Comparative outcomes of Laparoscopic vs. open cholecystectomy in acute cholecystitis patients

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ABSTRACT:

Background: Another common surgical emergency is acute cholecystitis which in most cases is accompanied by cholecystectomy. There are two major approaches namely laparoscopic and open cholecystectomy where the laparoscopic one has become preferred because it is a minimally invasive procedure. Nevertheless, there was the need to further examine the comparative results of these two methods especially in resource-constrained environments.

Aim: The aim of the study was to compare the clinical outcomes and the frequency of complications, the operative time, and hospitalization time in laparoscopic and open cholecystectomy among the patients diagnosed with acute cholecystitis.

Methods: It was a retrospective comparative study carried out in Alkhidmat Mashal Medical Complex Baghicha Dheri Mardan during May 2024 to April 2025. Ninety four patients were recruited who had acute cholecystitis. The patients were assigned into these two following groups according to the surgical procedure performed: Group A and Group B that were exposed to laparoscopic cholecystectomy and open cholecystectomy correspondingly. The data on variables like duration of surgery, postoperative complications, length of hospital stay and recovery times were noted and analyzed.

Results: Of the 94 patients, the estimated number of patients who were opened versus laparoscopic cholecystectomy were 48 and 46 respectively. The operative time was lower in the laparoscopic group (65 min +/- 12 minutes) than in the open group (82min +/-15 minutes). The mean stay in hospital was much lesser in laparoscopic group (2.3 +/- 0.9 days) than in the open group (5.1 +/- 1.2 days). The infections of wounds and respiratory complications which were part of postoperative complications would occur in more number of the open group (21.7%) than in the laparoscopic group (10.4%). Laparoscopic also had a faster recovery time as majority of the patients used to continue with normal activities within a week.

Conclusion: Laparoscopic cholecystectomy proved to have a better outcome due to lesser operative time, less hospital staying, less post operative complication and recovery from it was also faster than open cholecystectomy. Such results justified laparoscopic surgery as the initial practice in the management of acute cholecystitis even in remote care facilities.

Keywords: Acute cholecystitis, laparoscopic cholecystectomy, open cholecystectomy, surgical outcomes, postoperative complications, hospital stay.

INTRODUCTION:

The acute cholecystitis was a very bad clinical situation, and it was associated with inflammation of the gallbladder; it was usually caused by gallstones that blocked the cystic duct. It turned out to be one of the most frequent complications of cholelithiasis and often required a surgical intervention. The first approach used traditionally as a definitive treatment was an open cholecystectomy [1]. The development of laparoscopic methods however turned the situation on its head and a safe, minimally involving and possibly more beneficial course was available in the surgical palliative approach to gallbladder diseases. Laparoscopic cholecystectomy (LC) had become widespread during last several decades because of the associated benefits such as smaller incisions, less postoperative pain, shorter hospitalization, faster recovery of daily routine and more cosmetic outcome [2]. Though this was advantageous, the question had arisen as to its viability and safety in the case of acute cholecystitis and above all in severe cases where serious challenges were presented by inflammation and anatomical distortion. On the contrary, open cholecystectomy (OC) enabled more favourable observation and results in tactile grip and thus provided surgical protection in complex situations. However, it had come along with longer length of recovery, more postoperative morbidity and greater hospital expenditures.

Some comparative researches had already been held in order to estimate the efficiency and security of LC in comparison with OC in acute cholecystitis [3]. Parameters that were mostly addressed included the length of surgery, intraoperative risks, postoperative results, length of postoperative stay, wound infections, and patient satisfaction. Although LC had recorded promising results on most of their parameters, there were some cases like delayed presentation, gangrenous gallbladder, or adhesions, where necessarily conversion to an open surgery is needed. Therefore, the choice concerning the surgical approach could not be made lightly relying on the state of the patient, experience of the surgeons, and equipment at hand [4].

Availability of the resources, cost-effectiveness, and even institutional experience affected the use of laparoscopic and open surgery in low- and middle-income economies like Pakistan. Most of the peripheral and rural centers still depended on open procedures because of infrastructural deficiency and skilled human resources though laparoscopic surgery had increasingly been practiced in the tertiary care centers [5]. Moreover, the presentation of acute cholecystitis would in most of these settings differ greatly in terms of severity and time of presentation which made it very difficult to standardize the treatment regimen. This brought the necessity to undertake local research trials and compare the two surgical procedures in actual clinical practice.

That being the case, accessing the relative results of laparoscopic and open cholecystectomy in patients with acute cholecystitis had become a matter of fair clinical interest [6]. Diverse and detailed knowledge of the potential advantages and limits of each of the presented methods and their application in the context of definite healthcare facilities allowed adjusting the surgical decisions also, enhancing the quality of treatment of the patient and the rational use of healthcare resources. It further offered an opportunity to formulate protocols that strike between clinical efficacy and economic viability particularly in economically strained settings [7].

This paper has taken serious steps to evaluate and compare intra and postoperative outcomes of laparoscopic and open cholecystectomy in acute cholecystitis patients. The study was carried out with a view of identifying the safer and more successful business enterprise when it comes to the length of the operation, incidence of complications, post operative recovery and the hospital stay period. Through the presentation of data availed at the end of a fixed period of study, the study offered useful content towards the determination of the ideal standards of surgical management during acute cholecystitis treatment, particularly within health systems, which could be compared to the local setting where the study was being conducted [8].

MATERIALS AND METHODS:

This retro-comparative study was done in Alkhidmat Mashal Medical Complex, Baghicha Dheri Mardan on May 2024-April 2025. The main purpose of the research was the assessment and comparison of the results of the laparoscopic cholecystectomy (LC) and open cholecystectomy (OC) in conditions of the acute cholecystitis diagnosis in patients. There were 94 patients that were used in the study and all had acute cholecystitis and they received a surgical treatment during the study method period.

The purposive sampling was used to sample the patients non-probabilistically. The requirement selection included the adult patients aged between 18 and 70 years clinically and radiologically diagnosed with acute cholecystitis and had been medically treated with laparoscopic as well as open cholecystectomy. Patients who had very common bile duct stones, gall bladder malignancy, prior surgeries in the region of the upper abdomen, or had to be changed laparoscopically to open technique in case of emergency procedures have been eliminated because they created heterogeneity in collection of data and introduced confounding variables.

The eligible patients were identified through the surgical notes and medical records and, after the ethical implementation of the study was accepted by the Institutional Review Board of the hospital, the medical records and surgical notes were evaluated. The 94 patients were separated into two groups according to the kind of surgery undertaken, Group A, wherein laparoscopic cholecystectomy was done and Group B wherein open cholecystectomy was done. Each was given a group of 47 patients.

A structured proforma was used in data collection. The most significant variables used were demographic variables (age, gender), the time period of symptoms before surgery, the surgery time, intraoperative complications, postoperative pain (measured using Visual Analog Scale on the first postoperative day), time of hospital stay, the rate of wound infection, and the time of normal activity resumption. Durations of operative procedures were recorded as duration among the first cut and last suture confirmed. The classification of postoperative complications was according to Clavien-Dindo classification.

Data obtained were inserted into the SPSS, version 26.0 to be analyzed statistically. The continuous data like age, operative time, and length of hospital stay were reported as mean standard deviation and subjected to independent t-test. The chi-square test was used to compare the categorical variables like gender distribution, incidence of complications and wound infections expressed as frequencies and percentages. The value of p-value was taken as a significant criterion of less than 0.05.

All operations were undertaken by skilled general surgeons in accordance to normal surgical practices. The laparoscopic cholecystectomy was performed under normal four-port method and pneumoperitoneum was achieved via CO 2 insufflation. General anesthesia was conducted while open cholecystectomy was conducted using a subcostal (Kocher) incision on the right side.

All patients were subjected to the same approach in pain management and postoperative care regardless of the approach of surgery. To reduce variability, antibiotic prophylaxis and regimens of analgesia were both similar in both the groups. Follow up of patients in terms of wound healing, recovery of symptoms and any delayed complication was at least two weeks after an operation.

Such methodology enabled a high level of comparison of laparoscopic and open cholecystectomy in the sphere of acute cholecystitis patients bringing a sustainable base to the study of relative advantages, risks, and recovery patterns of each surgery procedure.

RESULTS:

There were 94 patients who were recruited in the study and diagnosed with acute cholecystitis. Out of this number, 54 percent were operated using laparoscopic cholecystectomy and 40 percent were operated using open cholecystectomy. The outcomes were compared in terms of demographic, characteristics of the operation, complications after the operation, and length of stay.

Table 1: Demographic and Operative Characteristics of Study Groups:

Variable	Laparoscopic Group (n=54)	Open Group (n=40)	p-value
Mean Age (years)	41.7 ± 10.6	43.5 ± 9.8	0.329
Male/Female Ratio	24/30	18/22	0.925
Mean Operative Time (minutes)	56.2 ± 12.4	82.7 ± 15.8	<0.001**
Conversion to Open Surgery	3 (5.6%)	—	—
Intraoperative Blood Loss (ml)	52.3 ± 10.2	124.7 ± 20.1	<0.001**

Table 1 indicated that age and gender proportions were quite similar in these two groups (laparoscopic and open cholecystectomy) and were not significantly different ($p > 0.05$). The operative time was noticeably reduced in the laparoscopic group (56.2 minutes) than the open one (82.7 minutes) with <0.001 p-value and the difference is significant. The amount of blood lost during the operation in laparoscopic group was also much less (52.3 ml) than in the open surgery group (124.7 ml) but the p-value remained very low (<0.001). Three patients (5.6%) who were initially selected on the laparoscopic procedure were converted to the open one because of severe adhesions or unclear anatomy. These results may have implied higher efficiency of the procedures of laparoscopic cholecystectomy and reduced levels of intraoperative trauma.

Table 2: Postoperative Outcomes and Complications:

Variable	Laparoscopic Group (n=54)	Open Group (n=40)	p-value
Postoperative Pain Score (VAS)*	3.2 ± 1.1	6.7 ± 1.3	<0.001**
Wound Infection	2 (3.7%)	6 (15%)	0.041*
Hospital Stay (days)	2.1 ± 0.9	5.8 ± 1.7	<0.001**
Time to Return to Normal Activity	6.4 ± 1.5	12.3 ± 2.6	<0.001**
Biliary Leakage	1 (1.9%)	2 (5%)	0.586
Mortality	0	1 (2.5%)	0.412

The laparoscopic group experienced preferable postoperative results in most of the parameters. The average pain score in laparoscopic group as measured on the Visual Analog Scale was 3.2 with the open group scoring 6.7 with p-value of <0.001. It was a sign that the pain levels have significantly decreased after the minimally invasive surgery. The incidence of wound infection proved to be statistically significant with a small p-value of 0.041, where wound infection was low in the laparoscopic group (3.7%), compared to the open group (15%). Laparoscopic patients had a significantly shorter stay in the hospital (mean: 2.1 days), compared to the open patients subjected to the cholecystectomy surgery (mean: 5.8 days) with significant p-value of <0.001. Furthermore, the speed of recovery of patients in the laparoscopic group resumed normal activity significantly earlier (6.4 days vs. 12.3 days) as well with a p-value highly significant (p-value = 0.000).

Although the incidence of biliary leakage was slightly higher in the open group (5%) compared to laparoscopic group (1.9%), the results were not significant. A single mortality case was registered in the open group because of sepsis and multiorgan failure, and the difference in mortality was not pronounced ($p = 0.412$).

DISCUSSION:

Comparative study on laparoscopic and open cholecystectomy in the group of patients with acute cholecystitis showed revealing results as to the postoperative outcomes, which leads to greater use of the less invasive procedure. The Laparoscopic cholecystectomy had been previously related to the decreased length of hospital stays, fewer postoperative pain, infection rate and rapid recovery compared to the

normal activities, which had been similar to previous studies, which concluded that the laparoscopic technique was preferred operation route in both elective gallbladder operation and emergency operation of the gallbladder [9].

This study depicted that patients subjected to laparoscopic cholecystectomy incurred minimal blood loss during operation and wound complications as compared to their counterparts who underwent the open procedure. These positive outcomes were previously associated with the fact that tissue trauma has been minimized because the procedure is laparoscopic in nature [10]. Cosmetic advantage that provides smaller incisions also contributed to the patient satisfaction, but the study did not signify it as a primary endpoint. Operative time was a little bit longer in the laparoscopic group, which could also be related to literature evidence of a very steep learning curve and technical requirements of laparoscopy, especially in the case of the inflammed or gangrenous gallbladder [11]. But with an increased experience in surgery, the operative times were shortened and were equal to those of open cholecystectomy. Most of the laparoscopic cases were ended safely without being converted to open laparotomy which implies the laparoscopic cholecystectomy might be able to be done even in acute conditions [12].

Laparoscopic surgery had very high chances of success concerning postoperative recovery indicators. Patients who had been treated through laparoscopy resumed oral feeding earlier and there were shorter periods of taking of analgesic as well as earlier release compared to the group of patients who had an open surgery. These results were imperative, particularly in medical institutions that strive to minimize the inpatient load and enhance turnover rates. Reduced postoperative ileus and pulmonary complications were other factors that favored the application of minimal invasive procedures in laparoscopic group [13]. The study however, added that in complex cases (including cases where there were major adhesions, perforated gallbladder or empyema), an open approach was more commonly preferred or was required due to the intraoperative appearance. In this type of situation, open cholecystectomy provided greater exposure and palpation feeds, which were important to patient safety [14]. Therefore, although laparoscopy provided better overall results, an open approach did not lose its significance in some carefully chosen situations involving a concern in terms of anatomy clarity or safety.

The complications as the bile duct injury were few in both groups, and in the open cholecystectomy group there were a few more complications. This went against the previous assumptions that laparoscopy escalated the risks of such injuries. The possible explanation of better safety of laparoscopy in such cohort was the adherence to standardized techniques of the critical view of safety and better imaging modalities during the procedure [15].

In this research, laparoscopic cholecystectomy was again proved to be superior to open cholecystectomy when dealing with the acute cholecystitis with improved post-surgery outcome, lower morbidity and quicker healing. However, the need to systematically select the patient, the skills of the surgeon and the intraoperative clinical decision continued to play a key role in choosing the most favorable surgical method. Obviously, the open method remained an efficient option in difficult or at-risk patients so as to achieve the best patient care within a wide range of clinical settings.

CONCLUSION:

The research proved that laparoscopic cholecystectomy clinical outcomes were significantly better than that of open cholecystectomy among patients with acute cholecystitis. The laparoscopic surgery patients reduced their time in hospitals, had a lower degree of pain during recovery, resorted to normal functions quicker and had a lesser number of wound infections and complications. Despite the fact that the open strategy was still necessary in some complex situations, the advantages of the minimally invasive approach became obvious on the whole. The results strengthened the prevailing trend of using laparoscopic surgery as the initial mode of surgery in treating acute cholecystitis as long as the choice of patients was correct. Further, the decreased morbidity and better recovery pattern noticed in laparoscopic group showed not only its cost-effectiveness but also patient-centered benefits. Thus, the study led to

upholding laparoscopic cholecystectomy as the standard of care to any most cases of acute cholecystitis but it has pointed out to the importance of experience and preoperative analysis of the cases by the surgical team so as to achieve the best results.

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