

# The Rigler's triad: a case of gallstone ileus

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## Abstract

Rigler's triad is an extremely rare syndrome that accounts for 4% of all cases of small intestinal obstruction (SBO). This illness is distinguished by three clinical and radiological features: pneumobilia, a severe intestinal blockage, and an abnormally placed gallstone in the gallbladder. An 84-year-old woman arrives at the Emergency Department with symptoms of SBO. The CT scan is essential for detecting the trio. An emergency laparoscopy with an

enterotomy and gallstone extraction was conducted successfully. The Rigler's triad should be suspected in elderly individuals with a history of gallstones in the gallbladder, especially in the emergency scenario. Large and solitary gallstones in the gallbladder that are asymptomatic should be candidates for cholecystectomy. In conclusion, this case is a very didactic instance, particularly because of the crisp CT images that can assist surgeons in identifying gallstone ileus and the mini-invasive method that can also benefit in an emergency context.

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## Introduction

The Rigler's triad is a type of gallstone ileus characterized by pneumobilia (air in the intrahepatic and extrahepatic bile ducts, as well as the choledochal duct) caused by a fistula between the gallbladder and the small bowel, an intestinal obstruction, and an abnormally located gallstone from the gallbladder. There isn't much information about gallstone ileus in the literature, but a recent review revealed some key points.<sup>1</sup>

According to epidemiology, the occurrence ranges from 0.3 to 5%, with females having a higher prevalence.<sup>1-3</sup>

In terms of diagnosis, clinical indicators may not be specific for gallstone ileus but rather for SBO, however a contrast-enhanced CT scan may be helpful in detecting the three pathognomonic indications.

To remove the gallstone in the intestine, the treatment of gallstone ileus must be surgical; nevertheless, the function of the laparoscopic technique can be advantageous. Both in the elderly and in crises, the mini-invasive approach can aid with diagnostics and deciding on the best surgical option.<sup>1-5</sup>

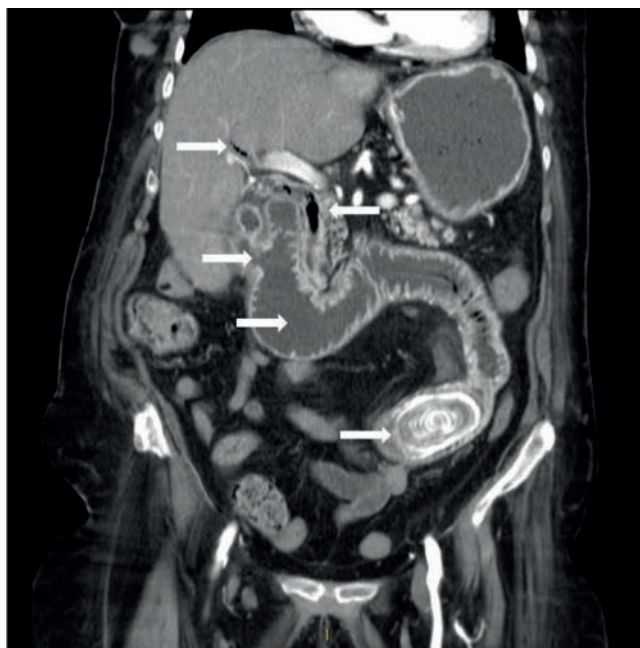
Cholecystectomy after gallstone ileus resolution with enterotomy can be considered in low-risk and young individuals who are at risk for recurrent biliary problems and gallstone ileus recurrence.<sup>1,3,6</sup> Some researchers believe that cholecystectomy may lower the incidence of gallbladder cancer.<sup>1,7</sup>

## Case Report

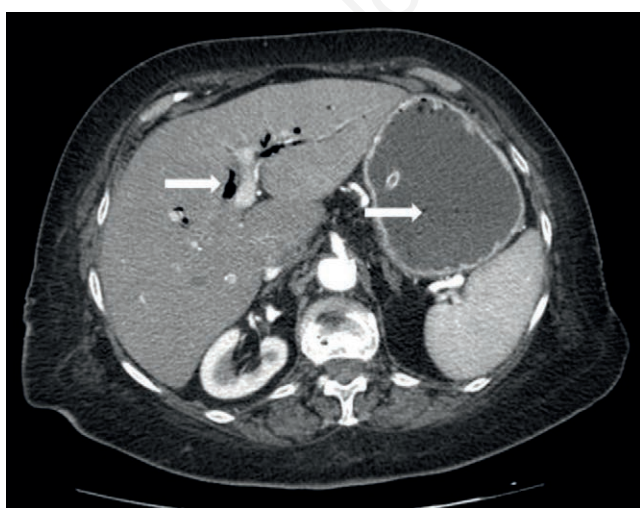
An 84-year-old woman presented to the Emergency Department (ED) with abdominal pain, particularly in the central abdomen, biliary vomit, and clinical symptoms of intestinal blockage. The symptoms began two days prior to the admission. The woman had no substantial medical history, merely asymptomatic gallstones in her gallbladder. The bilirubin rate, hepatic and pancreatic function were all normal in the blood tests. There was hyponatremia (Na 129 mEq/L) and a high creatinine level (3 mg/dL). There were no lactates or white blood cells (12.3109/L) observed. These laboratory tests were consistent with the hypothesis of small intestinal blockage and dehydration, but there were

no symptoms of ischemia. A radiograph of the abdomen was also taken, but no clinical signs were discovered. A CT scan was performed, and it revealed the typical symptoms of gallstone ileus. The cholecystoduodenal fistula causes pneumobilia (air in the intrahepatic and extrahepatic bile ducts, as well as the choledochal duct). The second indicator is a massive gallstone (3 cm) causing high intestinal obstruction, and the third sign is an abnormally positioned gallstone from the gallbladder. These three Rigler's triad symptoms are present on the CT scan, as seen in Figure 1 and 2. Our Emergency and General Surgery Unit treated the woman. Initially, a laparoscopic method was used to assess the intra-abdominal condition and confirm the diagnosis. To prevent the possibility of small intestinal damage, an optic view approach was

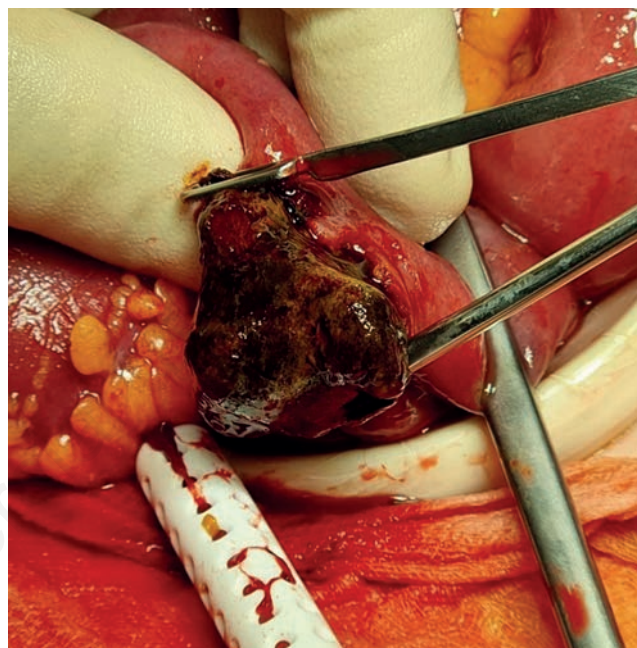
employed. Because of the huge size of the gallstone, a mini-laparotomy was performed for the enterotomy and stone extraction (Figure 3 and 4). We did not do the cholecystectomy since the gallbladder was totally linked to the duodenum. There were no difficulties in the early post-operative period. The nasogastric tube was withdrawn on the second post-operative day, intestinal gas was conducted on the third day, and the patient was referred after four days. The patient was discharged on the eighth postoperative day after blood creatinine and salt levels were corrected. At the one-month follow-up, there was no morbidity or late sequelae (no incisional site infection, no lingering abdominal pain, oral intake, and intestinal transit was normal). The patient was pleased with her full clinical recovery.



**Figure 1.** The Rigler's CT scan triad: pneumobilia in the intrahepatic bile duct and in the choledochal duct, cholecystoduodenal fistula, duodenal and gastric obstruction, gallstone within the first jejunum (by the upper arrow in the lower one).



**Figure 2.** Pneumobilia in the intrahepatic bile duct (left arrow) and gastric occlusion (right arrow).



**Figure 3.** Enterotomy with gallstone extraction.



**Figure 4.** Small bowel obstruction visible from the minilaparotomy.

## Discussion

This is a common and extremely instructive Rigler's triad situation, particularly for CT images (Figure 1 and 2). Figures 1 and 2 show the three pathognomonic indications.

Gallstone ileus is a rare clinical disease that accounts for 4% of all causes of SBO, with the incidence rate increasing to 25% in people over the age of 65.<sup>1,3</sup> It does, however, account for 0.3-0.5% of cholelithiasis problems.<sup>1</sup>

Ours is a typical case of gallstone ileus in an elderly female patient with a history of gallstones in the gallbladder. Clinically, we discovered evidence of intestinal blockage with vomiting and no intestinal gas, as well as dehydration and no jaundice. Given the patient's age and the absence of any other major findings on the abdomen x-ray, we decided to perform a CT scan to rule out other disorders, particularly abdominal cancer or volvulus, and to better plan the surgical treatment.

The gallstone ileus pathophysiology is caused by prolonged inflammation caused by the impact of the gallstone in the gallbladder on the surrounding duodenal wall.

This syndrome begins with wall ischemia, then progresses to wall necrosis, and finally to a fistula between the gallbladder and the duodenum, allowing the gallstone to pass into the duodenal lumen. SBO can arise at various levels of the small bowel depending on the size of the gallstone. According to studies, a bigger size of 2 cm can cause intestinal blockage.<sup>2,3,8</sup> Clinic indicators (vomiting, stomach discomfort, lack of intestinal gas and feces, hydro-electrolytic problem, acute kidney insufficiency) can explain why intestinal blockage occurs. However, in the majority of cases, a fistula can occur between the gallbladder and the duodenum (85%), with other locations (15%) being impacted, such as hepatoduodenal, choledochoduodenal, cholecystogastric, cholecystojejunal, and cholecysto-colonic fistulas (less than 5%).<sup>1</sup>

There are several syndromes based on the location of the intestinal obstruction: Bouveret's syndrome in cases of duodenum stop, with associated gastric outlet block,<sup>3,6</sup> Barnard's syndrome in cases of ileocecal valve occlusion,<sup>6,9</sup> and Rigler's syndrome in cases of small bowel, as in our patient.

Acute symptoms may necessitate immediate hospitalization and surgery, whereas subacute or chronic symptoms such as recurrent stomach pain and jaundice may also be present: it all depends on the location of the occlusion.<sup>3,4,6</sup>

This clinical condition is associated with a mortality and morbidity rate ranging from 12-27% to 50%.<sup>1</sup> According to the literature, advanced age, comorbidities, late diagnosis, and late therapy can all raise these risks.<sup>1</sup>

There are numerous diagnostic instruments that can be used in these situations. In 40-70% of instances, an abdomen X-ray can be diagnostic.<sup>1</sup> Pneumobilia cannot exist in isolation, however it is linked to gallstones and small intestinal blockage. In this case, ultrasound can only detect residual cholelithiasis or the lack of a large prior gallstone and areobilia.<sup>1</sup> The gold standard approach for diagnosis is a contrast-enhanced CT scan, which has a sensitivity of more than 90%.<sup>1</sup> However, if the gallstone diameters are compatible, a laparoscopic technique can be useful in an emergency to confirm an intraoperative diagnosis, prevent prolonged laparotomy, and treat the SBO.<sup>4</sup> In our situation, we observed that both CT for preoperative diagnosis and laparoscopic view for intraoperative confirmation and better surgical approach were effective.

Laparoscopy, as documented in the literature and guidelines, can be highly useful in emergency settings, not only for diagnosis and treatment, but also in geriatric patients.<sup>5,10</sup> We attempt to approach all patients with a laparoscopic overview to better decide

the method due to our extensive experience in laparoscopic surgery, as well as in emergency circumstances. In this patient, we begin with a laparoscopic technique to detect the small bowel obstruction before deciding to pursue the lithotomy with a mini-laparotomy.

In this case, given the patient's age and the minimal likelihood of future recurrences, we chose to leave the gallbladder in place rather than risk the risks associated with cholecystectomy (duodenal injuries, biliary fistula, vascular injuries).

However, there are no strong indications in the literature for cholecystectomy in asymptomatic cholelithiasis because the risk of surgical complications is greater than the risk of gallbladder cancer. However, certain instances warrant special treatment due to the potential of degeneration: Gallstones that are 3 cm or larger have a 9.2 times increased risk of gallbladder cancer, so cholecystectomy is recommended;<sup>11,12</sup> in case of growth of around 2-mm for a year, preventative cholecystectomy may be considered.<sup>7</sup> In each occurrence of gallbladder gallstones, the American Cancer Society recommends preventative cholecystectomy.<sup>12</sup> Furthermore, if the cholecystoduodenal fistula is too dangerous for the patient during surgery,<sup>1,3,6,7</sup> it might be left in place. Cholecystectomy should be considered in young stable patients with a longer life expectancy and hence a higher chance of recurrence of gallstone ileus.<sup>3,6</sup>

## Conclusions

This gallstone ileus example is particularly instructive, thanks to the superb CT scans. Furthermore, given the rarity of Rigler's triad publications and photographs, we believe it is critical for students and young surgeons to visualize this unusual illness.

The Rigler's triad is an uncommon illness that should be investigated and treated, especially in older people who have a history of gallstones in the gallbladder.

To avoid this clinical situation, patients with asymptomatic big and single gallstones should be evaluated for cholecystectomy. A gallstone ileus should be suspected and excluded in some cases of acute cholecystitis undergoing cholecystectomy with a likely intraoperative fistula. Laparoscopy can aid in diagnosis and can be used in emergency situations with caution in the abdominal access.

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