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Gallstone Ileus—Lessons from a Missed Diagnosis

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Abstract

Gallstone ileus is an uncommon presentation in patients with acute abdomen. Its diagnosis and treatment are often delayed due to its nonspecific clinical presentation. Presence of gallstone in ileum can be difficult to detect on computed tomography (CT) as mostly they are lucent. We report the case of a 66-year-old man with a 1-day history of vomiting and abdominal bloating. Initial CT could not identify the obstructing gall stone. On the follow-up CT, there was a distal shift of obstruction site in the intestine raising suspicion of a gallstone. We discuss the imaging findings on CT and the clues to diagnosing gallstone ileus.

Keywords
- fistula
- gallstone
- ileus
- obstruction

Introduction

Gallstone ileus (GSI) is a rare form of bowel obstruction that occurs in 0.4 to 1.5% of patients with cholelithiasis.[1] Gallstones (>2 cm) are thought to enter the duodenum through a cholecystoduodenal fistula.[2] GSI is an important complication of gallstone disease since it is often underreported and poorly managed. The terminal ileum or the ileocolic junction is usually the common location for mechanical obstruction as a result of gallstone due to its reduced diameter.

Patients present with small bowel obstruction symptoms including severe abdominal pain, nausea, vomiting, and abdominal distention. Computed tomography (CT) scan will show obstructed bowel; however, the impacted gallstone, especially the cholesterol ones, may not be detected due to their radiolucent nature. The important clues to look for include air in biliary tree, subtle increased density of the impacted calculus, and specks of rim calcification if any.

We report an interesting case of GSI that was not detected on preliminary plain CT scan but got detected on a follow-up CT scan, and discuss the subtle clues that led to its diagnosis.

Case Report

A 66-year-old male, a known case of chronic medical renal disease, presented to the emergency department with one day complaints of abdominal pain and four episodes of vomiting. Patient had no prior history of abdominal surgery, cholecystitis. On examination, his abdomen was soft, distended. Patient was dehydrated with raised serum creatinine levels; hence, he was started on intravenous fluids and antibiotics.

Ultrasonography abdomen revealed a contracted gallbladder and gaseous distension of bowel loops. Plain anteroposterior radiograph of the abdomen in erect position revealed no evidence of bowel dilatation or air-fluid levels.

He was managed conservatively. Two days later, he developed breathlessness with increased abdominal distension for which a plain CT scan of the abdomen was done. The CT scan revealed dilated jejunal and proximal ileal loops. Abrupt transition zone was identified at the level of mid-ileum and distal ileal loops were collapsed. However, no cause of obstruction could be detected. No intramural air foci, pneumoperitoneum, or free fluid in the abdomen was seen. The gallbladder was contracted in the present scan.

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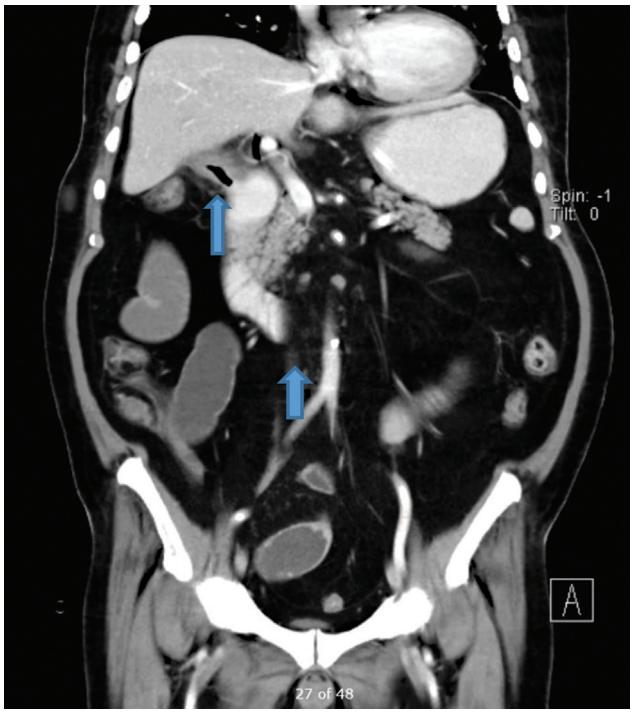

Fig. 1 Coronal section of contrast-enhanced follow-up computed tomographic scan shows increased air pocket in the gallbladder lumen (thin blue arrow). It also shows the obstructed gallstone in the pelvic region that is radiolucent with a few calcific specks in periphery (thick blue arrow). Note that its contour is conforming with the lumen of the ileal wall.

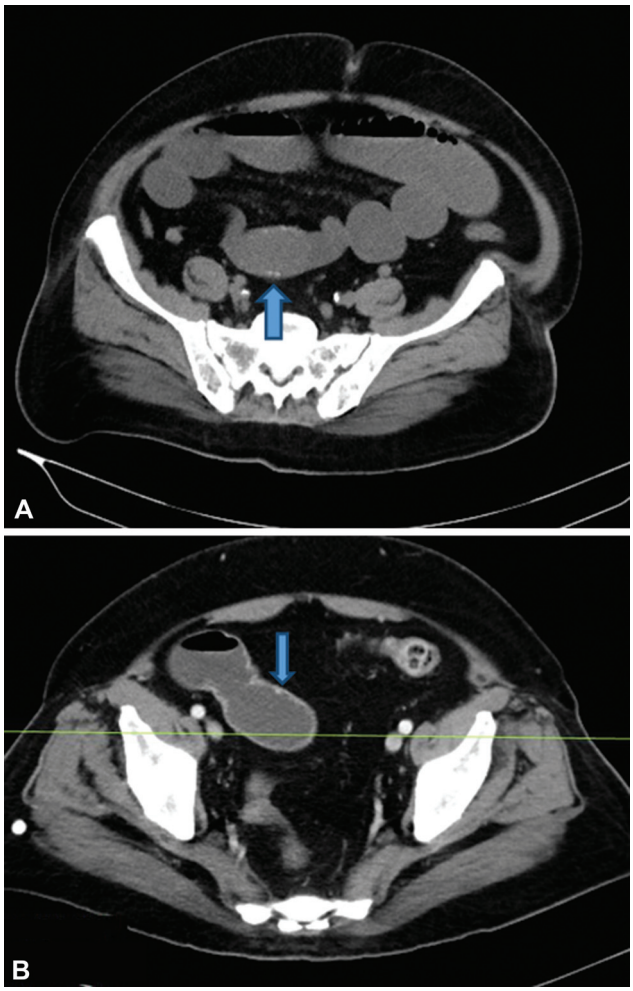

Fig. 2 (**A**) Axial section of unenhanced computed tomographic (CT) scan shows a radiolucent gallstone in the ileum conforming with the contour of the ileum (blue arrow). Notice the specks of rim calcification. (**B**) Axial section of contrast-enhanced follow-up CT scan shows that there is a change in transition zone as the gallstone has moved further distally within the ileum (blue arrow). The enhanced bowel wall makes visualization of the peripheral rim calcifications difficult.

Ryle's tube was inserted and patient was put on Bilevel Positive Airway Pressure support. The patients general condition improved; however, clinically the obstruction did not resolve. A repeat CT scan of the abdomen was performed 4 days after the initial scan. The CT scan demonstrated contracted gallbladder with air foci and pneumobilia (►**Fig. 1**). A small communication of the gallbladder could be seen with the first part of duodenum. Persistent small bowel dilatation with an abrupt transition point was seen. However, the transition zone that was earlier visualized in the mid-ileal loops now had moved further into the distal ileum (►**Fig. 2**). Upon careful examination, a 5 × 3cm radiolucent, oval-shaped density was identified at the transition zone having a subtle density difference with the fluid in the bowel loops (►**Figs. 3** and **4**). Small specks of rim calcification were seen in it. These findings could be better appreciated on narrow window settings (►**Fig. 5**). This was likely to be a radiolucent gallstone. The patient was taken up for exploratory laparotomy with removal of impacted gallstone (►**Figs. 6** and **7**) and decompression of intestines. Cholecystectomy and repair of cholecystoduodenal fistula using omental patch were done with feeding jejunostomy. The patient's condition improved postoperatively.

Review of earlier CT scan showed that both the gallstone and the gallbladder air were present (►**Figs. 8** and **9**). However, the air focus was very tiny at that time and hence not reported.

Discussion

GSI is an uncommon presentation of gallstone disease. It refers to obstruction of the small bowel due to impaction of one or more gallstones that have passed into intestines through a bilioenteric fistula. Most common fistula is a connection from the gallbladder to the duodenum (85% of cases) formed following chronic erosion by a stone or recurrent calculous cholecystitis.[1] The impacted stones are usually greater than 2 to 2.5 cm in diameter.[1,3,4] Smaller stones pass through the lumen of the bowel as "rolling stones" and rarely cause obstruction.

Common places for gallstones to be lodged include the ileum and ileocecal valve due to the anatomical narrow lumen in 60% of cases, jejunum in up to 16%, stomach in 15%, and colon (gallstone coleus) in 2 to 8% of cases.[5,6]

Gallstones are notoriously difficult to visualize on plain film radiography, with only 10 to 20% of stones containing enough calcium to be radiopaque.[7,8] Contrast-enhanced CT for GSI has a much higher sensitivity of 90 to 93%,[1,9–12] specificity of 100%,[9,12] and accuracy of 99%[9,12] as it has a higher sensitivity for the detection of air in gallbladder and subtle calcification seen in gallstones. Rigler's triad described

Fig. 3 Coronal section of follow-up enhanced computed tomography shows the obstructing gallstone (thin blue arrow) and the abrupt transition point (thick blue arrow) distal to which the ileal lumen is collapsed.

on plain films comprising of air in biliary tree, small bowel obstruction, and ectopic radiopaque gallstones is pathognomonic for GSI. In the literature, only 14 to 53% of cases present with the full criteria and in most cases, only two signs out of the triad are present.[1,9,13–15] Since then, two further signs have been described: change in the location of a previously noted gallstone (Rigler's tetrad)[10] and a dual air-fluid level in the right upper quadrant, the medial one being in the duodenal bulb, and the lateral one in the gallbladder (herein Rigler's pentad).[1] CT scan in addition will show abnormal inflamed gallbladder with wall thickening and presence of bilioenteric communication suggestive of fistula.

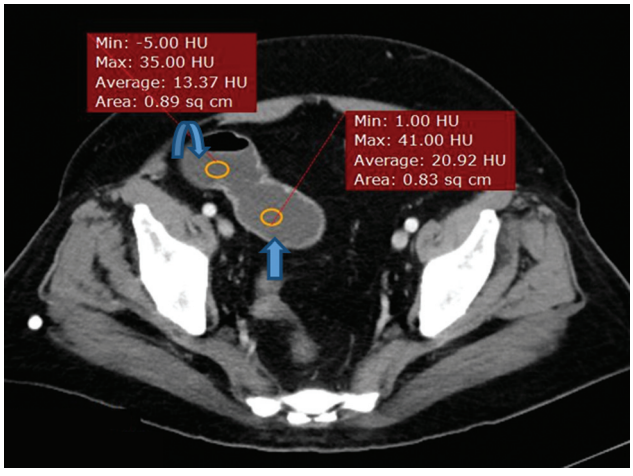

Fig. 4 Axial section of follow-up enhanced computed tomography shows that the density of the gallstone (straight blue arrow) and the adjacent fluid (curved blue arrow) within the bowel lumen is almost similar thus making it difficult to identify.

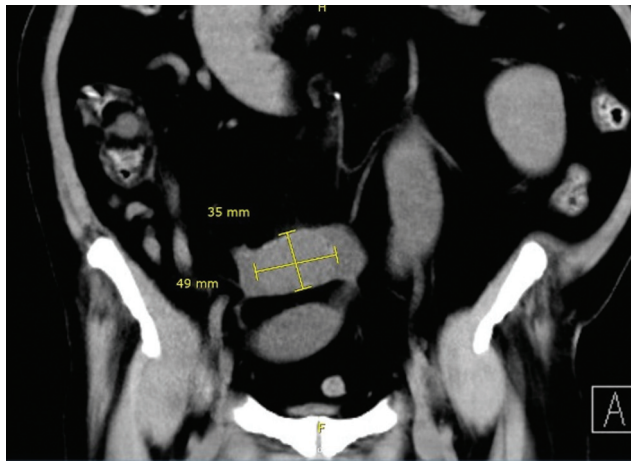

Fig. 5 Coronal section of unenhanced computed tomography. The gallstone is better visualized after the narrowing the window settings and its size can be measured.

The transition point of bowel caliber is well seen on the CT scan and a close evaluation will reveal even the lucent obstructing calculi.

Plain CT scan is found to be helpful as the small specks of calcification in the rim of calculi are better seen. On intravenous contrast-enhanced CT scanning, there can be difficulty in defining some radiolucent stones or rim-calcified stones[9,16] due to a lack of differentiation from the enhanced small bowel wall.

In our case, there were three challenges that prevented the diagnosis in the first place—air focus was tiny and the calculus was lucent, almost conforming to the shape and density of the fluid filled bowel loop. On analyzing the reasons, it was felt that GSI being a rare cause of intestinal obstruction, careful attention to gallbladder was not a routine practice in such cases. More so, the patient did not have

Fig. 6 Intraoperative image of removal of obstructed gallstone from the ileum.

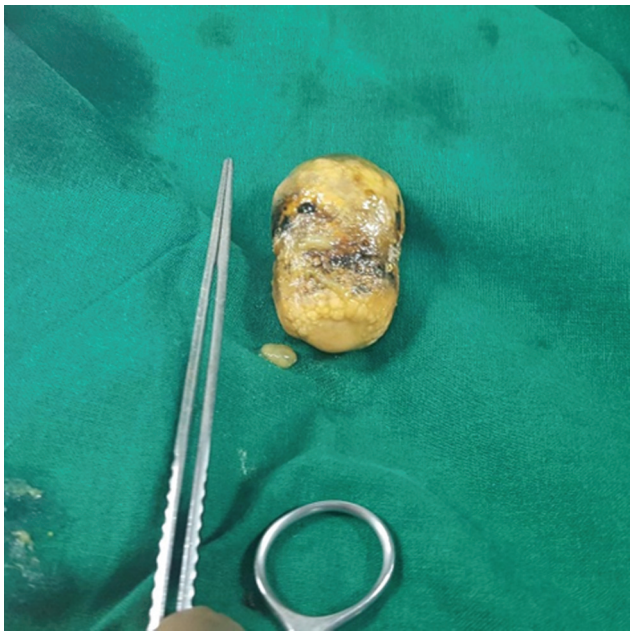

Fig. 7 Gallstone removed from the ileum.

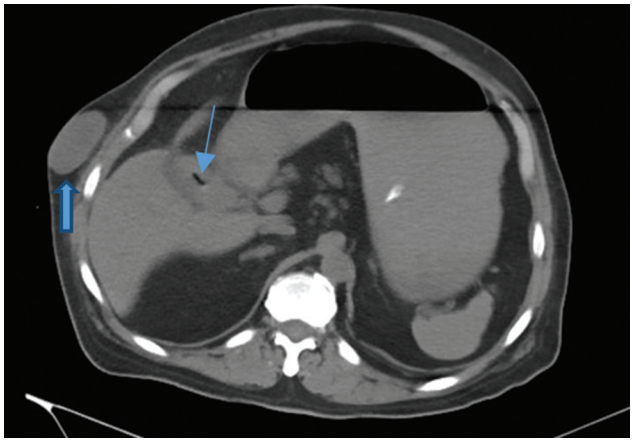

Fig. 8 Axial section of unenhanced computed tomography shows a speck of air within the gallbladder lumen (thin blue arrow). An incidental rounded hypodense nonenhancing lesion is seen in the right anterolateral abdominal wall (thick blue arrow) likely to be an epidermoid inclusion cyst.

any history of gallbladder disease. In subsequent scan, the air focus became larger and air appeared in bile ducts as well. What helped in identifying the calculus in the subsequent scan was the distal shift in the position of the obstructing point from proximal to distal ileum. We realized only a mobile intraluminal cause of obstruction like a gallstone could cause this. Also, though the stone was largely lucent, it could be visualized upon narrowing the window settings of image on the workstation. It is well known that subtle density difference between the normal and abnormal in CT scans can be often appreciated upon change in the window width and center settings. Subtle calcific specks were also present in the rim of the calculus but were discounted as nonspecific hyperdense bowel content as GSI was not a consideration in the first scan. Hyperdense specks are often seen in the bowel lumen due to the use of certain oral

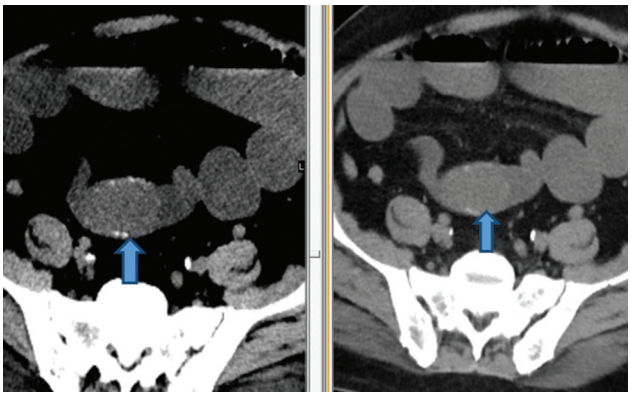

Fig. 9 Comparative scans of axial unenhanced computed tomography with narrow window settings in the left sided image. The gallstone is better visualized in narrow window settings (blue arrow). Note the collapsed ileal loop distal to it.

medication and they can mask the subtle rim calcification of the calculus.[17] Overall, a combination of above imaging factors combined with lack of clinical suspicion led to the missed diagnosis in the first scan. But attention to details and more obvious findings helped us in making the correct diagnosis in the second scan.

To conclude, GSI is a rare cause of intestinal obstruction. Close evaluation of gallbladder and biliary tree is needed in cases of intestinal obstruction for presence of air. Careful evaluation of intestinal lumen with appropriate window settings at the transition point to look for a lucent gallstone is needed. If follow-up CT scan shows a change in level of obstruction, a mobile intraluminal cause must be considered.

Conflict of Interest
None declared.

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