ORIGINAL ARTICLE

Evaluating the Outcomes of Laparoscopic versus Open Cholecystectomy in a Community Hospital Setting

Dr. Muhammad Hassan Abbas[1], Dr. Asif Nadeem[2], Dr. Mohtmam Nazir[1], Dr. Batool Hassan Abbas[3], Dr. Muhammad Hassnain Abbas[4], Dr. Hussain Saeed[5]

Surgical Unit-II, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan[1], Surgical Unit-II, Ghazi Khan Medical College, D. G. Khan[2], Ghazi Khan Medical College, Der Ghazi Khan[3], RHC Sehja District Rahim Yar Khan, Punjab Health Department[4], Department of Anaesthesia, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan[5]

Corresponding Email: *drhassanabbas@yahoo.com*

Abstract

Background: Gallstone obstruction is the most common reason for presenting acute cholecystitis (AC), where inflammation may have dire consequences. Given that the laparoscopic cholecystectomy (LC) process is minimally invasive and more beneficial than other surgical operations such as open cholecystectomy (OC).

Methods: This was a prospective observational study comparing LC and OC in a one-year follow-up from a Sheikh Zayed Hospital, Rahim Yar Khan. Descriptive statistics and inferential tests apply to collect and analyze data on patient demographics, surgical details, postoperative problems, and recovery factors.

Results: Out of the 70 patients, 50 had LC, and 20 had OC. Significantly shorter hospital stays (2.3±1.1 days) and surgical times (75.2±20.4 minutes vs. 105.6±25.3 minutes, $p<0.001$) were linked to LC. The LC group experienced shorter recovery times (10.4± 3.7 days vs. 18.6±5.2 days, $p<0.001$) and lower postoperative pain levels (3.2±1.1 vs. 5.6±1.7, $p<0.001$). Although the OC group had proportionally greater rates of gastrointestinal problems, wound infections, and bleeding, the differences were not statistically significant.

Conclusion: A shorter operative time, less hospitalization, less postoperative pain score, and faster recovery were observed with LC compared to OC. Further studies are needed to confirm these results; thus, LC is recommended as the surgical strategy of choice for AC.

Keywords

Gallstones, Pain, Operation, Recovery.

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Introduction

Acute cholecystitis (AC) is a condition that develops when a gallstone obstructs the cystic duct, causing gallbladder distension and subsequent bacterial or chemical inflammation[1]. In Western countries, 10% of people suffer from gallstones, a common gastrointestinal ailment[2]. Notably, over 80% of people with gallstones do not exhibit any symptoms. However, AC develops in 1-3% of individuals with symptomatic gallstones, posing a considerable health risk due to chronic discomfort in the right upper quadrant of the abdomen, as well as symptoms including anorexia, nausea, vomiting, and fever[3]. Gallstones cause calculous cholecystitis, which accounts for 95% of instances of AC; calculous cholecystitis, on the other hand, is less common, occurring in 5% of cases[4].

Cholecystectomy has a history that stretches back to the 1800s. The first known human gallbladder operation was credited to Pennsylvanian Civil War physician John Stough Bobbs in 1867. Later 1882, in West Berlin, Carl Johann August Langenbuch performed the first cholecystectomy, a historic moment in the history of surgery[5]. The prevalence of AC is high worldwide, and gallstones are a leading cause of hospital admissions[6]. Gallstone disease is not as common in Asia, although it is more common in wealthy metropolitan populations for lifestyle reasons such as obesity and inadequate nutrition[7]. Gallstones are another primary health concern in Pakistan, where they are a significant cause of AC cases observed in 8% and 20% of patients over the age of 40 and 60[8]. People's quality of life is negatively impacted by the condition, which can cause excruciating pain, digestive problems, and other difficulties if treatment is not received[9].

Patients with symptoms suggestive of AC should have an abdominal ultrasound to confirm the diagnosis. Additional imaging tests such as hepatobiliary iminodiacetic acid (HIDA) scans or CT scans may be necessary if the results of the initial ultrasound are unclear, if complications need to be ruled out, or if other diagnoses need to be considered[10]. AC is treated with a combination of surgical and medicinal methods. Bed rest, painkillers, intravenous fluids, and antibiotics are all part of medical therapy. Cholecystectomy, or the surgical removal of the gallbladder, is a medical procedure that can be carried out either laparoscopically or openly[11].

The treatment of AC has advanced significantly with the switch from open cholecystectomy (OC) to laparoscopic cholecystectomy (LC)[11]. Because it was a little invasive, LC gained popularity fast when it first appeared in the United States and France in the late 1980s12. 80% of US general surgeons used the tools and methods required for laparoscopic surgery by the early 1990s[12]. Compared to OC, LC has several benefits, such as shorter hospital stays, faster recovery periods,

less pain following surgery, and more minor surgical scars. Despite these advantages, the condition's accompanying inflammation, edema, and necrosis pose some difficulties for LC in AC[13]. These factors can complicate the process and raise the risk of postoperative complications.

LC was suggested as the initial course of treatment for AC in the Tokyo guidelines, which were updated in 2013 and published in 2006[14]. The guidelines considered the type of operation, its timing, and the severity of the condition. The severity of gallbladder inflammation determines the three classes of AC: mild, moderate, and severe. The best time to operate in cases of AC is still up for debate, with the main alternatives being early surgery or first conservative treatment followed by delayed LC[15]. Since inflammatory tissue is more susceptible to surgical intervention and may provide a higher risk of consequences, postponed surgery is the recommended course of action[15].

Though LC has emerged as the go-to surgical technique for AC, more information on its results must be available in community hospital settings, especially in nations like Pakistan. By comparing the results of LC and OC outcomes in a community hospital setting, this study seeks to close this gap.

Methodology

Study Design and Purpose

This prospective observational study compared the results of an OC with a LC performed over one year at a Sheikh Zayed Hospital, Rahim Yar Khan. The study sought to assess several factors, such as recovery time, surgical complications, length of hospital stay, and patient demographics.

Sample Size Estimation

The yearly surgical volume of the hospital and the frequency of cholecystectomy procedures were used to calculate the sample size. It was anticipated that a minimum of 60 patients would be required to detect a clinically significant difference in postoperative outcomes between the two groups, with a significance level of 0.05 and a power of 80%. Therefore, based on available data, 70 patients were included to account for the dropouts and missing records.

Grouping of Recruited Patients

The cohort of the patients who had a cholecystectomy was n=70, divided into two groups with n=50 underwent LC and n=20 with OC.

Inclusion Criteria

The subjects who received either LC or OC during the entire study period, aged 18 years or older, and with a diagnosis during which AC was indicated for gallbladder disease were included. This inclusion criterion ensured that the sample represented the typical patient population for cholecystectomy.

Exclusion Criteria

This study excluded patients who had undergone emergency cholecystectomy, those with incomplete medical records, and those contraindicated for LC or OC. This exclusion guaranteed that only voluntary and well-documented cases were assessed, thus preserving data accuracy and reliability.

Data Collection

The retrospective data was collected from the hospital's electronic medical records. Approval from the hospital's ethical committee was obtained. Patient demographics include the following: age, gender, body mass index, and comorbidities like diabetes and hypertension. Operative data regarding the time duration of surgery and intraoperative complications in the form of bleeding and bile duct injury were noted. Collected postoperative data included pain scores using a standardized scale and time to return to normal activities.

Statistical Analysis

SPSS version 22 was used to conduct the statistical analysis. The data were summarized using descriptive statistics, which computed frequencies and percentages for categorical variables and means and standard deviations for continuous variables. Using chi-square tests for categorical data (like gender distribution and the existence of comorbidities) and t-tests for continuous variables (like age, operative time, and duration of hospital stay), a comparative analysis was carried out between the LC and OC groups. A $p\text{-value}<0.05$ was used to indicate significance.

Ethical Considerations

An Institutional Review Board (IRB) approval was obtained for the study protocol. Anonymization of the data ensured that patient identities were secured and patient confidentiality was upheld. Since the study was retrospective, informed permission was not required.

Results

The study included 70 patients, with 50 in the LC group and 20 in the OC group. The average age was slightly higher in the OC group, and there were more females in the LC group. The BMI and prevalence of comorbidities were similar between the two groups (Table-1).

Table-1 Demographic characteristics of participants

Variables	LC Group (n=50)	OC Group (n=20)	p-value
Age (years, mean ± SD)	45.6±12.3	52.8 ± 14.1	0.03
Gender (M/F)	20/30	10/10	0.34
BMI (mean ± SD)	27.4±3.5	28.1 ± 3.9	0.45
Comorbidities (%)			

Diabetes	12 (24%)	5 (25%)	0.93
Hypertension	18 (36%)	8 (40%)	0.76

Operative Data

The operative time was significantly shorter in the LC group compared to the OC group. ($p<0.001$). There were no significant differences in intraoperative complications between the two groups (Table-2).

Table-2 Operative data among surgical groups

Operative Variables	LC Group (n=50)	OC Group (n=20)	p-value
Operative time (minutes)	75.2 ± 20.4	105.6 ± 25.3	<0.001
Intraoperative complications n(%)			
Bile duct injury	2 (4%)	1 (5%)	0.78
Bleeding requiring intervention	3 (6%)	2 (10%)	0.48

Postoperative Data

The length of hospital stay was significantly shorter in the LC group ($p<0.01$). The rate of GI complications, wound infections ($p<0.05$), and pain scores were lower in the LC group ($p<0.001$), and the recovery time was shorter ($p<0.001$).

Table-3 Post-operative time among surgical groups

Variables	LC Group (n=50)	OC Group (n=20)	p-value
Length of hospital stay (days)	2.3 ± 1.1	5.8 ± 2.4	<0.001
GI Complications (nausea/vomiting)	3 (6%)	5 (25%)	0.05
Wound Infections	4 (8%)	6 (30%)	0.08
Bleeding Requiring Intervention	3 (6%)	2 (10%)	0.55
Pain score (mean ± SD)	3.2 ± 1.1	5.6 ± 1.7	<0.001
Recovery time (days)	10.4 ± 3.7	18.6 ± 5.2	<0.001

Patients who underwent LC had a significantly shorter operative time and hospital stay compared to those who underwent open cholecystectomy. Besides, postoperative pain scores were lesser,

and recovery time was earlier in the LC group. GI complications, rate of wound infections, and bleeding requiring intervention were higher in the OC group.

Discussion

The results showed the most significant advantage of LC over OC in treating AC as the most effective surgical technique because it has a shorter recovery period, a shorter hospital stay, lower postoperative pain scores, and even faster recovery time.

In their study, Ganpathi et al.[16] reported demographic features of patients who underwent cholecystectomy for AC. The average age was about 52 years, and most patients were women. Mason et al.[17] evaluated 245 cases of urgent cholecystectomy in their study and showed a similar age distribution; female predominance was thus shown in this demographic pattern. Meta-analysis of operative outcomes of ten studies including 1,248 patients was undertaken by Coccolini et al.[18] The mean postoperative hospital stay in the OC group was significantly more extended compared to the LC group (MD of –4.74 days), similar to our study where the hospital stay came out substantially shorter in the LC group. Similar results were also observed by Teixeira et al.[19] and Antoniou et al.[20] supporting LC's benefit in shortening hospital stays and accelerating recovery.

In terms of postoperative pain and healing, LC is superior to OC. In a study comparing LC with OC for ACC, Boo et al.[21] recruited 33 patients and discovered that hospitalization was considerably shorter in the LC group (3.7±1.2 days) than in the OC group (6.3±2.7 days, p=0.010). Furthermore, only two patients in the OC group reported issues following surgery, compared to no postoperative morbidity in the LC group. These results align with our investigation, which found that LC was linked to faster recovery and lower pain scores. Catena et al.[22] compared LC and OC in a prospective, randomized trial about complications and found no fatalities. Our investigation showed no significant difference in missed stones, fistula, or common bile duct (CBD) injury between the two groups; however, the OC group had a statistically more significant incidence of wound infection and intestinal injury. These results are consistent with the widespread belief that LC provides a safer postoperative prognosis.

In conclusion, our results, which show a reduction in hospital stays, a decrease in pain scores, and a fast recovery period after surgery, are consistent with previous research. Widespread support for LC's benefits—fewer problems and better postoperative outcomes—confirms the treatment option's favour for AC.

Strengths, Limitations, and Recommendations

This study provides valuable insights into the outcomes of LC versus OC in a community hospital setting, contributing to the existing body of evidence. There are a few restrictions, however. The findings may be less broadly applicable due to the small sample size, particularly in the OC group. Confounding variables and bias in selection may be introduced by the observational design. Another drawback is the need for long-term follow-up information about healing and surgical

problems. The procedures and results of other institutions might not be reflected in the single-centre design.

More significant, randomized controlled trials are required to confirm these results and offer more reliable data to overcome these limitations. Long-term follow-up is necessary in future research to evaluate how durable the results found in this study are. It is crucial to conduct research in various healthcare contexts, such as remote and low-resource areas, to ensure the results are broadly relevant. Analysis of the relative costs of LC and OC could yield important information on healthcare policy and resource distribution.

Conclusion

It was conclude that LC is associated with better results than OC. Shorter operating times, shorter hospital stays, lower postoperative pain scores, and quicker recovery periods were all experienced by patients having LC. Even though the OC group experienced a greater rate of postoperative complications, the difference was not statistically significant. These results underscore the need for additional study to improve our knowledge and treatment of AC and support the ongoing use of LC as the recommended surgical technique.

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Conflict of Interest
None.

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None.

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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design: Abbas MH, Nadeem A, Nazir M

Acquisition, Analysis or Interpretation of Data: Abbas MH, Abbas BH, Abbas MH, Saeed H

Manuscript Writing & Approval: Abbas MH, Nadeem A, Nazir M, Saeed H

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.