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A Comparative Study of Clinical Outcome in Early and Interval cholecystectomy in Acute Calculous Cholecystitis

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Abstract

Background:

The appropriate time of laparoscopic cholecystectomy in treating acute cholecystitis is still debated. There are two techniques to treating acute cholecystitis: early cholecystectomy, which is done within 72 hours after the commencement of the condition. Delayed or interval cholecystectomy is conducted 6 to 8 weeks after the first medical therapy with antimicrobial medicines.

Aim of the Study:

The study's goal is to compare early versus delayed or interval cholecystectomy in patients with acute calculous cholecystitis.

Methodology:

Patients with acute cholecystitis admitted to the General Surgery department at SRM Medical college and Hospital, Kalahandi were separated into two groups. Patients in group A have an early laparoscopic cholecystectomy, whereas patients in group B who arrive after 72 hours will have a delayed or interval cholecystectomy.

Conclusion:

There is no significant difference in overall clinical outcomes between individuals treated with early and delayed cholecystectomy for acute calculous cholecystitis. The delayed cholecystectomy group had a longer total hospital stay and requires more medication than the early cholecystectomy group.

Keywords: Acute Calculus Cholecystitis, Open Cholecystectomy, Laparoscopic Cholecystectomy.

Introduction

Acute cholecystitis is a common condition in industrialized nations across the globe. Since the introduction of laparoscopic cholecystectomy, there has always been disagreement on when the procedure should be performed to treat acute cholecystitis. The ideal timing of laparoscopic cholecystectomy in the treatment of acute cholecystitis is still debated.

As a result, my research focuses on the scheduling of operation. In 1985, Mühe (under direct scope vision) conducted the first laparoscopic cholecystectomy. Mouret performed the same treatment using a video-laparoscope that is being used today in 1987, and Dubois and Perissat popularized it internationally from Europe and the United States.[1] There are two techniques available for treating acute cholecystitis: Early cholecystectomy is conducted within 72 hours after the beginning of illness.

A delayed or interval cholecystectomy is conducted 6 to 8 weeks after the first medical therapy with antimicrobial medicines. The precise timing of operation, possible advantages, and cost-effectiveness of Laparoscopic cholecystectomy as a therapy for acutely inflamed gallbladder has not been

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demonstrated and remains contentious.[2] In the presence of acute inflammation, LC becomes more challenging and difficult due to edema, exudate, adhesions with adjoining structures, and gallbladder distension, friability of tissues, unclear and distorted ductal and vascular anatomy [3], hypervascularity, congestion, and infection spread.

These risk factors contribute to unsatisfactory outcomes and a high conversion rate to open cholecystectomy in early cholecystectomy. Delayed cholecystectomy increases the chance of recurrent symptoms necessitating emergency surgery, a longer hospital stay, and greater healthcare expenditures.

Thus, the purpose of this research is to compare early versus delayed or interval cholecystectomy in acute calculous cholecystitis.

Aims and Objectives

• To compare overall morbidity and mortality between 30 patients managed with early or delayed laparoscopic cholecystectomy for acute calculous cholecystitis.

• To compare the conversion rate to open cholecystectomy between early and interval laparoscopic cholecystectomy

Methodology

This is a prospective comparative study of 30 patients diagnosed with acute calculous cholecystitis over a two-year period in the Department of General Surgery, SRM Medical college, Kalahandi who had laparoscopic cholecystectomy (early or delayed) for Acute Calculous Cholecystitis. The research proposal has been submitted to the hospital's ethics committee for approval. Prior to participation in the trial, all patients were told about the surgery and given their permission. The research included all individuals who were diagnosed with Acute Calculous Cholecystitis. Patients with common bile duct stones (choledocholithiasis), acute pancreatitis, prior upper abdominal surgery, or serious concurrent medical issues and major systemic illness that made them unsuitable for laparoscopic surgery were excluded from the research. Patients were split into two research groups: Group A and Group B, depending on their presentation to OPD and the length of illness onset (within or more than 72 hours). Patients in group A have an early laparoscopic cholecystectomy within 72 hours of symptom onset. Delayed or interval cholecystectomy is planned for patients in group B who arrived after 72 hours after symptom start or 6-8 weeks after receiving initial therapy with intravenous fluids, antibiotics, and analgesics. Patients with recurring bouts of cholecystitis who are being treated conservatively and are scheduled for interval cholecystectomy were excluded from this research. Morbidity, mortality, operating times, bile duct damage incidence, and hospital stay duration were the primary outcomes. Demographic and clinical data were collected for all patients. Patients are monitored until they are admitted to the hospital after surgery. The study's assessment criteria included both operating and postoperative factors, such as operation time, intraoperative and postoperative problems, inpatient length (total and post-surgical), and conversion rate to open cholecystectomy. For the delayed surgery group, hospitalization duration was calculated as the overall length of stay by combining the first and second hospitalizations. The secondary assessment criteria included treatment-related expenditures such as surgery, conservative therapy, and hospitalization. The overall cost of hospitalization includes the initial hospitalization, the second hospitalization (for the late operation group), and outpatient visits before and after admissions. Proforma utilized for patient records, as indicated in the annexures.

Statistics: Data collected was entered in Microsoft excel and analysed using SPSS -22.0. Mean and percentages was used for descriptive analysis.

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Results

Table 1: Age Distribution

Age group (years)	No of patients (n = 30)	Percentage (%)
21-30	3	10
31-40	7	22
41-50	9	30
51-60	5	18
61-70	5	16
>71	1	4

Table 2: Gender Distribution

Sex	No. of patients (n = 30)	Percentage (%)
Male	11	36
Female	19	64
Total	30	100

Table 3: Open Conversion Rate

	Total operated Cases (n = 30)	No. Of cases converted to open	(%)
Group A	15	1	6.66
Group B	15	0	0

Table 4: Length of Hospital Stay

	Group A	Group B	P Value
Hospital Stay (Days)	5.68±0.85	7.2±0.71	<0.05
Post Op Stay (Days)	3.08±0.95	2.8±0.58	0.22

Table 5: Operating Time

Operating Time	Group A	Group B
50 – 60 Min	0	2
61 – 70 Min	1	4
71 – 80 Min	2	5
81 – 90 Min	5	2
91 – 100 Min	5	1
> 100 Min	2	1
Total	15	15

Table 6: Intra Operative Findings, Intra Op & Post Op Complications

		Group A	Group B
Intra Op Findings	GB Adhesion	6 (40%)	2 (13%)
	GB Congestion	4 (26%)	1 (6.66%)
	GB Perforation	2 (13%)	0
Intra Op Complications	Bile/Stone Spillage	4 (26%)	1 (6.66%)
	Hemorrhage	3 (20%)	1 (6.66%)
	CBD Injury	0	0
	Conversion To Open Surgery	1 (6.66%)	0
Post Op Complication	Bile Leakage	1 (6.66%)	0
	Wound Infection	1 (6.66%)	0
	Hemorrhage	0	0

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Table 7: Studies Comparing Age Groups of Presentation

Study	Common age group of presentation
Nis (Nationwide Inpatient Sample) 2005-2009 [3]	40-59 years
Multicentre Rct	55-56 years
Addison Et Al [4]	50-59 years
This Study	41-50 years

Table 8: Studies Showing Gender of Acute Cholecystitis

References	Year	No of patients	Conversion rate	Percentage (%)
Asai [5]	2014	225	7/105	6.7
Kamalapurkar [6]	2014	84	1/60	1.7
Wright [7]	2015	445	7/92	7
Ambe [8]	2015	138	5/79	6.3
Amirthalingam [9]	2016	149	2/84	2.4
This study	2019	15	1/15	6.66

Table 9: Studies Showing Open Conversion Rates

Study	Gender predominance	Percentage (%)
Nis (Nationwide Inpatient Sample) 2005-2009 [3]	Female	64.7
Multicentre RCT	Female	62.8
Addison et al. [4]	Female	69
This Study	Female	64

Table 10: Studies Comparing Operative Times between Early and Delayed Groups

Study	Operative Time (Min)	
	Early Group	Delayed Group
Lo et al.[11]	135	105
Johansson et al.[12]	98	100
Lai et al.[13]	123	107
Kolla et al.[14]	104	93
This study	87	70

Discussion

The average age of patients presenting with acute calculous cholecystitis was 48.4±14.2 years, with 41-50 years being the most prevalent age range. This research agrees with the previous meta-analysis, with an open conversion rate of 6.66% in the early group. In this research, the average operating length was found to be 87.04 minutes in the early cholecystectomy group and 70.56 minutes in the delayed cholecystectomy group, with a p-value of <0.05, indicating a considerably lower surgical duration in interval cholecystectomy. In this research, the mean operational time for early laparoscopic cholecystectomy is 80 to 100 minutes, while for interval laparoscopic cholecystectomy is 60 to 80 minutes. Siddiqui et al. examined four clinical studies involving 375 patients and discovered that early laparoscopic cholecystectomy resulted in a shorter hospital stay and a longer operation time, but there was no significant difference in conversion rates between the early and delayed laparoscopic cholecystectomy groups. [10] This research found that the early group had a longer operational time than the delayed group, which is consistent with other studies. Overall operating times were quicker in both groups when compared to all of the studies described above because experienced surgeons performed surgery, there was more exposure to laparoscopy as in the latest research, and the comparable studies were conducted during periods when laparoscopy

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was developing. Catena and colleagues (2009) proposed using a harmonic scalpel to improve hemostasis and bile stasis during laparoscopic cholecystectomy, and preliminary data suggested that it may reduce the conversion rate to open surgery in patients undergoing laparoscopic cholecystectomy for acute cholecystitis. A prospective, randomized controlled experiment later validated these results (Catena et al. 2009).[15] In this investigation, three patients experienced recurring symptoms, two of whom had surgical intervention before the anticipated period of cholecystectomy, and so were excluded from the study.A Cochrane database study found that 18.3% of patients were in the delayed group, and in 5 RCTs, patients had to undergo emergency surgery in the interval period due to non-resolution or recurrence of cholecystitis symptoms before their planned operation, with a 45% conversion rate to open cholecystectomy. [16] According to a meta-analysis research published in the American Journal of Gastroenterology, more than 20% of patients who wanted to defer surgery did not respond to conservative treatment or had recurrent cholecystitis during the interim period. [17] Approximately 20% of patients hospitalized for non-operative care did not respond to medicinal therapy before the scheduled interval cholecystectomy and needed surgical intervention. Initial conservative treatment remains a feasible choice for individuals who appear late and should be determined on an individual basis.[18] The danger of doing a late cholecystectomy (weeks following cholecystitis diagnosis) is that a subgroup of patients would have recurrence of symptoms during the interval of medicinal therapy between diagnosis and surgical treatment, resulting in repeated hospital admissions and urgent surgery.[19] A meta-analysis of these studies found that more than 20% of patients did not respond to conservative care while awaiting definitive treatment, and over half of these patients needed emergency surgical intervention as a consequence. In this same analysis, there was no increase in morbidity in patients undergoing early treatment with laparoscopic ($p = 0.6$) or open ($p = 0.2$) cholecystectomy compared to delayed treatment, but there was a clear difference in length of hospital stay, with patients undergoing delayed intervention requiring a longer hospitalization.[19] In this research, the average total hospital stay in interval cholecystectomy was 7.2 days, whereas in early cholecystectomy it was 5.68. According to a meta-analysis research published in the American Journal of Gastroenterology, the urgent surgery group had a considerably lower overall hospital stay (mean SD) (9.6 2.5 days vs 17.8 5.8 days; $p < 0.0001$). [17] S.A. Khuwaith performed a research and discovered that the average hospital stay for delayed cholecystectomy is 18.5 days. [20] A research shown that overall hospital stays in ELC are four days less than those in delayed surgery. It was because the patients in the delayed group required two treatment episodes: one for conservative acute cholecystitis therapy and another for final surgical treatment later. Furthermore, several patients in the delayed group needed emergency readmission owing to persistent symptoms. In the sole experiment that revealed this outcome, ELC resulted in fewer working days missed. It was shown that both intraoperative and postoperative problems, such as bile and gall stone leakage owing to gall bladder rupture, hemorrhage, wound infection, and biliary fistula, were more likely with early than interval laparoscopic cholecystectomy. The greater risk of problems seen in the early laparoscopic cholecystectomy group might potentially be attributed to considerably higher starting body temperatures and total blood leukocyte count. However, given the shorter inpatient time and lower treatment costs, early laparoscopic cholecystectomy is preferable to delayed intervention. In a prospective randomized analysis, they discovered that the early cholecystectomy group had a higher per-operative and postoperative complication rate than the delayed cholecystectomy group, which is comparable to our findings. [21] Out of 15 instances of early cholecystectomy, one patient had a low output (<200cc) biliary fistula, resulting in a bile leak in the drain that was left in place. Both patients were treated conservatively with injectable hyoscine bromide and fatty foods. The drain output steadily decreased, and patients were released after the drain was removed and the production was insignificant. The patients' subsequent follow-up was

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uncomplicated, and follow-up ultrasonography abdomen revealed no collections or abnormalities in the gallbladder bed. No individuals in the interval cholecystectomy group developed biliary fistulas. Given the inflammatory process occurring in the porta hepatis, an early conversion to open cholecystectomy should be considered when adequate anatomical delineation is unclear or progress cannot be achieved laparoscopically. To prevent harm to the common bile duct, a partial cholecystectomy may be performed by cutting the gallbladder at the infundibulum and cauterizing the remaining mucosa in cases of severe infection. Some individuals present with acute cholecystitis yet face an unacceptably high surgical risk. In certain cases, a percutaneously inserted cholecystostomy tube should be explored. Cholecystostomy, which is often done with ultrasound guidance under local anesthetic and moderate sedation, may serve as a temporary remedy by emptying diseased bile. Percutaneous bile drainage improves symptoms and physiology, allowing for a delayed cholecystectomy 3 to 6 months following medical optimization. When fluoroscopy reveals a patent cystic duct in patients with cholecystostomy tubes, the tube may be withdrawn, and the choice to do a cholecystectomy is based on the patient's capacity to withstand surgical intervention.[18] In this research, the interval cholecystectomy group used considerably more antibiotics and analgesics than the early cholecystectomy group. Patients who had interval cholecystectomy returned to work earlier in the postoperative period than those who underwent instantaneous cholecystectomy, however patients who underwent interval cholecystectomy had a greater total morbidity owing to symptom recurrence during the conservative phase. This study's cost analysis was inadequate due to the small sample size and absence of systematic decision models. Patients are not paid for operational treatments or hospital stays, and the majority of drugs are provided free of charge at our hospital, thus the cost-effectiveness of immediate and interval cholecystectomy cannot be accurately evaluated in this research. In this research, we discovered increased overall morbidity-related expenditures in the interval cholecystectomy group. Wilson et al. found that early laparoscopic cholecystectomy for acute cholecystitis is less expensive and had a higher quality of life. [22] Lau and colleagues (2006) conducted a meta-analysis of randomized and other trials and found that early surgery was more cost-effective due to shorter total hospital stay and fewer readmissions for recurrent cholecystitis or biliary colic. There was no mortality in either group throughout this research.

Limitations of this study:

The primary limitation of this research is that the findings cannot be extended to the broader population owing to the limited sample size and absence of systematic decision models. The sample size should be raised further so that the findings may be applied to the broader population. Another significant limitation of the study is the exclusion of other conditions associated with acute calculous cholecystitis such as choledocholithiasis, gallstone pancreatitis, severe concomitant medical problems rendering them unfit for surgery, grade II & III cholecystitis, and patients in sepsis, resulting in the exclusion of complicated cases from this study, which are associated with higher morbidity and mortality rates. As a consequence, this research produced positive outcomes, such as lower open conversion rates and no fatality, since only simple patients were included in the study. So, the findings of this research do not apply to all instances of acute calculous cholecystitis and hence cannot be applied to the general population. This problem requires further investigation since there has been a shifting tendency in the time of laparoscopic cholecystectomy after acute calculous cholecystitis as more experience, exposure, and evolutions in the area of laparoscopy have occurred.

Conclusion

There is no significant difference in overall clinical outcomes between individuals treated with

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early and delayed cholecystectomy for acute calculous cholecystitis. The delayed cholecystectomy group had a longer total hospital stay and requires more medication than the early cholecystectomy group. Overall morbidity is higher in the interval cholecystectomy group. The early cholecystectomy group had a greater intraoperative procedure complexity, postoperative morbidity, and problems rate. Patients should be scheduled for an early or interval cholecystectomy based on the severity of their symptoms and their desire to undergo early surgery or first conservative treatment. A large number of instances are still required to complete this investigation.

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