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Original Research Article

A Retrospective Comparative Study of Clinical and Surgical Outcomes in Laparoscopic versus Open Cholecystectomy

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Abstract:

Background: Gallstone formation is one of the commonest conditions of the hepatobiliary system, and also one of the most common causes for surgical operation in the abdomen. Cholecystectomy is considered an effective way of managing gallbladder diseases. Open cholecystectomy was traditionally the standard surgical procedure, however, advancements have been made in surgery because of less postoperative pain, fast recovery rate, cosmetic advantages, and decreased hospitalization. Despite all the above merits, there might be occasions where an open cholecystectomy is indicated.

Aim: To retrospectively compare the clinical and surgical outcomes of laparoscopic cholecystectomy and open cholecystectomy.

Methodology: The retrospective comparative observational study was conducted in the department of general surgery at Gouri Devi Institute of Medical Sciences & Hospital, Durgapur, West Bengal, India. This research involved the collection of patient's record data, amounting to a total number of 150 patients' data, within one year timeframe. Data collection involves demographic information, operation time, complications, duration of hospital stay, recovery condition, and conversion rate.

Results: Out of the total 150 subjects participating in the experiment, laparoscopic cholecystectomy proved to be more effective post-operation because of better results, less hospitalization duration, and quick recovery when compared with open cholecystectomy.

Conclusion: Laparoscopic cholecystectomy showed superior postoperative recovery and reduced hospital stay compared with open cholecystectomy while maintaining comparable clinical effectiveness.

Keywords: laparoscopic cholecystectomy, open cholecystectomy, gallstone disease, retrospective study, surgical outcomes, postoperative complications

Introduction

The prevalence rate of gallstones is considered the highest among gastrointestinal and biliary disorders. Moreover, gallstones remain the significant cause of disease and surgeries throughout the entire world [1]. Gallstones disease is described by the formation of gallstones within the gallbladder, which might be asymptomatic or cause several complications and symptoms such as biliary colic, chronic cholecystitis, acute cholecystitis, gallstone pancreatitis, obstructive jaundice, and many more [2]. With the age increase, gallstones become more frequent and are associated with numerous factors that influence their occurrence, which include, but are not limited to, age, gender, obesity, dietary habits, genetics, sedentary lifestyle, hormones, and metabolic processes. High frequency of gallstones has significantly increased the costs of health care and surgical procedures throughout the world [3]. Cholecystectomy, or surgical elimination of gallstones, remains one of the best ways to address gallstones problems.

Cholecystectomy is a conventional way used for treating various kinds of diseases associated with the gallbladder and has given positive results to patients over the past few years. Patients who went through this process had no problem with removing their gallbladders effectively, and there were no chances that the problem would recur again, but this technique came with a lot of problems as well [4]. There was a need for making bigger incisions in one's abdomen, causing more pain, requiring longer stay at hospitals, not being able to return to their daily activities earlier, having higher chances of contracting infections from the wound site, and also bad-looking scars.

The laparoscopic cholecystectomy is considered one of the landmarks in the history of modern surgery as it has completely transformed the treatment approach to gallbladder diseases [5]. Since the introduction of laparoscopy into the field of medicine, there has been a great interest in its use because of the minimally invasive nature of the procedure, as well as the multiple benefits that it brings. As compared to traditional open surgery, laparoscopic cholecystectomy inflicts less trauma to the body, provides less postoperative pain, poses fewer risks of infection at the surgical wound, involves fewer days of hospitalization, leads to fast recovery, offers faster ambulation, ensures good cosmetic results, and enables earlier resumption of regular activity [6].

While preference has been increasingly leaning towards laparoscopic cholecystectomy, the importance of open cholecystectomy cannot be overlooked in contemporary surgical practices [7]. There are instances wherein an open procedure is preferred for certain conditions, which include but are not limited to cases with extreme gallbladder inflammation, complicated gallstone disease, extensive adhesions in the abdomen, abnormal anatomical structure, previous history of upper abdominal surgeries, poor operating environment, or when conversion occurs during surgery from laparoscopic to an open procedure [8]. It can be clearly seen that there are indeed several considerations to make in determining appropriate surgical procedure options. Comparing their outcomes is vital [9].

For these reasons, the current retrospective comparative study was carried out to assess the clinical and surgical performance of both laparoscopic cholecystectomy and open cholecystectomy in a particular study period. The present research was conducted with a view to assessing the comparative efficacy and effectiveness of the above surgical procedures in treating gallbladder diseases through analysing patients' medical records [10]. It was especially important to highlight some critical variables such as surgical time, intra-operative observations, post-operative complications, length of hospital stay, recovery period, and the overall result of surgery. Comparative analysis of all these parameters will help understand better the pros and cons of both procedures [11].

Furthermore, the study aimed at evaluating whether the minimal invasiveness of the laparoscopic procedure provides any significant clinical benefits compared to the conventional surgery. Tissue trauma, faster mobilization, shortened hospital stay, reduced complications and rapid recovery to normal activities were regarded as key aspects of successful surgery. At the same time, the study also acknowledged that the open approach still had its place in difficult cases where the use of the laparoscopic method would be ineffective [12].

It is anticipated that the results of the study will bring valuable information that will be important to determine the best surgical methods for addressing the problem of gallbladder disease in patients [13]. Through the systematic analysis of various surgery characteristics and their effectiveness in patients, the results will bring relevant evidence that will enable the selection of the optimal methods of surgery depending on various factors. Factors to be considered in this process include clinical conditions of patients, nature of gallbladder problems (severity and stage), presence of other medical problems, age, recovery expectations, and availability of surgery facilities [14].

In addition, the study is likely to improve surgical processes through providing vital information about differences between operative times, occurrence of complications, pain after surgery, time taken to recover from operations, length of stay in hospitals, and overall patient satisfaction [15].

The results from this study may help hospitals and healthcare organizations design evidence-based treatment guidelines and improve their quality improvement programs in regard to surgery. Moreover, these results may help in establishing guidelines on the use of surgical procedures as well as optimizing the use of healthcare infrastructure and surgical resources.

Apart from that, gaining a clearer insight into treatment outcomes will allow improving counseling services for patients and helping them make decisions regarding the choice of treatment procedure. In conclusion, this study should help promote the safety of patients during surgery, decrease post-surgery complications, optimize surgery time, and increase the general quality of health care in relation to surgeries.

Research Methodology

Study Design: The study under analysis was carried out through the method of retrospective comparative observational studies, which were designed to determine the clinical results and operations related to the two cholecystectomy procedures, such as laparoscopic and open cholecystectomy. Retrospective studies gave researchers the chance to analyze previous records during a certain period of time and examine the aspects of the two types of surgeries both before and after operation.

Study Area: This study was performed in the general surgery department of Gouri Devi Institute of Medical Sciences & Hospital in Durgapur, West Bengal, India.

Study Duration: The study was conducted over a period of 12 months.

Study Participants

Inclusion Criteria

- Patients diagnosed with symptomatic gallbladder disease and scheduled for surgical management.
- Patients who underwent laparoscopic cholecystectomy or open cholecystectomy during the study period.
- Patients with complete demographic, operative, and postoperative clinical records.
- Patients aged 18 years and above.

Exclusion Criteria

- Patients with incomplete or missing medical records.
- Patients managed conservatively without surgical intervention.
- Patients who underwent emergency surgical procedures with insufficient documentation.
- Patients with associated major hepatobiliary malignancies or severe systemic illness affecting surgical outcomes.

Sample Size: total of 150 records were included that satisfied the criteria for inclusion. This was because the chosen sample size comprised cases that had undergone laparoscopic cholecystectomy or open cholecystectomy and it was adequate enough for conducting comparisons of surgical procedures.

Procedure: Collection of medical record forms was done at the Medical Records department of the hospital. A methodical process of reviewing medical records through a standardized technique was used whereby information about patient demographics, signs and symptoms, operation carried out, operation findings, operation time, post-operation recovery, and post-operation complications were documented.

Patients were categorized into two groups according to the surgical technique performed:

- **Group I – Laparoscopic Cholecystectomy**
- **Group II – Open Cholecystectomy**

The comparative evaluation was done to see whether there were any differences in terms of operative results and the outcome post-operatively. Patient anonymity was ensured while doing this study.

Outcome Measures

The following clinical and surgical outcome parameters were assessed:

- operative duration (minutes)
- postoperative pain assessment
- duration of hospital stay (days)
- intraoperative and postoperative complications
- postoperative recovery period
- conversion from laparoscopic to open procedure
- overall surgical outcome

Statistical Analysis: Data collection was done and then analyzed using SPSS computer software (Statistical Package for Social Sciences). Frequency, percentage, mean, and standard deviation were descriptive statistics that were used for data analysis. Chi-square analysis was used in comparing between the groups of laparoscopic and open cholecystectomies on categorical data while independent t-test was used in comparing between the two groups on continuous data. Significance was set at p value <0.05.

Results

The total number of cases where cholecystectomy was performed during the time under study was 150. Patients were classified into two groups depending on whether laparoscopic or open surgery technique was applied. These two groups were then compared according to such criteria as surgical features, postoperative results, length of stay at hospital, and complications rate.

Table 1 indicates the distribution of the number of patients according to the surgical approach used in their treatments among the total sample size of 150 patients. As seen from the findings, 90 patients (60.0%) had laparoscopic cholecystectomy, whereas 60 patients (40.0%) had open cholecystectomy. It means that more patients were operated upon using the laparoscopic approach compared to those who underwent open surgery. This could be attributed to the advantages offered by laparoscopic surgery which include minimal incisions, less pain during postoperative care, brief duration of stay at the hospital, low rate of complications, quick recovery, ability to resume normal activities immediately after surgery, and good cosmetic effect. However, several patients still opted for open surgery.

Table 1: Distribution According to Surgical Procedure (n = 150)

Procedure	Frequency (n)	Percentage (%)
Laparoscopic cholecystectomy	90	60.0
Open cholecystectomy	60	40.0

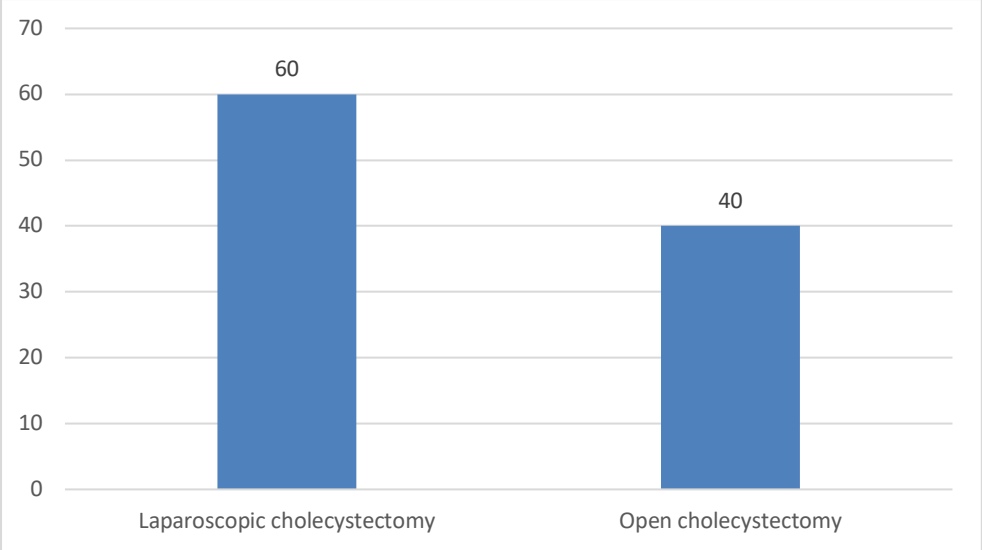

Figure 1: Graphical presentation of Distribution According to Surgical Procedure

Table 2 Age wise distribution of the 150 subjects taken in this experiment has been shown in Figure 2 below. It is apparent that the largest age group of patients was from the 41 – 50 years age bracket, which consisted of 46 patients, or 30.7% of all the patients in the sample. Also, 28% of the subjects belonged to the 31 – 40 years age bracket, while 22.6% of the subjects were older than 50 years old. Meanwhile, the smallest percentage of patients was in the 20 – 30 years age bracket, with 28 patients, or 18.7%. Thus, it is evident that the disease was more common among middle-aged patients, particularly in the age range of 41 to 50 years. This is mainly because of the cumulative effects of factors such as aging, metabolic disorders, obesity, diet, hormonal imbalance, and lifestyle changes, leading to formation of stones in the gallbladder over time. The low prevalence of the disease among younger people suggests that the burden of the disease is nonexistent in their case.

Table 2: Age Distribution of Patients (n = 150)

Age Group (years)	Frequency (n)	Percentage (%)
20–30	28	18.7
31–40	42	28.0
41–50	46	30.7
>50	34	22.6

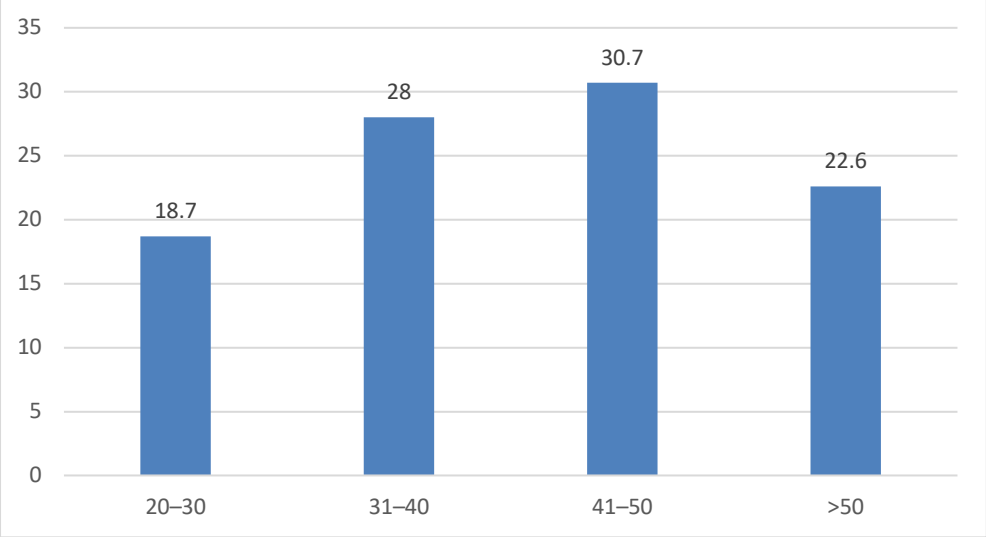

Figure 2: Graphical presentation of Age Distribution of Patients

Table 3 below shows there is an analysis of outcomes of surgical intervention between the groups of patients under treatment by using laparoscopic cholecystectomy and open cholecystectomy. It is clear from the data presented below that patients who underwent laparoscopic

cholecystectomy achieved better results concerning operative and postoperative outcomes. Thus, the average time of operation for laparoscopic cholecystectomy is equal to 65.4 ± 12.8 minutes, while the average time of operation in case of patients who had been operated on in a more traditional way amounted to 83.6 ± 16.5 minutes. Besides, the mean length of hospitalization period for the first group was significantly lower and amounted to 3.2 ± 1.4 days as opposed to 6.1 ± 2.0 days in the second one. It should also be noted that postoperative complications appeared less frequently during the operation of removal of the gallbladder in a laparoscopic way (10.0%) than in an open surgical procedure (20.0%). The reasons for it may be considered the following factors: fewer cases of woundings, minimal size of cuts, etc. Finally, the last criterion is the rate of recovery that happened much faster in the first case (9.5 ± 2.4 days) than in the second one (16.2 ± 3.7 days).

Table 3: Comparison of Surgical Outcomes

Parameter	Laparoscopic Cholecystectomy	Open Cholecystectomy
Mean operative duration (minutes)	65.4 ± 12.8	83.6 ± 16.5
Hospital stay (days)	3.2 ± 1.4	6.1 ± 2.0
Postoperative complications (%)	10.0	20.0
Recovery period (days)	9.5 ± 2.4	16.2 ± 3.7

Table 4 shown below and describes the distribution of complications following surgery in the 150 subjects who participated in the study. Based on the results obtained, it is clear that the period following surgery was largely successful among the patients studied, since 119 individuals (79.3%) experienced no problems during the postoperative period. The greatest number of patients developed postoperative complications in the form of postoperative infections in the affected area, which amounted to 15 (10.0% of all patients), postoperative fever, which was present in 10 patients (6.7%), and bile leakage, observed in 6 (4.0%) patients. Surgical wound infection arises because of several reasons, such as open wounds, surgery techniques, time taken for the operation, etc.

Table 4: Postoperative Complications (n = 150)

Complication	Frequency (n)	Percentage (%)
Surgical site infection	15	10.0
Bile leakage	6	4.0
Fever	10	6.7
No complication	119	79.3

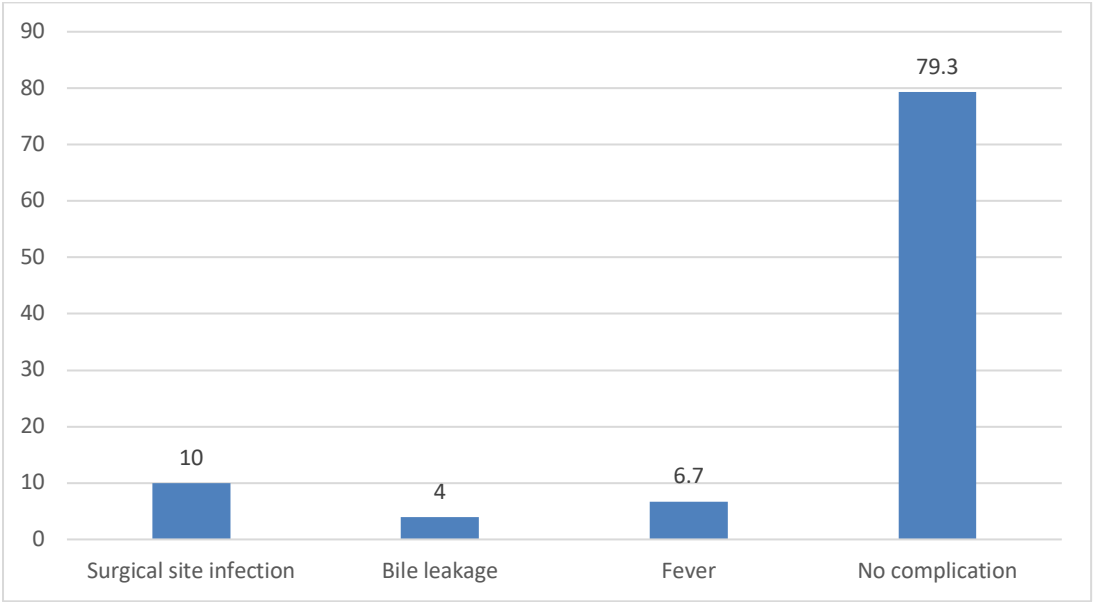

Figure 3: Graphical presentation of Postoperative Complications

Discussion

This retrospective comparative study has analyzed the clinical and surgical results of laparoscopic surgery vs. open surgery for cholecystectomy on 150 patients and concluded that those patients who had undergone laparoscopic cholecystectomy

experienced improved surgical results (Svanvik, 2000) [16]. Most patients chose laparoscopic surgery over open surgery, implying that the surgeons were more inclined towards less invasive procedures for treating gallbladder diseases. According to this study, patients treated via laparoscopic surgery had shorter operating times and less hospital stay compared to those treated via open surgery. The conclusion of the study was also validated by past studies regarding improved results from laparoscopic surgery (Chow et al., 2010) [17].

It was seen that fewer postoperative complications were seen in patients who underwent laparoscopic procedure. Incidence of surgical site infection was the most common postoperative complication, fever and bile leakage was seen in some cases; nevertheless, the total incidence rate of postoperative complications was less in comparison with open procedures (Kuwabara et al., 2010) [18]. Moreover, patients treated using laparoscopic procedure recovered quicker and resumed their daily activities earlier.

Despite the superior results achieved with laparoscopic cholecystectomy, open cholecystectomy retained its relevance in certain instances where there was an inflammatory process, adhesion formation, anatomical complexity, or the need for conversion to open surgery (Mazeh et al., 2009) [19]. Consequently, choice of technique is recommended based on the individual's health status, degree of disease, and skill of the surgeon. Indeed, the results from this current study are consistent with favoring laparoscopic cholecystectomy (Paajanen et al., 2011) [20].

Conclusion

the retrospective comparative analysis performed above, it appears that laparoscopic cholecystectomy is associated with better results than open cholecystectomy from both clinical and surgical perspectives for patients suffering from gallbladder diseases. From the findings presented above, it is evident that those patients who had undergone laparoscopic surgery were characterized by reduced duration of operations, reduced post-surgery pain, shortened hospitalization period, fewer complications after surgery, and earlier resumption of daily activities. It can be seen that the application of the surgery method mentioned above is helpful in the context of effectiveness in enhancing patients' recovery and improvement in post-surgical treatment. Nevertheless, the procedure of open cholecystectomy remains clinically important and can be considered a valid type of surgery when performing complex procedures and operating under difficult conditions. In other words, the selection of a particular technique for the treatment of patients should not be guided by the surgeons' preferences. Instead, such decisions should be made depending on the patients' examination results, complexity of the disease, and findings achieved during the operation itself.

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