REVIEW ARTICLE

CONTENTS

The surgical *versus* non-surgical approach to the management of acute cholelithiasis within the elderly population: A narrative review

Ehtesam A. Chowdhury[1], Olivia C. Jadeja[2], Surajit Sinha[3]

[1]DEPARTMENT OF GENERAL SURGERY, HEREFORD COUNTY HOSPITAL, WYE VALLEY NHS TRUST, UNITED KINGDOM

[2]DEPARTMENT OF GENERAL SURGERY, SOUTHMEAD HOSPITAL, NORTH BRISTOL NHS TRUST, UNITED KINGDOM

[3]DEPARTMENT OF GENERAL SURGERY, TORBAY HOSPITAL, TORBAY & SOUTH DEVON NHS FOUNDATION TRUST, UNITED KINGDOM

ABSTRACT

Aim: This narrative review aims to critically evaluate current evidence comparing surgical and non-surgical management strategies for acute cholelithiasis in elderly patients, focusing on outcomes, risks, and decision-making factors unique to this population.

Materials and Methods: A comprehensive literature search was performed in MEDLINE®, Embase™, PubMed®, and Google Scholar™ using the terms: "acute cholecystitis," "cholelithiasis," "elderly," "surgical management," "laparoscopic cholecystectomy," "non-surgical," and "percutaneous cholecystostomy." Studies published between 2005 and 2025 were included if they evaluated outcomes such as morbidity, mortality, recurrence, and hospital stay in elderly patients. Both surgical and non-operative management strategies were compared, including antibiotic therapy and cholecystostomy. Articles were selected in accordance with PRISMA principles.

Conclusions: Laparoscopic cholecystectomy remains the gold standard for acute gallstone disease but carries higher morbidity and mortality in elderly patients due to comorbidities and frailty. Non-operative approaches such as percutaneous cholecystostomy, or antibiotic therapy may reduce immediate surgical risk but are associated with higher recurrence and readmission rates. Optimal management requires an individualised, multidisciplinary approach considering physiological reserve, inflammatory markers, and patient preference. More prospective studies are needed to standardise risk stratification and management pathways specific to geriatric patients with acute cholelithiasis.

KEY WORDS: cholelithiasis, laparoscopic cholecystectomy, elderly, non-operative management, percutaneous cholecystostomy

Wiad Lek. 2026;79(2):370-376. doi: 10.36740/WLek/217729 DOI

INTRODUCTION

Cholelithiasis, defined as the formation of gallstones within the gallbladder, affects approximately 10–20% of adults in developed nations, with prevalence increasing sharply with age [1]. It is estimated that over 30% of individuals above 70 years develop gallstones, and women are affected nearly twice as often as men, particularly between the fifth and seventh decades of life due to hormonal and metabolic factors [2, 3].

The aging population has led to a corresponding rise in gallstone-related complications, which commonly include acute cholecystitis, choledocholithiasis, biliary pancreatitis, and cholangitis [4]. In elderly patients, these complications occur more frequently and can present atypically, resulting in delayed diagnosis and increased morbidity [5]. Among those older than 65 years, the incidence of acute cholecystitis is estimated at 6–11 cases per 1,000 persons annually, with associated mortality rates up to 5–10% in complicated cases [6, 7].

Management of acute gallstone disease in older adults presents unique challenges due to altered physiology, frailty, and the higher prevalence of cardiovascular and pulmonary comorbidities [8]. These factors amplify surgical risk and often necessitate consideration of conservative or minimally invasive options. Therefore, balancing the benefits of definitive surgical management against the risks of operative morbidity forms a critical part of clinical decision-making in this group.

AIM

The aim of this review is to compare and critically analyse surgical and non-surgical approaches to the management of acute cholelithiasis in the elderly population, assessing evidence regarding safety, efficacy, recurrence, and overall outcomes to guide optimal, individualised patient care.

Table 1. Inclusion and exclusion criteria for study eligibility

Criteria	Inclusion	Exclusion
Study focus	Acute gall stone disease/cholelithiasis and related complications	Other non-biliary stone disease
Population	Elderly (≥65 years) or studies identifying "geriatric" cohorts	Non-elderly populations
Study type	Original research, clinical trials, meta-analyses, or reviews	Commentaries, abstracts, conference abstracts, letters to the editor
Language and methods	Quantitative/qualitative/mixed methodology in English	Non-English
Timescale	Literature published between 2025 and 2005 (past 20 years)	Literature published before 2005

MATERIALS AND METHODS

This narrative review was conducted following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to ensure transparency and reproducibility.

The search strategy was largely through electronic databases such as MEDLINE®, Embase™, PubMed®, and Google Scholar™. These were systematically searched using combinations of the following Boolean operators: ("surgical" OR "operative" OR "invasive") AND ("non-surgical" OR "non-operative" OR "conservative") AND ("management" OR "treatment") AND ("gall stones" OR "cholelithiasis") AND ("elderly" OR "geriatric")

Search limits included articles published in the English language, original research, reviews, meta-analyses and studies published between January 2005 and January 2025. Additional manual screening of bibliographies was performed to identify relevant studies not indexed by database algorithms.

INCLUSION AND EXCLUSION CRITERIA

Studies were included if they:

1. Focused on elderly patients (≥65 years) diagnosed with acute cholelithiasis or cholecystitis.
2. Reported outcomes of surgical versus non-surgical management.
3. Included quantitative or qualitative assessment of morbidity, mortality, or recurrence.

Studies were excluded if they:

- Focused on non-biliary pathology (e.g., renal or pancreatic stones).
- Were commentaries, letters, or conference abstracts without full data.

Data were extracted from each eligible study regarding:

- Study design and population characteristics
- Age distribution of participants
- Type of management (laparoscopic cholecystectomy, open cholecystectomy, percutaneous cholecystostomy, or antibiotic therapy)
- Key outcomes (mortality, morbidity, recurrence, length of stay, and conversion rate)

No new patient data were collected; therefore, ethical approval was not required. A summary of inclusion and exclusion criteria is presented in Table 1.

REVIEW

The search identified approximately 62 potentially relevant studies. After screening this was narrowed down to 55 records which further reduced to 32 articles after eligibility assessment. After further exclusion, eight studies were assessed and included in this narrative review (fig.1). These were a mixture of cohort studies, systematic reviews, and randomised controlled trials (RCTs) focusing on the management of acute cholecystitis or cholelithiasis in elderly patients. The breakdown of study selection is outline in Figure 1.

PATIENT DEMOGRAPHICS

Across studies, the mean patient age ranged from 67 to 85 years, with most defining "elderly" as ≥65 years. Female predominance was consistent, with women comprising approximately 60–70% of cases [1–3, 8]. The prevalence of comorbid conditions (particularly cardiovascular disease, diabetes, and chronic kidney disease) was reported in up to 75% of elderly cohorts [9].

SURGICAL MANAGEMENT

Laparoscopic cholecystectomy remains the definitive treatment for symptomatic gallstone disease. Conversion to open surgery occurs in 5–15% of elderly cases, often due to dense adhesions, inflammation, or unclear biliary anatomy [10,11]. Conversion to open cholecystectomy can take place with different incisions, however, regardless of how it is achieved, it ultimately provides safe exposure of the gallbladder in difficult cases.

Mortality following laparoscopic cholecystectomy is generally low (0.3–1.5%), but significantly higher in octogenarians or frail patients (up to 5%) [12]. Morbidity is often related to cardiopulmonary complications and wound infection. Studies demonstrate that age, ASA (American Society of

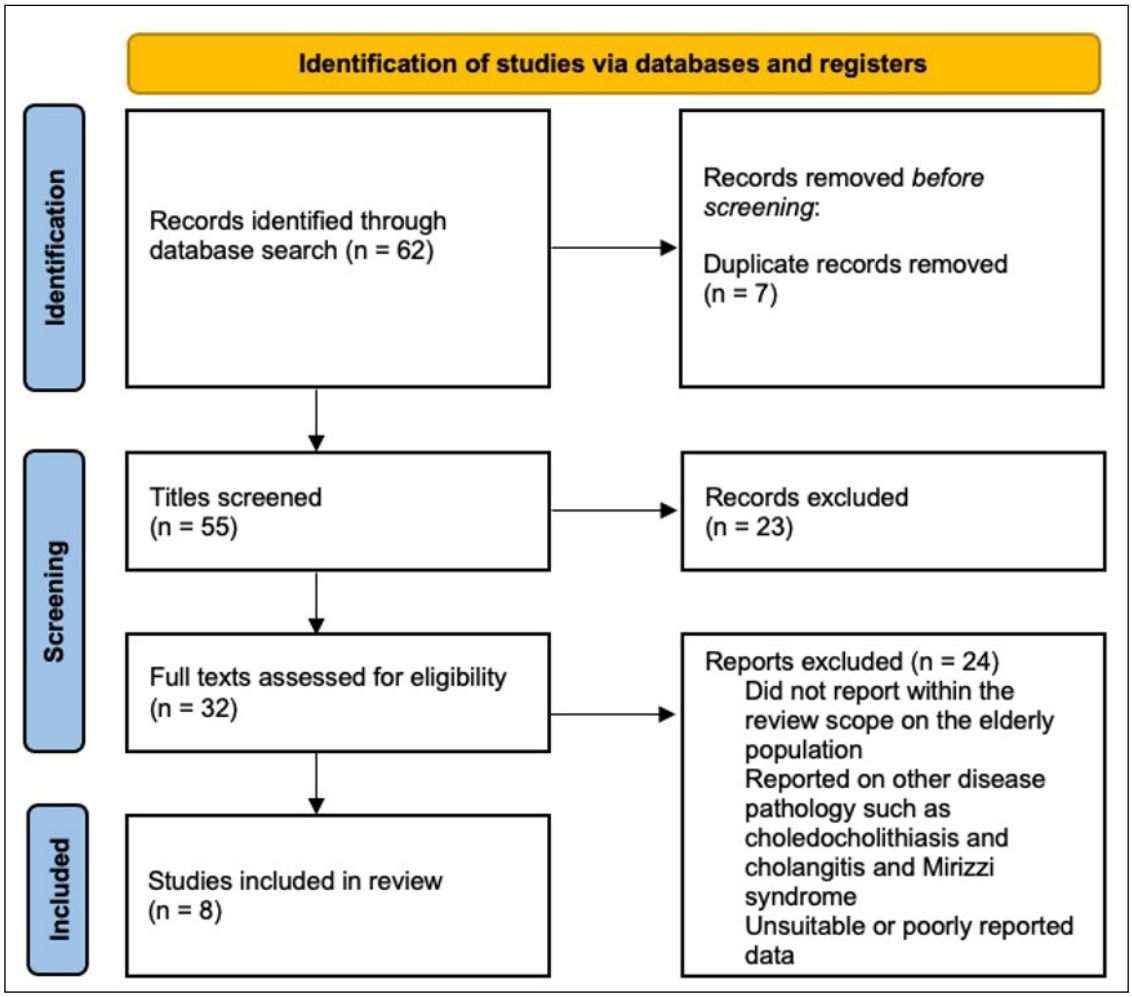

Fig. 1. Flowchart of study selection
Source: Own materials

Anaesthesiologists) score, and elevated inflammatory markers—notably C-reactive protein (CRP) and procalcitonin—predict the likelihood of conversion to open surgery or postoperative complications [13,14].

Laparoscopic techniques require intra-abdominal insufflation pressures of 12–15 mmHg, which can cause hemodynamic instability, reduced venous return, and compromised pulmonary function in the elderly [15]. Thus, reduced-pressure pneumoperitoneum and meticulous anaesthetic monitoring are recommended in high-risk patients.

HOSPITAL STAY AND OUTCOMES

Elective laparoscopic cholecystectomy results in shorter hospital stays (average 2–4 days) compared with urgent or emergency procedures (average 6–10 days) [16]. Studies consistently report that emergency cases have higher morbidity, whereas early elective surgery yields improved outcomes [17].

In elderly populations, prolonged hospitalisation is linked to increased nosocomial infections and deconditioning. Figure 2 summarises trends in length of stay across age groups.

NON-SURGICAL MANAGEMENT

Non-operative approaches include percutaneous cholecystostomy and antibiotic therapy.

Percutaneous cholecystostomy is typically performed under ultrasound or CT guidance using either a transhepatic or transperitoneal approach. Both methods are valid, though the transhepatic route may reduce bile leakage risk, while the transperitoneal approach is preferred when gallbladder distension limits access [18, 19].

Mortality after cholecystostomy ranges from 5–10%, often reflecting underlying illness rather than procedural complications [20]. Readmission and recurrence of biliary symptoms occur in up to 30% of elderly patients treated non-operatively [21].

Antibiotic-only therapy may be suitable for mild to moderate cases, particularly when surgery is contraindicated. However, recurrence rates of 20–25% and mortality up to 27% in severe disease have been reported [22, 23].

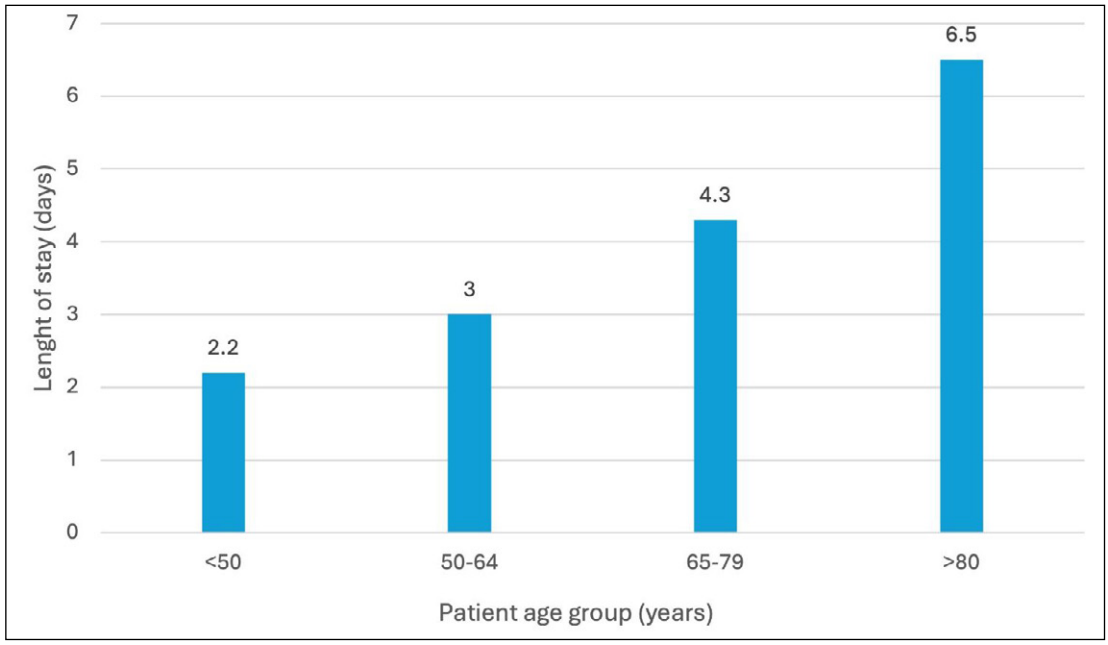

Fig. 2. Average post-operative length of hospital stay (LOS) following laparoscopic cholecystectomy for acute cholelithiasis by age group.
Data derived from Nassar & Richter [9], Lord et al. [10], Lupinacci et al. [11], Rees et al. [16], and Lai et al. [17]. LOS increases progressively with advancing age, reflecting higher comorbidity burden and delayed postoperative recovery among elderly patients

Escartín et al. specifically compared elderly patients managed surgically versus conservatively: Group A (surgical) underwent cholecystectomy or cholecystostomy, and Group B (conservative) received antibiotics alone. The study found lower recurrence and readmission rates in Group A, confirming the superiority of definitive management [22].

DISCUSSION

Acute cholelithiasis and its complications, such as acute cholecystitis, cholangitis, mechanical jaundice, and biliary pancreatitis, represent a significant source of morbidity in the elderly population. The management of these conditions requires a balance between the benefits of early definitive surgical treatment and the risks associated with frailty, comorbidity, and physiological decline.

SURGICAL MANAGEMENT

Laparoscopic cholecystectomy (LC) remains the preferred treatment for acute gallstone disease, supported by international guidelines including NICE and the World Society of Emergency Surgery [7, 8, 12]. Early LC within the first week of symptom onset reduces recurrence and complications, with lower overall cost and improved patient satisfaction compared to delayed or conservative management [16, 17].

Despite its advantages, LC in the elderly carries increased risks due to reduced physiological reserve and higher rates of cardiopulmonary disease. The elderly are more likely to experience perioperative instability related to pneumoperitoneum, as increased intra-abdominal pressure can reduce venous return, compromise cardiac output, and elevate pulmonary pressures [15]. Adjustments such as low-pressure laparoscopy, meticulous anaesthesia, and preoperative optimisation are therefore essential.

Conversion from laparoscopic to open cholecystectomy occurs more frequently in older adults, with rates reaching up to 15% [10]. Predictors include male sex, high body mass index, elevated C-reactive protein (CRP) and procalcitonin levels, thickened gallbladder wall, and severe inflammation [13,14]. These parameters may serve as early warning indicators, facilitating preoperative risk stratification.

NON-SURGICAL MANAGEMENT

When surgery poses unacceptable risk, non-operative strategies become vital alternatives. Percutaneous cholecystostomy (PC) provides effective decompression of the inflamed gallbladder under local anaesthesia. Both transhepatic and transperitoneal routes are widely used. The transhepatic approach offers reduced risk of bile leakage, while the transperitoneal route provides easier access when the gallbladder is markedly distended or hepatomegaly is present [18,19]. Mortality associated with PC is largely reflective of comorbidity rather than procedural complication, ranging between 5–10% [20].

Antibiotic-only therapy may be appropriate for mild cases or as a temporising measure before definitive surgery. However, recurrence and readmission rates remain high, particularly in frail or comorbid patients. Escartín et al. demonstrated that elderly patients managed conservatively with antibiotics alone had higher recurrence (22%) and mortality (27% in severe disease) compared to those undergoing surgical or interventional procedures [22]. These findings underscore that while conservative management may stabilise acute inflammation, it is rarely curative.

LENGTH OF STAY, READMISSION, AND RECURRENCE

Hospital length of stay (LOS) remains a key determinant of outcome and cost-effectiveness. Lupinacci et al. showed that elective LC is associated with the shortest LOS, while urgent and emergency procedures result in longer stays and higher intensive care unit admissions [11]. Elderly patients are particularly vulnerable to hospital-related complications, including infections, delirium, and deconditioning, all of which can prolong recovery [17].

Non-operative management, while initially reducing surgical risk, is frequently followed by readmission due to recurrent biliary symptoms. Studies by Bergman et al. and Pisano et al. reported recurrence rates of 25–31% after conservative therapy, with most episodes occurring within three months [19,20]. Recurrent admissions increase healthcare costs and often lead to delayed, higher-risk surgery, compounding overall morbidity.

PATIENT'S PERSPECTIVE

Patient-reported outcomes (PROs) are increasingly recognised as central to evaluating healthcare quality. Studies assessing LC outcomes have shown that both elderly and younger patients value the experience of the surgeon, avoidance of complications, and rapid recovery as their primary concerns [22, 23]. Elderly patients, in particular, place greater emphasis on continuity of care, communication, and rehabilitation support. A patient-centred approach—focusing on shared decision-making and expectation management—is therefore critical in geriatric surgical care.

CLINICAL IMPLICATIONS

The findings from this review reinforce that chronological age alone should not preclude surgery. Instead, decision-making should be individualised using comprehensive geriatric assessment, frailty scoring, and multidisciplinary input. Early LC should remain the default where feasible, while PC or antibiotic therapy may serve as temporising measures in unstable or high-risk patients. Optimisation before surgery—including correction of fluid and electrolyte imbalance, cardiopulmonary evaluation, and infection control—is key to minimising complications.

LIMITATIONS

This review was limited by heterogeneity among included studies regarding definitions of "elderly," outcome measures, and follow-up durations. Additionally, few randomised controlled trials exist specifically targeting geriatric populations, and most evidence derives from retrospective data. Further research is warranted to establish standardised protocols and predictive models for treatment selection in older adults.

CONCLUSIONS

Surgical and non-surgical management strategies for acute cholelithiasis in the elderly must be individualised, balancing procedural risk against disease recurrence and overall prognosis. Laparoscopic cholecystectomy remains the gold-standard treatment when tolerated, offering definitive resolution and reduced long-term complications. Non-operative management, including percutaneous cholecystostomy and antibiotic therapy, has a role in frail or unstable patients but is associated with higher recurrence and readmission rates.

A multidisciplinary, patient-centred approach is essential to optimise outcomes. Future studies should focus on refining risk stratification models, integrating biomarkers such as CRP and procalcitonin, and developing consensus-based guidelines tailored to the elderly population.

REFERENCES

1. Wilkins T, Agabin E, Varghese J, Talukder A. Gallbladder dysfunction: cholecystitis, choledocholithiasis, cholangitis, and biliary dyskinesia. Prim Care. 2017;44(4):575–597. doi: 10.1016/j.pop.2017.07.002. DOI
2. Shaffer EA. Gallstone disease: Epidemiology of gallbladder stone disease. Best Pract Res Clin Gastroenterol. 2006;20(6):981–996. doi: 10.1016/j.bpg.2006.05.004. DOI
3. Méndez-Sánchez N, et al. Epidemiology of gallstones in aging populations. Curr Opin Gastroenterol. 2020;36(2):71–77. doi: 10.1016/j.gtc.2010.02.003. DOI

4. Kimura Y, Takada T, Kawarada Y, et al. Definitions, pathophysiology, and epidemiology of acute cholangitis and cholecystitis: Tokyo Guidelines. J Hepatobiliary Pancreat Surg. 2007;14(1):15–26. doi: 10.1007/s00534-006-1152-y. DOI
5. Chhoda A, Mukewar S, Mahadev S. Managing gallstone disease in the elderly. Clin Geriatr Med. 2021;37(1):43–69. doi: 10.1016/j.cger.2020.08.005. DOI
6. Riall TS. Evidence-based management of gallstone disease in older adults. JAMA Surg. 2018;153(6):551–552. doi: 10.1177/0885066614554192. DOI
7. NICE. Gallstone disease: diagnosis and management. NICE guideline NG104. 2021. https://www.nice.org.uk/guidance/cg188 (Access: January 2025)
8. Pisano M, Ceresoli M, Cimbanassi S, et al. 2017 WSES and SICG guidelines on acute calculous cholecystitis in the elderly population. World J Emerg Surg. 2019;14:10. doi: 10.1186/s13017-019-0224-7. DOI
9. Nassar Y, Richter S. Management of complicated gallstones in the elderly: comparing surgical and non-surgical treatment options. Gastroenterol Rep. 2019;7(3):205–211. doi: 10.1093/gastro/goy046. DOI
10. Lord AC, Hicks G, Pearce B, Tanno L, Pucher PH. Safety and outcomes of laparoscopic cholecystectomy in the extremely elderly: a systematic review and meta-analysis. Acta Chir Belg. 2019;119(6):349–356. doi: 10.1080/00015458.2019.1658356. DOI
11. Lupinacci RM, Nadal L, Rego R, et al. Surgical management of gallbladder disease in the very elderly. Eur J Gastroenterol Hepatol. 2013;25(3):380–384. doi: 10.1097/MEG.0b013e32835b7124. DOI
12. Kim S, Donahue TR. Laparoscopic cholecystectomy. JAMA. 2018;319(17):1834. doi: 10.1001/jama.2018.3438. DOI
13. Magnano San Lio RM, Barchitta M, Maugeri A, et al. Preoperative risk factors for conversion from laparoscopic to open cholecystectomy: a systematic review and meta-analysis. Int J Environ Res Public Health. 2023;20(1):408. doi:10.3390/ijerph20010408. DOI
14. Yaow CYL, Chong RIH, Chan KS, et al. Should procalcitonin be included in acute cholecystitis guidelines? A systematic review. Medicina (Kaunas). 2023;59(4):805. doi:10.3390/medicina59040805. DOI
15. Zhu Q, Mao Z, Yu B, et al. The safety of carbon dioxide pneumoperitoneum for elderly patients during laparoscopic surgery. Surg Laparosc Endosc Percutan Tech. 2010;20(1):54–57. doi:10.1097/SLE.0b013e3181ce1462. DOI
16. Gurusamy KS, Samraj K, Gluud C, et al. Meta-analysis of randomized controlled trials on the safety and effectiveness of early versus delayed laparoscopic cholecystectomy for acute cholecystitis. Br J Surg. 2010;97(2):141–150. doi:10.1002/bjs.6870. DOI
17. Barka M, Khalil J, Mouna B, et al. Early laparoscopic cholecystectomy for acute cholecystitis: does age matter? Geriatr Gerontol Int. 2023;23(9):671–675. doi:10.1111/ggi.14643. DOI
18. Papis D, Khalifa E, Bhogal R, et al. Is percutaneous cholecystostomy a good alternative treatment for acute cholecystitis in high-risk patients? Am Surg. 2017;83(6):623–627.
19. Bergman S, Al-Bader M, Sourial N, et al. Recurrence of biliary disease following non-operative management in elderly patients. Surg Endosc. 2015;29(12):3485–3490. doi: 10.1007/s00464-015-4098-9. DOI
20. Garcés-Albir M, Martín-Gorgojo V, Perdomo R, et al. Acute cholecystitis in elderly and high-risk surgical patients: is percutaneous cholecystostomy preferable to emergency cholecystectomy? J Gastrointest Surg. 2019;24(12):2579–2586. doi: 10.1007/s11605-019-04424-5. DOI
21. Mora-Guzmán I, Di Martino M, Bonito A, et al. Conservative management of gallstone disease in the elderly population: outcomes and recurrence. Scand J Surg. 2019;108(3):205–210. doi: 10.1177/1457496919832147. DOI
22. Escartín A, González M, Cuello E, et al. Acute cholecystitis in very elderly patients: disease management, outcomes, and risk factors for complications. Surg Res Pract. 2019;2019:9709242. doi: 10.1155/2019/9709242. DOI
23. Parkin E, Stott M, Brockbank J, et al. Patient-reported outcomes for acute gallstone pathology. World J Surg. 2017;41(5):1234–1238. doi: 10.1007/s00268-016-3854-x.

CONFLICT OF INTEREST

The Authors declare no conflict of interest

CORRESPONDING AUTHOR

Ehtesam Ahmed Chowdhury
General Surgery, Hereford County Hospital,
Wye Valley NHS Trust,
Herford, United Kingdom
e-mail: ehtesam.chowdhury@gmail.com

ORCID AND CONTRIBUTIONSHIP
Ehtesam Ahmed Chowdhury: 0009-0008-7820-4966 A B D E F
Olivia C Jadeja: 0009-0007-3139-4371 B D
Surajit Sinha E F

A – Work concept and design, B – Data collection and analysis, C – Responsibility for statistical analysis, D – Writing the article, E – Critical review, F – Final approval of the article

RECEIVED: 13.02.2025
ACCEPTED: 29.01.2026