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Gallstone Ileus With Prior CT Showing the Stone Before Fistula Formation: A Case Report

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Abstract

Gallstone ileus is an uncommon cause of mechanical bowel obstruction, and imaging obtained before the fistula forms is rarely available. A 98-year-old woman with known cholelithiasis presented with one to two weeks of decreased appetite, nausea, vomiting, and vague abdominal pain. Contrast-enhanced CT showed small bowel obstruction, pneumobilia, a cholecystoduodenal fistula, and a 3.6 cm hypoattenuating gallstone at the jejunal transition point. CT obtained 10 months earlier, during an emergency department visit for epigastric pain, had shown a large gallstone within the gallbladder with no pneumobilia or fistula, and she had been referred for surgical evaluation. She underwent enterolithotomy, and a 4.5 cm gallstone was removed from the jejunum approximately 50 cm distal to the ligament of Treitz. Cholecystectomy and fistula repair were deferred because of her age and comorbidities, and she was tolerating a diet at the two-week follow-up. The two CT examinations bracket the interval in which the fistula formed and the stone migrated. A large gallstone found on imaging is an opportunity to discuss elective cholecystectomy when surgical risk is acceptable.

Categories: Radiology, General Surgery, Gastroenterology
Keywords: cholecystoenteric fistula, comparative historical imaging, contrast-enhanced ct, enterolithotomy, gallstone ileus, pneumobilia, rigler's triad, small bowel obstruction

Introduction

Gallstone ileus is an uncommon cause of mechanical bowel obstruction. A nationwide analysis of U.S. admissions found that it caused 0.095% of mechanical bowel obstructions, lower than earlier estimates [1]. Older reviews report that it causes up to 4% of bowel obstructions overall and 25% of small bowel obstructions in patients older than 65 years, with mortality of 12% to 27% [2]. Most patients are older women, with a female-to-male ratio of approximately 3.5:1 [2]. Chronic inflammation or pressure on the gallbladder wall allows a gallstone to erode into the adjacent bowel, most often the duodenum (75% to 83% of cases), and stones 2.5 cm or larger are prone to impaction [3].

Rigler's triad of pneumobilia, small bowel obstruction, and an ectopic gallstone was identified on 4 of 27 plain radiographs (14.8%) and 21 of 27 CT examinations (77.8%) in one series [4]. In another series, CT had a sensitivity of 93% and an accuracy of 99% for gallstone ileus [5]. We report the case of a 98-year-old woman in whom CT obtained 10 months before presentation showed a large gallstone within the gallbladder before fistula formation.

Case Presentation

A 98-year-old woman with cholelithiasis, hypertension, hyperlipidemia, type 2 diabetes mellitus, and a remote cesarean section was transferred from an outside emergency department (ED), accompanied by her daughter. Ten months earlier, she had presented to the ED with three to four months of epigastric pain. Ultrasound and CT at that visit showed cholelithiasis with mild pericholecystic inflammatory change, and she was referred for outpatient surgical evaluation. No cholecystectomy was performed, and the available records document no further evaluation for abdominal symptoms in the interval. Her home medications were amlodipine, hydrochlorothiazide, metoprolol succinate, glimepiride, and lovastatin. She lived in the community with family support, and no formal functional assessment or American Society of Anesthesiologists class was recorded.

She reported one to two weeks of decreased appetite, nausea, intermittent vomiting, and vague abdominal pain. Her last bowel movement, on the day before presentation, was normal, and she had last passed flatus about three days earlier. CT obtained at the referring ED showed marked gastric distention, and a nasogastric tube returned 2 L of bilious fluid. No other treatment before transfer was documented.

After decompression, she was alert, in no acute distress, and without abdominal pain. Temperature was 36.1°C, heart rate 79 beats/minute, blood pressure 112/56 mmHg, respiratory rate 14 breaths/minute, and oxygen saturation 100% on room air. The abdomen was soft, non-distended, and non-tender.

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The white blood cell count was normal at 7.5 × 10^9/L, and electrolytes showed a hypochloremic hypokalemic metabolic alkalosis consistent with protracted vomiting (Table 1). Lactate was normal at 1.2 mmol/L, liver tests were normal, and lipase was mildly elevated without clinical or CT evidence of pancreatitis. C-reactive protein was not measured.

Test	Patient value	Reference range
White blood cell count	7.5 × 10^9/L	4.0–11.0 × 10^9/L
Neutrophils	83.5%	40–70%
Hemoglobin	11.9 g/dL	12.0–15.5 g/dL
Sodium	132 mmol/L	135–145 mmol/L
Potassium	3.4 mmol/L	3.5–5.0 mmol/L
Chloride	85 mmol/L	98–107 mmol/L
Total carbon dioxide	35 mmol/L	22–29 mmol/L
Glucose	193 mg/dL	70–99 mg/dL
Blood urea nitrogen	30 mg/dL	7–20 mg/dL
Creatinine	0.9 mg/dL	0.6–1.2 mg/dL
Lactate	1.2 mmol/L	0.5–2.0 mmol/L
Lipase	115 U/L	Above the laboratory reference range
Alanine aminotransferase	26 U/L	7–56 U/L
Aspartate aminotransferase	18 U/L	10–40 U/L
Alkaline phosphatase	114 U/L	44–147 U/L
Total bilirubin	0.6 mg/dL	0.1–1.2 mg/dL

TABLE 1: Laboratory values at presentation.

Laboratory values obtained at presentation. Reference ranges are standard adult values and may differ from those of the performing laboratory. C-reactive protein was not measured.

Imaging findings

Right upper quadrant ultrasonography showed cholelithiasis without acute cholecystitis, with a 3 mm gallbladder wall and a 5 mm common bile duct. Chest radiography was non-contributory.

Contrast-enhanced CT of the abdomen and pelvis showed moderately severe gastric distention and dilated small bowel loops with an abrupt transition to decompressed distal bowel. A 3.6 cm rounded hypoattenuating intraluminal structure at the transition point was favored to represent an ectopic gallstone (Figure 1). The decompressed, thick-walled gallbladder communicated with the second portion of the duodenum, consistent with a cholecystoduodenal fistula (Figure 2). New moderate bilobar pneumobilia, not shown in the figures, completed Rigler's triad. The patient had no history of biliary instrumentation, and no additional imaging was performed.

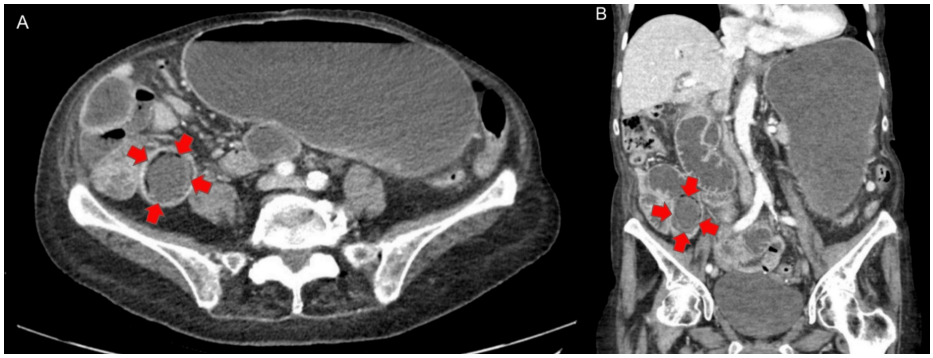


FIGURE 1: Ectopic gallstone causing small bowel obstruction at the transition point.

Axial (A) and coronal (B) contrast-enhanced CT images of the abdomen and pelvis at presentation show a 3.6 cm rounded hypoattenuating intraluminal gallstone (red arrows) at the jejunal transition point.

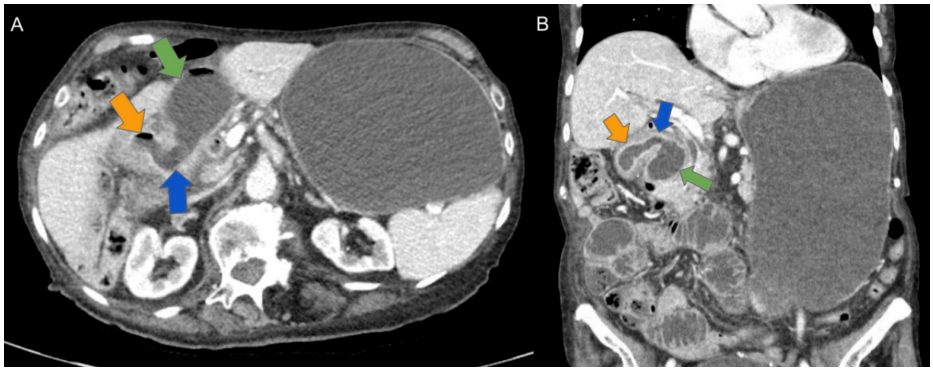


FIGURE 2: Cholecystoduodenal fistula with a decompressed gallbladder.

Axial (A) and coronal (B) contrast-enhanced CT images of the abdomen and pelvis at presentation show a decompressed thick-walled gallbladder (orange arrow) with surrounding inflammatory change. The gallbladder communicates (blue arrow) with the adjacent second portion of the duodenum (green arrow). Moderate to severe gastric distention and multiple dilated small bowel loops are also present.

The CT from 10 months earlier showed a single large gallstone within the gallbladder, with mild pericholecystic inflammatory change and no pneumobilia, fistula, or bowel obstruction (Figure 3). The stone was not measured in the report of the prior examination.

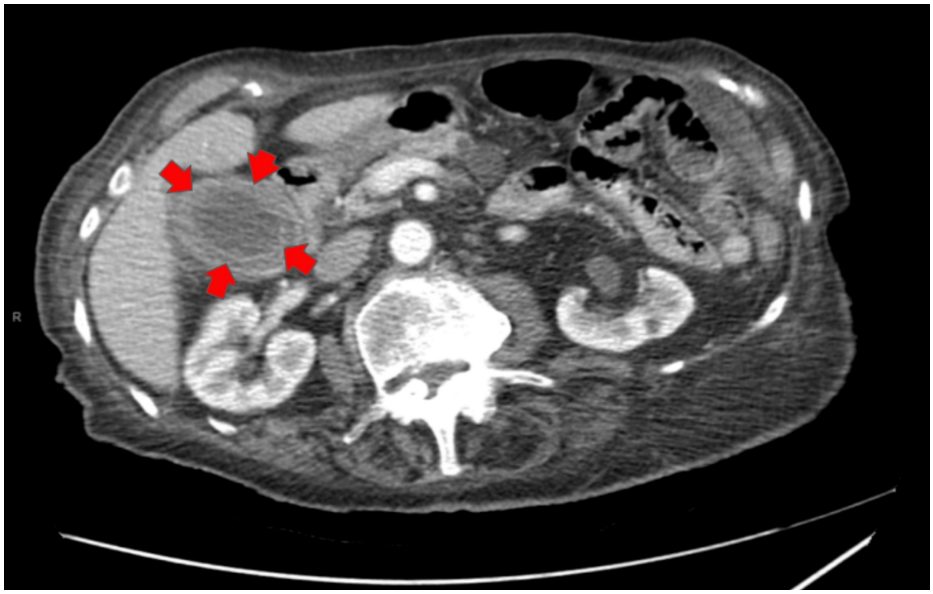


FIGURE 3: Gallstone within the gallbladder 10 months before presentation.

Axial contrast-enhanced CT image of the abdomen and pelvis obtained 10 months before presentation shows a single large gallstone (red arrows) within the gallbladder. Mild pericholecystic inflammatory change is present, without pneumobilia or fistula. The stone was not measured in the original report.

Management and outcome

She was admitted to the surgical intensive care unit for nasogastric decompression and intravenous fluids. After a discussion of operative risk with her family, she underwent exploratory laparotomy on the day after presentation. A 4.5 cm gallstone was impacted in the jejunum approximately 50 cm distal to the ligament of Treitz. It was extracted through a 2 cm longitudinal enterotomy, which was closed transversely in two layers. The bowel was viable, and no resection was required. Because of her age and comorbidities, cholecystectomy and fistula repair were deferred. Pathology received multiple green-to-black irregular calculi measuring 0.1 to 4.9 cm, with a gross description only and no composition analysis.

The nasogastric tube was removed, and her diet was advanced after she passed flatus. She did not pass a voiding trial and was discharged home with an indwelling urinary catheter on postoperative day three, four days after admission. At the two-week postoperative visit, she was tolerating a diet with normal bowel function and a healing incision, with decreased appetite and mild weakness. Office follow-up in one month was planned. Table *2* presents a clinical timeline of the case.

Time point	Event
10 months before presentation	ED visit for three to four months of epigastric pain. Ultrasound and CT showed cholelithiasis with mild pericholecystic inflammatory change and no pneumobilia or fistula. Discharged with a referral for outpatient surgical evaluation
1 to 2 weeks before presentation	Onset of decreased appetite, nausea, intermittent vomiting, and vague abdominal pain
Day 0	Transfer from an outside ED. CT showed gallstone ileus. Nasogastric decompression returned 2 L. Admission to the surgical intensive care unit
Day 1	Exploratory laparotomy with enterolithotomy. A 4.5 cm jejunal gallstone was removed
Day 4 (postoperative day 3)	Discharged home with an indwelling urinary catheter after a failed voiding trial
Postoperative day 13	Surgical follow-up visit. Tolerating a diet with normal bowel function and a healing incision

TABLE 2: Clinical timeline.

ED: emergency department

Discussion

In this patient, CT obtained 10 months before presentation showed a large gallstone within the gallbladder with mild inflammation and no pneumobilia or fistula. CT at presentation showed a cholecystoduodenal fistula, new pneumobilia, and the stone obstructing the jejunum. The fistula formed, and the stone migrated between the two examinations.

Patients with the subacute form of gallstone ileus may continue to pass flatus [2]. This patient had a normal bowel movement the day before presentation, a normal white blood cell count and lactate, and a soft abdomen despite marked distention on CT. Proximal small bowel obstruction typically causes prominent vomiting with minimal abdominal distension [6], and her examination followed nasogastric removal of 2 L of fluid.

Only 10% to 15% of gallstones are calcified enough to be seen on radiography, and noncalcified stones are often isoattenuating to bile on CT [7]. Pneumobilia without prior biliary instrumentation strongly suggests an internal biliary fistula [8]. Stone composition was not analyzed, and attenuation on conventional CT is an imperfect guide to composition. Dual-energy CT has been studied for this purpose [7,9]. The stone measured 3.6 cm on CT and 4.5 cm at surgery, a difference that measurement plane and ex vivo measurement may explain. By either measurement, it exceeded the 2.5 cm size prone to impaction [3].

Gallstones impact most often in the ileum (50.0% to 60.5% of cases) and less often in the jejunum (16.1% to 26.9%) [3]. The differential diagnosis includes adhesions, hernia, malignancy, Crohn disease, and volvulus [6], but pneumobilia and an ectopic intraluminal stone favor gallstone ileus.

Prior imaging has aided the diagnosis of gallstone ileus in earlier reports. Roesslhuemer et al. described a radiopaque gallstone within the gallbladder on CT seven months before a terminal ileal gallstone ileus [10], and Alhomaid et al. identified a calcified gallbladder stone on CT obtained six years earlier [11]. Neither report described whether pneumobilia or a fistula was present on the earlier examination. In the present case, the earlier CT was obtained for symptomatic gallstone disease and showed neither. Comparison through the electronic medical record showed similar rounded morphology of the two stones, which supported a gallbladder origin of the obstructing stone.

In a review of 1,001 cases, mortality was 11.7% after enterolithotomy alone and 16.9% after a one-stage procedure that added cholecystectomy and fistula repair [12]. Recurrent gallstone ileus after enterolithotomy alone is reported in less than 5% [12] to 8% [3] of patients. After small bowel impaction, the fistula is expected to close spontaneously, although a persistent fistula carries risks of recurrence and carcinoma [3]. Because ultrasound still showed cholelithiasis, this patient's recurrence risk is not negligible. Remaining life expectancy for a 98-year-old woman in the United States is approximately 2.6 years [13]. Over that horizon, we believe that interval cholecystectomy and fistula repair are best reserved for recurrent symptoms, and that imaging is best guided by symptoms.

This patient's stone was already large when first imaged, and she was symptomatic at that time. Gallstones 3 cm or larger have been associated with a higher risk of gallbladder cancer than stones smaller than 1 cm [14]. We offer as an interpretation beyond the findings of this case that elective cholecystectomy can reasonably be discussed when imaging shows a gallstone of 3 cm or more in a patient with acceptable surgical risk, even without symptoms. In frail patients, observation with counseling about warning symptoms is reasonable. She had been referred for surgical evaluation after the earlier visit, but the available records do not show whether that evaluation occurred.

This report is limited by its single-patient design and by the absence of interval imaging, so the timing of fistula formation and stone migration cannot be determined. The stone was not measured on the prior CT; the CT and operative measurements differed, and composition was not analyzed. The available operative findings do not describe assessment of the fistula or a search for additional stones, so the fistula diagnosis rests on CT. Documented follow-up extends to two weeks after surgery.

Conclusions

CT obtained 10 months before presentation showed a large gallstone within the gallbladder before fistula formation, and comparison with the presenting CT supported the gallbladder origin of the obstructing stone. Recognition of Rigler's triad on CT is helpful for timely diagnosis, and enterolithotomy alone was a reasonable approach at 98 years of age. When a large gallstone is found in a patient with acceptable surgical risk, the finding is an opportunity to discuss elective cholecystectomy.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Adyasha M. Pradhan, Thomas DiFilippo, Indraneil Mukherjee, Gail Yarmish

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Supervision: Gail Yarmish

Disclosures

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