Jurnal Kedokteran Methodist Vol.18 No.1 Tahun 2025
DOI : 10.46880/jkm.v20i1
https://ejurnal.methodist.ac.id/index.php/jkm/issue/view/250

REVIEW ARTIKEL

Surgical Management of Acute Cholecystitis: Early versus Delayed Laparoscopic Cholecystectomy

M. Fadillah Tarigan[1]

[1.] Faculty of Medicine, Universitas Sumatera Utara
tarigan.fadillah@gmail.com

ABSTRACT

Acute cholecystitis is a common surgical emergency, primarily caused by gallstones blocking the cystic duct. Even though laparoscopic cholecystectomy is universally regarded as the best treatment, the best time for surgery is still a matter of clinical and logistical concern. This narrative review assesses the existing evidence about early versus delayed laparoscopic cholecystectomy. Evidence from studies and guidelines consistently demonstrates suggesting early laparoscopic cholecystectomy yields superior results, including reduced total length of hospital stay and lower rates of recurrent biliary events, without increasing major morbidity, conversion to open surgery, or bile duct injury when conducted in accordance with safe surgical principles. Delayed laparoscopic cholecystectomy is still an option for some patients who are temporarily unsuitable for surgery, have uncontrolled sepsis, need their gallbladder drained, or can't get to the right surgical expert. Consequently, the time of intervention ought to be tailored to the patient's physiology, disease severity, and institutional capacity, rather than conforming to a predetermined temporal threshold. Early laparoscopic cholecystectomy needs to be considered the standard of treatment wherever possible, whereas delayed cholecystectomy management should be confined to meticulously chosen cases.

Keywords: *acute cholecystitis; laparoscopic cholecystectomy; early cholecystectomy; delayed cholecystectomy; gallbladder*

DOI : 10.46880/jkm.v20i1
https://ejurnal.methodist.ac.id/index.php/jkm/issue/view/250

INTRODUCTION

Acute cholecystitis is an acute inflammation of the gallbladder, typically occurring when gallstones obstruct the cystic ducts. In clinical practice, this is important because the disease can progress from local inflammation to empyema, gangrene, perforation, or systemic sepsis if the source of infection is not controlled. Contemporary reviews emphasize that most patients benefit from definitive gallbladder removal during the same episode of illness, provided the operation can be performed safely (Gallaher & Charles, 2022).

Traditional delay strategies assume that inflammation should be allowed to subside before cholecystectomy. This approach seems intuitive, but it puts patients at risk for recurrent biliary colic, recurrent cholecystitis, pancreatitis, cholangitis, repeated hospital visits, and prolonged antibiotic use. Failure to perform cholecystectomy upon initial hospital admission has been associated with significant morbidity among patients who subsequently return with recurrent disease (Escartín et al., 2019).

International standards have gradually transitioned to early laparoscopic cholecystectomy as the usual procedure. Early laparoscopic cholecystectomy should be the standard of therapy wherever possible, including for some vulnerable subgroups following a proper evaluation (Pisano et al., 2020). Treatment timing decisions is linked to severity, comorbidity status, and institutional capacity, rather than symptom duration (Yokoe et al., 2018). A recent clinical review also described acute cholecystitis as a condition in which confirmation of the diagnosis, risk stratification, antimicrobial therapy, and surgical control of the source of infection should be integrated early (Mencarini et al., 2024). This review focuses on the practical question of whether to perform early versus delayed laparoscopic cholecystectomy in acute cholecystitis. The main argument is that early surgery is preferable for most patients. Still, the safest timing is determined by patient physiology, disease severity, surgeon expertise, and intraoperative anatomy, not simply by the calendar.

LITERATURE REVIEW METHOD

A literature review was conducted using the concepts of 'acute cholecystitis,' 'early laparoscopic cholecystectomy,' 'delayed laparoscopic cholecystectomy,' 'single-stay cholecystectomy,' 'interval cholecystectomy,' 'Tokyo Guidelines,' 'WSES Guidelines,' 'bile duct injury,' 'subtotal cholecystectomy,' and 'percutaneous cholecystostomy.'

Priority was given to articles published between 2016 and 2025 in peer-reviewed journals indexed in major biomedical databases and generally covered by Scopus. Significant evidence from the last decade was selected if it directly provided information on timing, safety, recurrence, length of hospital stays, surgical difficulty, or decision-making. This review includes randomized trials, systematic reviews, meta-analyses, population-based studies, guideline documents, and highly relevant observational studies.

DOI : 10.46880/jkm.v20i1
https://ejurnal.methodist.ac.id/index.php/jkm/issue/view/250

DEFINITION AND CLINICAL FRAMEWORK

In the literature, "early" laparoscopic cholecystectomy has been described as surgery conducted within 24 hours of hospital admission, within 72 hours of symptom onset, within 7 days of symptom onset, or during the same hospital stay. This heterogeneity complicates direct comparisons between studies and explains why some meta-analyses separate the time from symptom onset and the time from hospital admission (Borzellino et al., 2021). Delayed laparoscopic cholecystectomy usually means starting with conservative treatment including fasting, fluids, painkillers, and antibiotics, and then having the surgery a few weeks later. While delayed surgery may reduce the intensity of acute inflammation at the time of surgery, it shifts risks to the waiting period. It can increase overall resource utilization through readmissions and recurrent biliary complications (Rice et al., 2019).

Management of acute cholecystitis should be tailored to severity, comorbidities, organ dysfunction, and local expertise. Early laparoscopic cholecystectomy is the appropriate management for Grade I and selected Grade II cases. In addition, Grade III disease requires careful assessment of organ dysfunction and, if surgery is performed, treatment at more advanced centers (Okamoto et al., 2018). Antimicrobial therapy is an important bridge to source control but is not a replacement for definitive treatment in patients eligible for surgery. Empiric antimicrobial therapy with subsequent de-escalation after microbiology results are available, and its duration should be guided by disease severity and the adequacy of source control (Gomi et al., 2018). Initial management begins with vital signs, resuscitation, severity assessment, and early decision-making regarding surgery, drainage, or referral. TG18 emphasized the need for early recognition of organ dysfunction and structured triage, as delayed treatment escalation can increase the risk of severe biliary infection (Miura et al., 2018).

In the literature, "early" laparoscopic cholecystectomy has been described as surgery conducted within 24 hours of hospital admission, within 72 hours of symptom onset, within 7 days of symptom onset, or during the same hospital stay. This heterogeneity complicates direct comparisons between studies and explains why some meta-analyses separate the time
from symptom onset and the time from hospital admission (Borzellino et al., 2021).

Delayed laparoscopic cholecystectomy usually means starting with conservative treatment including fasting, fluids, painkillers, and antibiotics, and then having the surgery a few weeks later. While delayed surgery may reduce the intensity of acute inflammation at the time of surgery, it shifts risks to the waiting period. It can increase overall resource utilization through readmissions and recurrent biliary complications (Rice et al., 2019).

Management of acute cholecystitis should be tailored to severity, comorbidities, organ dysfunction, and local expertise. Early laparoscopic cholecystectomy is the appropriate management for Grade I and selected Grade II cases. In addition, Grade III disease requires careful assessment of organ dysfunction and, if surgery is performed, treatment at more advanced

DOI : 10.46880/jkm.v20i1
https://ejurnal.methodist.ac.id/index.php/jkm/issue/view/250

centers (Okamoto et al., 2018). Antimicrobial therapy is an important bridge to source control but is not a replacement for definitive treatment in patients eligible for surgery. Empiric antimicrobial therapy with subsequent de-escalation after microbiology results are available, and its duration should be guided by disease severity and the adequacy of source control (Gomi et al., 2018).

Initial management begins with vital signs, resuscitation, severity assessment, and early decision-making regarding surgery, drainage, or referral. TG18 emphasized the need for early recognition of organ dysfunction and structured triage, as delayed treatment escalation can increase the risk of severe biliary infection (Miura et al., 2018).

EARLY AND DELAYED LAPAROSCOPIC CHOLECYSTECTOMY

The most reliable advantage of early laparoscopic cholecystectomy is a decrease in total hospital duration. Study indicated no significant increase in bile duct injury, bile leakage, conversion to open surgery, or postoperative morbidity (Lyu et al., 2018). A meta-analysis concentrating on early scheduling definitions indicated that the advantages of early laparoscopic cholecystectomy were most pronounced when the procedure was conducted within the initial episode rather than postponed for several weeks. The authors argued that operating during the same hospitalization avoids the distortion introduced by classifying different early timing windows under a single label (Borzellino et al., 2021). Early laparoscopic cholecystectomy was associated with shorter hospital stays and at least comparable safety, in terms of conversions and major morbidity, compared with delayed surgery (Wu et al., 2023).

Network meta-analyses also suggest that very early surgery may optimize outcomes, although the exact extent varies depending on the outcome being measured. Cholecystectomy performed within 24 hours of hospital admission optimally reduced the overall length of stay. However, cholecystectomy conducted within 72 hours of symptom onset yielded favorable outcomes for postoperative complications (Coccolini et al., 2022). Study showed that early laparoscopic cholecystectomy was safe and resulted in reduced overall morbidity, a shorter total hospital stays, decreased antibiotic exposure, and cheaper expenditures in comparison to delayed operation (Roulin et al., 2016).

A randomized study by Rajcok and colleagues also supports early laparoscopic cholecystectomy as a viable approach, showing that early treatment did not worsen the primary safety outcome and reduced the burden associated with two-stage management (Rajcok et al., 2016). Therefore, the existing evidence base is not simply a competition between two surgical dates. It reflects broader considerations: early surgery treats the disease. It eliminates the source of recurrence, whereas delayed surgery only temporarily manages the inflammation but leaves the gallbladder in place during the vulnerable period.

DISCUSSION

Current literature favours early laparoscopic cholecystectomy for most patients with acute cholecystitis. This evidence is not based on a

DOI : 10.46880/jkm.v20i1
https://ejurnal.methodist.ac.id/index.php/jkm/issue/view/250

single outcome but on a recurring pattern across multiple clinical trials, meta-analyses, and health systems studies: early surgery provides definitive treatment, reduces total hospital stay, avoids recurrent biliary events, and does not appear to increase major adverse surgical outcomes when performed safely. The most important nuance is that early surgery does not necessarily mean unsafe surgery. Guidelines emphasize that surgical strategy should be modified when inflammation prevents safe anatomic identification, particularly in the triangle of Calot and the hepatocystic plate (Wakabayashi et al., 2018).

A critical view for safety remains the gold standard for safe dissection before clamping and dividing ductal or arterial structures. Multisociety guidelines on the prevention of biliary tract injury recommend the systematic application of safe cholecystectomy principles and the use of salvage strategies when a critical view cannot be achieved (Brunt et al., 2020). Bile duct injuries are rare but potentially devastating, and prevention is far more important than achieving a complete total cholecystectomy at all costs. The WSES guidelines on bile duct injuries emphasize early recognition, appropriate classification, expert referral, and a structured remedial pathway when an injury occurs (de'Angelis et al., 2021). Therefore, subtotal cholecystectomy is not a failure but a safety maneuver in difficult gallbladder surgery. A contemporary review describes subtotal cholecystectomy as an acceptable salvage option when inflammation, fibrosis, or distorted anatomy make total cholecystectomy dangerous (Ramírez-Giraldo et al., 2023).

Intraoperative complications should be anticipated before the incision is made. Risk factors include advanced age, male gender, elevated inflammatory markers, gallbladder wall thickening, retained stones, severe Tokyo disease, delayed presentation, and comorbidity burden. The Chole-Risk score was established to predict problems after early laparoscopic cholecystectomy. It shows the benefit of formal preoperative risk stratification (Di Martino et al., 2021). These times should also be viewed as a quality issue for hospitals. Delays often occur not because surgery is clinically undesirable but because emergency operating room time, consultant laparoscopic expertise, anesthesia capacity, and weekend staffing are limited. Population-level evidence from the UK suggests that times are influenced by system organization and that improving access to emergency cholecystectomy can reduce length of stay and resource use (Wiggins et al., 2019).

Economic considerations support early laparoscopic cholecystectomy because it compresses treatment into a single hospital stay and reduces repeated evaluations, imaging, antibiotics, readmissions, and scheduling intervals. Studies that emphasize clinical outcomes and medical expenditures after TG18 implementation also indicate that early management in accordance with guidelines can improve efficiency (Lin et al., 2021).

WHEN POSTPONING SURGERY STILL MAKES SENSE

Delayed laparoscopic cholecystectomy should not be considered obsolete. This procedure remains appropriate when patients are physiologically unfit for immediate anesthesia,

DOI : 10.46880/jkm.v20i1
https://ejurnal.methodist.ac.id/index.php/jkm/issue/view/250

are experiencing uncontrolled septic shock, have worsening comorbidities, or require stabilization before definitive surgery. Validation study demonstrated that not every patient is suited to the same early surgical pathway, particularly in Grade III disease or in hospitals without advanced surgical resources (Bekki et al., 2021).

In selected high-risk patients, gallbladder drainage can be used as a bridge to interval cholecystectomy or as a palliative strategy when surgery is not possible. The CHOCOLATE randomized trial indicated that laparoscopic cholecystectomy may be more effective than percutaneous catheter drainage in high-risk, operable patients, advising against the automatic use of drainage as a substitute for surgery (Loozen et al., 2018). If drainage is performed, the timing of subsequent interval cholecystectomy should be individualized. Evidence regarding interval laparoscopic cholecystectomy after percutaneous transhepatic cholecystostomy suggests that patient factors, local expertise, and sepsis resolution may outweigh a single fixed interval (Kourounis et al., 2022). Postponing surgery may also be an option when expert laparoscopic support is unavailable, and removal is safer than attempting a high-risk dissection in an unsupported environment. In such contexts, postponing surgery should represent a deliberate risk-reduction decision, not a passive consequence of inadequate planning.

PROLONGED SYMPTOM DURATION AND THE "72-HOUR RULE"

A practical controversy arises over whether patients presenting after 72 hours or 1 week should automatically undergo interval surgery.

Recent literature does not support rigid rules. Bundgaard and colleagues found that early laparoscopic cholecystectomy remained safe even after 5 days of symptoms, suggesting that symptom duration alone is insufficient to deny surgery at hospital admission (Bundgaard et al., 2021). Barka and colleagues questioned whether acute cholecystitis still requires surgery after the first week, reflecting a real-world problem where many patients are present late. Their analysis supports the view that patient selection and operative considerations are more relevant than fixed time constraints (Barka et al., 2023).

A systematic review by van Maasakkers and colleagues specifically evaluated the 7-day cutoff and found no clear increase in major complications or conversions in patients operated on after 7 days, despite longer operative times and hospital stays. This supports the idea that early surgery performed late may be more difficult but not necessarily unsafe (van Maasakkers et al., 2024). The wait before surgery can prolong hospital stays and shift patients into a more severe inflammatory phase. Data on waiting times indicate that delays after hospital admission can increase length of stay, a system-level outcome that could be prevented if emergency surgery pathways were optimized (Bressan et al., 2024).

Recent cohort studies continue to demonstrate that the risks of early surgery are more pronounced in patients with severe inflammation,

DOI : 10.46880/jkm.v20i1
https://ejurnal.methodist.ac.id/index.php/jkm/issue/view/250

high-risk anatomy, and comorbidities than in all patients presenting late. Therefore, recent studies advocate individualized risk assessment rather than withholding early surgery simply because a time threshold has been exceeded (Mansor et al., 2025).

LIMITATIONS OF EVIDENCE

Several limitations need to be considered when interpreting. First, the definition of early surgery varies widely across clinical trials and meta-analyses. Second, many studies are observational and susceptible to selection bias, as sicker or more complex patients are often assigned to delayed or drainage-based strategies. Third, conversion to open surgery, subtotal cholecystectomy, and salvage techniques may be inconsistently defined across studies. Fourth, surgical expertise and institutional capacity significantly influence outcomes but are difficult to standardize. Centers with routine emergency laparoscopy expertise may achieve excellent initial outcomes, while centers with low case volumes may be more likely to refer certain difficult cases. Finally, few studies fully capture patient-centered outcomes such as quality of life, anxiety during the waiting period, return to work, and satisfaction with single-patient care.

CONCLUSION

Laparoscopic cholecystectomy should be done early in patients with acute cholecystitis to stop the infection at its source during the first episode, shortens the hospital stay, and lowers the risk of major surgical complications if safe surgical principles are followed. Delayed laparoscopic cholecystectomy is still a good option for certain patients who aren't ready for surgery right away, need drainage, or need to be moved to a centre with the right expertise. Contemporary approaches must move beyond the rigid 72-hour rule to a structured decision that integrates severity, physiologic risk, institutional capabilities, and intraoperative safety. The safest operation is not simply the earliest but the earliest that can be performed with clear anatomy, adequate expertise, and a readiness to employ salvage strategies.

REFERENCES

Barka, M., Jarrar, M. S., Sahli, J., Abdessalem, Z. Ben, Hamila, F., & Youssef, S. (2023). Early laparoscopic cholecystectomy for acute cholecystitis: should we operate beyond the first week? *Langenbeck's Archives of Surgery*, *408*(1). https://doi.org/10.1007/s00423-023-02816-5

Bekki, T., Abe, T., Amano, H., Hanada, K., Kobayashi, T., Noriyuki, T., Ohdan, H., & Nakahara, M. (2021). Validation of the Tokyo guideline 2018 treatment proposal for acute cholecystitis from a single-center retrospective analysis. *Asian Journal of Endoscopic Surgery*, *14*(1). https://doi.org/10.1111/ases.12801

Borzellino, G., Khuri, S., Pisano, M., Mansour, S., Allievi, N., Ansaloni, L., & Kluger, Y. (2021). Timing of early laparoscopic cholecystectomy for acute calculous cholecystitis: a meta-analysis of randomized clinical trials. *World Journal of Emergency Surgery*, *16*(1), 16.

https://doi.org/10.1186/s13017-021-00360-5

Bressan, L., Cimino, M. M., Vaccari, F., Capozzela, E., Biloslavo, A., Porta, M., Bortul, M., & Kurihara, H. (2024). Preoperative Waiting Time Affects the Length of Stay of Patients Treated via Laparoscopic Cholecystectomy in an Acute Care Surgical Setting. *Journal of Clinical Medicine*, *13*(23). https://doi.org/10.3390/JCM13237263

Brunt, L. M., Deziel, D. J., Telem, D. A., Strasberg, S. M., Aggarwal, R., Asbun, H., Bonjer, J., McDonald, M., Alseidi, A., Ujiki, M., Riall, T. S., Hammill, C., Moulton, C.-A., Pucher, P. H., Parks, R. W., Ansari, M. T., Connor, S., Dirks, R. C., Anderson, B., … Stefanidis, D. (2020). Safe Cholecystectomy Multi-society Practice Guideline and State of the Art Consensus Conference on Prevention of Bile Duct Injury During Cholecystectomy. *Annals of Surgery*, *272*(1), 3–23. https://doi.org/10.1097/SLA.0000000000003791

Bundgaard, N. S., Bohm, A., Hansted, A. K., & Skovsen, A. P. (2021). Early laparoscopic cholecystectomy for acute cholecystitis is safe regardless of timing. *Langenbeck's Archives of Surgery*, *406*(7). https://doi.org/10.1007/s00423-021-02229-2

Coccolini, F., Solaini, L., Binda, C., Catena, F., Chiarugi, M., Fabbri, C., Ercolani, G., & Cucchetti, A. (2022). Laparoscopic Cholecystectomy in Acute Cholecystitis: Refining the Best Surgical Timing Through Network Meta-Analysis of Randomized Trials. In *Surgical Laparoscopy, Endoscopy and Percutaneous Techniques* (Vol. 32, Number 6). https://doi.org/10.1097/SLE.0000000000001103

de'Angelis, N., Catena, F., Memeo, R., Coccolini, F., Martínez-Pérez, A., Romeo, O. M., De Simone, B., Di Saverio, S., Brustia, R., Rhaiem, R., Piardi, T., Conticchio, M., Marchegiani, F., Beghdadi, N., Abu-Zidan, F. M., Alikhanov, R., Allard, M.-A., Allievi, N., Amaddeo, G., … Sommacale, D. (2021). 2020 WSES guidelines for the detection and management of bile duct injury during cholecystectomy. *World Journal of Emergency Surgery*, *16*(1), 30. https://doi.org/10.1186/s13017-021-00369-w

Di Martino, M., Mora-Guzmán, I., Jodra, V. V., Dehesa, A. S., García, D. M., Ruiz, R. C., Nisa, F. G. M., Moreno, F. M., Batanero, S. A., Sampedro, J. E. Q., Cumplido, P. L., Bravo, A. A., Rubio-Perez, I., Asensio-Gomez, L., Aranda, F. P., Farrarons, S. S., Moreno, C. R., Moreno, C. M. M., Lasarte, A. S., … Martin-Perez, E. (2021). How to Predict Postoperative Complications After Early Laparoscopic Cholecystectomy for Acute Cholecystitis: the Chole-Risk Score. *Journal of Gastrointestinal Surgery*, *25*(11). https://doi.org/10.1007/s11605-021-04956-9

Escartín, A., González, M., Pinillos, A., Cuello, E., Muriel, P., Tur, J., Merichal, M., Mestres, N., Mías, M.-C., & Olsina, J.-J. (2019). Failure to perform index cholecystectomy during acute cholecystitis results in significant morbidity for patients who present with recurrence. *HPB*, *21*(7), 876–882. https://doi.org/10.1016/j.hpb.2018.11.007

Gallaher, J. R., & Charles, A. (2022). Acute Cholecystitis. *JAMA*, *327*(10), 965. https://doi.org/10.1001/jama.2022.2350

Gomi, H., Solomkin, J. S., Schlossberg, D., Okamoto, K., Takada, T., Strasberg, S. M.,

Ukai, T., Endo, I., Iwashita, Y., Hibi, T., Pitt, H. A., Matsunaga, N., Takamori, Y., Umezawa, A., Asai, K., Suzuki, K., Han, H., Hwang, T., Mori, Y., … Yamamoto, M. (2018). Tokyo Guidelines 2018: antimicrobial therapy for acute cholangitis and cholecystitis. *Journal of Hepato-Biliary-Pancreatic Sciences*, *25*(1), 3–16. https://doi.org/10.1002/jhbp.518

Kourounis, G., Rooke, Z. C., McGuigan, M., & Georgiades, F. (2022). Systematic review and meta-analysis of early vs late interval laparoscopic cholecystectomy following percutaneous cholecystostomy. *HPB : The Official Journal of the International Hepato Pancreato Biliary Association*, *24*(9), 1405–1415. https://doi.org/10.1016/j.hpb.2022.03.016

Lin, Y. N., Wu, Y. T., Fu, C. Y., Liao, C. H., Cheng, C. T., Wang, S. Y., Lin, B. C., Hsu, Y. P., Kang, S. C., Liu, E. H., Kuo, I. M., Ou Yang, C. H., Yang, S. J., Huang, J. F., Hsu, C. P., Hsieh, F. J., Liao, C. A., Kuo, L. W., Tee, Y. S., & Hsieh, C. H. (2021). Evaluating the advantages of treating acute cholecystitis by following the Tokyo Guidelines 2018 (TG18): a study emphasizing clinical outcomes and medical expenditures. *Surgical Endoscopy*, *35*(12). https://doi.org/10.1007/s00464-020-08162-7

Loozen, C. S., Van Santvoort, H. C., Van Duijvendijk, P., Besselink, M. G., Gouma, D. J., Nieuwenhuijzen, G. A., Kelder, J. C., Donkervoort, S. C., Van Geloven, A. A., Kruyt, P. M., Roos, D., Kortram, K., Kornmann, V. N., Pronk, A., Van Der Peet, D. L., Crolla, R. M., Van Ramshorst, B., Bollen, T. L., & Boerma, D. (2018). Laparoscopic cholecystectomy versus percutaneous catheter drainage for acute cholecystitis in high risk patients (CHOCOLATE): Multicentre randomised clinical trial. *BMJ (Online)*, *363*. https://doi.org/10.1136/bmj.k3965

Lyu, Y., Cheng, Y., Wang, B., Zhao, S., & Chen, L. (2018). Early versus delayed laparoscopic cholecystectomy for acute cholecystitis: an up-to-date meta-analysis of randomized controlled trials. *Surgical Endoscopy*, *32*(12), 4728–4741. https://doi.org/10.1007/s00464-018-6400-0

Mansor, S., Zaidi, A., Habibullah, M., Hourani, R., Aldali, Y., Ghali, M. S., Dawdi, S., Suliman, I., Alobahi, M., Jarboa, L., Valiyapurayil, M., & Zarour, A. (2025). Early Laparoscopic Cholecystectomy for Acute Cholecystitis. When Do Risks Seem Imminent? *Asian Journal of Endoscopic Surgery*, *18*(1). https://doi.org/10.1111/ases.70052

Mencarini, L., Vestito, A., Zagari, R. M., & Montagnani, M. (2024). The Diagnosis and Treatment of Acute Cholecystitis: A Comprehensive Narrative Review for a Practical Approach. *Journal of Clinical Medicine*, *13*(9), 2695. https://doi.org/10.3390/jcm13092695

Miura, F., Okamoto, K., Takada, T., Strasberg, S. M., Asbun, H. J., Pitt, H. A., Gomi, H., Solomkin, J. S., Schlossberg, D., Han, H., Kim, M., Hwang, T., Chen, M., Huang, W. S., Kiriyama, S., Itoi, T., Garden, O. J., Liau, K., Horiguchi, A., … Yamamoto, M. (2018). Tokyo Guidelines 2018: initial management of acute biliary infection and flowchart for acute cholangitis. *Journal of Hepato-Biliary-Pancreatic Sciences*, *25*(1), 31–40. https://doi.org/10.1002/jhbp.509

Okamoto, K., Suzuki, K., Takada, T., Strasberg, S. M., Asbun, H. J., Endo, I., Iwashita, Y., Hibi, T., Pitt, H. A., Umezawa, A., Asai, K., Han, H., Hwang, T., Mori, Y., Yoon, Y., Huang, W. S., Belli, G., Dervenis, C., Yokoe, M., … Yamamoto, M. (2018). Tokyo Guidelines 2018: flowchart for the management of acute cholecystitis. *Journal of Hepato-Biliary-Pancreatic Sciences*, *25*(1), 55–72. https://doi.org/10.1002/jhbp.516

Pisano, M., Allievi, N., Gurusamy, K., Borzellino, G., Cimbanassi, S., Boerna, D., Coccolini, F., Tufo, A., Di Martino, M., Leung, J., Sartelli, M., Ceresoli, M., Maier, R. V., Poiasina, E., De Angelis, N., Magnone, S., Fugazzola, P., Paolillo, C., Coimbra, R., … Ansaloni, L. (2020). 2020 World Society of Emergency Surgery updated guidelines for the diagnosis and treatment of acute calculus cholecystitis. *World Journal of Emergency Surgery*, *15*(1), 61. https://doi.org/10.1186/s13017-020-00336-x

Rajcok, M., Bak, V., Danihel, L., Kukucka, M., & Schnorrer, M. (2016). Early versus delayed laparoscopic cholecystectomy in treatment of acute cholecystitis. *Bratislava Medical Journal*, *117*(6). https://doi.org/10.4149/BLL_2016_065

Ramírez-Giraldo, C., Torres-Cuellar, A., & Van-Londoño, I. (2023). State of the art in subtotal cholecystectomy: An overview. In *Frontiers in Surgery* (Vol. 10). https://doi.org/10.3389/fsurg.2023.1142579

Rice, C. P., Vaishnavi, K. B., Chao, C., Jupiter, D., Schaeffer, A. B., Jenson, W. R., Griffin, L. W., & Mileski, W. J. (2019). Operative complications and economic outcomes of cholecystectomy for acute cholecystitis. *World Journal of Gastroenterology*, *25*(48), 6916–6927. https://doi.org/10.3748/wjg.v25.i48.6916

Roulin, D., Saadi, A., Di Mare, L., Demartines, N., & Halkic, N. (2016). Early versus delayed cholecystectomy for acute cholecystitis, are the 72 hours still the rule? A randomized trial. *Annals of Surgery*, *264*(5). https://doi.org/10.1097/SLA.0000000000001886

van Maasakkers, M. H. G., Weijs, T. J., Cnossen, O. P., van Braak, W. G., Kelder, J. C., Roulin, D., & Boerma, D. (2024). Evaluating the 7-day barrier: early laparoscopic cholecystectomy for cholecystitis with prolonged symptom duration; a systematic review and meta-analysis. In *Langenbeck's Archives of Surgery* (Vol. 409, Number 1). https://doi.org/10.1007/s00423-024-03555-x

Wakabayashi, G., Iwashita, Y., Hibi, T., Takada, T., Strasberg, S. M., Asbun, H. J., Endo, I., Umezawa, A., Asai, K., Suzuki, K., Mori, Y., Okamoto, K., Pitt, H. A., Han, H. S., Hwang, T. L., Yoon, Y. S., Yoon, D. S., Choi, I. S., Huang, W. S. W., … Yamamoto, M. (2018). Tokyo Guidelines 2018: surgical management of acute cholecystitis: safe steps in laparoscopic cholecystectomy for acute cholecystitis (with videos). *Journal of Hepato-Biliary-Pancreatic Sciences*, *25*(1). https://doi.org/10.1002/jhbp.517

Wiggins, T., Markar, S. R., MacKenzie, H., Faiz, O., Mukherjee, D., Khoo, D. E., Purkayastha, S., Beckingham, I., & Hanna, G. B. (2019). Optimum timing of emergency cholecystectomy for acute cholecystitis in England: population-based cohort study. *Surgical Endoscopy*, *33*(8), 2495–2502. https://doi.org/10.1007/s00464-018-6537-x

Wu, H., Liao, B., Cao, T., Ji, T., Huang, J., Luo, Y., & Ma, K. (2023). Comparison of the safety profile, conversion rate and hospitalization duration between early and delayed laparoscopic cholecystectomy for acute cholecystitis: a systematic review and meta-analysis. In *Frontiers in Medicine* (Vol. 10). https://doi.org/10.3389/fmed.2023.1185482

Yokoe, M., Hata, J., Takada, T., Strasberg, S. M., Asbun, H. J., Wakabayashi, G., Kozaka, K., Endo, I., Deziel, D. J., Miura, F., Okamoto, K., Hwang, T., Huang, W. S., Ker, C., Chen, M., Han, H., Yoon, Y., Choi, I., Yoon, D., … Yamamoto, M. (2018). Tokyo Guidelines 2018: diagnostic criteria and severity grading of acute

DOI : 10.46880/jkm.v20i1
https://ejurnal.methodist.ac.id/index.php/jkm/issue/view/250

cholecystitis (with videos). *Journal of Hepato-Biliary-Pancreatic Sciences*, *25*(1), 41–54. https://doi.org/10.1002/jhbp.515

DOI : 10.46880/jkm.v20i1
https://ejurnal.methodist.ac.id/index.php/jkm/issue/view/250

Table 1. Selected contemporary evidence comparing early and delayed laparoscopic cholecystectomy in acute cholecystitis

Author/Year	Study Design and Population	Timing Comparison	Main Findings	Clinical Interpretation
Roulin et al. (2016)	Randomized controlled trial; patients with acute cholecystitis, including symptoms >72 hours	Early LC vs delayed LC	Early LC reduced overall morbidity, total length of hospital stay, duration of antibiotic therapy, and costs	The 72-hour rule should not be used as an absolute cutoff in clinically fit patients
Rajcok et al. (2016)	Randomized clinical study of acute cholecystitis	Early LC vs delayed LC	Comparable surgical safety with practical advantages for early treatment	Early LC is feasible when adequate laparoscopic expertise is available
Wiggins et al. (2019)	Population-based cohort study in the UK	Emergency cholecystectomy across different early timeframes	Earlier emergency surgery was associated with improved resource utilization outcomes	System-level access to emergency operating lists is essential for optimal timing
Escartín et al. (2019)	Cohort study evaluating recurrence after non-index surgery	No index cholecystectomy followed by recurrent presentations	Recurrence after failure of initial management leads to significant morbidity	Avoiding early surgery may shift risk to future hospital admissions
Rice et al. (2019)	Economic and outcomes analysis	Cholecystectomy care pathways in acute cholecystitis	Complications and costs vary depending on management pathway	Delayed strategies may impose hidden economic burdens
Bundgaard et al. (2021)	Retrospective study evaluating symptom duration	Early LC across different symptom durations	Early LC beyond 5 days was not associated with increased complications	Symptom duration alone should not determine timing
Borzellino et al. (2021)	Meta-analysis of randomized controlled trials	Early/index admission LC vs delayed LC	Early LC shortened hospital stay without increasing morbidity	Index-admission surgery is a stronger clinical concept than rigid time cutoffs
Coccolini et al. (2022)	Network meta-analysis of randomized trials	Multiple early timing strategies vs delayed surgery	≤24 hours from admission may prolong hospital stay; ≤72 hours from symptom onset may increase complications	The earliest safe and feasible operation is generally preferred
Wu et al. (2023)	Systematic review and meta-analysis	Early LC vs delayed LC	Early LC associated with shorter hospital stay and comparable or improved safety profile	Current pooled evidence supports early surgery in appropriate patients
Van Maasakkers et al. (2024)	Systematic review/meta-analysis of prolonged symptoms	LC within 0–7 days vs >7 days of symptoms	No clear increase in major complications or conversion after >7 days, although operative difficulty may increase	Surgery beyond 7 days is feasible but should be individualized