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A Comparative Study of Postoperative Outcomes in Open Cholecystectomy versus Laparoscopic Cholecystectomy

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ABSTRACT

Background: Surgery is usually necessary to treat gallstones, or cholelithiasis. Because laparoscopic cholecystectomy is less intrusive than open cholecystectomy, it is now the treatment of choice.

Objectives: To evaluate and compare the postoperative results of open and laparoscopic cholecystectomies with regard to duration of hospital stay, complication rates, and amount of discomfort experienced during the procedure.

Methods: A prospective comparative study was conducted on one hundred patients with symptomatic cholelithiasis who were to undergo elective cholecystectomy. Patients were randomized into two groups: Among the patients, 50 patients were operated for Laparoscopic Cholecystectomy and 50 for Open Cholecystectomy. The data on the postoperative results of the operation, including the time spent during the operation, as well as the time spent on pain, the length of stay in the hospital, and complications were collected and compared using statistical methods with the chosen level of significance equals to $p \leq 0.05$.

Results: The mean operative time of Laparoscopic Cholecystectomy was less than Open Cholecystectomy (48. 5 ± 12. 4 vs. 68. 5 ± 15. 3 minutes; $p \leq 0.05$). The overall postoperative pain was less in patients who undertook Laparoscopic Cholecystectomy with the mean pain period of (18. 3 ± 5.2) hours compared with 30. 7 ± 7. For Open Cholecystectomy patients the time taken was 1 hours. The length of the hospital stay was also lesser in Laparoscopic Cholecystectomy group which was (1.8 ± 1.2) days compared to Open Cholecystectomy group of (4.8 ± 1.5) days. Also, the Laparoscopic Cholecystectomy group had less complication rate at 12% compared to the Open Cholecystectomy at 38% with $p \leq 0.05$

Conclusion: Laparoscopic Cholecystectomy is shown to be more beneficial in terms of postoperative results than Open Cholecystectomy in terms of the operating time, pain, hospital stay, and complications. Thus, these results show Laparoscopic Cholecystectomy as the most appropriate surgical management for patients with symptomatic cholelithiasis; however, Open Cholecystectomy will still be required for cases that are not suitable for Laparoscopic Cholecystectomy.

Keywords: Laparoscopic Cholecystectomy, Open Cholecystectomy, Postoperative Outcomes, Cholelithiasis, Operative Time, Hospital Stay, Complications.

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INTRODUCTION

Gallstones or cholelithiasis is another common gastrointestinal (GI) disorder which involves the formation of stones in the gallbladder and which requires cholecystectomy[1]. Cholelithiasis is a result of the deposit of various components of the bile and even though the majority of patients are asymptomatic, complicated cases include cholecystitis, biliary colic and pancreatitis necessitating surgery[2, 3]. In the past, Open Cholecystectomy(OC) was the most common surgical procedure used for the management of patients with gallstone[4, 5]. But the discovery of Laparoscopic Cholecystectomy (LC) in the last decade of the twentieth century brought a revolutionary change in the surgical practice and become a method of choice because of the

large number of advantages[6]. It has been reported that LC is less painful than open surgery, the length of stay is shorter and the recovery period is faster. However, OC is still done in some instances, especially when laparoscopic surgeries are not possible, or when some problems occur in the process[7, 8]. Globally, gallstone disease has been a leading source of morbidity,10% is said to be the illness prevalence in Pakistan. The gold standard of treatment for both acute and chronic cholecystitis is laparoscopic cholecystectomy. Nonetheless, an open surgical approach is necessary for individuals with complex gall bladder diseases, such as those involving challenging anatomy, significant inflammation, intra-abdominal adhesions, gall bladder malignancy, and inexperience using equipment. Because laparoscopic surgery has less discomfort, requires less time to recover, causes less stress during surgery, and has a lower inflammatory response than open surgery, it is recommended. Retained stones, abscess, and postoperative bleeding are the early postoperative consequences. Remaining gall bladder, biliary stenosis, and choledocholithiasis are the late surgical problems. Retained stones (13%) are the most frequent problems overall, followed by wound infections (12%) and bile leaks (10%). However, the extent and need of the measures needed to address those side effects are not mentioned. In this tertiary care study, postoperative complications from laparoscopic and open cholecystectomy patients were retrospectively evaluated, and the problems were ranked based on the extent of non-surgical or surgical procedures needed to address them. The purpose of this study is to compare the postoperative result of LC and OC in cholelithiasis patients. The purpose of this study is to establish the best modality of surgical intervention for the management of cholelithiasis based on parameters including operative time, postoperative pain, hospital stay and complications.

MATERIALS AND METHOD

This prospective comparative study analyzed postoperative outcomes in patients undergoing either Laparoscopic Cholecystectomy (LC) or Open Cholecystectomy (OC). Study was conducted in Ghurki Trust Teaching Hospital from June 2022 till April 2023. In order to ascertain whether surgical procedure is more successful for patients who require gallbladder removal, a thorough analysis comparing the postoperative results of open and laparoscopic cholecystectomy is being carried out. The participants of the study were 100 patients in total with symptomatic cholelithiasis who were to undergo elective cholecystectomy. The randomize sampling technique was used for this study using computer-generated random numbers and patients were divided into two groups. Group A, composed of 50 patients who had received LC while Group B, considered 50 patients who had received OC. The method of randomisation was by means of computer-generated random numbers and allocation was done under blinded envelopes. Ethical approval for this study was obtained from the Institutional Review Board (IRB) of Lahore University of Biological & Applied Sciences (Lahore-UBAS), a project of Lahore Medical & Dental College (LMDC), Pakistan. Ethical approval letter ref no. 2023/39B. All participants gave their informed permission after being informed about the goals, methods, possible hazards, and advantages of the study. Patients were guaranteed the freedom to resign from participation at any time without compromising their medical care, and participation was completely optional. Throughout the trial, all patient data were anonymised and securely maintained to ensure confidentiality. As for the inclusion criteria, only patients with symptomatic cholelithiasis, aged between 18 and 70 years were included in the study. Patients who have had prior abdominal surgery specifically within the upper part, complicated obstruction such as choledocholithiasis, cirrhosis or carcinoma of the gallbladder and Persons who lack capacity to make an informed decision were excluded from the study. Data was collected through medical records were searched for preoperative and postoperative information, such as patient demographics, medical histories, and specifics about the surgical procedures. Pain was measured using the Visual Analog Scale (VAS), a standardized tool for assessing pain intensity. In order to gauge their happiness with the treatment, patients required to fill out surveys or questionnaires about their general quality of life following surgery, their perception of the cosmetic results, and their ability to resume everyday activities after surgery.All the statistical analysis was done using the SPSS software version 27. Data analysis was done by use of descriptive statistics. Chi-square test was used to compare categorical data while independent t-tests was used to compare continuous data with confidence intervals and effect sizes reported where applicable. A ($p \leq 0.05$) was taken as statistically significant.

RESULTS

The study compared laparoscopic chole- cystectomy (LC) and open cholecystectomy (OC) across several key postoperative outcomes: These are operating time, postoperative pain, duration of hospital stays, and postoperative complications rate. The present study reveal that LC is generally favorable than OC in most of the cases as shown in table-1.

* The Chi-square test was used to compare gender distribution between the groups, while an independent t-test was used to compare the mean age.

The mean operative time (Table-2) was significantly shorter for LC at 48. 5 minutes whereas the average user spends 68 minutes. 5 minutes for OC. LC duration is likely to be shorter compared with the open approach because the procedure involves less tissue handling and dissection. This efficiency shortens the time the patient is kept under anesthesia and the effects of long hours of surgeries.

*An independent t-test was used to compare the mean pain duration between the groups.

The postoperative pain assessment (Table-3) revealed that patients who underwent LC had lesser mean pain duration of 18. 3 hours the time taken was still much lesser than thirty minutes. 6 hours in the CA group and 7 hours in the OC group. This difference is mainly attributed to the fact that LC is less invasive to the tissues hence causing little inflammation and pain compared to USG.

LC patients experienced less postoperative pain, attributed to the smaller incisions and reduced tissue trauma associated with laparoscopic surgery. This was mainly evidenced by the fact that LC patients were discharged from hospital much earlier than other groups of patients, the average length of stay being 1. OC patients had mean stay of 4 days only while RC patients had mean stay of 8 days. 8 days. Due to the faster healing, patients with LC can be discharged earlier and this decreases the chance to get infections that are gotten when in the hospital as well as cutting down overall costs as shown in table-4.

Patients undergoing LC had significantly shorter hospital stays, contributing to quicker recovery times and lower healthcare costs. The LC group had a significantly a smaller number of complications as compared to OC group 12 % and 38 % respectively. In particular, wound infections were observed in more patients of the OC group (22%) as compared to the LC group (6%) due to the greater extent of injury in the form of large surgical incisions in open procedures. Further, other adverse outcomes like bile duct damage and deep vein thrombosis were observed in the OC group more often as shown in table-5.

The postoperative results of Laparoscopic Cholecystectomy (LC) and Open Cholecystectomy (OC) are compared and shown in fig-1. LC demonstrates a far quicker operating time, less pain flare-ups, a shorter hospital stays, and fewer overall problems. The preference for LC in the treatment of symptomatic cholelithiasis is supported by these results.

The incidence of complications was significantly lower in the LC group, underscoring the safety and effectiveness of laparoscopic cholecystectomy compared to the open approach. The demographic and clinical characteristics of the two groups were well-matched, ensuring that the observed differences in outcomes are more likely due to the type of surgery rather than patient-specific factors. The operative time for LC was significantly shorter, reflecting the procedure's efficiency and reduced invasiveness compared to OC. LC patients experienced less postoperative pain, attributed to the smaller incisions and reduced tissue trauma associated with laparoscopic surgery.

Table 1: Demographic and Clinical Characteristics

Characteristic	Group A (LC)	Group B (OC)
Number of Patients (n)	50	50
Mean Age (years)	45.32 ± 9.76	49.00 ± 14.28
Gender (M/F)	12/38	9/41

(p≤0.05)

Table 2: Operative Time (minutes)

Operative Time (minutes)	Group A (LC)	Group B (OC)
30-40 minutes	3 (6%)	0 (0%)
41-50 minutes	35 (70%)	0 (0%)
51-60 minutes	12 (24%)	8 (16%)
61-70 minutes	0 (0%)	22 (44%)
71-80 minutes	0 (0%)	15 (30%)
81-90 minutes	0 (0%)	5 (10%)
Mean Operative Time (minutes)	48.5 mins	68.5 mins

(p≤0.05)

Table 3: Postoperative Pain Duration (hours)

Pain Duration (hours)	Group A (Laparoscopic Cholecystectomy)	Group B (Open Cholecystectomy)
Mean ± SD	18.3 ± 5.2 hours	30.7 ± 7.1 hours

(p≤0.05)

*Independent t-test was applied to compare the mean pain duration between the groups.

Table 4: Length of Hospital Stay (days)

Duration of Stay (days)	Group A (LC)	Group B (OC)
1-2 days	43 (86%)	3 (6%)
3-7 days	4 (8%)	41 (82%)
More than 7 days	3 (6%)	6 (12%)
Mean Duration (days)	1.8 days	4.8 days

(p≤0.05)

*Independent t-test was used to compare the mean hospital stay duration between the two groups

Table 5: Postoperative Complications

Complication	Group A (LC)	Group B (OC)
Wound Infection	3 (6%)	11 (22%)
Bile Duct Injury	0 (0%)	2 (4%)
Other Complications	3 (6%)	6 (12%)
Total Complications (%)	6 (12%)	19 (38%)

($p \leq 0.05$)

*Chi-square test was utilized to compare the proportion of postoperative complications between the groups

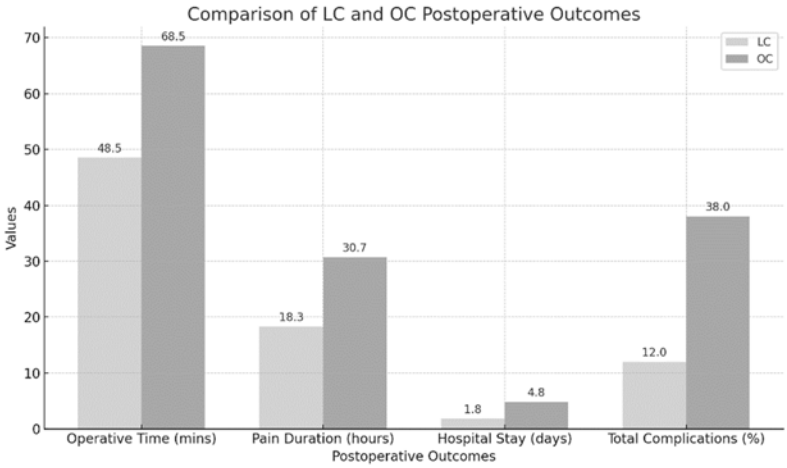

Figure 1: Comparison of Postoperative Outcomes between Laparoscopic Cholecystectomy (LC) and Open Cholecystectomy (OC).

DISCUSSION

It is evident from this study results that laparoscopic cholecystectomy has the advantage over open cholecystectomy; The LC has been observed to have a significantly shorter operative time than that of OA; this may be explained by the fact that LC is less invasive and involves smaller incisions and less tissue dissection[9]. This efficiency is especially critical in the reduction of the time the patient is subjected to anaesthesia and thereby lessening the chances of developing complications relating to anaesthesia[10, 11]. Pain after the operation was significantly lower in the LC group, which is in accordance with the data found in other studies[12]. Chattopadhyay et al., 2020 stated that the reduction in pain may be attributed to a lower level of tissue damage that is characteristic of LC since the procedure entails smaller cuts and less handling of internal organs. It improves the quality of the patient's comfort and thus helps to mobilize the patient earlier, which is important in preventing DVT [13]. Another significant advantage stated by Kumar et al., 2021 is of LC patients is the reduction of the hospital duration of stay, which consequently lowers the costs of healthcare and the incidences of Hospital Acquired Infections [14]. Thus LC patients recover faster than other types of patients and are able to return to work and other daily activities faster which helps to save resources and money[15]. The overall fewer complications in the LC group strengthen the fact that laparoscopic methods should be employed when performing cholecystectomy [16]. OC is also known to have higher complications such as wound infections and bile duct injuries which are related to the open procedure. These are in tandem with the previous studies, pointing out that LC was safer with few post operative complications[17]. It is, however, important to understand that OC is still occasionally required since LC is not always possible or advisable and can be complicated by surgery. It means that the decision to perform OC should be made depending on the patient characteristics and the surgeon's discretion[18], Because laparoscopic cholecystectomy patients are less likely to experience problems than open cholecystectomy patients, low-grade surgical and non-surgical therapies are necessary. By offering a consistent approach for reporting and comparing complication rates, modified Clavien-Dindo classification (MCDC) is an invaluable tool for evaluating surgical complications and can enhance patient outcomes. The laparoscopic cholecystectomy (LC) was reported to produce quicker recovery periods, less postoperative discomfort, and shorter hospital stays. On the other hand, OC was linked to a greater frequency of problems. These results validate LC as a better overall alternative that is preferred by patients.

CONCLUSION

The findings of the present study showed that Laparoscopic Cholecystectomy (LC) has a shorter operative time, less postoperative pain, a shorter postoperative hospital stay, and fewer complications compared with Open Cholecystectomy (OC). Based on these benefits, Laparoscopic Cholecystectomy should be regarded as the initial option for the surgical management of symptomatic cholelithiasis. However, Open

Cholecystectomy still has a role in situations where Laparoscopic Cholecystectomy is not feasible.

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Abbreviations:

LC: Laparoscopic Cholecystectomy
OC: Open Cholecystectomy
GI: Gastrointestinal
VAS: Visual Analog Scale

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