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PER OPERATIVE AND POST OPERATIVE COMPLICATIONS IN EARLY VERSUS ELECTIVE CHOLECYSTECTOMY WITH ACUTE CALCULUS CHOLECYSTITIS

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Abstract

Objective: *To compare per-operative and post-operative complications in early versus elective cholecystectomy with acute calculus cholecystitis.*

Study Design: *Prospective comparative study.*

Place and Duration of Study: *Surgical Department, Combined Military Hospital Sialkot from Jul 2023 to Jul 2024.*

Methods: *Fifty patients with a clinical diagnosis of acute calculous cholecystitis confirmed by clinical and imaging findings as per TG18 criteria were divided into two groups of twenty-five individuals each. Group A underwent early cholecystectomy, while Group B had elective cholecystectomy. Perioperative and postoperative complications were compared between both groups.*

Results: *The study included 50 patients equally divided into early and elective groups. The mean age was 45.00 ± 6.837 years in Group A (early cholecystectomy) and 43.84 ± 7.284 years in Group B (elective cholecystectomy). Group A had 5 (20%) males and 20 (80%) females, while Group B had 4 (16%) males and 21 (84%) females. Group A showed slightly higher rates of bile/stone spillage (12% vs. 8%) and lower rates of conversion to open surgery (4% vs. 8%) and hemorrhage (8% vs. 16%), although these differences were not statistically significant. Postoperative complications, including bile leakage and wound infection, were lower in Group A but did not reach statistical significance.*

Conclusion: *Both early and elective cholecystectomy are safe and effective for acute calculous cholecystitis, with no significant differences in perioperative and postoperative complications. Early cholecystectomy may offer slightly lower complication rates, making it a viable option for managing ACC.*

Introduction

The gallbladder is a small organ located under the liver where bile is stored, concentrated, and then released into the small intestine. Acute cholecystitis (AC) is the inflammation of the gallbladder, typically caused by gallstones obstructing the gallbladder neck or cystic duct (1). It is one of the most common causes of acute abdomen, occurring in approximately 3–10% of all patients presenting with abdominal pain in the emergency room (2). Around 90% to 95% of AC cases are due to cystic duct obstruction caused by gallstones, where it is called acute calculous cholecystitis (ACC) while 5% to 10% of AC cases are acalculous in nature (3).

Gallstones can form due to a variety of factors, including genetic predisposition, gallbladder contraction, microbiome and metabolic factors

such as obesity and high estrogen levels (4). In the United States alone, gallstone disease has been associated with increased overall mortality (5). This highlights the necessity for definitive treatment.

Historically, cholecystectomy has been found to be the best treatment strategy for cholecystitis (6). The procedure, which involves the surgical removal of the gallbladder, used to be performed using open surgery, but now it is performed through laparoscopic techniques. Since the advent of laparoscopic cholecystectomy in 1987 by Professor Mouret, this procedure has proven to be safe and effective (7). However, whether to perform early or elective cholecystectomy has become a topic of debate. Early cholecystectomy has shown a significant reduction in the risk of recurrent biliary events and recurrent pancreatitis compared to elective cholecystectomy (8). The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) recommends early cholecystectomy within 24-72 hours of diagnosis to avoid increased risks of complications and to decrease cost and hospital stay. A study by Bundgaard et al. concluded that early laparoscopic cholecystectomy for ACC is safe regardless of timing, even beyond 5 days, and is not associated with increased complications (9). In another study by Wei Dai et al., there was no significant difference between early and late cholecystectomy regarding postoperative complications, readmission rates, and conversion rates, although the length of hospital stay was shorter for the early cholecystectomy group (10).

Being such an important topic, there are still limited studies on the per-operative and post-operative complications of early versus delayed laparoscopic cholecystectomy. The per-operative and post-operative complications have not been studied in a single study, especially in our healthcare setup. The present study aims to evaluate the per-operative and post-operative complications in early and elective cholecystectomy and to determine which is the preferable operative intervention for ACC, to guide surgeons in choosing the best treatment method. This will also help us reduce the economic burden on our healthcare setups as well as improve patient satisfaction.

Objective: To compare the per operative and post operative complications in early versus elective cholecystectomy with acute calculus cholecystitis.

Methods

This was conducted as a prospective comparative study at Surgical Department, Combined Military Hospital Sialkot over a period of 1 year from Jul 2023 to Jul 2024 following approval from the institutional ethical committee (_____). Sample size was 32 calculated by WHO sample size calculator 2.0 taking level of significance as 5%, power of test as 90%, anticipated population proportion 1 as 0.267 and anticipated population proportion 2 as 0 (11). Total 50 patients planned for cholecystitis fulfilling inclusion criteria were enrolled in the study after informed consent.

Inclusion Criteria:

Patients aged 18-60 years who fulfilled the criteria for acute cholecystitis (ACC) as defined by the Tokyo Guidelines 2018 (TG18) (12) and were planned to undergo cholecystectomy were included in this study.

Exclusion Criteria:

Patients with acute cholecystitis not related to gallstones, those with severe comorbidities that contraindicate surgery, patients with previous upper abdominal surgery, pregnant women, and patients who refuse to participate in the study were excluded.

The clinical diagnosis of ACC was confirmed by TG18, which includes local signs such as Murphy's sign, right upper quadrant (RUQ) pain or tenderness, and systemic signs of fever, elevated C-reactive protein (CRP), and elevated white blood cell (WBC) count, along with imaging findings consistent with ACC. After confirmation of the diagnosis, the participants were randomly divided into 2 groups into early cholecystectomy group and elective cholecystectomy group (after initial conservative management).

The early cholecystectomy group was categorized as 'Group A' while the elective cholecystectomy group was categorized as 'Group B'.

Operative Techniques

Early Laparoscopic Cholecystectomy: Laparoscopic cholecystectomy was performed within 72 hours of hospital admission. Antibiotic therapy was initiated with intravenous (I.V.) Ceftriaxone (1g) every 12 hours and I.V. Metronidazole (500mg) every 8 hours for 48 hours post-operatively, followed by oral Cefixime (200mg) twice daily if the clinical condition was stable. Patients were discharged as soon as possible after Day 2, provided their body temperature and blood leukocyte count were normal. A follow-up visit was scheduled for day 30.

Elective Laparoscopic Cholecystectomy: Initial antibiotic therapy included I.V. Ceftriaxone (1g) every 12 hours and I.V. Metronidazole (500mg) every 8 hours for 24 hours, followed by oral Cefixime (200mg) twice daily if the clinical condition was stable. Patients were discharged as soon as possible after starting oral Cefixime. Laparoscopic cholecystectomy was performed 6 weeks after the primary admission. A follow-up visit was scheduled for day 30.

Open Cholecystectomy: The main reason for converting to open surgery was the difficulty in clearly defining the anatomy within Calot's triangle. The decision to convert was made intra-operatively by the surgeon to avoid potential complications. This procedure involved making a right subcostal incision, which provided excellent visualization of the gallbladder and Calot's triangle, facilitating the dissection of the gallbladder.

Patient Evaluation and Data Collection

We evaluated the complications in all 50 patients, after dividing them into early cholecystectomy and elective cholecystectomy groups.

The factors kept under consideration included patients' pre-operative variables such as age, gender Bile / Stone Spillage, CBD Injury, Conversion to Open Surgery, Hemorrhage and GB Perforation as well as post-operative variables such as Bile Leakage, Wound Injection, Sinus Formation and Persistent Wound Pain.

Data Analysis

The patients in the two groups were analyzed considering age, gender, and complications occurring per-operatively and post-operatively. The data was examined statistically using the Statistical Package for Social Sciences version 25.0 (SPSS v25). For quantitative variables, an independent sample t-test was utilized, while for qualitative variables, the Chi-square test was employed to compare the two groups. The p-value for statistical significance and the association between categorical variables were determined using a paired t-test, with a p-value of ≤ 0.05 considered statistically significant.

Results

Fifty patients were included in our one-year study period and were divided into two equal groups of 25 each. These patients were scheduled for laparoscopic cholecystectomy. Ages ranged from 25 years (the youngest patient) to 57 years (the oldest patient). Most of the patients were in their forties. **(Table I)**.

Table I: Age Distribution

Age	No of patients	Percentage
20-30	3	6
30-40	4	8
40-50	33	66
50-60	10	20

The mean age was 45.00 ± 6.837 years in group A (Early Cholecystectomy) and 43.84 ± 7.284 years in group B (Elective Cholecystectomy) (p = 0.564). In terms of gender distribution, there were 5 (20%) males and 20 (80%) females in group A, and 4 (16%) males and 21 (84%) females in group B (p = 0.713) **(Table II) (n=50).**

Table II: Comparison of Baseline Variables n= 50				
Variables		**Group**		**p-value**
		Group A (Early) n = 25	**Group B (Elective) n = 25**	
Age (mean years ± S.D)		45.00 ±6.837	43.84 ±7.284	0.564
Gender	**Male, n(%)** 9 (18%)	5 (20%)	4 (16%)	0.713
	Female, n(%) 41 (82%)	20 (80%)	21(84%)	

Per-operative complications were studied and compared between both groups. In our study, the per-operative bile/stone spillage, conversion to open surgery, and hemorrhage were noted as 3 (12%), 1 (4%), and 2 (8%) in the early group and 2 (8%), 2 (8%), and 4 (16%) in the elective group, respectively, with corresponding p-values of 0. 637, 0.552, and 0.384, respectively. There was no bile/stone spillage and GB perforation reported **(Table III) (n=50).**

Table III: Comparison of per-operative complications between groups n= 50			
Complication	**Group**		**p-value**
	Group A (Early) n = 25	**Group B (Elective) n = 25**	
Bile / Stone Spillage	3 (12%)	2 (8%)	0.637
CBD Injury	0	0	-
Conversion to Open Surgery	1 (4%)	2 (8%)	0.552
Hemorrhage	2 (8%)	4 (16%)	0.384
GB Perforation	0	0	-

Post-operative complications were also noted and compared between the two groups. In our study, the post-operative bile leakage, wound infection, and sinus formation were noted as 0, 1 (4%), and 0 in the early group and 1 (4%), 2 (8%), and 1 (4%) in the elective group, respectively, with corresponding p-values of 0.312, 0.552, and 0.312, respectively. No patient developed persistent wound pain. **(Table IV) (n=50)**

Table IV: Comparison of post-operative complications between groups			
Complication	**Group**		**p-value**
	Group A (Early)	**Group B (Elective)**	
Bile Leakage	0	1 (4%)	0.312
Wound Injection	1 (4%)	2 (8%)	0.552
Sinus Formation	0	1 (4%)	0.312
Persistent Wound Pain	0	0	-

Discussion

Our study aimed to compare the per-operative and post-operative complications between early and elective laparoscopic cholecystectomy in patients with acute calculus cholecystitis. The results demonstrated that both surgical approaches are generally safe, but some differences favored early over elective in terms of specific complications.

The mean age and gender distribution between the two groups were comparable, indicating that demographic factors did not significantly influence the choice of surgical timing or outcomes. This consistency allowed for a more focused comparison of the surgical techniques themselves.

Per-operative complications, including bile/stone spillage, conversion to open surgery, and hemorrhage, showed no significant differences between the early and elective groups. Although the early group had slightly higher rates of bile/stone spillage (12% vs. 8%), this difference was not statistically significant (p = 0. 637). Conversion to open surgery and hemorrhage rates were slightly lower in the early group but almost equal between the two groups, indicating that the timing of surgery did not adversely affect these per-operative outcomes.

In a study by Goran at all, the early group had lower biliary tract injury and mean bleeding rate but the difference was not statistically significant ($p<0.05$) ,while the difference for conversion to open surgery was significant and lower for early group (13). In an another study by Maria et al, the early cholecystectomy group had lower CBD injuries as compared to the elective group (14).

Post-operative complications such as bile leakage, wound infection, and sinus formation were also lower in the early group but there were no significant differences noted. Notably, the early group had a lower incidence of wound infections (4% vs. 8%), but this difference did not reach statistical significance (p = 0.552). The absence of persistent wound pain in both groups suggests that laparoscopic cholecystectomy, whether performed early or electively, is an effective intervention for acute calculus cholecystitis with minimal long-term discomfort for patients.

These findings align with previous studies suggesting that early cholecystectomy can reduce hospital stay and healthcare costs without increasing the risk of complications. For example, a study by Wei Dai et al indicated no significant differences in postoperative complications, readmission rates, or conversion rates between early and late cholecystectomy groups, although the early group benefited from a shorter hospital stay (10). Our study supports these findings and underscores the feasibility and safety of early laparoscopic cholecystectomy in managing acute calculus cholecystitis.

Conclusion

In conclusion, our study found no significant differences in per-operative and post-operative complications between early and elective laparoscopic cholecystectomy for acute calculus cholecystitis. Both approaches are safe and effective, with the early cholecystectomy group benefiting from slightly lower complication rates. Given these findings, early laparoscopic cholecystectomy should be considered a viable option for managing acute calculus cholecystitis, offering lower complications and reduced risk of recurrent biliary events.

Conflict of Interest

We declare that there was no conflict of interest.

Limitations

The authors are aware of the limitations, the most important being the small sample size. Longer follow-up periods could provide further insights into the long-term outcomes and cost-effectiveness of early versus elective cholecystectomy. Additionally, correlating symptoms and radiological findings with complications, as well as exploring patient-reported outcomes and quality of life measures, could enhance our understanding of the broader impacts of these surgical timing strategies on patient care.

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