

A rare cause of mechanical intestinal obstruction: biliary obstruction due to gallstones: our clinical experience with 12 cases and review of the current literature

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ABSTRACT

Aims: Biliary ileus is a rare clinical condition in which gallstones cause mechanical obstruction in the gastrointestinal tract as a result of biliary enteric fistula formation. The aim of this study is to present the clinical characteristics, diagnostic processes and surgical outcomes of cases undergoing surgical treatment due to biliary ileus.

Methods: Twelve patients who underwent surgical treatment for gallstone ileus between February 2019 and June 2025 were retrospectively evaluated. Demographic characteristics, presenting symptoms, laboratory values, type of biliary-enteric fistula, obstruction location, surgical methods used, length of hospital stay and mortality data were analyzed.

Results: The mean age of the patients was 77.4 ± 10.3 years, and 66% were female. All patients presented with symptoms of intestinal obstruction. Contrast-enhanced computed tomography confirmed intestinal obstruction in all cases and enabled preoperative diagnosis in 11 patients. Cholecystoduodenal fistula was the most common fistula type (91.7%). The obstruction was most frequently located in the ileum (41.7%). Enterotomy/enterolithotomy was the most commonly performed surgical procedure (66.6%). The mean hospital stay was 12.1 ± 6.2 days, and one patient (8.3%) died due to postoperative sepsis.

Conclusion: Gallstone ileus is a rare cause of intestinal obstruction, frequently seen in the elderly and requiring surgical treatment. The findings of our study demonstrate that early diagnosis with contrast-enhanced CT and a surgical approach to relieve the obstruction constitute an effective treatment strategy.

Keywords: Gallstone ileus, intestinal obstruction, enterotomy, cholecystoenteric fistula

INTRODUCTION

The most common cause of ileus is small bowel adhesions secondary to previous surgery,¹ while another frequent cause is obstruction due to intraluminal pathologies. Only a small proportion of patients presenting to the emergency department with intestinal obstruction have gallstones. Gallstone ileus accounts for only 1-4% of all intestinal obstructions.² Gallstone ileus is a rare but serious complication of cholelithiasis. Overall, gallstone ileus develops in approximately 0.3-0.5% of all cholelithiasis cases.³ It occurs when gallstones pass into the intestinal lumen and cause mechanical obstruction as a result of a biliary-enteric fistula forming between the gallbladder or bile ducts and a segment of the gastrointestinal tract (most commonly the duodenum, stomach, or colon).^{2,4} Intestinal obstruction usually occurs when the gallstone exceeds 2.5 cm in diameter.⁵ The obstruction most commonly occurs in the terminal ileum, but it can also be seen in the proximal ileum, jejunum, colon or duodenum.⁴ Significantly, approximately 80% of gallstones that pass into the intestinal system via biliary-enteric fistula are spontaneously expelled without causing any symptoms.⁴ However, other cases that cannot

be expelled spontaneously are extracted via enterotomy. The most common fistula locations are cholecystoduodenal and cholecystocolic.⁴

Gallstone ileus is seen more frequently in elderly patients and women because gallstone disease is more common in this population.^{6,7} Advanced age, comorbidities, and delays in diagnosis contribute to higher morbidity and mortality, with reported mortality rates of approximately 15%.⁵

In this study, we present the demographic characteristics, clinical findings, diagnostic methods, surgical management, and outcomes of 12 patients who underwent surgical treatment for gallstone ileus. This case series was prepared in accordance with the PROCESS 2025 guidelines.

METHODS

Patients who underwent surgical treatment for gallstone ileus between February 2019 and June 2025 in a single tertiary care center were retrospectively reviewed. Ethical committee approval was obtained prior to the start of the study Ankara

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Bilkent City Hospital Medical Researches Ethics Committee (Date: 12.11.2025, Decision No: TABED 2-25-1627). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Inclusion criteria for the study were defined as being 18 years of age or older, having a confirmed diagnosis of gallstone ileus based on clinical, radiological [computed tomography (CT), ultrasonography (USG)] and/or intraoperative findings, having undergone surgical treatment and having complete medical records available. Patients who did not receive a diagnosis of biliary obstruction or who were followed up with conservative treatment, cases under 18 years of age, those with a different intraoperative obstruction etiology and patients with incomplete clinical or surgical records were excluded from the study. The diagnostic process was formally evaluated according to national surgical protocols and all consecutive patients meeting the criteria within the specified time frame were included in the analysis. Study data were collected by researchers from the hospital information system and patient files.

Twelve patients were included in the study. The patients' demographic data (age, gender), presenting symptoms (abdominal pain, vomiting, distension, absence of gas or stool passage, etc.), comorbidities, laboratory findings [white blood cell (WBC), C-reactive protein (CRP), liver function tests, electrolytes], imaging findings (CT, USG, direct radiography), location of obstruction (duodenum, jejunum, ileum, colon), fistula type (cholecystoduodenal, cholecystocolic, cholecystogastric, etc.), surgical method used (enterolithotomy, enterolithotomy+cholecystectomy+fistula repair, two-stage approach, etc.) and length of hospital stay and mortality rate were noted.

Surgical procedures were performed under general anesthesia. Patients were placed on the operating table in the supine position and standard sterilization procedures were applied. Laparotomy was performed via a midline incision. Depending on the location of the gallstone, the small bowel segment was carefully evaluated through exploration. Absorbable 3-0 suture material was used for the enterotomy procedure and the intestinal wall was primarily closed in a single or double layer. In cases where cholecystectomy and fistula repair were performed, gallbladder dissection was performed using the classic open technique and the fistula tract was closed with primary sutures. A standardized surgical instrument set was used for surgical procedures; additionally, a monopolar cautery was used as an energy device. The application of a nasogastric tube and drain at the end of the surgery was evaluated according to clinical indication for all patients. In the postoperative period, patients were followed up in the intensive care unit or ward according to the standard protocol.

Postoperative complications were graded according to the internationally accepted Clavien-Dindo classification system. Complications developing in each patient were categorized and recorded according to this system, ranging from class I to class V.

No Artificial Intelligence-based tools, software or language models were used in the preparation of this article during the stages of hypothesis development, data analysis, statistical interpretation or text generation. All content was prepared manually by researchers and evaluated in accordance with scientific accuracy and ethical principles.

Statistical Analysis

Descriptive statistical analyses were used. Continuous variables were expressed as mean±standard deviation, and categorical variables were presented as numbers and percentages. Statistical analyses were performed using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA). Since this was primarily a descriptive study, no comparative statistical tests were applied.

RESULTS

All patients presented with complaints of abdominal pain, nausea, vomiting and inability to pass gas or stool. Different combinations of Rigler's triad [intestinal obstruction, pneumobilia (Figure 1) and ectopic gallstone (Figure 2)] were detected in patients diagnosed by CT. Preoperative gallstone ileus was diagnosed in 11 patients, while 1 patient underwent surgery for acute abdomen and ileus and the diagnosis was confirmed.

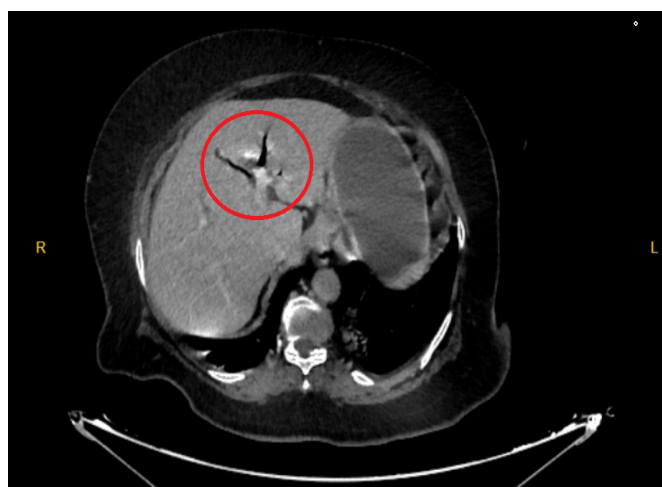


Figure 1. Pneumobilia (enclosed in an ellipse)

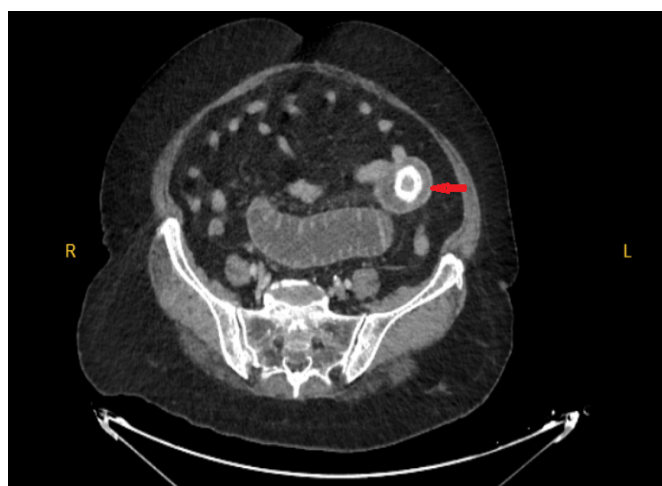


Figure 2. Ectopic gallstone, Double Sign Image (indicated by the arrow)

The demographic, clinical, surgical and laboratory findings of the 12 patients included in the study are presented in Table 1 and Table 2. The mean age of the patients was 77.42±10.30, and 8 (66%) were female. All cases were elderly and had multiple comorbidities. Concomitant diseases included hypertension (n=7, 58.3%), diabetes mellitus (n=4, 33.3%), cardiac disease (n=4, 33.3%) and congestive heart failure or cerebrovascular disease (n=3, 25%). A history of abdominal surgery was present in 4 patients (33.3%).

Table 1. Demographic, clinical, and surgical characteristics of patients

Patient no	Age (years), gender	Comorbidity	CCI, 10 year expected survival ^a	The story of the abdominal surgery	The story of biliyer	Biliary-enteric fistula site	Gallstone obstruction area	The operation performed	Hospitalization period(days)	Mortality
1	82, M	CAD, CVO	6, 2%	Absent	Absent	Choledochoduodenal	Jejunum	Enterotomy	12	Survivor
2	56, F	Absent	1, 96%	Absent	Present	Choledochoduodenal	Ileum	Subtotal cholecystectomy + primary fistula repair + enterotomy	11	Survivor
3	87, F	COPD, HT, CHF, CAD	6, 2%	Present	Present	Choledochoduodenal	Ileum	Enterotomy	10	Survivor
4	70, F	Absent	3, 77%	Absent	Absent	Cholestaticgastritis	Jejunum/proximal ileum	Subtotal cholecystectomy + primary fistula repair + enterotomy	8	Survivor
5	77, F	DM, HT, CHF, Hypothyroidism	5, 21%	Absent	Present	Choledochoduodenal	Jejunum	Enterotomy	10	Survivor
6	73, F	HT, DM	4, 53%	Present	Present	Choledochoduodenal	Ileum	Enterotomy	14	Survivor
7	93, F	CAD, DM, PE, CVO, HT, Alzheimer's disease, Lung cancer	11, 0%	Absent	Absent	Choledochoduodenal	Jejunum	Enterotomy	6	Deceased
8	74, F	COPD, Dementia	5, 21%	Present	Present	Choledochoduodenal	Jejunum/proximal ileum	Enterotomy	7	Survivor
9	88, M	CAD, HT, Alzheimer's disease	7, 0%	Absent	Present	Choledochoduodenal	Ileum	Small intestine resection + anastomosis	18	Survivor
10	69, F	Absent	2, 90%	Absent	Absent	Choledochoduodenal	Jejunum/proximal ileum	Enterotomy	6	Survivor
11	74, M	HT	3, 77%	Present	Absent	Choledochoduodenal	Duodenum and Jejunum	Cholecystectomy + primary fistula repair + enterotomy + gastroenterostomy + nutritional jejunostomy	28	Survivor
12	86, M	HT, DM, CVO, CHF	7, 0%	Absent	Present	Choledochoduodenal	Jejunum	Enterotomy	15	Survivor

*M: Male, F: Female, CAD: Coronary artery disease, CVO: Cerebrovascular event, HT: Hypertension, COPD: Chronic obstructive pulmonary disease, CHF: Congestive heart failure, DM: Diabetes mellitus, PE: Pulmonary thromboembolism, CCI: Charlson Comorbidity Index

Table 2. Laboratory findings of patients

Patient no	Glucose (mg/dl)	Creatinine (mg/dl)	Albumin (g/L)	GGT (U/L)	LDH (U/L)	Total bilirubin (mg/dl)	WBC (x10 ⁹ /L)	Hemoglobin (g/dl)	CRP (mg/L)
1	135	3.19	37	22	300	1.3	19.3	18.7	96
2	175	0.99	52	33	439	1.12	7.6	14.7	10
3	125	1.37	42	35	193	1.34	16.5	12.5	90
4	141	1.28	50	18	347	1.66	14.1	14	40
5	188	1.7	43	38	231	1.66	12.1	13.4	56
6	262	1.21	39	24	192	0.73	12.1	13.9	51
7	224	1.2	34	46	313	1.09	22.8	10	200
8	81	0.66	34	229	258	0.37	15.9	10.8	104
9	144	1.19	42	21	215	1.2	14.7	14.8	109
10	138	0.78	34	30	374	0.28	14.4	13.7	42
11	163	3.52	38	28	248	0.53	23.2	14.8	16
12	138	1.83	30	96	536	0.48	30.2	14.4	252

*GGT: Gamma-glutamyl transferase, LDH: Lactate dehydrogenase, WBC: White blood cell, CRP: C-reactive protein

Seven patients (58.3%) had a previous diagnosis of cholelithiasis or a history of attacks, while five patients (41.7%) did not. The bile-enteric fistula type was predominantly cholecystoduodenal (**Figure 3**) (11 patients; 91.7%); only 1 patient (8.3%) had a cholecystogastric fistula.



Figure 3. Cholecystoduodenal fistula (red ellipse) and fistula tract (red arrow)

The most common site of gallstone obstruction was the ileum (5 patients, 41.7%). This was followed by the jejunum (4 patients, 33.3%) and the jejunum/proximal ileum (3 patients, 25%). One patient had obstruction in both the duodenum and the jejunum.

Laboratory data showed that the mean glucose level of patients at admission was 159.5 ± 47.85 mg/dl, the mean creatinine level was 1.57 ± 0.89 mg/dl, the mean albumin level was 39.58 ± 6.61 g/L, the mean gamma glutamyl transferase (GGT) was 51.67 ± 59.54 U/L, lactate dehydrogenase (LDH) was 303.83 ± 105.42 U/L, total bilirubin was 0.98 ± 0.48 mg/dl, WBC mean $16.9 \pm 6.1 \times 10^9$ /L, hemoglobin mean 13.8 ± 2.18 g/dl, CRP mean 88.83 ± 72.78 mg/L. A marked increase in creatinine levels was detected in four patients, and they presented with acute renal failure due to ileus.

When evaluating the surgical methods applied, the most frequently preferred approach was enterotomy/enterolithotomy (**Figure 4, 5**), which was performed in 8 cases (66.6%). In two patients (16.6%), subtotal cholecystectomy and fistula repair were performed in addition to enterotomy during the same session. In one case (8.3%), complex surgical procedures were performed, including cholecystectomy, fistula repair, gastroenterostomy, and jejunostomy in addition to enterotomy. Furthermore, in one patient (8.3%), small bowel resection and end-to-end anastomosis were performed due to advanced damage detected in the intestinal segment.

The average length of hospital stay for patients was calculated as 12.08 ± 6.23 days. Close monitoring and supportive treatments were administered to all patients during the postoperative period. Postoperative complications were evaluated according to the Clavien-Dindo classification (8); grade V mortality was observed in one patient [case No. 7, 93-year-old female, Charlson Comorbidity Index (CCI) 11, 10-year survival expectation 0% (9)], while Clavien-Dindo grade I-II complications were observed in the other cases. Overall, mortality was low (1/12; 8.3%) with early diagnosis and appropriate surgical approach.

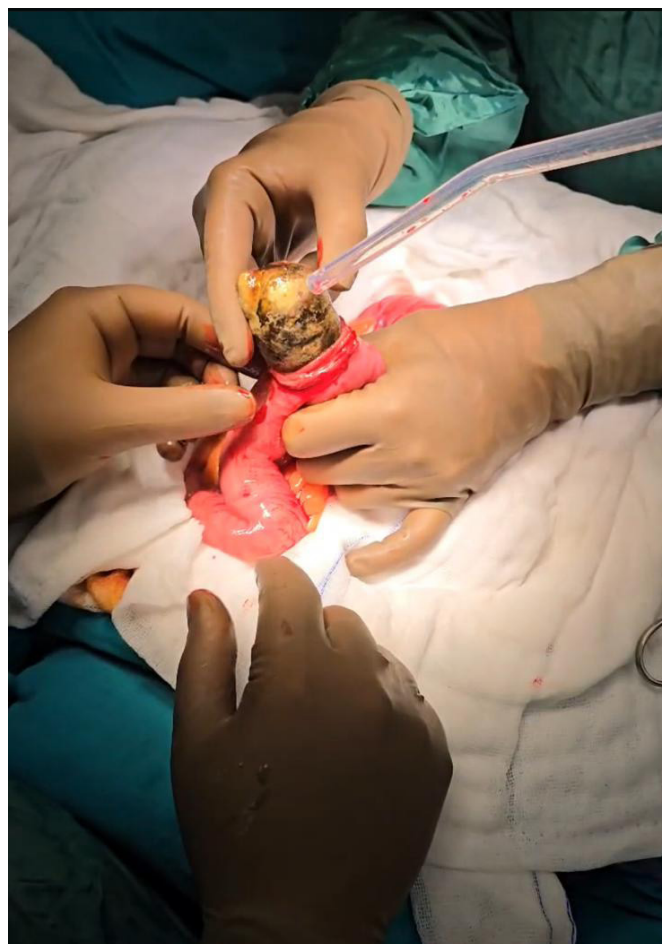


Figure 4. Enterotomy



Figure 5. Gallstone removed by enterotomy

DISCUSSION

Gallstone ileus is a rare cause of intestinal obstruction in elderly and female patients.^{10,11} It tends to occur in this patient group in elderly patients with concomitant cardiovascular, pulmonary or metabolic comorbidities. This increases the surgical risk profile and mortality rates. The reported mortality rates of 12-27% in the literature for cases of gallstone ileus indicate that these patients belong to a high-risk group.^{10,12} In our case series, the average age of the patients was advanced (most >70 years) and a significant proportion had one or more comorbidities. When the CCI was evaluated, it was determined that the majority of our patients had a high CCI score (5 ± 2.69) and consequently, low estimated 10-year survival rates; this shows that the actual surgical risk level of the patients in our series was quite high, consistent with the literature.

The diagnosis of gallstone ileus is often delayed due to nonspecific clinical symptoms and the fact that radiological findings such as Rigler's triad are not always fully apparent.¹¹ Patients may generally present with subacute, intermittent obstruction symptoms (e.g., intermittent abdominal pain, nausea-vomiting, temporary improvements), which can lead to misdiagnosis in the early stages. The literature reports that the rate of correct preoperative diagnosis varies between 30% and 70%, which is relatively low.¹² Consequently, in many cases, a definitive diagnosis can only be made during laparotomy.³ This delay in diagnosis increases the risk of prolonged obstruction, dehydration, electrolyte imbalance and sepsis in patients, making postoperative complications more likely. Indeed, delayed diagnosis and treatment significantly increase mortality; some series have reported mortality rates reaching 30% in cases where a diagnosis could not be made.¹² Therefore, cholelithiasis ileus should be considered in cases of unexplained intestinal obstruction, especially in elderly patients.

Contrast-enhanced CT examination performed in the early period enables the definitive diagnosis of gallstone ileus, allowing surgery to be planned at the appropriate time and thereby significantly reducing morbidity and mortality rates.¹³⁻¹⁵ The patients in our study were diagnosed with contrast-enhanced CT and early treatment strategies were planned based on these imaging findings. CT examination enabled detailed determination of the gallstone size, the anatomical region where fistula formation occurred, the stone's location, and the level of ileus; thus, surgical intervention could be performed without delay and in a targeted manner.

In the literature, obstruction with gallstones most commonly occurs in the ileum (particularly the terminal ileum and ileocecal valve region).¹⁶ According to different sources, approximately 60-70% of cases are obstructed by stone impaction in the terminal ileum region.¹⁷ The jejunum is the second most commonly affected segment of the small intestine, but its rate is lower in the literature (usually around 10-15%).¹⁸ In our study, the terminal ileum was frequently observed as the location of gallstone ileus (41.7%). This was followed by the jejunum (33.3%) and the jejunum/proximal ileum (25%).

In the literature, cholecystoduodenal fistulas are the most common type, with rates reported between 60% and 85%.^{10,19} Cholecystocolic fistulas are generally the second most common type, accounting for approximately 10-20% of cases.³

Choledocho gastric fistulas are rarer and have been reported in most series at a rate of 5-8%.³ In addition, other types of fistulas, such as choledochojejunal and choledochooduodenal, have been described but constitute a very small proportion of total cases.³ Our series is consistent with this distribution: in 11 of 12 patients (91.7%), the fistula causing the passage of gallstones into the intestine was cholecystoduodenal (gallbladder-duodenum), while only 1 patient (8.3%) had a cholecystogastric (gallbladder-stomach) fistula; no cases of cholecystocolic or cholecystojejunal fistula were observed.

In the literature, a significant proportion of patients who develop gallstone ileus may not have a previously diagnosed gallstone disease. Sources indicate that only approximately 50% of cases have a history of gallbladder stones or related clinical history.^{6,12} In other words, approximately half of patients with gallstone ileus present with intestinal obstruction for the first time and have no history of a significant gallstone-related attack in the past. In our study, 58.3% of patients had a known history of cholelithiasis (gallstones) or a history of biliary colic/acute cholecystitis attacks prior to gallstone ileus. The 58.3% rate in our series is similar to the approximately 50% rate reported in the literature. Consistent with the literature data, biliary obstruction can occur in a significant number of patients without a history of gallstones. Therefore, biliary obstruction should be considered in the differential diagnosis of elderly patients presenting with ileus, even if they have no history of biliary disease.

The primary goal in treating gallstone ileus is to rapidly relieve intestinal obstruction. Surgical removal of the stone (enterotomy or enterolithotomy) is the first step in all cases; however, there are different approaches regarding subsequent procedures.^{12,20} Some surgeons prefer to perform cholecystectomy and biliary-enteric fistula repair in the same session (single-stage surgery), while others recommend only stone removal in the first stage and elective cholecystectomy and fistula closure in the second stage (following the patient's recovery), especially in high-risk patients.¹² The literature emphasizes that in most cases, enterotomy to relieve obstruction is sufficient and is associated with lower morbidity compared to other more extensive procedures.^{10,12,21} In our series, the surgical techniques used were tailored to the patient's clinical condition. In the majority of patients, stones were primarily removed via enterotomy. In a limited number of patients who were hemodynamically stable and had an acceptable surgical risk, simultaneous subtotal cholecystectomy and fistula repair were performed. In one case, segmental small bowel resection and anastomosis were required due to intestinal damage caused by the stone. The literature reports that resection may be performed in cases where bowel ischemia or perforation develops due to ileus duration.¹² The absence of significant complications in the cases where we performed single-stage surgery demonstrates that this approach can be safely applied when appropriate patients are selected. Overall, the results in our series suggest that the choice of surgical technique is not decisive for short-term outcomes. Some studies have also shown that the preferred surgical method (enterotomy alone vs. single-stage) does not significantly affect mortality rates.¹¹ The key is to determine the most appropriate strategy based on the patient's overall condition and risk profile. Compared to the mortality rates of 7-30% reported in the literature,¹⁰ the fact that mortality in our series remained at a lower rate of 8% may be due to prompt diagnosis and treatment, as well

as a multidisciplinary approach supported by intensive care. In our postoperative follow-ups, no recurrence of biliary ileus was observed in any patient who underwent enterotomy alone. The literature also indicates that in most cases following enterotomy, the biliary-enteric fistula closes spontaneously and these patients can be followed without experiencing recurrent biliary symptoms.²² However, classical knowledge indicates that gallstone ileus may recur in 5-17% of cases where the gallbladder and fistula are left in place.^{3,20} Therefore, especially in younger patients with a long life expectancy, elective cholecystectomy and fistula repair should be planned for the future if the gallbladder is left in place.

This study is significant in that it presents the clinical and surgical characteristics of patients who underwent surgical treatment for gallstone ileus based on real-life data. All cases were evaluated consecutively, and the diagnostic process was confirmed by contrast-enhanced computed tomography. Critical parameters affecting the surgical decision, such as the obstruction site and fistula type, were reported in detail. This allows the study to provide a robust clinical dataset that contributes to the literature.

Limitations

The retrospective design of this study, the limited sample size and the fact that it was conducted at a single center constitute significant limitations. Due to the limited long-term follow-up data, recurrence and late complications could not be evaluated. As it does not include randomized and prospective comparisons, definitive conclusions cannot be drawn regarding the effectiveness of different surgical approaches.

There are cost differences between surgical methods and it is consistent with the literature that single-stage enterolithotomy may offer advantages with lower resource utilization. This study does not include a direct economic analysis.

Since gallstone ileus is a rare clinical condition, studies with larger sample sizes, multicenter designs and prospective designs are required. Advanced research comparing the long-term outcomes of surgical approaches, recurrence rates and cost-effectiveness analyses will contribute to establishing treatment standards in clinical practice.

CONCLUSION

Biliary obstruction is a rare but serious condition commonly seen in elderly patients with comorbidities. Early diagnosis and prompt surgical intervention are critical in reducing mortality in these cases. As a clinical recommendation, gallstone ileus should be considered in elderly patients presenting with symptoms of intestinal obstruction and a history of gallstones and contrast-enhanced CT should be performed for diagnosis. In treatment, rather than a one-size-fits-all approach, a strategy tailored to the patient's general condition should be followed. In most cases, enterotomy to relieve the obstruction, which has a low mortality rate, should be preferred as the first-line treatment. Additional surgical procedures should be planned according to individualized treatment principles, taking into account the patient's clinical condition and comorbidity burden. This selective approach will minimize complications in the acute period and improve patient outcomes by preventing problems that may arise in the long term.

ETHICAL DECLARATIONS

Ethics Committee Approval

This study was approved by the Ankara Bilkent City Hospital Medical Researches Ethics Committee (Date: 12.11.2025, Decision No: TABED 2-25-1627).

Informed Consent

This retrospective study used pre-existing anonymized patient data. No additional intervention was performed, and there was no direct patient contact. The study was approved by the Ethics Committee, and the requirement for written informed consent was waived by the ethics committee.

Peer Review Process

This manuscript was subject to external peer review.

Conflict of Interest

The authors declare no conflicts of interest related to this study.

Financial Disclosure

The authors received no financial support for the conduct or publication of this research.

Author Contributions

Concept: AY, EŞ, EY, HPÖ, SE; Design: AY, EŞ, EY, HPÖ, SE; Control: AY, EŞ, EY, HPÖ, SE; Resources: AY, EŞ, EY, HPÖ, SE; Materials: AY, EŞ, EY, HPÖ, SE; Data Collection and/or Processing: AY, EŞ, EY, HPÖ, SE; Analysis and/or Interpretation: AY, EŞ, EY, HPÖ, SE; Literature Review: AY, EŞ, EY, HPÖ, SE; Writing the Article: AY, EŞ, EY, HPÖ, SE; Critical Review: AY, EŞ, EY, HPÖ, SE.

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