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RESEARCH ARTICLE

Factors Affecting Laparoscopic Cholecystectomy Operative Time. An observational study was conducted retrospectively from a single tertiary center

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Abstract

Laparoscopic cholecystectomy is a common procedure during which operating times vary significantly. An. Improving patient outcomes can result from a better understanding of the factors influencing these variations. Efficiency of surgery. 40 consecutive laparoscopic cholecystectomies over six months were examined. in reverse. Clinical presentation, surgeon intraoperative outcomes, and patient demographics. Among the information acquired were experiences. A significantly longer operating time was observed in patients with dense adhesions and acute cholecystitis. Procedures performed by surgeons with less experience also took longer to complete. Targeted surgical training and more efficient operating room scheduling can be made possible by understanding these elements. These results suggest that careful preoperative assessment and customized surgical planning are necessary to maximize the outcomes of laparoscopic cholecystectomy.

Keywords: Laparoscopic cholecystectomy, acute cholecystitis, surgical time, adhesions

INTRODUCTION

Gallstone disease is best treated surgically with a laparoscopic cholecystectomy (LC). And additional benign conditions of the gallbladder [1]. LC has been in business since the late 1980s. Changed general

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surgery by providing a less invasive open cholecystectomy substitute [1,2]. Shorter hospital stays and less postoperative pain are just two advantages of these methods. These include a quicker return to regular activities, a decreased risk of wound infection, and improved cosmetic outcomes. This has caused it to be widely adopted [1,3]. As a result, LC is currently among the most popular electives. Millions of cases of surgery are performed annually throughout the world. Beyond what is medical. The benefits of LC are substantial. The efficacy and safety of procedures are continuously being assessed in practice. Patient-centered care and resource optimization in the modern era [4]. More specifically, operating time has. Became an important indicator for assessing surgical performance and the use of medical resources. Expanded. increased risk of complications, exposure to anaesthesia, and increased utilization of operating room resources. Longer operating times have also been linked to increased medical expenses both during and after surgery. [5,6]. On occasion, however, short operating times could indicate poor surgical technique. Jeopardize the protection of patients. For the best possible patient outcomes and institutional efficiency, the ideal balance must be struck. Comprehending the elements that impact operative time in LC is therefore crucial [5,7]. The patient's health is one of the factors that can affect how long this procedure takes. g. body mass index, comorbidities, age, and gallbladder disease severity) the surgeon (e.g., A. level of expertise and knowledge of cutting-edge laparoscopic procedures) and intraoperative results (e.g. g. acute inflammation, anatomical changes, or the presence of adhesions). Additional elements that could play a role include the complexity of the cases, the availability of surgical instruments, and the efficiency of the operating room personnel [7,8]. Finding and evaluating these factors helps with preoperative planning, patient counselling, and more. It also helps with more precise operating list scheduling, better hospital resource allocation, and focused training for junior staff and surgical residents [11,15]. Quality improvement, patient safety, and cost-effectiveness have become more and more important to the surgical community in recent years [18,23]. To optimize the surgical pathway, improved recovery procedures, advancements in surgical equipment, and the incorporation of simulation-based training are all being considered [19,21]. Nonetheless, operational time variability continues to be a problem, especially in teaching hospitals and environments with limited resources. Institutions can apply evidence-based strategies to improve trainees' educational experiences, streamline workflow, and lower complications by methodically assessing the factors that contribute to this variability [22,29]. This research aims to investigate the factors that influence the duration. Required for cholecystectomy (laparoscopic). Providing useful insights is the goal of this study. improve overall care quality, safety of the patients, and surgical efficiency in a minimally invasive setting, the effects of invasive general surgery by examining a

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group of patients having LC. Various surgeon-related and patient intraoperative factors [30,34].

MATERIALS AND METHODS

Study Design

The aim of this research was to evaluate the variables affecting the amount of time needed for a laparoscopic cholecystectomy through a retrospective observational analysis.

Study Setting and Population

Information was gathered from the operating room logs of patients who had laparoscopic cholecystectomy operations over a predefined six-month period. Both elective and emergency cases were included to reflect a broad variety of clinical presentations.

Inclusion and Exclusion Criteria

Inclusion criteria:

people who had a laparoscopic C and were at least 18 years old, cholecystectomy for acute, chronic, or gallstone disease.

Availability of complete operation theatre and clinical records.

Exclusion criteria:

Patients with incomplete or missing data.

Open cholecystectomy was used in some cases.

patients who have had upper abdominal surgery in the past.

Pediatric patients or those undergoing cholecystectomy for malignancy.

Data Collection

From patient files, anaesthesia records, and operating room logs, pertinent information was methodically retrieved. The variables listed below were noted for every instance.

Age, sex, and body mass index (BMI) are demographic details.

Clinical diagnosis: Acute cholecystitis, chronic cholecystitis, or gallstone disease without cholecystitis. There are two types of surgical experience: junior (residents/registrars) and senior (consultants/fellows).

Intraoperative findings include anatomical variations, adhesions, thickening of the gallbladder wall, and intraoperative complications.

Operative time: The duration expressed in minutes between the skin incision and its completion. skin closure.

Data Analysis

Standard statistical software was used to analyse all of the data that had been gathered and entered into a spreadsheet. Depending on the data distribution, continuous variables (like age, BMI, and operating time) were summarized as standard deviation, either

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mean or interquartile range and median. The. Numbers and percentages of categorical variables (such as surgeon experience diagnosis and sex). intraoperative results) were presented [39]. Comparisons of the operating times of various groups (e.g., A. acute versus. Junior versus adult chronic cholecystitis. For this the Chi-square test was employed. continuous variables while the students t-test or Mann-Whitney U test was employed for categorical variables. (such as the presence or absence of adhesions) [42]. Any analysis was considered statistically significant if the. 0.05 was less than the p-value.

Ethical Considerations

Anonymized retrospective data were used in this investigation. No identifying information was included in the analysis or reporting, and patient confidentiality was rigorously upheld. Formal ethical approval was not necessary for this kind of study per institutional policy.

RESULTS

Clinical features and patient demographics.

Forty laparoscopic cholecystectomy patients were taken into consideration for the study. The average age was 42.6 ± 13.2 yrs with a range of 21 to 68 years. There were 26 women (65%) and 14 men (35%). The average body mass index (BMI) was 25 point 8 ± 3-point 7 kg/m². 12 (30%) of the cases were for acute cholecystitis, and 28 (70%) were for chronic cholecystitis or symptomatic gallstones. Senior surgeons performed the surgery in 22 cases (55 percent) while junior surgeons performed the surgery in 18 cases (45 percent). In 14 cases, or 35%, dense adhesions were observed.

Table no.1: Clinical Characteristics and Patient Demographics

Characteristic	Value (n = 40)
Age (mean ± SD, years)	42.6 ± 13.2
Sex (M/F)	14/26
BMI (mean ± SD, kg/m²)	25.8 ± 3.7
Diagnosis	
- Acute cholecystitis	12 (30%)
- Chronic cholecystitis	28 (70%)

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Surgeon Experience	
- Junior	18 (45%)
- Senior	22 (55%)
Adhesions Present	14 (35%)

Table 1: Standard deviation (SD) and body mass index (BMI) are shown

Acute cholecystitis: characterized by individuals who exhibit imaging, laboratory, and clinical signs of acute gallbladder inflammation.

Chronic cholecystitis: Defined as patients with a history of recurrent biliary symptoms and imaging suggestive of chronic gallbladder disease.

Surgeon experience: Consultants and fellows with three or more years of independent experience are referred to as senior, while residents and registrars with less than three years are referred to as junior.

Adhesions present: Intraoperative finding of dense fibrous tissue around the gallbladder.

Operative Time Analysis

For all cases the average operating time was 88 minutes plus or minus 24 minutes and seven minutes. (range: 45–150 minutes).

Diagnosis: Compared to chronic cholecystitis (79.2 ± 18.5 minutes, $p<0.05$) operatively mean. One was the time for acute cholecystitis was 108.6 ± 22.9 minutes, or significantly longer.

Surgeon Experience: Senior surgeons mean operative time was 76 4 ± 17. 9 minutes ($p = 0.016$) while junior surgeons' mean operative time was 98. 3 ± 21.4 minutes.

Adhesions: The average operative time for cases with dense adhesions was 105. 7 ± 19. 3 minutes, whereas the average for cases without adhesions was 78.6 ± 15.2 minutes (p 0 < 01).

Table no.2: Operative Time by Group

Group	Mean Operative Time (min) ± SD	p-value
Acute cholecystitis	108.6 ± 22.9	<0.05
Chronic cholecystitis	79.2 ± 18.5	
Junior surgeon	98.3 ± 21.4	0.016
Senior surgeon	76.4 ± 17.9	

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Adhesions present	105.7 ± 19.3	<0.01
No adhesions	78.6 ± 15.2	

Table 2: Values are presented as mean operative time in minutes ± standard deviation (SD)

For continuous variables P-values are determined using the appropriate Mann-Whitney U test or Students t-test. [36].

Acute vs. chronic cholecystitis: p-value compares mean operative times between these two diagnostic groups.

Figure 1 - Operative Time Distribution in Acute vs. Chronic Cholecystitis

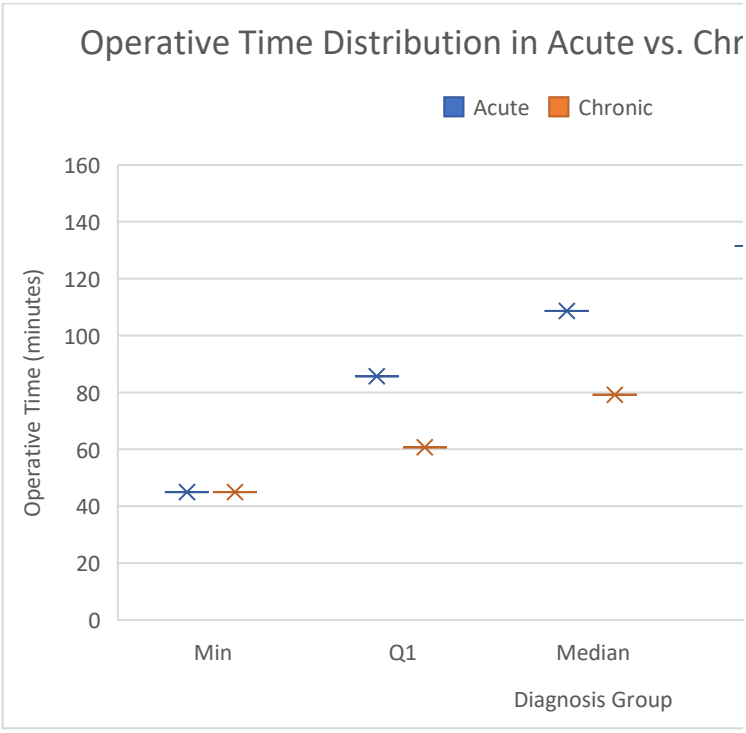

Figure 1: This chart shows the minimum, median, third quartile (Q3), first quartile (Q1), and maximum operative times for patients with acute and chronic cholecystitis. For each group, each marker stands for a summary value. This visualization shows that operative times are typically longer and more variable in acute cholecystitis than in chronic cholecystitis, even though it uses summary data rather than individual patient values.

Junior vs. senior surgeon: p-value compares mean operative times based on surgeon experience.

Adhesions present vs. absent: p-value compares mean operative times based on the presence or absence of intraoperative adhesions [41]. Statistical significance set at $p < 0.05$.

Note: The summary statistics used to generate Figure 1 are provided in Appendix A

Summary of Significant Findings

When dense adhesions were present and acute cholecystitis was present, the operating time was noticeably longer. Junior surgeons' surgeries took longer than those of senior surgeons. No notable conversions or intraoperative complications to open surgery were observed in this series. These results imply that the primary determinants of operative time in laparoscopic cholecystectomy are surgeon experience, intraoperative adhesions, and acute inflammation.

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DISCUSSION

Our study shows that laparoscopic cholecystectomy operating times are significantly longer for patients with acute cholecystitis, those with dense intraoperative adhesions, and procedures carried out by less experienced (junior) surgeons [22]. Such findings are consistent with previous published research, including studies published in the International Journal of Surgery Research and Practice. Longer operating times have been linked to acute inflammation and difficult anatomical conditions according to these studies. Acute cholecystitis poses technical challenges that call for additional vigilance and often more advanced surgical techniques [33]. Tissue edema, obscured planes, and adhesions are some of these challenges that make dissection take longer and increase the possibility of complications [32,37]. Our finding that junior surgeons require more time is in line with the established learning curve in laparoscopic surgery, underscoring the importance of targeted supervision and gradual exposure to difficult cases during surgical training [37]. We found no significant effect in our cohort, which may have been caused by the small sample size and patient demographics, despite some literature suggesting that higher BMI may also lengthen operating time [31,33]. the small sample size retrospective design and single-center setting are significant drawbacks that could limit the generalizability of our findings and introduce selection bias [23,35]. Despite these limitations, the practical implications of our findings are as follows: training programs should continue to emphasize hands-on experience with supervision in challenging cases, and careful preoperative assessment can help anticipate longer procedures, allowing for better operating room scheduling and resource allocation [29]. The factors that lead to longer operative times can ultimately be identified and addressed to improve surgical efficiency, improve patient outcomes, and guide clinical practice and educational initiatives in minimally invasive surgery [26,30,35,38].

CONCLUSION

Overall, this study shows that the main factors linked to longer operating times in laparoscopic surgery. acute cholecystitis the presence of thick intraoperative adhesions and cholecystectomy in our context. as well as less experience of the surgeon. Understanding these factors is essential for maximizing preoperative planning, enhancing operating room productivity, and guaranteeing patient safety. Surgical outcomes can be further improved by allocating cases based on the experience of the surgeon and foreseeing technical difficulties in complicated cases. The overall efficacy of minimally invasive gallbladder surgery will be increased, and operating times will be reduced with continued emphasis on structured training and meticulous patient evaluation.

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Appendix A: Summary Statistics Used for Figure 1

Group	Min	Q1	Median	Q3	Max
Acute	45	85.7	108.6	131.5	150
Chronic	45	60.7	79.2	97.7	150