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Original Research Article

MANAGEMENT OF INFLAMED GALLBLADDERS REGARDLESS OF TIME FRAME-A RETROSPECTIVE STUDY

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Abstract

Background: Laparoscopic cholecystectomy is often done as an elective treatment for patients with symptomatic cholelithiasis, and is widely regarded as the preferred method. The efficacy, safety, and feasibility of laparoscopic cholecystectomy in the early stages of acute cholecystitis, specifically within 72 hours of symptom onset, have been extensively demonstrated. This surgical approach offers several secondary benefits, including expedited recovery, reduced hospitalisation duration, absence of complications associated with delayed treatment, prompt return to work, and overall advantages for the patient. Consequently, the acceptance and consensus regarding the use of laparoscopic cholecystectomy in this context are now widely acknowledged. Regarding the timeframe of late laparoscopic cholecystectomy, specifically between 72 hours to 6 weeks after onset, there exists a lack of consensus among surgeons. Prospective Investigation of the Management of Inflamed Gallbladders Regardless of Time Frame. **Materials and Methods:** This research is a retrospective randomised comparative study undertaken within the Department of Surgery at Melmaruvathur Adhiparasakthi Institute of Medical Sciences & Research, Tamilnadu, India from January 2020 to December 2021. The selection of patients for surgery is based on those who have been hospitalised via the Emergency and Outpatient Department (OPD) with a diagnosis of acute cholecystitis. The time span for these cases ranges from 24 hours to 6 weeks. These patients are then separated into two distinct categories. 100 patients were included in this study and divided into two equal groups. Group A: Patients operated within 72 hours(ELC). Group B: Patients operated between 72hrs. to 6 weeks(LLC). **Result:** The majority of patients are between the age range of 40 to 60 years, accounting for 50% of the total population. The total number of patients included in the study was 100, with 70 being female and 30 being male. Total of four patients in group A and five patients in group B had port site infection as a result of the removal of an infected gallbladder specimen. Three patients in Group A and two patients in Group B had intraoperative control of sinus bleeding. There were four patients in Group A and two individuals in Group B who had systemic infection. During the process of separating the thick adhesion between the gallbladder and the duodenum, one duodenal damage occurred. There is no evidence of CBD damage or intraabdominal collection. However, there have been studies indicating a higher incidence of bile duct injuries when surgical procedures are conducted on inflamed gallbladders by inexperienced surgeons. There is no statistically significant difference seen between the two groups in terms of the total duration of hospital stay and the time taken for early return to work after surgery. **Conclusion:** The safety and efficacy of laparoscopic cholecystectomy in the management of acute cholecystitis during emergency admissions have been well-established, since it is linked with few postoperative complications and a low risk of conversion to open surgery, irrespective of the time constraints involved.

INTRODUCTION

Acute cholecystitis is the pathological condition characterised by inflammation of the gallbladder. The aetiology of acute cholecystitis involves the obstruction of the cystic duct, leading to pathophysiologic changes. Cholecystitis is a medical ailment that is most effectively managed with surgical intervention, however conservative treatment may be used as an alternative if deemed essential. This medical disease may be seen with or without the concurrent presence of gallstones, and it may further be categorised as either acute or chronic. The condition is present in both males and females, however it may exhibit a predilection for certain demographic groups. Additionally, it may manifest with certain characteristic indications and symptoms. Acute cholecystitis might potentially provide diagnostic challenges due to its resemblance to various medical conditions, including peptic ulcer disease, irritable bowel disease, and heart disease. Both chronic and acute pancreatitis have the potential to mimic symptoms of gallbladder disease.[1-3] Acute cholecystitis is characterised by the obstruction of the cystic duct, leading to the development of inflammation. Typically, the liver synthesises bile, which then traverses the bile duct and is subsequently stored inside the gallbladder. Following the consumption of some food items, particularly those that are spicy or oily in nature, the gallbladder undergoes stimulation, prompting the release of bile from the gallbladder. This bile is then transported down the cystic duct and into the duodenum via the bile duct. This procedure facilitates the digestion of meals. In addition to its role in bile storage, the gallbladder has the ability to concentrate bile. The precipitation of stones may occur when there is a disruption in homeostasis, leading to the formation of concentrated bile. This disruption can be caused by factors such as biliary stasis, supersaturation of cholesterol and lipids from the liver, disturbances in the concentration process, and nucleation of cholesterol crystals. Acute calculous cholecystitis refers to the condition in which cystic duct obstruction occurs due to the presence of a stone. Understanding the occurrence of biliary colic is crucial as it pertains to the temporary blockage caused by gallstones, resulting in discomfort. If the discomfort associated with biliary colic persists for a duration of six hours, the diagnosis may be revised to acute calculous cholecystitis. When a stone is not detected, the condition is referred described as acute acalculous cholecystitis.[4,5] Irrespective of the aetiology of the obstruction, the presence of edoema in the gallbladder wall will ultimately lead to ischemia of the wall, resulting in the development of gangrene. The gallbladder, when affected by gas-forming organisms, may lead to the development of acute emphysematous cholecystitis, a potentially life-threatening illness. Rupture of the gangrenous gallbladder has a significant mortality risk. The prevalence of gallstones among individuals diagnosed with acute cholecystitis is around 95%.[6-8] Nevertheless, it should be noted that the presence of incidental gallstones does not necessarily warrant treatment. Research suggests that only 20% of individuals with asymptomatic gallstones will experience symptoms within a span of 20 years. Additionally, approximately 1% of patients with asymptomatic gallstones may encounter complications before the onset of symptoms. Consequently, there is no justification for performing preventive cholecystectomy in asymptomatic patients.[9] The advent of laparoscopic cholecystectomy has significantly transformed the field of surgery in the treatment of cholelithiasis. This procedure is currently the most frequently performed laparoscopic surgery globally. With the introduction of novel techniques and the accumulation of surgical expertise, laparoscopic cholecystectomy can now effectively address more challenging and intricate cases of gallbladder disease that previously necessitated open surgery. Consequently, the remarkable advance The use of laparoscopic cholecystectomy in cases of acute cholecystitis is a subject of ongoing debate due to concerns over its increased morbidity rate and the need for conversion to open surgery as a result of technical challenges.[10,11] However, it is important to note that laparoscopic cholecystectomy is widely recognised as the preferred surgical approach for symptomatic gallstones around the globe. The published findings indicate a drop in the conversion rate as experience increases. The study demonstrated a correlation between the time delay from the beginning of acute symptoms to the surgical procedure and both local and overall complication rates.[12,13] The procedure known as early laparoscopic cholecystectomy (ELC) involves the performance of a cholecystectomy within a 72-hour timeframe after the onset of an acute episode. The procedure of late laparoscopic cholecystectomy (LLC) is often conducted within a timeframe of 72 hours to 6 weeks. The approach of delayed laparoscopic cholecystectomy (DLC) involves an initial conservative treatment followed by a laparoscopic cholecystectomy (LC) after a period of 6 weeks. The safety and feasibility of performing laparoscopic cholecystectomy within 72 hours of admission is no longer a subject of debate. However, there exists a subset of patients who, for various reasons, do not undergo surgery during this timeframe. These reasons may include delayed reporting to the outpatient department or emergency room, lack of response to conservative management, or recurrence of symptoms during the waiting period for delayed laparoscopic cholecystectomy. The evaluation of the safety and feasibility of laparoscopic surgery at this particular time is necessary. Acute cholecystitis often arises as a prevalent consequence associated with the presence of gallstones. The condition may result in

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considerable morbidity and death due to potentially life-threatening consequences, including empyema of the gallbladder, gangrene of the gallbladder, and perforation of the gallbladder. These problems often manifest as surgical emergencies, and the recommended course of action is either laparoscopic or open surgical surgery. Nevertheless, the time of the lap. The dispute around cholecystectomy and the potential benefits of further therapy has been a subject of debate.[14,15] The presence of acute inflammation poses additional challenges and difficulties during laparoscopic cholecystectomy. These challenges include edema, exudates, hyper vascularity, congestion, adhesions with adjacent structures, distention of the gallbladder, friability of tissues, unclear and distorted biliovascular anatomy, risk of infection dissemination, and technical difficulties. These risk factors contribute to suboptimal outcomes and a higher likelihood of converting to open cholecystectomy. Consequently, the patient is deprived of the possible advantages associated with laparoscopic cholecystectomy. Recent evaluation has indicated that delaying laparoscopic cholecystectomy may potentially increase the likelihood of experiencing further complications related to gallstones during the waiting period. This, in turn, may require additional hospital admissions. However, it has been found that early laparoscopic cholecystectomy is a safe alternative for individuals with acute cholecystitis. It is important to note that the conversion rate to open cholecystectomy may be higher in these cases.[16] However, advancements in technological changes and the proficiency of surgeons have resulted in comparable outcomes between late laparoscopic cholecystectomy and early laparoscopic cholecystectomy.[17] The optimal time for doing laparoscopic cholecystectomy is a topic of ongoing debate. Recent assessments have mostly shown that early laparoscopic surgery is a safe approach, with a consensus among surgeons supporting this viewpoint. However, it is important to note that as the delay in performing the operation rises, there is a corresponding increase in technical challenges associated with the procedure. The incidence of complications related to acute cholecystitis is known to rise as a result of organised adhesions and other associated complications. However, there have been studies suggesting that while delays in treatment may contribute to increased complications, the inflammatory process can vary among individuals, and such delays may not significantly impact the final outcome. In fact, the results of delayed laparoscopic cholecystectomy have been found to be comparable to those of immediate procedures, as indicated by previous research.[18-20] Several studies have shown that there is no statistically significant difference in the main outcomes of early and late laparoscopic cholecystectomy.

MATERIALS AND METHODS

This research is a retrospective randomised comparative study undertaken within the Department of Surgery at Melmaruvathur Adhiparasakthi Institute of Medical Sciences & Research, Tamilnadu, India from January 2020 to December 2021. The selection of patients for surgery is based on those who have been hospitalised via the Emergency and Outpatient Department (OPD) with a diagnosis of acute cholecystitis. The time span for these cases ranges from 24 hours to 6 weeks. These patients are then separated into two distinct categories.

Group A: Patients operated within 72 hours (ELC).

Group B: Patients operated between 72hrs. To 6 weeks (LLC).

Group B comprises patients who presented to the emergency department after a significant delay, experienced a recurrence while waiting for treatment, did not respond to conservative management, and expressed a willingness to undergo surgery during the later stages of their condition for any reason. Patients with choledocholithiasis, pancreatitis, cholangitis, and gallbladder cancer are not included in this group. The recorded data encompasses various aspects, including demographic information, patients' medical history, clinical observations and severity, complete blood count (CBC), liver function tests, renal function tests, radiological findings, timing of cholecystectomy, duration of the surgical procedure, conversion rate, complication rate, and mortality rate, length of hospital stay, any additional relevant investigations, and follow-up.

Methodology

The research consisted of 100 patients who were separated into two groups, each of whom had a comparable surgical treatment. All patients had a preanesthetic checkup. Preoperative antibiotics were administered to all patients. The patient assumes a supine posture during the typical laparoscopic cholecystectomy procedure, with four ports placed strategically. These ports are positioned at the umbilicus, subxiphoid, and two on the right side. The subcostal region was accessed, and pneumoperitoneum was established to facilitate a preliminary diagnostic laparoscopy. Intraoperative observations were made and the dissection was initiated based on the specific circumstances, such as employing antegrade, retrograde, intraluminal guided retrograde, or transection techniques at the midpoint of the gallbladder body.

RESULTS

The majority of patients are between the age range of 40 to 60 years, accounting for 50% of the total population. The total number of patients included in the study was 100, with 70 being female and 30 being male. The youngest participant in the study

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was 16 years of age, while the oldest participant was 62 years old. The image illustrates a female to male ratio of 2.33:1. During the first phase, it was observed that 32 patients (64%) exhibited mild cholecystitis, 16 patients (32%) displayed moderate cholecystitis, and 2 patients (4%) presented with severe cholecystitis. During the later stages, Group 26 had mild symptoms of cholecystitis, accounting for 52% of the cases. Additionally, 18 individuals (36%) experienced moderate symptoms, while 6 individuals (12%) suffered from severe attacks of cholecystitis. All of our patients included in the study were classified as ASA-I or ASA-II and underwent surgical procedures. None of the patients in either group had a poor ASA classification. However, we suggest considering other options for patients who are unable to tolerate general anaesthesia. These options include conservative therapy for moderate cases and percutaneous cholecystostomy for severe cases of acute cholecystitis. In the present investigation, no mortality or significant adverse events were seen. Among the four patients included in the early laparoscopic cholecystectomy group, bile leak occurred, which resolved spontaneously after a period of four days. It is plausible that this bile leak originated from an accessory duct. There were three patients in the late group. A total of four patients in group A and five patients in group B had port site infection as a result of the removal of an infected gallbladder specimen. Three patients in Group A and two patients in Group B had intraoperative control of sinus bleeding. There were four patients in Group A and two individuals in Group B who had systemic infection. During the process of separating the thick adhesion between the gallbladder and the duodenum, one duodenal damage occurred. There is no evidence of CBD damage or intraabdominal collection. However, there have been studies indicating a higher incidence of bile duct injuries when surgical procedures are conducted on inflamed gallbladders by inexperienced surgeons. There is no statistically significant difference seen between the two groups in terms of the total duration of hospital stay and the time taken for early return to work after surgery. However, Group A exhibits a socioeconomic advantage and is also able to prevent the occurrence of recurrent cholecystitis, as well as the related comorbidities and subsequent hospital readmissions.

Table 1: Gender and age of the participants

Gender	Number	Percentage	P value
Male	30	30	0.36
Female	70	70	
Age			0.15
Below 20	7	7	
20-30	12	12	
30-40	31	31	
40-50	28	28	
Above 50	22	22	

Table 2: Clinical severity in Group A and Group B

Clinical type	Group A=50		Group B=50	
	Number	Percentage	Number	Percentage
Mild	32	64	26	52
Moderate	16	32	18	36
Severe	2	4	6	12

Table 3: Comparison of intraoperative findings in Group A and Group B

Pathology	Group A		Group B		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Gangrene	2	4	3	6	5	5
Mucocele	5	10	11	22	16	16
Inflammation	29	58	21	42	50	50
Phlegmons	6	12	4	8	10	10
Frozen calot	2	4	4	8	6	6
Xanthogranulomatous cholecystitis	1	2	0	0	1	1
Empyema	4	8	4	8	8	8
Mirrizi's syndrome	1	2	3	6	4	4
Total	50	100	50	100	100	100

Table 4: Complication of early and late LC in terms of effect of time in surgical outcome

Surgical outcome	Early LC	Late LC
Hospital stay	1.51±0.25	1.44±0.15
complications	5	4
Operating time	51.58±3.69	61.85±3.96
Conversion rate	3.5	2.5

Table 5: Comparison of complications in early and late laparoscopic cholecystectomy

Complications	Group A	Group B	Total	Percentage
Port site infection	4	5	9	32.14

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Systemic infection	4	2	6	21.43
Sinus bleed	3	2	5	17.86
Bile leak	4	3	7	25
Duodenal injury	1	0	1	3.57
Total	16	12	28	100

DISCUSSION

The advent of laparoscopic cholecystectomy has had a profound impact on the discipline of general surgery. As surgeons gain more proficiency in this technique, its scope of use is constantly growing. Consequently, laparoscopic cholecystectomy has now become the established norm for managing symptomatic cholelithiasis. Initially, the pioneers of laparoscopic cholecystectomy regarded acute cholecystitis as a contraindication for laparoscopic surgery. The primary rationale for adopting a cautious therapeutic approach was the apprehension around the elevated likelihood of harm to the CBD caused by the presence of edematous and inflammatory tissues that obstructed the anatomical visibility inside Calot's triangle. Nevertheless, as surgeons gained more experience and developed advanced technical abilities, they began to recognise that these challenges might be effectively addressed. Consequently, a significant number of publications emerged, providing evidence and endorsing the viability of using the laparoscopic method in cases of acute cholecystitis, while maintaining an acceptable level of morbidity. The majority of randomised and prospective studies, along with their corresponding meta-analyses, have indicated that there is no statistically significant difference in mortality, morbidity, operation time, and conversion rates when comparing early and late laparoscopic cholecystectomies. As a result, early laparoscopic cholecystectomy is widely regarded as a safe and feasible procedure. Another benefit of early laparoscopic cholecystectomy is the significant decrease in hospital stay duration and reduction in missed work days. This approach also provides a final therapy during the first admission, eliminating the need for further hospitalisations due to recurring symptoms.[21,22] However, existing research indicates that ELC should be conducted within a 72-hour timeframe from the first manifestation of symptoms, and this recommendation is widely accepted across several studies. The research currently lacks clarity about the impact of delays over 72 hours and their associated effects. Furthermore, previous randomised controlled studies have not thoroughly examined these specific groups. Although there have been several investigations conducted on the comparison between early and late laparoscopic cholecystectomy, the effectiveness and safety of these procedures have only been partially established. Several preliminary clinical trials have examined the effects of exceeding the 72-hour time limit on conversion rates and complications. However, recent findings are now appearing on the safety of laparoscopic cholecystectomy in cases of acute cholecystitis, regardless of the time frame.[23] The pathogenic progression of acute cholecystitis is a well-documented inflammatory response. During the first phase, the predominant phases of hyperemia and edema contribute to the facilitation of dissection at Calot's triangle. This facilitation continues for a period of 72 hours. The presence of chronic inflammation, characterised by adhesions, fibrosis, hypervascularity, and necrosis, contributes to the challenging dissection encountered at the calot’s triangle during surgical procedures. However, there is a scarcity of comprehensive literature that effectively compares the distinguishing features of early and late stages of acute cholecystitis. In our research, the median duration from the initiation of symptoms to surgery in the early laparoscopic cholecystectomy group is less than 72 hours, with a range of 24 to 72 hours. In contrast, in the late laparoscopic group, the duration is more than 72 hours to 6-8 weeks. The clinical diagnosis is determined based on the Tokyo criteria.[24] The findings from our data analysis indicate that the majority of cases in the late laparoscopic cholecystectomy group had mild to moderate symptoms, with just a small number of cases classified as severe. The findings of our research indicate that there is a correlation between the postponement of final therapy for acute cholecystitis and heightened clinical severity. The intraoperative pathological observations of acute cholecystitis indicate a range of inflammation levels, which can be categorised into three main types: simple acute cholecystitis with edoema and minimal inflammation, phlegmatous type with extensive inflammation and adhesions, and gangrenous type with patchy to frank gangrene, with or without perforation, in addition to inflammation.[25,26] Based on the existing literature, the pathological progression of acute cholecystitis is typically characterised by an initial edematous phase followed by a subsequent fibrotic phase. However, our study's analysis of pathological findings yielded unexpected results. Contrary to expectations, we found no significant differences in the distribution of simple, phlegmatous, and gangrenous pathologies between the two groups (early laparoscopic cholecystectomy vs. late laparoscopic cholecystectomy). Our research indicates that there is significant variability in the inflammatory response across individuals, suggesting that not everyone experiences the same level of inflammation. Several studies have demonstrated that various factors can influence the natural progression of acute cholecystitis. These factors include comorbid conditions such as diabetes,

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hypertension, and thyroid disorders, as well as advanced age and gender. These findings suggest that the inflammatory process in acute cholecystitis is not solely dependent on time, but is also influenced by other contributing factors. The results of our study indicate that performing laparoscopic cholecystectomies more than 72 hours after the onset of symptoms did not present any significant challenges. Specifically, there was no notable disparity in operating time between the two groups undergoing laparoscopic cholecystectomy, and there was also no discernible distinction in the rate of conversion to open cholecystectomy between the groups. It is important to highlight that in instances of intense inflammation in acute cholecystitis, laparoscopic intervention is relevant. The procedure of cholecystectomy should ideally be conducted by a laparoscopic surgeon who has both experience and expertise in this particular surgical technique. It is important for the surgeon to not hesitate in converting to an open procedure if any intraoperative complications arise or if there is difficulty in identifying the anatomy at the calot's triangle. Several studies have shown that enhanced skills and procedures over time may contribute to increased conversion rates and reduced morbidity in the context of acute cholecystitis. This might perhaps explain the positive outcomes seen in recent publications, irrespective of the timing of the surgical procedure, as compared to prior findings.[27]

CONCLUSION

The safety and efficacy of laparoscopic cholecystectomy in the management of acute cholecystitis during emergency admissions have been well-established, since it is linked with few postoperative complications and a low risk of conversion to open surgery, irrespective of the time constraints involved.

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