications		Wound Complications	
	*%age	**%age	*%age	**%age	*%age	**%age	*%age	**%age	*%age	**%age
Patients irrespective of risk factors	8.44	13.79	64.23	100	10.57	37.39	9.77	31.07	-	1.72
Patients with no risk factors	3.84	5.26	67.31	100	5.77	23.68	5.77	21.05	-	-
Patients with acute cholecystitis	16.67	22.22	70.83	100	16.67	55.67	12.51	44.44	-	-
Patients with cirrhosis	9.09	100	68.18	100	9.09	100	13.64	100	-	-
Patients with age 65 years and above	7.69	-	61.54	100	7.69	33.33	-	16.67	-	-
Patients with diabetes mellitus	12.5	100	68.75	100	-	-	-	-	-	50
Patients with hypertension	6	-	77.77	100	11.11	50	11.11	33.33	-	-
Patients with I.H.D.	-	-	66.07	100	9.09	33.33	13.18	33.33	-	-

*Laparoscopic cholecystectomy **Open cholecystectomy

Table-III. Comparison of patient with drains and nature of drain fluids in LC versus OC group

Nature of drain fluid	Patient in laparoscopic cholecystectomy group	Patients is open cholecystectomy group
Total cases with drains	46.34%	31.03%
Serosanguinous	42.28%	15.86%
Sanguineous	1.63%	1.72%
Bilious	2.44%	3.45%

Table-IV. Comparison of post operative duration to tolerate oral feedings in LC versus OC groups

Post operative duration	Patient in laparoscopic cholecystectomy group	Patients is open cholecystectomy group
12 hours	13%	-
24 hours	85.37%	98.28%
36 hours	1.63%	-
48 hours	-	1.72%

The mean time taken to tolerate orally, was 0.94 days and 1.02 days after LC and primary OC respectively. Post operative feeding in all the patients of both studies was started with liquids then shifted to semisolid diet and nearly every patient was able to tolerate normal diet 48 hours after operation except one case of OC who remained in post operative ileus for 48 hours. Comparison of time taken by patient for tolerating oral feedings after operation in LC and OC groups is shown in table IV.

The data of results revealed that mean duration of post operative hospital stay was 1.87 days and 5.44 days in our LC and OC groups respectively. Morbidity due to post operative day and its comparison in patients with LC and OC is shown in graphs V.

DISCUSSION

The morbidity and mortality associated with cholecystectomy has decreased to such an extremely low levels in past few decades not only in western countries but in the developing countries like Pakistan as well where first LC was performed in 1971[7]. This is due to greater awareness of the patients about symptomatic gallstone disease, improvements in techniques of laparoscopic and endoscopic techniques. Recent literature has strongly suggested that LC is the most promising new technique evolved for the management of gallstone disease. Therefore to conclude a safe choice between LC and OC, comparison of mortality and morbidity in two procedures is discussed.

No mortality happened in our both series, despite the fact that a significant number of patients with co-morbid medical illnesses were present in both groups. A prospective evaluation in 954 patients of laparoscopic and OC in a Switzerland hospital reported the mortality rate 0.15% and 1.3% respectively[8]. In United States, a prospective study of 2650 consecutive patients undergoing cholecystectomy to analyze the learning curve since the introduction of LC between July 1990 and June 1997, LC was performed in 1929 patients (73%), 203 patients (7.5%) required conversion to OC and 518 patients (19.5%) had primary OC. The mortality was 0% for laparoscopic cholecystectomy, 0.5% for conversions and 1% for OC[9].

It was observed that morbidity due to bile duct injuries in our LC group remained 0% while 3.45% (2) patients developed common bile in our other study of OC. A documented incidence of bile duct injury is up to 2.51% with LC[10] and 0.38% with OC[11], which is less than that of LC. However a prospective institutional study conducted in Germany between 01/09/1994 to 31/08/1995 on 4675 patients with gallstones, 68.6% and 31.4% patients underwent LC and conventional OC respectively and highest postoperative morbidity was found in conventional cholecystectomy group with revision of common bile duct[12]. The incidence of morbidity due to bile duct injuries with LC remained 2.6% in a study conducted by Muneer A in Pakistan[13].

These observations show that morbidity due to bile duct injuries was higher in our series of OC as compared to that of LC in our series as well as different other studies. However, results of our successful laparoscopic cholecystectomies and conversions to OC show that these complications may be avoided by low threshold of conversion.

In our comparative study conversion from LC to OC was required in 7.32% (nine) patients. In an Italian study of laparoscopic cholecystectomies for cholelithiasis in cirrhotic patients, conversion to OC was required in 19% cases. While a United States study in cirrhotic patients showed conversion rate 12%[14].

In our series of LC, rate of conversion among patients with acute cholecystitis, cirrhosis and elderly cases was 12.5%, 9.09% and 7.69% respectively. Though our series was small, even then, results are well comparable with conversion rates of other series in literature and morbidity in cases with conversions is no more than that with elective OC. However, it is better for cases in which conversion to OC is suspected, nature of disease and conversion to OC should be informed to the patients, pre-operatively.

Results of our series and different series in literature, show that no factor alone reliably predict un-successful LC but both patient and surgeon factors predict conversion from LC to OC. Rate of conversion is less in hands of well trained and experienced surgeons as compared to trainee surgeons. Combinations of acute cholecystitis, increasing age, cirrhosis, patients with documented history of multiple attacks of biliary colic (10 or more) or acute cholecystitis in past and previous history of upper abdominal surgery had greater risk for conversion [15].

In our series of LC, 3 cases (2.44%) developed bile stained drain due to bile leak from gall bladder bed, which was decreased gradually and stopped on third post operative day. However , in our series of OC, bile stained drain was not observed in any case except two cases (3.45%) that had common bile duct injury and they were treated by insertion of T tubes. In our both series, no patient developed bile collection or haematoma in gall bladder fossa with a follow up to three months.

Post operative hemorrhagic drain due to mild oozing of blood from dissected area of gall bladder bed was observed in two patients (1.63%) of LC. One patient was cirrhotic while the other one had acute cholecystitis with friable vascular adhesions. Amount of blood in the drain bag after 24 hours of operation was about 100 ml and it stopped in next forty eight hours. However in series of primary OC, post operative hemorrhage did not occurred in any case.

After cholecystectomy, it was decided to place the drains in 57 (46.34%) and 18 (31.03%) cases of LC and OC series respectively. There were two cases (3.45%) in OC group in which T tube were inserted to manage the bile duct injuries. In a Switzerland study, the degree of difficulty of laparoscopic procedure was assessed by the presence of adhesions to the gall bladder area, difficulty of dissection in calot's triangle , intra operative bleeding and hence the need for a drain[16].

In our series of LC the percentage of patients with drains was higher than those with elective OC and also those reported in literature. The fact was that, we used to place a drain prophylactically in every case with difficult dissection because of vascular adhesions or acute cholecystitis and when hemorrhage or bile leak from the operative site was suspected. This prophylactic use of drains in laparoscopic group does not have additional morbidity. However, two cases of OC that developed bile duct injury and required T tubes insertion had more morbidity due to prolonged post operative hospital stay.

In our comparative study, most often observed post operative complications were pain, fever respiratory complications, nausea and vomiting. The results declared that morbidity due to these complications was found to be less in our LC group than our OC group.

Comparison of morbidity due to these complications in this comparative study conducted in our setup as well as different studies reported in literature has shown that post operative recovery is better in LC as compared to OC group, especially in cases with risk factors like acute cholecystitis, cirrhosis, diabetes mellitus and elderly patients[17]. The fact of this low morbidity and early recovery with LC is decreased traumatic insult to patients during surgical intervention and early mobilization after operation.

Morbidity due to postoperative wound complications like wound infection, haematoma or incisional hernia etc, remained 0% in our series of LC while one case (1.72%) developed wound infection in our series of OC.

In a United States study of LC as outpatient procedure[18], among postoperative complications, wound complications included seroma, wound seepage and wound infection and 18% of these complications were seen at trocar sites. In a German study of LC in elderly patients, post-operative incarcerated incisional hernia was noted in one out of 90 patients[19]. In another study conducted in department of surgery, University of de Montreal, PQ, the incidence of wound complications in

OC was up to 6.5% and in case of LC it was 1.05%[20].

Among post-operative complications, wound complications have their own morbidity with OC, which happen less often with LC. As it has been revealed in our study as well as other studies in literature, LC has significantly decreased morbidity due to these complications as compared to OC.

It was observed that the mean time taken by the patients for tolerating the regular diet after operation in laparoscopic series was less than one day, 0.94 days (range -12 hours to 36 hours) while after primary OC it was 1.02 days (range -24 to 48 hours), which was longer than that of LC. After the introduction of LC, in a comparative study of LC versus OC[21]the mean time for tolerating a regular diet remained 1.23 days in LC group versus 2.44 days in OC group. Delayed tolerance for regular diet after operation is one of the factors, which affects the postoperative hospital stay and morbidity.

As it is shown in the results, LC is more convenient for patients, because after operation they have to keep away from oral diet only for a short duration as compared to those with OC.

In our study, mean duration of postoperative hospital stay remained 1.87 days (range 12 hours to 7 days) and 5.44 days (range, 3-14 days) for LC and OC groups respectively. A matched study of LC versus OC conducted in Canada22 revealed a significant difference in the mean lengths of hospitalization, which was 2.4 days versus 6.4 days for LC and OC group respectively.

It is the early mobilization after LC that helps to decrease the post-operative complications, post-operative hospital stay and hence morbidity as compared to conventional cholecystectomy. This shorter postoperative hospital stay after LC that has enabled the elderly and many high-risk patients to undergo surgical treatment for cholelithiasis and cholecystitis.

Reported mortality with OC in cirrhotic patients ranges from 10% to 80%[23] while these rates are lower with laparoscopic cholecytectomy. In a case-control study of morbidity after OC was 19% versus 9.5%, morbidity rate 29.5% versus 5.3% and postoperative hospital stay 5 days versus 3 days in cases with cirrhosis and without cirrhosis respectively[24]. Studies have proved that patients with compensated liver cirrhosis do not represent any more contraindication to LC, which has less septic postoperative complications when compared with open surgery[25].

As it has been reported in other studies and evidenced in our study, as well, because of reduced morbidity in cirrhotic patients with goos residual hepatic function, LC is safe and effective treatment of cholelithiasis.

In our laparoscopic series, no diabetic patient developed wound complications while one patient (50%) of OC developed wound infection, which was treated by daily dressing under antibiotic cover. Among other concomitant co-morbid conditions, diabetes mellitus is one of the risk factors for post-operative morbidity and mortality, especially in OC. However, if diabetes mellitus is properly controlled, then morbidity may be reduced to that of non-diabetic patients[17,26].

There has been no significant increase in operative risk or postoperative morbidity with LC in diabetic patients when compared with OC27. The results of our study and other studies suggest that LC in diabetic patients can be subjected with more safety than OC, with a reduced morbidity.

Cardiovascular diseases (hypertension, coronary heart disease, cardiac arrhythmias) have been known to increase the operative risk in classic OC. However, after the introduction of LC, co-morbid illness due to these risk factors seems to be no contra-indication for surgical intervention for symptomatic gallstones disease in these patients[28]. Morbidity due to these factors is preventable and can be decreased by their proper pre-operative evaluation and critical per-operative and post-operative monitoring for these patients. Per-operative and post-operative courses remained similar in our both LC and OC groups, in patients with morbid obesity except one patient with OC who developed wound infection and who was also a known diabetic.

In the early days of LC, morbid obesity was considered to be a relative contra indication for this procedure but in resent studies, results of per-operative and postoperative morbidity of LC in obese patients are either better or well comparable with morbidity figures of OC[29]. LC is quite safe and even with better outcome than OC for which a bigger incision has to be given

with all its morbidity. However, LC in morbidly obese patients as in open surgery is technically more demanding than in normal individuals.

CONCLUSION

Laparoscopic cholecystectomy is a safe and effective treatment of symptomatic gallstone disease. With low threshold of conversion it has definitive and significant advantages over OC with earlier mobilization, shorter hospitalization and rapid recovery towards normal life without increasing mortality and morbidity. Conversion to laparotomy in cases of technical difficulty or doubtful biliary anatomy, is a wise option, reflects sound surgical judgement and should not be considered a failure or complication of procedure. Training experience and skill of laparoscopic techniques are the factors concerned to surgeon while cases with acute cholecystitis, older age, co-morbid medical conditions and complicated gallstone disease are patient's concerning factors which influence the morbidity figures. Safety, efficacy and minimal morbidity with LC, have helped us to conclude than in our setup, LC is replacing OC and becoming a new gold standard treatment of cholelithiasis and cholecystitis.

REFERENCES

1. Cuschieri A; Steal R.J.C and Moosa. A.R. Minimal access therapy. In Essential Surgical Practice 4th ed. 2000; (Vol.1) PP-493-519.

2. Z' graggen-K; et al. Acute postoperative pancreatitis after laparoscopic cholecystectomy. Arch-Surg-1997 Sep; 132(9): 1026-30; discussion 1031.

3. John G. Huner: Minimal Invasive Surgery. In Seymour I. Schwartz; et al: Principles of Surgery. 7th ed. (Vol.II) PP 2145-2162.

4. Wu-JS; Dunnegan-DL; Lutmnn-DR; Soper-NJ; the evolultion and maturation of laparoscopic cholecyustectomy in an academic practice. J-Am-Coll-Surg-1998 May; 186(5): 554-60.

5. Savader-SJ; et al: Laparoscopic cholecystectomy-related bile duct injuries. A health and financial disaster. Ann-Surg. 1997 Mar; 225(3): 265-73.

6. Sarli-L; et al: Reduced postoperative morbidity after elective laparoscopic cholecystectomy. Stratified matched case-control study. World-J-Surg. 1997 Oct; 21(8): 872-8.

7. Muhammad Nasir: Laparoscopic Cholecystectomy. In clinical study of usefulness or otherwise of drains after elective open cholecystectomy. 1999; P. 86.

8. Koch. A; Gastiger-I; Indications for surgical therapy of gallstones Zentralbl-Chior, 1998; 123 Suppl 2:224.

9. Ahmad SA; et al. Complications of laparoscopic cholecystectomy; the experience of a university affiliated teaching hospital, J-Laparoendosc-Adv-Surg-Tech-A, 1997 Feb; 7(1) 29-35.

10. Gadaez-TR: U.S. Experience with laparoscopic cholecystectomy. Am-J-Surg, 1993; 165; 450.

11. Ruers-TJ; Jakimowicz-JJ: Laparoscopic cholecystectomy: A new trend in the management of gallstones disease, scand-J-Gastroenterol-Suppl. 1991; 1888: 8-12.

12. Ihasz-M; et al: complications of laparoscopic cholecystectomy in Hungary: A multi-center study of 13833 patients, Eur-J-Surg. 1997 Apr; 163(4): 267-74.

13. Cagir-B; Rangrag-M; Maffuci-L; Ostrander-LE; Herz-BL: A retrospective analysis of laparoscopic and open cholecystectomies. J-Laparoendosc-Surg. 1994 Apr; 4(2): 89-100.

14. Poggio-JI: et al. A comparison of Laparoscopic and open cholecystectomy in patients with compensated cirrhosis and symptomatic gallstone disease. Surgery 2000 April; 127(4): 405-II.

15. Briskin-BS; et al. A comparison of Laparoscopic and open cholecystectomy in patients with compensated cirrhosis and symptomatic gallstone disease. Surgery. 2000 April; 127(4): 405-II.

16. Tangle-FM; Lavergne J; Barkin-JS; Unger-SW; Laparoscopic cholecystectomy in the elderly. Surg-Endosc. 1997 Jun; (6) 636-8.

17. Bond-G; De-Costa-A; Laparoscopic cholecystectomy the experience of community hospital. Aust-N-Z-J-Surg. 1996 Jan; 66(1): 14-7.

18. Lam-D; Miranda-R; Hom-SJ; Laparoscopic cholecystectomy as an outpatient procedure. J.Am-Coll-Surg. 1997 Aug; 185(2): 152-5.

19. Bond-G; De-Costa-A; Laparoscopic cholecystectomy: the experience of community

hospital. Aust:-N-Z--J-Surg. 1996 Jan; 66(1): 14-7.

20. Sanabria-JR. et al. Laparoscopic cholecystectomy: the experience: a matched study. Can-J-Surg. 1993 Aug; 36(4): 330-6.

21. Sajjad Dar; Abdul Mannan Baber: Cholecystectomy with and without drainage. JPMA; January, 1991.

22. Saleemann-R; et al. Laparoscopic cholecystectomy in cirrhotic patients. J-Am-Coll-Surg. 1998 Oct; 187(4): 4003.

23. Stuttmann-R; et al: Pre-operative morbidity and anesthesia related negative events in patients undergoing conventional or laparoscopic cholecystectomy. Endosc-Surg-Allied-Technol-1995 Aug; 3(4); 156-61.

24. Glatti-A; et al: laparoscopic cholecystectomy in morbid obesity. Schweiz-Med-Wochenschr. 1994 Oct 8; 124(40): 1758-63.

25. Harris-BC: Retrospective comparison of outcome of 100 consecutive open cholecystectomy and 100 consecutive laparoscopic cholecystectomies. South-Med-J. 1993 Sep; 86(9) 993-6.

26. Glatti-A; et al: laparoscopic cholecystectomy in morbid obesity. Schweiz-Med-Wochenschr. 1994 Oct 8; 124(40): 1758-63.

27. Paredes-Cotore-JP; et al: Laparoscopic cholecystectomy in Spain; Multicentric study of 2432 patients. Rev. Esp-Enferm-Dig. 1994 Jan; 85(1): 19-26.

28. Ackland-MJ; Jolley-DJ; Ansari-MJ; Postoperative complications of cholecystectomy in Victorian Public Hospital. Aust. N-Z-J-Public – Health, 1996 Dec; 20(6); 583-8.

29. Lillemoe-KD: Surgical treatment biliary tract infections. Am-Surg. 2000 Feb; 66(2): 138-44.