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Case Report

Gallstone ileus: a rare cause of intestinal obstruction

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ABSTRACT

Gallstone ileus is a rare complication of choledocholithiasis, characterized by mechanical intestinal obstruction caused by the impaction of a gallstone within the gastrointestinal tract. Patients typically present with nonspecific symptoms, which may be intermittent due to the movement of the calculus along the gastrointestinal tract. We report the case of an 89-year-old patient who presented to our emergency department with intestinal obstruction caused by a gallstone. After hemodynamic stabilization, the patient underwent exploratory laparotomy, followed by enterolithotomy, without addressing the cholecystoduodenal fistula. This condition presents a diagnostic challenge due to its rarity, nonspecific clinical presentation, and the intermittent nature of the disease (tumbling phenomenon). As such, a high index of suspicion is essential, particularly in elderly patients with a history of gallbladder lithiasis. The main controversy in surgical treatment revolves around the extent of surgery and the timing of the procedures. In most cases, isolated enterolithotomy is recommended, as it is a less invasive approach, reducing the morbidity and mortality associated with this condition.

Keywords: Gallstone ileus, Tumbling phenomenon, Enterolithotomy, One-stage procedure, Two-stage procedure

INTRODUCTION

Choledocholithiasis is a major cause of morbidity worldwide, leading to acute conditions affecting the pancreas, bile ducts, liver or gastrointestinal tract.[1,2]

Gallstone ileus is a rare complication of choledocholithiasis, characterized by mechanical intestinal obstruction due to the impaction of a gallstone within the gastrointestinal tract.[3-5] It was first described in 1654 by Dr. Erasmus Bartholin, who identified a cholecystoenteric fistula and a calculus in the gastrointestinal tract of a patient during an autopsy.[6,7]

In most cases the stone enters the gastrointestinal tract through a bilioenteric fistula between the gallbladder and duodenum (60% of cases).[3,7,8] Patients present with non-specific symptoms which can be intermittent due to the progression of the calculus along the gastrointestinal tract.[5,8] Although the approach to biliary ileus remains controversial, resolving the obstruction remains the cornerstone of treatment.[6]

We present the case of an 89-year-old patient who came to our emergency department with abdominal pain, nausea, and vomiting, initially attributed to renal failure. However, further investigation revealed that the symptoms were due to an intestinal obstruction caused by a gallstone.

CASE REPORT

An 89-year-old woman, presented to our emergency department with a three-day history of nausea, vomiting and abdominal pain, along with reduced urinary output. She confirmed experiencing constipation, bloating, and not passing flatus for at least three days and denied prior history of cholelithiasis- related events. This is an obese

patient with T2DM, hypertension, dyslipidemia, chronic kidney disease and the surgical history of the hysterectomy.

Upon assessment, the patient was normotensive, tachycardic, oliguric, and afebrile. Her skin and mucous membranes appeared pale and anicteric. Physical examination revealed moderate abdominal distension, mild tenderness in the epigastric region and right hypochondrium, with no rebound tenderness.

Laboratory investigation indicated leukocytosis (19×10^9/L) with neutrophilia (90.4%), impaired renal function (creatinine 3.11 mg/dL, urea 177 mg/dL), elevated levels of C-reactive protein (CRP) (42 mg/L) and procalcitonin (0.83 ng/mL) and pyuria. Blood gas analysis showed metabolic acidemia and hyperlactacidemia. Abdominal ultrasound revealed only gallbladder microlithiasis with no other significant findings. The patient was admitted with a presumptive diagnosis of urinary infection and started on volume repletion, empirical antibiotic therapy and nasogastric intubation. Urine and blood cultures were requested.

A *Pseudomonas aeruginosa* strain was isolated from the patient's urine and the antibiotic changed according to the antimicrobial susceptibility test.

On the second day of hospitalization, an assessment by a surgeon was requested. On physical examination, the patient was apyretic, anicteric, hemodynamically stable, and diuresis was maintained. The abdomen was less distended, with normal bowel sounds, and palpation did not elicit pain. The patient denied nausea and reported passing stools. Analytically, there was an improvement in inflammatory markers, renal function, and metabolic acidosis. A probable subocclusive condition due to adhesions was considered, and it was suggested to clamp the nasogastric tube and initiate a liquid diet, which the patient tolerated.

One week after admission, an abdominal computed tomography (CT) scan was performed due to clinical deterioration, including ongoing nausea and vomiting, worsening metabolic acidosis, and declining hemodynamic status. The CT report revealed thickening of the gallbladder and adjacent duodenal wall, pneumobilia, and a 30-mm stone causing dilation of the small intestine loops (Figure 1 and 2).

Following hemodynamic optimization, an exploratory laparotomy was performed, confirming the presence of a stone in the jejunum (Figure 3). An enterolithotomy was then carried out without addressing the fistula (Figure 4). Postoperatively, the patient developed acute pulmonary edema with respiratory failure, requiring admission to the intensive care unit for two days. She was discharged on the 8th postoperative day with a referral for follow-up to a general surgery appointment. The patient is currently awaiting evaluation at a specialized hepatobiliopancreatic surgery center.

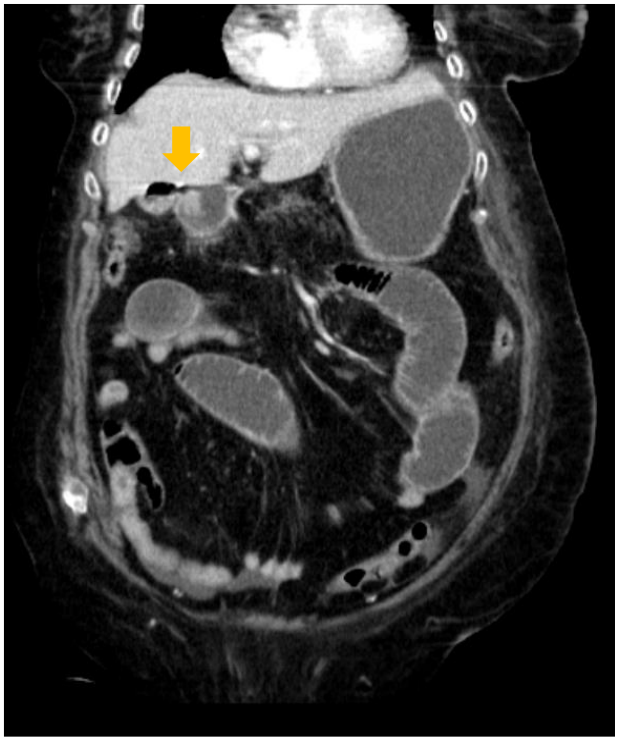

Figure 1: CT scan showing thickening of the gallbladder and adjacent duodenal wall, along with pneumobilia (arrow).

Figure 2: Contrast-enhanced CT showing a 30-mm stone causing dilation of the small intestine loops (arrow).

Figure 3: Intraoperative findings following exploratory laparotomy: a stone was identified at the jejunal level, with upstream dilation, as indicated by the dissecting forceps.

Figure 4: Enterolithotomy for gallstone removal.

DISCUSSION

Intestinal obstruction secondary to a gallstone is a rare manifestation of cholelithiasis, accounting for 0.15% to 1.5% of all complications associated with this condition.[4,9] It is more common in elderly women, with a female-to-male ratio of 3:1 and a higher incidence after the age of 60.[5,6,9]

Gallstone ileus is a rare cause of intestinal obstruction, accounting for 1% of all mechanical obstructions and 1-4% of non-strangulating mechanical obstructions.[3,6,8,9] However, it becomes a more common cause of intestinal obstruction in the elderly, with reported rates of up to 25%.[8,9]

As previously mentioned, in most cases, the gallstone enters the gastrointestinal tract through a fistula, which forms as a result of an inflammatory process that promotes adhesions and erosion of the gallbladder wall, allowing the stone to migrate into the adjacent gastrointestinal tract.[3,6,9] However, it may also pass through a communication between the bile duct and another part of the gastrointestinal tract, directly through a dilated ampulla of Vater, or by erosion of the intestinal wall caused by free stones in the abdominal cavity after laparoscopic cholecystectomy.[3,7,9]

A history of cholelithiasis is common but not a prerequisite, being present in about 25-72% of cases at the time of presentation. Although the pathophysiology is largely associated with an inflammatory process that promotes fistula formation, acute cholecystitis is diagnosed in only 30% of cases.[9]

The most common site of gallstone impaction is the terminal ileum (50% to 75%), followed by the jejunum (16% to 27%), duodenum (3.5% to 14.6%), and colon (3% to 4%).[3,4,9] The level of obstruction is determined by the size of the stone (typically >2.5 cm), the location of the fistula, and the diameter of the intestinal lumen.[3,5,9,11] Additionally, the presence of diverticula, strictures, or neoplasms may also serve as sites of impaction.

Patients typically present with symptoms suggestive of intestinal obstruction, including constipation, nausea, vomiting, abdominal pain and distension, dehydration, and electrolyte imbalances.[4,8,9] These symptoms can be intermittent due to the 'tumbling phenomenon,' where the stone's movement through the gastrointestinal tract may temporarily resolve the obstruction, only for symptoms to recur as the stone becomes impacted further downstream.[4,8,9] This phenomenon, combined with the nonspecific nature of the symptoms, often results in delayed diagnosis, which is typically made 3 to 8 days after symptom onset.[8-10]

This occurred with our patient, who, despite presenting signs and symptoms suggestive of an obstructive condition, had the diagnosis of biliary ileus initially overlooked due to the spontaneous resolution of symptoms during the surgeon's assessment and the presence of other contributing factors, such as renal failure and a history of previous surgery (adhesions).

Therefore, imaging tests play a crucial role in diagnosis, as physical examination findings are often nonspecific.[3,8] Classic findings on abdominal X-rays include pneumobilia, signs of intestinal obstruction, and ectopic calculi that change position on serial images (Rigler´s Triad).[4,8-10] The presence of two of these three signs is considered pathognomonic for biliary ileus.[9] Nonetheless, these findings are observed in only 15–50% of cases, and the sensitivity of X-rays is low, ranging from 40% to 70%.[4,9,10]

When the diagnosis remains uncertain, abdominal ultrasound can help identify stones, pneumobilia, fistula, impacted calculi, and residual cholelithiasis or choledocholithiasis, increasing the sensitivity of radiography to 74%.[7-10] However, this study is limited by the marked distension of intestinal loops, which is common in these patients.[8]

In this case, ultrasound detected only the presence of gallstones, failing to identify the fistula, the ectopic calculus, or any other alterations suggestive of cholecystitis. Consequently, the diagnosis was made through an abdominal CT scan with contrast, which revealed all three elements of Rigler's triad.

CT appears to be the most effective diagnostic method compared to ultrasound and abdominal X-ray, with a sensitivity of 93% and a specificity of 100%.[4,7,10] It enables precise localization of the fistula, assessment of the obstruction site, and evaluation of the affected intestine's viability, thereby assisting in therapeutic decision-making.[3,9]

The treatment of biliary ileus involves the surgical resolution of the obstruction and correction of the fistula, with endoscopic removal of the calculus reserved for high-risk patients, provided it is accessible via endoscopy or colonoscopy.[3,4,7]

However, the most appropriate surgical approach remains a subject of debate, with no consensus on whether to perform enterolithotomy alone, with or without a delayed approach to the fistula and gallbladder (two-stage procedure, TSP), or to address the fistula and perform cholecystectomy simultaneously with enterolithotomy (one-stage procedure, OSP).[4,8,9]

Most authors advocate for isolated enterolithotomy as the safest procedure, as it is associated with lower morbidity (27.3%) and mortality (4.9%-11.7%) compared to OSP (morbidity 61.6% and mortality 10.5%-16.9%).[3,4,6,8,9] These patients are typically elderly, with multiple comorbidities and a poor general condition, often due to delayed diagnosis, making them better candidates for simpler and less invasive procedures.[7]

Proponents of OSP argue that it reduces the need for re-intervention due to complications arising from the persistence of the fistula, such as recurrent ileus, cholecystitis, or cholangitis.[7] However, the risk of recurrence is low (5-9%), and only 10% of patients require a new intervention for persistent biliary symptoms, as the fistula typically closes spontaneously in the absence of residual lithiasis (closure rates of 50-61.5%).[3,4,6,9]

Accordingly, OSP should be reserved for young, low-risk patients who are in good general condition and have been adequately optimized preoperatively.[5,6,8,9] This approach is also recommended for patients presenting with acute cholecystitis, cholangitis, or gangrene of the gallbladder, as well as in cases of residual lithiasis.[5,6]

In situations where the local inflammatory process and multiple adhesions complicate access to the fistula and gallbladder bed, cholecystectomy and fistula closure can be deferred. This allows time for patient optimization and a more thorough evaluation of the biliary system.[4,6] Although there are no established guidelines defining the interval before the second intervention, a waiting period of at least 4-6 weeks after the initial surgery is recommended. If spontaneous fistula closure is not observed within six months, deferred treatment should be considered. During this time, close monitoring is essential to ensure timely intervention if symptoms develop.[3,4,9]

Although laparotomy remains the standard approach, laparoscopy may have a role in the treatment of biliary ileus. This minimally invasive technique offers potential benefits over open surgery, such as shorter hospital stay, and reduced morbidity associated with laparotomy. However, the surgeon's experience, the impact of pneumoperitoneum on the patient's general condition, and technical challenges-such as a distended bowel and adhesions from the inflammatory process-must be carefully considered.[8,9]

As previously mentioned, our patient underwent an open enterolithotomy. This approach was chosen due to her frailty and significant cardiopulmonary comorbidities, which limited her ability to tolerate prolonged operating times and more invasive procedures. This strategy also allowed us to focus on optimizing her post-operative care.

CONCLUSION

This condition poses a diagnostic challenge, not only due to its rarity but also because of its nonspecific presentation, with signs and symptoms that can mimic other causes of intestinal obstruction. Additionally, the intermittent nature of the disease, caused by the tumbling phenomenon, can delay diagnosis as clinical evaluations and investigations may fail to identify the obstruction during asymptomatic phases. Therefore, a high index of suspicion is crucial, particularly in elderly patients with a history of gallbladder lithiasis.

The primary controversy surrounding surgical treatment relates to the extent of surgery and the timing of the procedures. In most cases, isolated enterolithotomy is recommended, as it is a less invasive approach, thereby reducing the morbidity and mortality associated with this condition.

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