BOUVERET SYNDROME: DIAGNOSTIC AND THERAPEUTIC CHALLENGES – A RETROSPECTIVE CASE SERIES AND LITERATURE REVIEW

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Abstract

Introduction: Bouveret syndrome is a rare form of gallstone ileus causing gastric outlet obstruction due to gallstone migration through a cholecysto-enteric fistula. Its nonspecific presentation often delays diagnosis, increasing morbidity and mortality, especially in elderly patients with comorbidities.
Material & Method: A retrospective observational study included all patients diagnosed with Bouveret syndrome between January 2018 and December 2024 at the Emergency County Hospital Târgu Mureș, Department of General Surgery I. Diagnosis was based on imaging, endoscopy, or intraoperative findings. Clinical, laboratory, imaging, and therapeutic data were collected from medical records. The primary endpoint was therapeutic success; secondary outcomes included postoperative morbidity, hospital stay, ICU admission, and in-hospital and 30-day mortality. Descriptive statistics used medians, interquartile ranges, and proportions. A narrative literature review was also conducted using PubMed, Web of Science, and Scopus to identify relevant studies on diagnosis and management.
Results: Seven patients were identified, with a median age of 73 years and female predominance (71.4%). All presented with symptoms of gastric outlet obstruction. CT was performed in all cases, identifying Rigler's triad in 71.4% and a cholecysto-enteric fistula in 85.7%. Endoscopic therapy was attempted initially in 71.4% but had limited success (20%). Surgery was required in 85.7%, most commonly enterolithotomy. Outcomes reflected the cohort's high-risk profile, with frequent ICU admissions, major complications in more than half of patients, and a 30-day mortality rate of 42.9%. The literature review supported these findings, emphasizing elderly predominance, CT utility, limited endoscopic success, and frequent need for surgery.
Conclusion: Bouveret syndrome is a rare but severe cause of gastric outlet obstruction. CT is essential for diagnosis, while surgery remains the definitive treatment in most cases. Early recognition and individualized management are crucial to improve outcomes.

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Introduction

Bouveret syndrome is a rare variant of gallstone ileus, accounting for approximately 2–3% of all gallstone-related intestinal obstructions, which themselves represent 1–4% of all cases of intestinal occlusion [1,2]. The condition occurs when a gallstone migrates through a bilioenteric fistula, most commonly cholecystoduodenal, and becomes impacted at the pylorus or proximal duodenum. This fistulous tract develops as a consequence of chronic inflammation, pressure necrosis, and adhesions between the gallbladder and adjacent gastrointestinal structures [3,4]. The result is a rare and potentially life-threatening form of gastric outlet obstruction.

Despite its low incidence, Bouveret syndrome is associated with significant morbidity—up to 60%—and mortality rates ranging from 12% to 20% [5,6]. It predominantly affects elderly women, with an average age of 74 years and a female-to-male ratio of approximately 2:1 [3,5]. The nonspecific nature of its symptoms, including intermittent nausea, vomiting, abdominal distension, and epigastric pain, often delays diagnosis and leads to dehydration, electrolyte imbalance, and weight loss in prolonged cases [6,7].

Imaging studies remain the cornerstone of diagnosis. Computed tomography (CT) is the most sensitive modality for identifying Rigler's triad—pneumobilia, intestinal obstruction, and ectopic gallstone—while magnetic resonance cholangiopancreatography (MRCP) and ultrasound can provide complementary information [8,9]. Endoscopic evaluation can confirm the diagnosis by direct visualization of the obstructing stone and, in selected cases, allows for attempted removal [3,4,9].

If left untreated, the condition may result in persistent gastric outlet obstruction, malnutrition, or intestinal perforation, all contributing to its high morbidity and mortality [5,6]. Moreover, failure to address the underlying fistula may predispose patients to recurrent gallstone ileus, biliary infections, or, rarely, gallbladder carcinoma [10].

Therapeutic management remains challenging and individualized. Minimally invasive techniques, such as endoscopic lithotripsy or percutaneous approaches, are typically considered first-line treatments but show limited success rates—approximately 20–30%—compared with surgical intervention [1,2]. The success of endoscopic treatment largely depends on the size of the stone; those exceeding 2.5 cm are less likely to be extracted intact and may migrate distally, leading to gallstone ileus [3,8]. Consequently, up to 90% of patients ultimately require surgery for definitive treatment [3,6].

The principal surgical procedures include enterolithotomy or gastrotomy, with or without cholecystectomy and fistula repair (the so-called "one-stage procedure"). Although one-stage operations can prevent recurrent biliary complications, they are associated with higher perioperative risk, particularly in elderly or frail patients. Conversely, a two-stage approach, involving initial stone extraction followed by delayed cholecystectomy and potential spontaneous fistula closure, may be safer in selected cases [5,6].

Given the absence of universally accepted treatment guidelines and the scarcity of large clinical series, management of Bouveret syndrome should be tailored to each patient, considering comorbidities, stone characteristics, and institutional expertise [1–10].

Materials and methods

A retrospective observational study was conducted, including all patients diagnosed with Bouveret syndrome over seven years, between January 2018 and December 2024, at the Emergency County Hospital Târgu Mureș, within the Department of General Surgery I, a

tertiary referral center for emergency abdominal surgery. All consecutive cases identified during the study interval were included, given the rarity of the condition. The diagnosis of Bouveret syndrome was established preoperatively based on imaging and/or endoscopic findings or intraoperatively during surgical exploration.

Clinical, laboratory, imaging, operative, and outcome-related data were retrospectively extracted from electronic medical records, operative reports, imaging archives, and discharge summaries. Collected variables included demographic characteristics (age and sex), clinical presentation (duration of symptoms, nausea, vomiting, abdominal pain, abdominal distension, and dehydration), laboratory parameters at admission, diagnostic modalities used (computed tomography, magnetic resonance cholangiopancreatography, abdominal ultrasound, and upper gastrointestinal endoscopy), and therapeutic approach. Treatment-related data focused on the initial management strategy, including attempted endoscopic intervention, type of surgical procedure performed (enterolithotomy or gastrotomy), and whether a one-stage procedure (stone extraction with simultaneous cholecystectomy and fistula repair) or a two-stage approach was adopted.

Postoperative outcomes were analyzed with emphasis on therapeutic success, defined as definitive relief of gastric outlet obstruction without recurrence during the index hospitalization, postoperative morbidity assessed using the Clavien–Dindo classification, length of hospital stay, need for intensive care unit admission, and in-hospital and 30-day mortality. Failure of initial endoscopic management and subsequent need for surgical intervention were recorded as secondary outcomes.

Statistical analysis was primarily descriptive, considering the limited sample size. Continuous variables are presented as medians with interquartile ranges, while categorical variables are expressed as absolute numbers and percentages. When deemed appropriate, exploratory comparisons were performed using Fisher's exact test for categorical variables and the Mann–Whitney U test for continuous variables. A p-value < 0.05 was considered statistically significant.

In parallel, a narrative literature review was undertaken to contextualize the institutional experience. A structured search of PubMed, Web of Science, and Scopus databases was performed using the terms "Bouveret syndrome," "gallstone ileus," "gastric outlet obstruction," and "cholecystoenteric fistula." Relevant systematic reviews, case series, and representative case reports published in English were selected and analyzed. Data from the literature were synthesized and compared with the findings of the present case series, particularly regarding diagnostic strategies, therapeutic approaches, and reported outcomes, and were integrated into the Discussion section.

The study protocol was approved by the Institutional Ethics Committee of the Emergency County Hospital Târgu Mureș. Given the retrospective nature of the study, the requirement for informed consent was waived. All patient data were anonymized prior to analysis, and the study was conducted in accordance with the principles of the Declaration of Helsinki.

Results

During the seven-year study period (2018–2024), seven patients diagnosed with Bouveret syndrome were identified and included in the analysis. The median age of the cohort was 73 years (IQR 70–78), with a predominance of female patients (71.4%). Patients presented with a substantial burden of comorbidities, reflected by a median Charlson Comorbidity Index of 5, while 85.7% were classified as ASA physical status III–IV. Clinically, all patients presented with

symptoms suggestive of gastric outlet obstruction, with persistent vomiting reported in all cases, frequently associated with abdominal pain and abdominal distension. The median duration of symptoms before hospital admission was 7 days (IQR 4.5–12.0).

Radiological evaluation played a crucial role in establishing the diagnosis. Computed tomography (CT) was performed in all patients and allowed identification of characteristic imaging features of gallstone ileus. Rigler's triad was observed in five patients (71.4%), while a cholecystoenteric fistula was identified in six patients (85.7%). The median gallstone size was 40 mm (IQR 35–48). The baseline characteristics, clinical presentation, and diagnostic findings of the study cohort are summarized in Table 1.

Variable	Value
Age, years	73 (70–78)
Female sex, n (%)	5 (71.4)
BMI, kg/m²	26.3 (24.6–29.4)
Charlson comorbidity index	5 (4–6)
ASA physical status III–IV, n (%)	6 (85.7)
Symptom duration before admission, days	7 (4.5–12.0)
Vomiting at presentation, n (%)	7 (100)
Rigler's triad present on CT, n (%)	5 (71.4)
Cholecystoenteric fistula identified, n (%)	6 (85.7)
Gallstone size, mm	40 (35–48)

Table 1. Baseline Characteristics, Clinical Presentation and Diagnostic Findings (n = 7). *Values are presented as median (interquartile range) or number (percentage). BMI - Body mass index

From a therapeutic standpoint, management strategies varied depending on the clinical presentation and feasibility of minimally invasive approaches. An initial endoscopic intervention was attempted in five patients (71.4%), reflecting the current recommendation of considering endoscopic treatment as the first therapeutic option when technically feasible. However, successful endoscopic stone extraction was achieved in only one patient (20%), while the remaining patients required surgical treatment due to failed endoscopic attempts or large stone size (Figures 1-3).

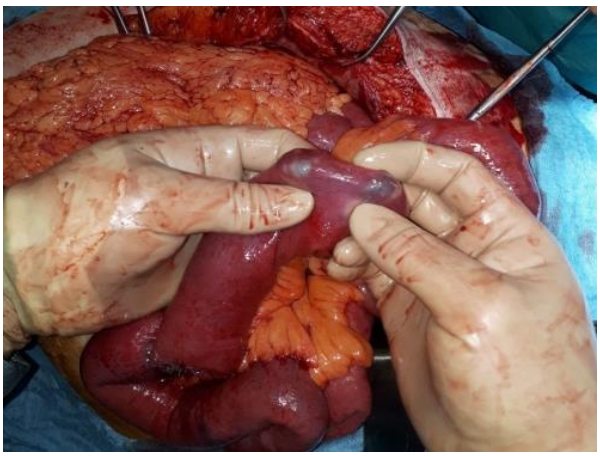

Figure 1. Intraoperative view showing markedly distended proximal small bowel loops with identification of the obstructing gallstone during surgical exploration for Bouveret syndrome.

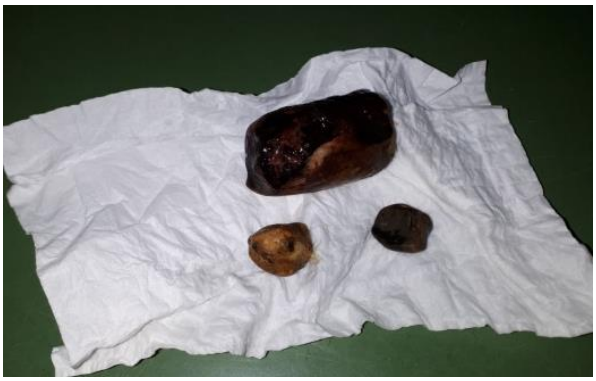

Figure 2. Extracted gallstones following surgical removal, including a large obstructing calculus responsible for gastric outlet obstruction and two smaller associated stones.

Overall, six patients (85.7%) required surgical intervention. Among these, enterolithotomy alone represented the most frequently performed procedure (42.9%), followed by one-stage surgery combining enterolithotomy with cholecystectomy

(28.6%). In one patient, a gastrotomy was performed to allow direct removal of the impacted gallstone from the proximal duodenum. The median operative time was 145 minutes (IQR 121–158)

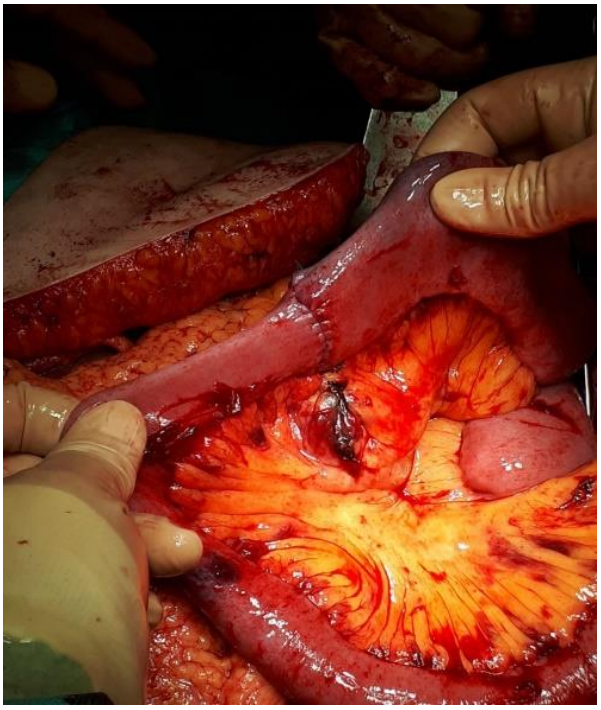

Figure 3. Intraoperative enterotomy following removal of the impacted gallstone, demonstrating the bowel wall and site of obstruction after extraction.

Postoperative outcomes reflected the high-risk profile of the study population. Five patients (71.4%) required postoperative intensive care unit (ICU) admission, with a median ICU stay of 3 days (IQR 2–5). The median hospital length of stay was 11 days (IQR 8–16).

Postoperative morbidity was significant. According to the Clavien–Dindo classification, major complications (grade ≥ III) occurred in four patients (57.1%), while minor complications were observed in two cases. Despite appropriate surgical treatment and postoperative management, in-hospital and 30-day mortality were both 42.9%, reflecting the advanced age and substantial comorbidity burden of the affected population. No recurrence of gastric outlet obstruction was observed during follow-up. The therapeutic strategies and postoperative outcomes are detailed in Table 2.

Variable	Value
Endoscopic attempt performed, n (%)	5 (71.4)
Endoscopic success, n (%)	1 (20.0)
Surgical treatment required, n (%)	6 (85.7)
Enterolithotomy alone, n (%)	3 (42.9)
Gastrotomy, n (%)	1 (14.3)
One-stage surgery (enterolithotomy + cholecystectomy), n (%)	2 (28.6)
Operative time, minutes	145 (121–158)
ICU admission, n (%)	5 (71.4)
ICU stay, days	3 (2–5)
Hospital length of stay, days	11 (8–16)
Major complications (Clavien–Dindo ≥ III), n (%)	4 (57.1)
In-hospital mortality, n (%)	3 (42.9)
30-day mortality, n (%)	3 (42.9)
Recurrence during follow-up, n (%)	0

Table 2. Therapeutic management and clinical outcomes (n = 7)

The literature search identified multiple publications describing Bouveret syndrome, including case reports, case series, and systematic reviews. After screening for relevance and availability of clinical data, eight representative studies were selected for qualitative comparison with the present case series. Across the analyzed studies, Bouveret syndrome predominantly affects elderly patients, with mean ages generally ranging between 70 and 80 years, and a clear female predominance, consistent with the demographic characteristics observed in the present cohort. Most studies report nonspecific clinical symptoms, including persistent vomiting, epigastric pain, and abdominal

distension, reflecting the underlying gastric outlet obstruction.

Regarding diagnostic evaluation, computed tomography is consistently described as the most reliable imaging modality, with the detection of Rigler's triad in approximately 60–80% of cases. These findings are consistent with our results, in which Rigler's triad was detected in 71.4% of patients. Therapeutic strategies reported in the literature emphasize the initial use of endoscopic techniques, although their success rate remains relatively limited. Most studies report endoscopic success rates between 10% and 30%, largely depending on gallstone size and location. Consequently, the majority of patients ultimately require surgical treatment, most commonly enterolithotomy, which represents the safest surgical approach in elderly or high-risk patients. The main findings from the reviewed literature are summarized in Table 3. Overall, the findings of the present case series are consistent with previously published data, particularly regarding the elderly age of affected patients, the diagnostic importance of CT imaging, the relatively low success rate of endoscopic therapy, and the frequent need for surgical intervention. The relatively high morbidity and mortality observed in our series further emphasize the clinical severity of this rare form of gallstone ileus and the importance of early diagnosis and appropriate therapeutic management.

Study	Year	Study type	Number of cases	Endoscopic success (%)	Surgery required (%)
Cappell & Davis [11]	2006	Review	128	10–15	~85
Caldwell et al. [6]	2018	Review	67	29	71
Ong et al. [13]	2020	Systematic review	315	28	72
Haddad et al. [5]	2018	Literature review	64	25	75
Mavroeidis et al. [15]	2013	Review	43	21	79
Nickel et al. [12]	2013	Case series + review	36	17	83
Jin & Naidu [3]	2021	Case report review	30	20	80
Wang et al. [7]	2019	Case report review	28	18	82

Table 3. Summary of major studies on Bouveret syndrome

Discussions

Bouveret syndrome represents a rare and complex manifestation of gallstone disease, characterized by gastric outlet obstruction caused by the migration of a gallstone through a bilioenteric fistula into the duodenum or pylorus. Although gallstone ileus accounts for approximately 1–4% of all mechanical bowel obstructions, Bouveret syndrome represents only a small fraction of these cases, making it an uncommon but clinically important condition [5,6]. Due to its rarity and

nonspecific clinical presentation, diagnosis is frequently delayed, which contributes to the significant morbidity and mortality associated with the disease.

The demographic characteristics observed in the present series are consistent with those described in the literature. Bouveret syndrome predominantly affects elderly patients and shows a clear female predominance, reflecting the epidemiology of gallstone disease [5,11]. In our cohort, the median age was 73 years and the majority of patients were female, findings that closely mirror those reported in large reviews of the condition. Advanced age and a high burden of comorbidities are common in this patient population and significantly influence both therapeutic decision-making and postoperative outcomes. The elevated Charlson comorbidity scores and the predominance of ASA III–IV patients observed in our study further emphasize the high-risk clinical profile typically associated with this condition.

Clinically, the presentation of Bouveret syndrome is often nonspecific and usually related to gastric outlet obstruction. Persistent vomiting is the most commonly reported symptom and was present in all patients in our series. Other symptoms such as abdominal pain, abdominal distension, and dehydration are also frequently described [3,6]. Because these manifestations may mimic other causes of gastric outlet obstruction, establishing the diagnosis based solely on clinical findings can be difficult.

Radiological evaluation plays a critical role in the diagnostic process. Computed tomography has become the preferred imaging modality due to its high sensitivity and ability to identify the classical findings associated with gallstone ileus [9]. In particular, Rigler's triad—consisting of pneumobilia, intestinal obstruction, and an ectopic gallstone—remains a key radiological sign. Previous studies have reported detection rates of approximately 60–80% for this triad when CT imaging is used [9,13]. In our study, Rigler's triad was identified in more than two-thirds of the patients, further confirming the central role of CT imaging in the diagnostic workup of suspected Bouveret syndrome.

The management of Bouveret syndrome remains controversial, largely due to the rarity of the condition and the absence of standardized treatment guidelines. Many authors recommend attempting endoscopic treatment as the initial therapeutic approach, particularly in elderly patients or those with significant comorbidities [6,13]. Endoscopic techniques may include direct stone extraction or fragmentation using mechanical, laser, or electrohydraulic lithotripsy. However, the success of these procedures is highly dependent on stone size and anatomical location.

The success rate of endoscopic therapy reported in the literature is relatively low, generally ranging between 10% and 30% [6,13]. Large gallstones, which are common in Bouveret syndrome, significantly reduce the likelihood of successful endoscopic extraction. Stones exceeding 2.5–3 cm are particularly difficult to remove endoscopically and often require surgical intervention [6]. In our series, endoscopic treatment was attempted in the majority of patients but was successful in only one case, which is consistent with previously reported outcomes.

Because of the limited effectiveness of endoscopic techniques, surgery remains the definitive treatment for most patients with Bouveret syndrome. The primary objective of surgical management is the removal of the obstructing gallstone. Enterolithotomy is the most commonly performed procedure and is generally considered the safest option in elderly or high-risk patients due to its shorter operative time and lower physiological stress [5,17]. More extensive procedures, such as one-stage surgery including enterolithotomy, cholecystectomy, and fistula repair, remain controversial.

The role of simultaneous cholecystectomy and fistula repair has been widely debated. Proponents of the one-stage approach argue that it prevents recurrent gallstone ileus, biliary infections, and potential malignant transformation of the gallbladder [5]. However, this strategy may significantly prolong operative time and increase perioperative risk in patients with multiple comorbidities. As a result, many surgeons prefer a staged approach consisting of initial stone removal followed by delayed biliary surgery if necessary. Several studies suggest that spontaneous closure of the bilioenteric fistula may occur after removal of the obstructing gallstone, particularly when the cystic duct remains patent and no residual stones are present [5,6].

The postoperative outcomes observed in our series reflect the severe clinical condition of the affected patients. A high proportion of patients required intensive care monitoring following surgery, and major postoperative complications were relatively common. Similar findings have been reported in previous studies, where morbidity rates remain substantial due to the advanced age and comorbidity burden of the patients [6,11]. Mortality rates reported in the literature range between approximately 12% and 24% [5,6]. The higher mortality observed in our cohort likely reflects the advanced age of the patients, the emergency presentation of the disease, and the presence of multiple comorbid conditions.

The literature review conducted as part of the present study highlights the limited availability of large clinical series addressing Bouveret syndrome. Most publications consist of isolated case reports or small retrospective cohorts, which makes it difficult to establish standardized treatment algorithms. Nevertheless, several consistent observations emerge across the literature, including the predominance of elderly female patients, the diagnostic value of CT imaging, the relatively low success rate of endoscopic therapy, and the frequent need for surgical intervention [5,6,13].

Taken together, the findings of our study are consistent with previously published data and reinforce the importance of maintaining a high index of suspicion when evaluating elderly patients presenting with gastric outlet obstruction. Early recognition and appropriate imaging are essential for timely diagnosis, while therapeutic strategies should be individualized based on the patient's clinical condition, stone size, and available expertise.

Although limited by the retrospective nature of the analysis and the small sample size inherent to such a rare condition, the present study contributes additional clinical data to the existing literature. By combining institutional experience with a focused literature review, our findings provide further insight into the diagnostic challenges and therapeutic considerations associated with Bouveret syndrome.

Conclusions

Bouveret syndrome is a rare but severe cause of gastric outlet obstruction that predominantly affects elderly patients with multiple comorbidities. Diagnosis relies mainly on computed tomography, which plays a key role in identifying the obstructing gallstone and associated bilioenteric fistula. Although endoscopic techniques may be attempted initially, surgical intervention remains the definitive treatment in most cases. Early recognition and individualized management are essential to improve outcomes in this challenging clinical condition.

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