SAR Journal of Surgery

Abbreviated Key Title: *SAR J Surg*
Home page: https://sarpublication.com/journal/sarjs/home
DOI: https://doi.org/10.36346/sarjs.2026.v07i02.003

OPEN ACCESS

ISSN 2707-7748 (P)
ISSN 2709-6912 (O)

Review Article

Acute Acalculous Cholecystitis: An Update on Diagnosis and Management: Review Article

Kumar H.R. (MBBS, MS)[1*]

[1]Associate Professor of Surgery, Taylor University School of Medicine and Health Science, 47500 Subang Jaya, Malaysia

***Corresponding Author:** Dr. Kumar Hari Rajah
Associate Professor of Surgery, Taylor University School of Medicine and Health Science, 47500 Subang Jaya, Malaysia

Article History: | Received: 23.01.2026 | Accepted: 19.03.2026 | Published: 20.03.2026 |

Abstract: Acute acalculous cholecystitis is characterized by inflammation of the gallbladder without the presence of gallstones. It is commonly seen in older and critically ill patients. The etiology of this condition is broad and includes infective, inflammatory, traumatic, and connective tissue disorders. Acute acalculous cholecystitis is associated with a higher risk of complications like gangrene and perforation. Clinical examination and laboratory investigations are not sensitive for the diagnosis of acute acalculous cholecystitis. Ultrasonography is the first-line imaging modality to diagnose acute acalculous cholecystitis, followed by Cholescintigraphy. The management of acute acalculous cholecystitis can be divided into cholecystectomy and percutaneous cholecystostomy. In this review, we will investigate the risk factors, investigations, and treatment of acute acalculous cholecystitis.

Keywords: "Acute Acalculous Cholecystitis"," Cholecystectomy"," Gallbladder Drainage"," HIDA scan"," Percutaneous Cholecystostomy"," Ultrasonography", and "Risk Factors.".

INTRODUCTION

Acute acalculous cholecystitis is a clinical condition that is characterized by inflammation of the gallbladder in the absence of gallstones. This condition is seen in critically ill patients who may have underlying medical diseases or in those patients who have undergone major surgical procedures. Acute acalculous cholecystitis is associated with a mortality rate of 30%, and it has a higher risk of gangrene and perforation of the gallbladder. This condition is seen in patients with diabetes mellitus, congestive cardiac failure, and end-stage renal disease. Acute acalculous cholecystitis is also associated with a higher risk of secondary infection of the gallbladder with bacteria like Salmonella, Shigella, Mycobacterium, and viruses like hepatitis A and B, as well as the human immunodeficiency virus(Barie & Eachempati, 2003; De Olivera, 2016).

The clinical presentation of acute acalculous cholecystitis is atypical, with right-sided upper abdominal pain seen in only 25% of cases, and eliciting a positive Murphy's sign is difficult, as most of these patients are elderly with co-morbidities, and blood investigations like full blood count, liver function test, and inflammatory markers like C. Reactive Protein are not helpful. The diagnosis of acute acalculous cholecystitis is confirmed by imaging modalities, and ultrasonography is the most common one, as it will reveal the thickening of the gallbladder wall of more than 4cm, the presence of pericholecystic fluid collection, and the absence of gallstones. Ultrasonography has a sensitivity of up to 92% and a specificity of 90% and can be performed in the intensive care unit. Cholescintigraphy is the next investigation that is used to diagnose acute acalculous cholecystitis, and it has a sensitivity of 79% and specificity of 87%. The main disadvantage of cholescintigraphy is the use of nuclear tracers and the need to transport the patient, which can be a problem in patients who are admitted to the Intensive Care Unit. Computerized tomography is indicated for complications like gangrene and perforation of the gallbladder. The treatment of acute acalculous cholecystitis can be divided into conservative treatment with antibiotics and definitive management in the form of percutaneous cholecystostomy and cholecystectomy(Huffman & Schenker, 2010; Owen &

Jain, 2005; Petracca *et al*., 2020; Ryu *et al*., 2003; Wang *et al*., 2003).

The diagnosis and management of acute acalculous cholecystitis is an area of concern, and we will investigate the risk factors for developing acute acalculous cholecystitis. We will also look at the role of imaging modalities in the diagnosis of acute acalculous cholecystitis and the role that percutaneous cholecystostomy and cholecystectomy play in its management. We conducted a literature review using PUBMED, Cochrane database of clinical reviews, and Google Scholar, looking for clinical trials, observational studies, cohort studies, systematic reviews, and meta-analyses from 1985 to 2025. We used the following keywords: "Acute acalculous cholecystitis", "Gallbladder drainage", "Percutaneous cholecystostomy", "Ultrasonography "," HIDA scan"," Cholecystectomy and "Risk factors". All articles were in the English language only. Further articles were obtained by manual cross-referencing of the literature. Case reports and studies with fewer than 10 patients and editorials were excluded. Adult male and female patients were included in this study, and pediatric patients were excluded.

DISCUSSION

Risk Factors for Acute Acalculous Cholecystitis

Some of the risk factors for the development of acute acalculous cholecystitis include age above 50 years and the presence of a cerebrovascular accident (Gu *et al*., 2014). Critically ill patients are also a risk factor for the development of acute acalculous cholecystitis, and a retrospective study by Laurila *et al*., looked at the patients who were admitted to the intensive care unit, and a total of 39 patients were diagnosed with acute acalculous cholecystitis. The mean APACHE score was 25, and 64% of the patients had had up to 3 organ failures. The total length of hospital stay was 19 days, and the mortality rate was 44%(Laurila *et al*., 2004). Patients who undergo major surgical procedures like abdominal aortic aneurysm repair and those who are on long-term total parenteral nutrition are at risk of developing acute acalculous cholecystitis(Walden *et al*., 1994).

Patients with severe burns are also associated with a higher risk of developing acute acalculous cholecystitis. Theodorou *et al.,* looked at the predisposing factors for acute acalculous cholecystitis in severely burns patient. A total of 15 patients were included in this study, and they concluded that increasing age, the need for blood transfusion, and mechanical ventilation were risk factors for the development of acute acalculous cholecystitis(Theodorou *et al*., 2009). A review of acute acalculous cholecystitis in burns was conducted by Walsh *et al*., the incidence of acute acalculous cholecystitis in burns was 0.4% to 3.5%. It was commonly seen in patients with more than 30% of burns. The risk factors for acute acalculous cholecystitis were the need for blood transfusion, mechanical ventilation, and the need for prolonged total parenteral nutrition (Walsh *et al*., 2018).Markaki *et al*., looked at the infectious causes of acute acalculous cholecystitis with Salmonella typhi, which may spread to the bloodstream, and Hepatitis A virus, which can lead to direct invasion of the gallbladder. Other organisms, like cytomegalovirus, cryptosporidium, and Mycobacterium tuberculosis, are seen in immunocompromised patients (Markaki *et al*., 2021).

Diagnosis of Acute Acalculous Cholecystitis

The diagnosis of acute acalculous cholecystitis is difficult, as clinical examination of the patient may not reveal any positive finding and blood investigations, such as the presence of leukocytosis, elevated inflammatory markers like C. Reactive Protein (CRP), and elevated liver enzymes, are not helpful. Imaging modalities like ultrasonography are the most common methods that is perfomed to establish the diagnosis of acute acalculous cholecystitis, with cholescintigraphy being the next best imaging modality. Computerized Tomography is reserved if there is the presence of other abdominal pathologies or complications like gangrene, perforation, and empyema of the gallbladder (Addas *et al*., 2019). Ultrasonography is the main imaging modality that is used to diagnose acute acalculous cholecystitis. It can reveal the gallbladder wall thickening of more than 3mm, the presence of pericholecystic fluid collection, and the absence of gallstones. The sensitivity of ultrasonography is at 20% to 100%, while its specificity is at 93% to 97%(Phipps *et al*., 2025). Lin *et al*., looked at the prognostic significance of ultrasonography in the early diagnosis of acute acalculous cholecystitis in elderly bedridden patients. A total of 43 patients with acute acalculous cholecystitis were included in this study, and ultrasonography was effective and easy to perform for bedridden patients to make an early diagnosis of acute acalculous cholecystitis(Lin *et al*., 2021).

Cholescintigraphy is the second-line imaging modality that is performed in patients with acute acalculous cholecystitis when ultrasonography is equivocal. This procedure involves the administration of intravenous technetium 99, and then images are taken to see if there is no enhancement of the gallbladder. This procedure involves transferring the patient from the intensive care unit, and it involves the use of nuclear material, but it has a good sensitivity and specificity to diagnose acute acalculous cholecystitis(Gokhale *et al*., 2012). Mariat *et al*., compared ultrasonography with cholescintigraphy in the diagnosis of acute acalculous cholecystitis, and cholescintigraphy was associated with a higher sensitivity and specificity than ultrasonography. Ultrasonography was, however, easier to perform and did not require the transport of the patient (Mariat *et al*., 2000).

Morgan *et al*., evaluated the imaging that was performed for acute acalculous cholecystitis, and ultrasonography was the first-line investigation of choice due to its low cost, availability, and lack of ionizing radiation. The criteria for diagnosis can be divided into the major criteria, which include the gallbladder wall thickening of more than 3mm, the presence of pericholecystic fluid collection, and mucosal sloughing with intramural gas. The minor criteria include gallbladder distension. Scintigraphy has a better sensitivity and specificity in diagnosing acute acalculous cholecystitis, but it is not readily available, and it involves the use of radiation. Computerized tomography is often done to look for other pathologies in the abdomen or to look for complications of acute acalculous cholecystitis, like gangrene, perforation, and necrosis of the gallbladder (Morgan *et al*., 2025).

Table Ⅰ: Ultrasonography vs Cholescintigraphy in the Diagnosis of Acute Acalculous Cholecystitis

Feature	Ultrasonography (US)	Cholescintigraphy (HIDA)
Sensitivity	20–100% (highly variable)-Phipps *et al*.,	38–100% (variable)-Phipps *et al*.,
Specificity	93–97% (high)-Phipps *et al*.,	78–100%, but may be as low as 38% in Acute Acalculous Cholecystitis due to false positives-Phipps *et al*.,
Strengths	Bedside, rapid, no radiation; high specificity; prognostic value-Lin *et al*.,	Functional test; guides surgical vs medical management-Gokhale *et al*.,
Limitations	Wide sensitivity variability; operator dependent-Phipps *et al*.,	Frequent false positives; reduced specificity in Acute Acalculous Cholecystitis-Mariat *et al*.,

Management of Acute Acalculous Cholecystitis

The management of acute acalculous cholecystitis initially involves the use of intravenous antibiotics and analgesics, followed by a definitive management, which can be divided into cholecystectomy, which can be performed as an open or laparoscopic method, and percutaneous drainage of the gallbladder (Saragò *et al*., 2022). The management of acute acalculous cholecystitis will depend on the clinical condition of the patient and the fitness to undergo general anesthesia. Laparoscopic cholecystectomy is the preferred method of choice, but there is a risk of conversion to an open cholecystectomy if there are complications like gangrene or perforation of the gallbladder. For patients who are not fit for surgery, percutaneous cholecystostomy may be performed to stabilize them (Treinen *et al*., 2015).

A systematic review of the literature on the role of cholecystectomy in the management of acute acalculous cholecystitis was conducted by Soria-Aledo *et al*., A total of 10 studies were included in this review, and cholecystectomy was performed in low-risk patients, while in high-risk patients, percutaneous cholecystostomy was performed due to the low morbidity from the procedure. In some patients, percutaneous cholecystostomy may even be considered as a definitive form of therapy (Soria Aledo *et al*., 2017). Do *et al*., had conducted a retrospective study on the role of percutaneous cholecystostomy as a definitive form of therapy in the management of acute acalculous cholecystitis. A total of 124 patients were included in this study, and clinical effectiveness was seen in 100% of the patients, and the recurrence rate was at 4.1%. The catheter removal rate was seen in 99.6% of the patients (Do *et al*., 2023).Noh *et al*., also assessed the role of percutaneous cholecystostomy for acute acalculous cholecystitis. A total of 271 patients were included in this study, and the clinical success rate was seen in 86.7% of cases; the complications from the procedure were seen in 2.2% of cases, and the recurrence rate after catheter removal was 2.3%(Noh *et al*., 2018).Lo *et al*., also looked at the role of percutaneous cholecystostomy in the management of acute acalculous cholecystitis. A total of 30 patients with acute acalculous cholecystitis were included in this study, and the success rate was 93% of the cases (Lo *et al.,* 1995).

Chen *et al.,* looked at the role of percutaneous cholecystostomy as a definitive treatment for moderate to severe acute acalculous cholecystitis. A total of 44 patients were included in this retrospective study, and 47.7% of patients did not experience any recurrent symptoms after removal of the tube, and 13.8% experienced symptoms of recurrence. The mortality rate was at 38.6%(Chen *et al*., 2021).Another retrospective study by Chung *et al*., assessed whether percutaneous cholecystostomy can be used as a definitive form of treatment for acute acalculous cholecystitis. A total of 57 patients were included in this study, and percutaneous cholecystostomy had a technical success rate of 93%, and the recurrence rate was at 7% after 32 months of follow-up(Hee Chung *et al*., 2012). Ozyer *et al*., looked at the long-term results of percutaneous cholecystostomy as a definitive treatment for acute acalculous cholecystitis. A total of 47 patients underwent percutaneous cholecystostomy, and they were followed up to 10 years after catheter removal. The long-term clinical success rate was 87.2% and, the complication rate was at 5.3%, and the mortality rate was at 9.3% (Ozyer, 2018).A similar retrospective study by Kirkegard *et al*., also concluded that percutaneous cholecystostomy was effective as a definitive treatment for acute acalculous cholecystitis(Kirkegård *et al*., 2015).

Bea *et al*., looked at the management of acute acalculous cholecystitis in a tertiary teaching hospital. A total of 487 patients were included in this study, and delayed cholecystectomy was done in 88.8% of the

cases, which was associated with the lowest recurrence rate. This study showed that delayed cholecystectomy is the most common surgical procedure that is performed for acute acalculous cholecystitis(Bea *et al*., 2019).Ueno *et al*., conducted a study on the role of emergency laparoscopic cholecystectomy in the management of acute acalculous cholecystitis. A total of 27 patients with acute acalculous cholecystitis had undergone emergent laparoscopic cholecystectomy, and these patients were associated with a higher risk of conversion to open cholecystectomy and the need for blood transfusion (Ueno *et al*., 2016).

Conservative treatment for the management of acute acalculous cholecystitis was assessed by Chang *et al*., A total of 171 cases of acute acalculous cholecystitis were included in this study, with 103 undergoing conservative treatment and 68 undergoing cholecystectomies. There were no differences in the outcomes from both procedures, and the etiology of acute acalculous cholecystitis was important in deciding which form of therapy should be offered to the patient (Chang *et al*., 2023).

Table Ⅱ: Percutaneous Cholecystostomy vs Cholecystectomy in Acute Acalculous Cholecystitis: Comparative Summary

Parameter	Percutaneous Cholecystostomy (PC)	Cholecystectomy (Open/Laparoscopic)
Primary role in Acute Acalculous Cholecystitis (AAC)	Minimally invasive source control is one of the two prevailing options for AAC. (Sarago *et al*.,)	Definitive removal of the gallbladder is a major option when feasible. (Sarago *et al*.,)
Timing of procedure	Critically ill/high-risk surgical candidates; safer than open surgery in severely ill AAC; often the first step. (Treinen *et al*.,)	Patients fit for anesthesia and laparoscopy; early Laparoscopic Cholecystectomy preferred when conversion/anesthesia risk is low. (Treinen *et al*.,)
Definitive vs bridging therapy	Often definitive with no need for interval cholecystectomy in many AAC patients; can also be a bridge to later surgery. (Soria-Aledo *et al*., Noh *et al*.,)	Definitive treatment prevents recurrence; chosen after stabilization or upfront in suitable patients. (Soria-Aledo *et al*., Noh *et al*.,)
Outcomes (summary)	Large AAC cohorts show good clinical success and low recurrence/mortality after PC. (Noh *et al*.,)	Effective with favorable outcomes in suitable patients; risk increases with critical illness. (Trienen *et al*.,)

CONCLUSION

Acute Acalculous cholecystitis is a rare form of cholecystitis without a gallstone, and it has a multifactorial etiology. The diagnosis is difficult as most patients are critically ill, and clinical examinations will not exhibit the typical features of acute cholecystitis. Blood investigations are non-specific, and ultrasonography is the main imaging modality that is used to diagnose this condition, with cholescintigraphy being the second most common imaging modality. Percutaneous cholecystostomy is the most common treatment option, while cholecystectomy is a definitive form of therapy for patients who are fit for surgery or for those who have complications like gangrene and perforation of the gallbladder. The treating surgeon needs to decide when a cholecystectomy should be performed for acute acalculous cholecystitis. Percutaneous cholecystostomy may be an option for treatment if there is a risk of mortality following surgery.

Conflict of Interest: There is no conflict of interest.

REFERENCES

- Addas, M. J., Alshammari, R. M., Alokayli, A. M., Bedaiwi, A. K., Ghabban, A. M., Alasiri, A. M., ... & Alruwaili, A. N. (2019). Evaluation of acalculous cholecystitis, diagnosis, and management. *Archives of Pharmacy Practice*, *10*(3-2019), 17-20.
- Barie, P. S., & Eachempati, S. R. (2003). Acute acalculous cholecystitis. *Current gastroenterology reports*, *5*(4), 302–309. https://doi.org/10.1007/s11894-003-0067-x
- Bea, V. B., Patón, A. C., de la Fuente, R. A., Sagrado, M. G., García Alonso, F. J., & Castillo, M. P. M. (2019). Acute calculous cholecystitis: A real-life management study in a tertiary teaching hospital. *Revista Espanola de Enfermedades Digestivas*, *111*(9), 667–671. https://doi.org/10.17235/REED.2019.6260/2019
- Chang, C., Wang, Y., Shi, W., Xu, H., Huang, X., & Jiao, Y. (2023). Is conservative management a safe approach for patients with acute acalculous cholecystitis presenting with an acute abdomen? *Medicine (United States)*, *102*(35), E34662. https://doi.org/10.1097/MD.0000000000034662
- Chen, B. Q., Chen, G. D., Xie, F., Li, X., Mao, X., & Jia, B. (2021). Percutaneous cholecystostomy as a definitive treatment for moderate and severe acute acalculous cholecystitis: a retrospective observational study. *BMC Surgery*, *21*(1). https://doi.org/10.1186/s12893-021-01411-z
- de Oliveira Júnior, S. A., Lemos, T. E. V., de Medeiros Junior, A. C., Freire, A. D., de Carvalho Garcia, C., e Silva, R. D. S., ... & Araújo Filho, I. (2016). Acute acalculous cholecystitis in critically

ill patients: risk factors, diagnosis and treatment strategies. *J Pancreas*, *17*(17), 580-586.

- Do, Y. A., Yoon, C. J., Lee, J. H., Choi, W. S., & Lee, C. H. (2023). Percutaneous cholecystostomy as a definitive treatment for acute acalculous cholecystitis: clinical outcomes and risk factors for recurrent cholecystitis. *British Journal of Radiology*, *96*(1147). https://doi.org/10.1259/bjr.20220943
- Gokhale, S. M., Lokare, S. D., & Nemade, P. (2012). Role of cholescintigraphy in management of acute acalculous cholecystitis. *Indian Journal of Nuclear Medicine*, *27*(4), 231–236. https://doi.org/10.4103/0972-3919.115393
- Gu, M. G., Kim, T. N., Song, J., Nam, Y. J., Lee, J. Y., & Park, J. S. (2014). Risk factors and therapeutic outcomes of acute acalculous cholecystitis. *Digestion*, *90*(2), 75–80. https://doi.org/10.1159/000362444
- Hee Chung, Y., Ryoung Choi, E., Min Kim, K., Jin Kim, M., Kyun Lee, J., Taek Lee, K., Hyuck Lee, K., Wook Choo, S., Soo Do, Y., & Choo, I.-W. (2012). *Can Percutaneous Cholecystostomy be a Definitive Management for Acute Acalculous Cholecystitis?* www.jcge.com
- Huffman, J. L., & Schenker, S. (2010). Acute Acalculous Cholecystitis: A Review. In *Clinical Gastroenterology and Hepatology* (Vol. 8, Number 1, pp. 15–22). https://doi.org/10.1016/j.cgh.2009.08.034
- Kirkegård, J., Horn, T., Christensen, S. D., Larsen, L. P., Knudsen, A. R., & Mortensen, F. V. (2015). Percutaneous cholecystostomy is an effective definitive treatment option for acute acalculous cholecystitis. *Scandinavian Journal of Surgery*, *104*(4), 238–243. https://doi.org/10.1177/1457496914564107
- Laurila, J., Syrja¨la¨2, H., Syrja¨la, S., Syrja¨la¨2, S., Laurila, P. A., Saarnio, J., & Ala-Kokko, T. I. (2004.). *Acute acalculous cholecystitis in critically ill patients*. https://doi.org/10.1111/j.1399-6576.2004.00426.x
- Lin, Q., Shen, L., Chen, C., Yang, Z., Que, Y., Liu, Y., Yin, M., Xu, G., & Li, J. (2021). Prognostic Significance of Ultrasound Findings of Acute Acalculous Cholecystitis for Elderly Long-Term Bedridden Patients. *Frontiers in Medicine*, *8*. https://doi.org/10.3389/fmed.2021.743998
- Lo, L. D., Vogelzang, R. L., Braun, M. A., & Nemcek, A. A. (1995). Percutaneous Cholecystostomy for the Diagnosis and Treatment of Acute Calculous and Acalculous Cholecystitis. *Journal of Vascular and Interventional Radiology*, *6*(4), 629–634. https://doi.org/10.1016/S1051-0443(95)71150-2
- Mariat, G., Mahul, P., Prévôt, N., De Filippis, J. P., Cuilleron, M., Dubois, F., & Auboyer, C. (2000). Contribution of ultrasonography and cholescintigraphy to the diagnosis of acute acalculous cholecystitis in intensive care unit patients. *Intensive Care Medicine*, *26*(11), 1658–1663. https://doi.org/10.1007/s001340000684
- Markaki, I., Konsoula, A., Markaki, L., Spernovasilis, N., & Papadakis, M. (2021). Acute acalculous cholecystitis due to infectious causes. *World Journal of Clinical Cases*, *9*(23), 6674–6685. https://doi.org/10.12998/wjcc.v9.i23.6674
- Morgan, M. A., DePietro, D. M., Whorms, D. S., Pantel, A. R., Ganeshan, D., Goldman, I. A., Yang, J., & Khot, R. (2025). Acalculous cholecystitis– an imaging and therapeutic update. In *Abdominal Radiology* (Vol. 50, Number 7, pp. 2881–2891). Springer. https://doi.org/10.1007/s00261-024-04691-0
- Noh, S. Y., Gwon, D. Il, Ko, G. Y., Yoon, H. K., & Sung, K. B. (2018). Role of percutaneous cholecystostomy for acute acalculous cholecystitis: clinical outcomes of 271 patients. *European Radiology*, *28*(4), 1449–1455. https://doi.org/10.1007/s00330-017-5112-5
- Owen, C. C., & Jain, R. (2005). Acute Acalculous Cholecystitis. *Current Treatment Options in Gastroenterology*, *8*, 99–104.
- Ozyer U. (2018). Long-term results of percutaneous cholecystostomy for definitive treatment of acute acalculous cholecystitis: a 10-year single-center experience. *Acta gastro-enterologica Belgica*, *81*(3), 393–397.
- Petracca, G., Zappia, F., Giuseppe, M., Mariano, M., Francesco, M., Silvaggio, F., ... & Cafaro, D. (2020). Acute Alitasic Cholecystitis. *Gallstones-Review and Recent Progress*.
- Phipps, B. S., Kavnoudias, H., & Di Muzio, B. (2025). What imaging modalities should be considered in suspected acute acalculous cholecystitis? A review of the evidence. In *Insights into Imaging* (Vol. 16, Number 1). Springer Science and Business Media Deutschland GmbH. https://doi.org/10.1186/s13244-025-02106-2
- Ryu, J. K., Ryu, K. H., & Kim, K. H. (2003). Clinical features of acute acalculous cholecystitis. *Journal of clinical gastroenterology*, *36*(2), 166–169. https://doi.org/10.1097/00004836-200302000-00015
- Saragò, M., Fiore, D., De Rosa, S., Amaddeo, A., Pulitanò, L., Bozzarello, C., Iannello, A. M., Sammarco, G., Indolfi, C., & Rizzuto, A. (2022). Acute acalculous cholecystitis and cardiovascular disease, which came first? After two hundred years still the classic chicken and eggs debate: A review of literature. In *Annals of Medicine and Surgery* (Vol. 78). Elsevier Ltd. https://doi.org/10.1016/j.amsu.2022.103668
- Soria Aledo, V., Galindo Iñíguez, L., Flores Funes, D., Carrasco Prats, M., & Aguayo Albasini, J. L. (2017). ¿Es la colecistectomía el tratamiento de elección en la colecistitis aguda alitiásica? Revisión sistemática de la literatura. *Revista Espanola de*

Enfermedades Digestivas, *109*(10), 708–718. https://doi.org/10.17235/reed.2017.4902/2017

- Theodorou, P., Maurer, C. A., Spanholtz, T. A., Phan, T. Q. V., Amini, P., Perbix, W., Maegele, M., Lefering, R., & Spilker, G. (2009). Acalculous cholecystitis in severely burned patients: Incidence and predisposing factors. *Burns*, *35*(3), 405–411. https://doi.org/10.1016/j.burns.2008.08.003
- Treinen, C., Lomelin, D., Krause, C., Goede, M., & Oleynikov, D. (2015). Acute acalculous cholecystitis in the critically ill: risk factors and surgical strategies. In *Langenbeck's Archives of Surgery* (Vol. 400, Number 4, pp. 421–427). Springer Verlag. https://doi.org/10.1007/s00423-014-1267-6
- Ueno, D., Nakashima, H., Higashida, M., Yoshida, K., Hino, K., Irei, I., Moriya, T., Matsumoto, H., Hirai, T., & Nakamura, M. (2016). Emergent laparoscopic cholecystectomy for acute acalculous cholecystitis revisited. *Surgery Today*, *46*(3), 309–312. https://doi.org/10.1007/s00595-015-1173-8
- Walden, D. T., Urrutia, F., & Soloway, R. D. (1994). Acute acalculous cholecystitis. *Journal of Intensive Care Medicine*, *9*(5), 235-243.
- Walsh, K., Goutos, I., & Dheansa, B. (2018). Acute acalculous cholecystitis in burns: A review. In *Journal of Burn Care and Research* (Vol. 39, Number 5, pp. 724–728). Oxford University Press. https://doi.org/10.1093/jbcr/irx055
- Wang, A.-J., Wang, T.-E., Lin, C.-C., Lin, S.-C., & Shih, S.-C. (2003). Clinical predictors of severe gallbladder complications in acute acalculous cholecystitis. *World Journal of Gastroenterology*, *9*(12). http://www.wjgnet.com/1007-9327/9/2821.asp