

Outcomes of Early Verses Delayed Laparoscopic Cholecystectomy in Acute Gallstone-Induced Pancreatitis Regarding Length of Hospital Stay and Conversion to Open Cholecystectomy

Muhammad Zafar Mengal, Ch. M. Kamran, Rana Sohail, Ahmad Naeem Akhtar, M. Rehan Hameed, M. Hussain Zia

Objective: To compare the mean length of hospital stay and rate of conversion from laparoscopic to open in early versus delayed cholecystectomy in patients with acute Gallstone-Induced pancreatitis.

Study design and setting: A prospective comparative study was conducted in the Department of Surgery, Narowal Medical College, Narowal, from 07 January to 06 July 2025

Methodology: After the hospital's ethical committee approval, eighty patients with mild to moderate gallstone-induced pancreatitis were randomly allocated into two groups: early cholecystectomy (EC) and delayed cholecystectomy (DC), 40 patients each. All surgeries were performed by the same surgical team. Length of hospital stay and conversion to open cholecystectomy were recorded. Data were analyzed using chi-square and independent t-tests, with $p < 0.05$ considered significant.

Results: Mean age was comparable between EC (45.40 ± 3.80 years) and DC (46.70 ± 4.00 years) groups ($p = 0.29$). The mean length of hospital stay was significantly shorter in the EC group (5.35 ± 0.80 days) compared with the DC group (8.90 ± 0.80 days) ($p < 0.001$). Conversion to open cholecystectomy occurred in 22.5% of EC patients versus 77.5% of DC patients ($p < 0.001$).

Conclusion: Early laparoscopic cholecystectomy significantly reduces hospital stay and conversion to open surgery compared with delayed cholecystectomy in mild to moderate gallstone-induced pancreatitis.

Keywords: Gallstones, Hospital stay, Laparoscopic cholecystectomy, Pancreatitis

How to cite this Article:

Mengal MZ, Kamran CM, Sohail R, Akhtar AN, Hameed MR, Zia MH. Outcomes of Early Verses Delayed Laparoscopic Cholecystectomy in Acute Gallstone-Induced Pancreatitis Regarding Length of Hospital Stay and Conversion to Open Cholecystectomy. J Bahria Uni Med Dental Coll. 2026;16(4):872-7 DOI: <https://doi.org/10.51985/JBUMDC2025827>

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non Commercial License (<http://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non commercial use, distribution and reproduction in any medium, provided the original work is properly cited.

M. Zafar Mengal

Associate Professor, Department of Surgery
Narowal Medical College, Narowal
Email: zafar.mengal1979@gmail.com

Ch. M. Kamran

Professor, Department of Surgery
Narowal Medical College, Narowal
Email: chmkamran@gmail.com

Rana Sohail

Professor, Department of Surgery
Narowal Medical College, Narowal
Email: noon196@gmail.com

Ahmad Naeem Akhtar

Associate Professor, Department of Surgery
Narowal Medical College, Narowal
Email: Ahmadnaeem9172@gmail.com

M. Rehan Hameed

Assistant Professor, Department of Surgery
Narowal Medical College, Narowal
Email: m_rehan92@yahoo.com

M. Hussain Zia

Senior Registrar, Department of Surgery
Narowal Medical College, Narowal
Email: Dr.hussainzia@gmail.com

Received: 07-11-2025
Accepted: 15-08-2026

1st Revision: 16-02-2026
2nd Revision: 02-08-2026

INTRODUCTION:

Acute pancreatitis is an inflammation of an exocrine gland pancreas that may be a cause of severe abdominal pain, pancreatic necrosis, and multi organ failure, most commonly caused by gallstones and alcohol consumption.¹ It is a common presentation in the emergency department and is related with marked morbidity and mortality.² Most common causes of acute pancreatitis include pancreatic duct obstruction by a gallstone, others include alcohol consumption, abdominal trauma, certain drugs and toxins, metabolic abnormalities, infections, post ERCP, and idiopathic origins.³ Among these, gallstones are the commonest cause of acute pancreatitis throughout world.⁴ In biliary pancreatitis, pancreatic duct obstruction is thought to trigger the premature activation of these enzymes but the exact underlying mechanism remains controversial. The early activation of pancreatic enzymes like trypsin leads to inflammation and destruction of pancreatic tissue, followed by the release of cytokines, which contribute to both local and systemic complications.⁴ History of back radiating abdominal pain, laboratory tests such as serum lipase or amylase, and outward results of pancreatitis as produce by trans abdominal ultrasound, a computed tomography (CT) scanner or magnetic resonance imaging (MRI), are used to diagnose acute pancreatitis. In other tests there might be

lipids such as triglycerides, immunoglobulin analysis, full blood count, electrolytes and hgA1c test and complete metabolic work up.⁵ a number of scoring systems are being proposed to categorize both the severity of acute pancreatitis and to forecast the morbidity and mortality of acute pancreatitis. These are the Ranson criteria, Glasgow scale, the SOFA and the BISAP score. The Ranson criteria have been on the list of more frequently used severity classification instruments in acute pancreatitis. In Ranson criteria acute pancreatitis is differentiated into mild (1–2 points), moderate (3–5 points), and severe (6 or more points).⁶

Oxygen supplement, intravenous fluids, analgesics, and nutritional support, are the first general management. Early enteral nutrition is preferable when well-tolerated otherwise, liquid supplement or enteral tube feeding in the first 48 hours of admission is more favorable.⁷ in cases of gallstone-induced pancreatitis, cholecystectomy is ultimate treatment to prevent recurrence. Laparoscopic cholecystectomy is considered the gold standard for cholelithiasis.⁷ more recent instructions suggest early or index admission cholecystectomy in patients with mild to moderate acute biliary pancreatitis. International Association of Pancreatology also advocates against cholecystectomy but offers support in the same admission in mild gallstone induced pancreatitis.⁸ Another recommendation is to do cholecystectomy during the first hospitalization and not more than 2 weeks-4 weeks later after discharge as suggested by the American Gastroenterological Association.⁹

A number of confounding factors to decide upon whether to perform early or delayed cholecystectomy, which are hospitalization, intraoperative difficulty, conversion to open cholecystectomy, length of surgery, length of stay and complications of gallstones such as recurrent pancreatitis, acute cholecystitis, cholangitis or biliary colic.^{9, 10}

According to the proponents of early cholecystectomy (within 48 hrs of admission), early cholecystectomy is not a risk factor in morbidity and mortality and will shorten the hospital length of stay. Conversely, proponents of delayed cholecystectomy would argue that delayed cholecystectomy reduces the risk of operative complications, in that the inflammatory process has been resolved, but it leads to an extended overall hospital stay. Limited evidences exist on the most appropriate time to perform laparoscopic cholecystectomy in mild and moderate cases of acute gallstone induced pancreatitis locally and in other countries too. We tend to prefer delayed cholecystectomy in such situations in the past as part of normal clinical practice. Nevertheless, the scarcity of literature supports early cholecystectomy. Thus, the current research was undertaken to provide information in our population and also to be a contribution towards a wider knowledge and applicability of timing in cholecystectomy of mild to moderate acute gall stone induced pancreatitis. In our current research the results

we compared were the mean hospitalization and the rate of conversion to open cholecystectomy between early and delayed surgical intervention among patients with mild/moderate acute pancreatitis caused by the presence of gall stones.

METHODOLOGY;

The randomized clinical trial was conducted at the department of surgery Narowal medical college Narowal between 07-01-2025 to 30-06-2025 and involved eighty patients aged between 20 and 70 years with 40 patients in each group having mild to moderate gallstone induced pancreatitis being presented to emergency department on the case. The surgical emergency unit was used to admit all eligible patients by verifying them using clinical, biochemical, and imaging findings with a Ran son score of 3 to 5 who were fit to undergo laparoscopic cholecystectomy and make informed consent after understanding the operation. The patients having severe pancreatitis, additional etiologies of pancreatitis, stones of the common bile duct (where ERCP must be performed), previous biliary surgery, high operative risk (ASA IV or higher), pregnancy, lost to follow-up were excluded.. A sample size was determined, relying on the past research findings, and a 95% confidence level and power of 80% utilizing hitherto anticipated conversion rates of 16.7 percent in the initial cholecystectomy category and 60 percent conversion in the delayed group.¹¹

Sampling was done consecutively on a non-probability basis and the two groups were randomly divided by applying the lottery option: Group A corresponded to early cholecystectomy and Group B to delayed cholecystectomy.

There was an explanation of the procedure to the individual patients or their guardians and informed consent was secured. All the surgeries were performed and all the postoperative evaluation was done by the same operating surgeon to reduce bias. Approval of the study protocol was given by the institutional research board of Narowal medical college with IRB no 28/2025 dated 06 January 2025 and informed written consent was obtained from all the participants.

A predesigned pro forma was used to collect data, which comprised of demographic data, severity of the disease, length of hospital stay and conversion of laparoscopic to open cholecystectomy. The analysis of the data was done via SPSS version 26. Quantitative variables (hospital stay, BMI, age, etc.) were expressed in terms of mean and standard deviation, whereas qualitative ones (gender, frequency, etc.) were expressed in terms of frequency and percentage. The chi-square test of categorical variables and the independent-samples t-test of continuous variables were used to compare the two groups and a p-value of not more than 0.05 was taken to be statistically significant. Stratification was used to control potential confounders such as age, gender, BMI, and smoking.

RESULTS:

A total of 80 patients were included in the study, with 40 patients in each group, Early Cholecystectomy (EC) and Delayed Cholecystectomy (DC).the demographic characteristics of patients were as under. Table 1 There was no statistically significant difference in mean age or gender distribution between the two groups. Mean BMI was significantly higher in the delayed cholecystectomy group ($p = 0.003$) Table 2. Conversion to open cholecystectomy were 9 patients (22.5%) in the EC group and 31 patients (77.5%) in DC group with a significant variation ($p < 0.001$). The frequency of conversion to open surgery was significantly low in the former group. There was no age or gender difference in the distribution of patients, and there was a significant difference in BMI of delayed-surgery patients.

Other non-significant complications have been witnessed in this study that were lower in early laparoscopy cholecystectomy compared to delayed laparoscopic cholecystectomy as indicated in table 3.

DISCUSSION:

The timing of cholecystectomy on patients with acute gallstone induced pancreatitis remains a controversial issue in question. Historically, with mild to moderate pancreatitis cases, cholecystectomy was withheld until healing of local complications typically at the six-week interval.¹² Although

numerous studies have investigated the best timing with which to perform surgery in mild gallstone induced pancreatitis, few studies have done so in a randomized and prospective study. This deficiency in quality evidence has resulted in different recommendations, and confusion remains as to whether patients can safely be discharged until they have received cholecystectomy following an attack of acute pancreatitis.¹³

Age distribution in this research showed that 7.5 percent ($n = 6$) of patients were aged 12-40 years and the remaining 92.5 percent ($n = 74$) of patients were aged 41-70 years. The average age of the early cholecystectomy (EC) was 45.40 and the delayed cholecystectomy (DC) was 46.70. The difference in mean age between the two groups was not statistically significant ($p = 0.29$). These values closely match the findings by Jee et al. in which the average age of the two groups was 42.5 years.¹⁴ similar findings were also indicated by Aksoy et al. and the mean age of the two groups was 44.7 years.¹⁵

The average BMI in the early cholecystectomy (EC) group was 25.50 $\pm$ 3.60 kg/m² and in the delayed cholecystectomy (DC) group was 29.70 $\pm$ 6.50 kg/m². It was statistically significant ($p = 0.003$), which means that the patients with delayed cholecystectomy are more likely to possess a higher index of body mass.

In this study results, regarding body mass index, 67.5% ($n = 27$) of patients in the EC group had a BMI < 27 kg/m², while 32.5% ($n = 13$) had BMI ≥ 27 kg/m². In contrast, in the DC group, 42.5% ($n = 17$) had BMI < 27 kg/m², and 57.5% ($n = 23$) had BMI ≥ 27 kg/m².

Regarding gender distribution, 45.0% ($n=18$) of the early cholecystectomy (EC) group consisted of males, and 55.0% ($n=22$) consisted of females, whereas 42.5% ($n=17$) and 57.5% ($n=23$) of the delayed cholecystectomy (DC) group

Table 1 Demographic and Clinical Characteristics

Variable	Early Cholecystectomy (n=40)	Delayed Cholecystectomy (n=40)	p-value
Mean Age (years)	45.40 $\pm$ 3.80	46.70 $\pm$ 4.00	0.29
BMI (kg/m ²)	25.50 $\pm$ 3.60	29.70 $\pm$ 6.50	0.003
Gender Distribution	M = 21 (52.5%), F = 19 (47.5%)	M = 20 (50%), F = 20 (50%)	1.000

Table 2 Perioperative Outcomes

Outcome	Early Cholecystectomy (n=40)	Delayed Cholecystectomy (n=40)	p-value
Length of Hospital Stay (days)	5.35 $\pm$ 0.80	8.90 $\pm$ 0.80	< 0.001
Conversion to Open Cholecystectomy	9 (22.5%)	31 (77.5%)	< 0.001

Table 3 Post-operative Complications in Early vs Late Cholecystectomy ($n = 80$)

Complication	Early (n=40)	%	Late (n=40)	%	P-value
Atelectasis	0	0%	8	20%	0.010
Fever	12	30%	32	80%	<0.001
Pain in abdomen	6	15%	18	45%	0.004
Bleeding (immediate)	0	0%	1	2.5%	1.000
Cystic duct blowout / biliary leak	0	0%	1	2.5%	1.000
Sub hepatic collection	0	0%	0	0%	–
Surgical site wound infection	1	2.5%	3	7.5%	0.300, NS

consisted of males and females respectively. The total population of the study was 45 men and 56.25 percent female participants.

The two groups did not show any statistically significant difference in the gender distribution ($p = 1.000$). The proportions are comparable with the androcentric proportions reported by Jee et al. and Nebiker et al., who indicated that in the EC group, female constituted 47.37% and male, 52.63% and, in the DC group, female constituted 73.3% and male, 61.76%, respectively.^{15,16}

Historically, interval cholecystectomy has been popular as it is believed that pancreatitis inflammation and edema may complicate dissection during index admission, raising the possibility of more surgical complications and conversion to open surgery. Nevertheless, recent studies indicate that delayed surgery does not minimize intraoperative complications, based on three meta-analyses and one cohort study.^{17,18,19}

In our analysis, Conversion to open cholecystectomy has been observed in 9 patients (22.5) of early cholecystectomy (EC) group and 31 patients (77.5) of delayed cholecystectomy (DC) group. This was a very significant difference ($p < 0.001$) showing a much lower conversion rate with early laparoscopic intervention. There was a study by Mikwar Z et.al. where the rate of laparoscopic to open cholecystectomy conversion was found to be 2.62, which gives an advantage to our study.²⁰ This laparoscopy to open rate (5.26 percent in early and 7.89 percent in late group) is also present in another study by Chandak, U et al which also benefits our study. According to our results, the postponement of surgery in moderate ABP can raise the chances of conversion to open cholecystectomy. Such variations can be explained by variations in sample size, experience of the surgeon, choices of patients, and other factors during the operation, like the common bile duct (CBD) injury, anatomical alteration, or hemodynamic instability. The controversial ERP role in ABP is also another issue that may impact the timing of surgery²¹.

Other studies have indicated escalated complications when cholecystectomy is delayed. A multicenter randomized trial with large sample sizes found that complications were rather common: 44 percent of the operated patients developed complications (involving biliary problems more often), as the study was prematurely terminated ($p=0.02$).²² In a study by Jee et al., the number of complications became so high that the study had to be discontinued early, and 33.3 percent of the operated patients experienced complications (including more of the biliary kind).

The mean length of stay in our study was -0.80 days in the cholecystectomy group at an early time and 8.90 days in the delayed cholecystectomy group. The difference was very high ($p < 0.001$).

The average hospital stay in the DC was also longer than in the FL, and was 8.96/0.76 days, whereas in the FL it was 3.5 days. This corresponds to results of other researchers, who also found hospital stay of 4.56 days in EC group and 12.10 days in DC. Equally, longer stays were observed in the DC group (5.70 + 6.2 days compared to EC (4.70 + 2.4 days). These results endorse the notion that early cholecystectomy is able to reduce hospital stay, which might decrease the costs and enhance outcomes. Hospital stay discrepancies could also be partially due to selection criteria, we only considered moderate cases, yet for other cases there were mild cases too.

A meta-analysis done by Fugazzola P, et al showed that early laparoscopic cholecystectomy is a safe and effective approach for managing mild acute gallstone pancreatitis in patients during their initial hospitalization. However, it is crucial to exercise strict control over the indications and contraindications for this procedure²³.

Early cholecystectomy is more effective than delayed one cholecystectomy among patients having an acute gallstone induced pancreatitis in reducing the length of hospitalization and the recurrence rate of pancreatitis. Early Cholecystectomy reduces Hospital stay which is cost effective because of the reduced resource needs and time and effort. Even though early and late cholecystectomy have no significant difference in terms of postoperative complications such as surgical site infections as well as the need of ERCP. Our study is supported by these findings, which indicate that early laparoscopic cholecystectomy poses no significant risk to patients, and the reduction in hospital stay as well as rate of conversion to open surgery do not significantly vary based on patient age or gender distribution. The mean BMI of patients in the delayed surgery group was higher and that may have contributed to the elevation in the operative difficulty and conversion rate. In general, our results favor the use of early cholecystectomy in the treatment of mild to moderate patients of gall stone induced pancreatitis. This early intervention can decrease the number of complications, hospitalization, and open surgery conversion, as well as help better manage the resources used in healthcare and patient outcomes.²⁵

The advantages of this study are its randomized clinical trial design, the correct choice of the sample size, and the standardization of the collection of data with the help of a structured pro forma. However, its weaknesses are a risk of selection bias as the sample was non-probability, narrowed generalizability as of a single center study, and a relatively short follow-up period. Also, the use of self-reported smoking status and BMI, and not all confounding factors could be properly addressed may create measurement bias.

The long-term results, economic implications, subgroup analysis in terms of comorbidities and BMI, the role and time of ERCP, and patient satisfaction and quality of life should be evaluated in future studies.

CONCLUSION

In our study, we have examined the length of hospital stay and frequency of conversion to open cholecystectomy in early and delayed cholecystectomy amidst patients with moderate acute biliary pancreatitis. We concluded that, in moderate acute biliary pancreatitis patients, laparoscopic cholecystectomy at an early age resulted in a reduced length of stay, and transformation of laparoscopic cholecystectomy to open cholecystectomy.

Conflict of Interest: None

Fundings: No funding source

Use of Artificial Intelligence (AI) Disclosure: There is no AI tool used.

Authors Contribution:

Muhammad Zafar Mengal: Data collection and article writing

Ch. M. Kamran: Proof reading

Rana Sohail: Dana analysis

Ahmad Naeem Akhtar: Literature search

M. Rehan Hameed: Reference writing

M. Hussain Zia: Drafting and revision

REFERENCES:

1. Szatmary P, Grammatikopoulos T, Cai W, Huang W, Mukherjee R, Halloran C, Beyer G, Sutton R. Acute pancreatitis: diagnosis and treatment. *Drugs*. 2022; 82(12):1251-76. <https://doi.org/10.1007/s40265-022-01766-4>
2. Sohail Z, Shaikh H, Iqbal N, Masood H, Parkash O. Aetiology, presentation and outcomes of patients presenting with acute pancreatitis in a tertiary care hospital. *J Pak Med Assoc*. 2024; 74(3):563-5. <https://doi.org/10.47391/JPMA.9279>
3. Matta B, Gougol A, Gao X, Reddy N, Talukdar R, Kochhar R, et al. Worldwide variations in demographics, management, and outcomes of acute pancreatitis. *Clin Gastroenterol Hepatol*. 2020; 18(7):1567-75. <https://doi.org/10.1016/j.cgh.2019.12.028>
4. Mittal N, Oza VM, Muniraj T, Kothari TH. Diagnosis and Management of Acute Pancreatitis. *Diagnostics (Basel)*. 2025 Jan 23; 15(3):258 <https://doi.org/10.3390/diagnostics15030258>. PMID: 39941188; PMCID: PMC11816589.
5. Rajah H K. Current management of gallstone pancreatitis: a narrative review. *Asian J Med Health*. 2024; 22:23-32. <https://doi.org/10.9734/ajmah/2024/v22i91087>
6. Yuan X, Xu B, Wong M, Chen Y, Tang Y, Deng L, Tang D. The safety, feasibility and cost-effectiveness of early laparoscopic cholecystectomy for mild acute biliary pancreatitis: a meta-analysis. *Surgeon*. 2021; 19(5):287-96. <https://doi.org/10.1016/j.surge.2020.06.014>
7. Prasanth J, Prasad M, Mahapatra SJ, Krishna A, Prakash O, Garg PK, Bansal VK. Early versus delayed cholecystectomy for acute biliary pancreatitis: a systematic review and meta-analysis. *World J Surg*. 2022; 46(6):1359-75. <https://doi.org/10.1007/s00268-022-06501-4>
8. Hallensleben ND, Timmerhuis HC, Hollemans RA, Pocornie S, van Grinsven J, van Brunschot S, et al.; Dutch Pancreatitis Study Group. Optimal timing of cholecystectomy after necrotising biliary pancreatitis. *Gut*. 2022; 71(5):974-82. <https://doi.org/10.1136/gutjnl-2021-324239>
9. Di Martino M, Ielpo B, Pata F, Pellino G, Di Saverio S, Catena F, et al.; MANCTRA-1 Collaborative Group. Timing of cholecystectomy after moderate and severe acute biliary pancreatitis. *JAMA Surg*. 2023; 158(10):e233660.
10. Zainab H, Aslam M, Shah N. A study of early laparoscopic cholecystectomy in mild acute gallstone pancreatitis. *Saudi Surg J*. 2024; 12(1):27-33. doi:10.4103/ssj.ss_2_22
11. Zaidi AH, Taimur M, Naqvi S, Ullah S, Faridi MA. Safety and efficacy of early cholecystectomy in acute biliary pancreatitis. *J Islamabad Med Dent Coll*. 2023; 12(4):982. <https://doi.org/10.35787/jimdc.v12i4.982>
12. Alburakan AA, Alshunaifi AI, AlRabah RN, Alshammari SA, Aloraini AM, Nouh TA, et al. Early versus delayed cholecystectomy in biliary pancreatitis: experience from a local acute care surgery unit. *Medicine (Baltimore)*. 2023; 102(48):e36491. <https://doi.org/10.1097/MD.00000000000036491> PMID: 38050277; PMCID: PMC10695525.
13. Wu H, Liao B, Cao T, Ji T, Huang J, Luo Y, Ma K. Comparison of the safety profile, conversion rate and hospitalization duration between early and delayed laparoscopic cholecystectomy: a systematic review and meta-analysis. *Front Med (Lausanne)*. 2023; 10:1185482. <https://doi.org/10.3389/fmed.2023.1185482>
14. Jaiswal SP, Upadhy PS, Paudel S, Thapaliya I, Awale L, Adhikary S, et al. Early versus delayed laparoscopic cholecystectomy for acute mild biliary pancreatitis: a prospective comparative study. *Int J Surg Open*. 2024; 62:708-12. <https://doi.org/10.1097/IO9.0000000000000194>
15. Piele SM, Preda SD, Pătra?cu ?, Laskou S, Sapalidis K, Dumitrescu D, ?urlin V. Indication and timing of cholecystectomy in acute biliary pancreatitis – systematic review. *Curr Health Sci J*. 2024; 50(1):125-32. <https://doi.org/10.12865/CHSJ.50.01.16>
16. Qureshi R, Khan B, Kumar R, Mandhan P, Dawach A, Memon AH. Outcomes of delayed vs early cholecystectomy in acute biliary pancreatitis caused by gallstones. *Prof Med J*. 2025; 32(10):1235-41. <https://doi.org/10.29309/TPMJ/2025.32.10.9618>
17. Akram S, Khalid H, Muhi-ud-din Z, Imran M, Rashid F, Fawad M. Optimal timing to perform cholecystectomy in patients with acute biliary pancreatitis. *J Health Rehabil Res*. 2024; 4(3):1523. <https://doi.org/10.61919/jhrr.v4i3.1523>
18. Robertson FP, Dennison AR, Pandanaboyana S. Optimal timing of cholecystectomy for severe acute pancreatitis and understanding complications and comorbidities. *JAMA Surg*. 2024; 159(4):466-7. <https://doi.org/10.1001/jamasurg.2023.6932>
19. Mikwar Z, Aljadani FF, Alotaibi AK, Neazy FA, Alsaadi NH, Alzahrani MA, Awadh A. The Conversion Rate of Laparoscopic Cholecystectomy to Open Cholecystectomy at King Abdulaziz Medical City, Jeddah, Saudi Arabia: Prevalence and Causes. *Cureus*. 2024 Jun 24; 16(6):e63026. doi: 10.7759/cureus.63026. PMID: 39050302; PMCID: PMC11267824
20. Ahmad, M. S., Mehmood, S., Kareemullah, M., Rashid, M., Hameed, B., Imran, H. M., & Hamad Ullah, R. (2024). Acute Biliary Stone-Induced Pancreatitis: The Outcomes of Early vs. Delayed Laparoscopic Cholecystectomy: Early Versus Delayed Cholecystectomy. *Pakistan Journal of Health Sciences*, 5(09), 213–218. <https://doi.org/10.54393/pjhs.v5i09.2110>

21. Chandak, U., Pind, V., Mitra, A., Bansod, P. Y., Gaikwad, U., & Ramteke, P. (2022). Early versus late laparoscopic cholecystectomy in acute biliary pancreatitis: a prospective randomised study. *International Surgery Journal*, 9(9), 1559–1565. <https://doi.org/10.18203/2349-2902.isj20222059>
22. Walayat S, Baig M, Puli SR. Early vs late cholecystectomy in mild gallstone pancreatitis: an updated meta-analysis. *World J Clin Cases*. 2021; 9(13):3038-47. <https://doi.org/10.12998/wjcc.v9.i13.3033>
23. Fugazzola P, et al. Clinical update on acute cholecystitis and biliary pancreatitis: between certainties and grey areas. *eClinicalMedicine (Lancet)*. 2024; (Article in press). <https://doi.org/10.1016/j.eclinm.2024.102241>
24. Faur M, Fleaca SR, Gherman CD, Bacila CI, Tanasescu D, Serban D, et al. Optimal timing and outcomes of minimally invasive approach in acute biliary pancreatitis. *Med Sci Monit*. 2022; 28:e937016. <https://doi.org/10.12659/MSM.937016>
25. Alotaibi AE, Khan MK, Alobaysi ST, Alotaibi AH, Altammar M, Albedaiwi SA, Al-Osaimi OA, Alrasheed AM, Alotaibi AM. Outcomes of early versus delayed cholecystectomy in acute gallstone pancreatitis: a systematic review and meta-analysis. *Cureus*. 2025 Oct 17; 17(10):e94793. doi:10.7759/cureus.94793. PMID: 41250738; PMCID: PMC12619953.