

## Gallstone ileus: literature review

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**Summary.** Gallstone ileus is a rare case of mechanical intestinal obstruction observed in patients with history of cholelithiasis or cholecystitis. Its diagnosis is difficult and it is characterized by high mortality rate. Diagnostic Imaging plays an important role in the management of patients with suspected gallstone ileus because an early diagnosis could reduce the mortality. Abdominal Computed Tomography (CT) is the preferred modality because of its rapid diagnosis. Surgery remains the gold standard treatment. ([www.actabiomedica.it](http://www.actabiomedica.it))

**Key words:** gallstone ileus, intestinal obstruction, biliary-enteric fistula

### Introduction

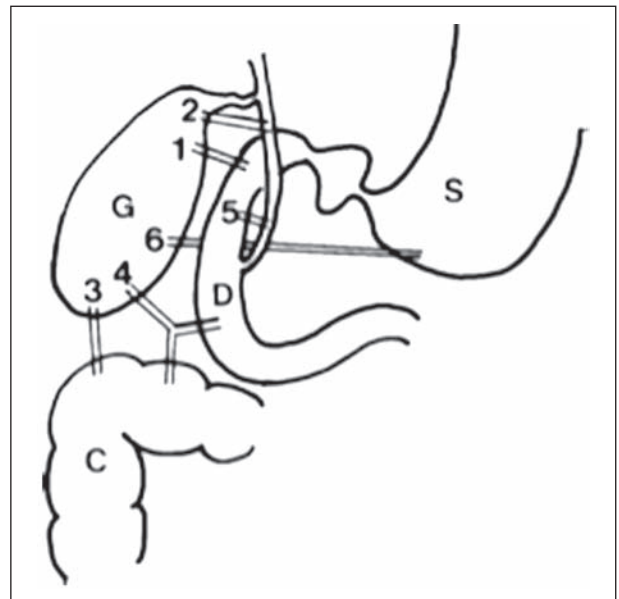
Gallstone ileus is a rare and potentially serious complication of cholelithiasis and it is characterized by mechanical occlusion of the intestinal lumen provoked by one or more gallstones (1). It accounts for 1%-4% of all cases of mechanical intestinal obstruction, but for up to 25% of those in patients over 65 years of age, with a female to male ratio of 3.5-6.0:1 (2).

The morbidity and mortality rates of gallstone ileus remain very high, however early diagnosis and prompt treatment could reduce the mortality rate (3).

### Discussion

The term “gallstone ileus” was first coined by Bartolin in 1654 and referred to the mechanical intestinal obstruction due to impaction of one or more large gallstones within the gastrointestinal tract. Biliary-enteric fistula is the major pathogenic mechanism of gallstone ileus (3). The gallstone enters the gastrointestinal tract through a fistula between a gangrenous gallbladder (resulted from recurrent attacks of cholecystitis) and

the gastrointestinal tract (Figure 1 and 2). The gallstone can impact anywhere in the gastrointestinal tract



**Figure 1.** Diagram of the possible biliary-enteric fistulas. The most common is with the duodenum (1) but, although much more rarely, it can also form with the colon (3), with the stomach (6) and very rarely with the common bile duct (2). G: gallbladder, D: duodenum, C: colon, S: stomach



**Figure 2.** Examples of fistulas. A: cholecysto-pyloric; B: cholecysto-duodenal; C: cholecysto-colic.

and its size should be at least 2 cm to 2.5 cm in diameter to cause obstruction (4).

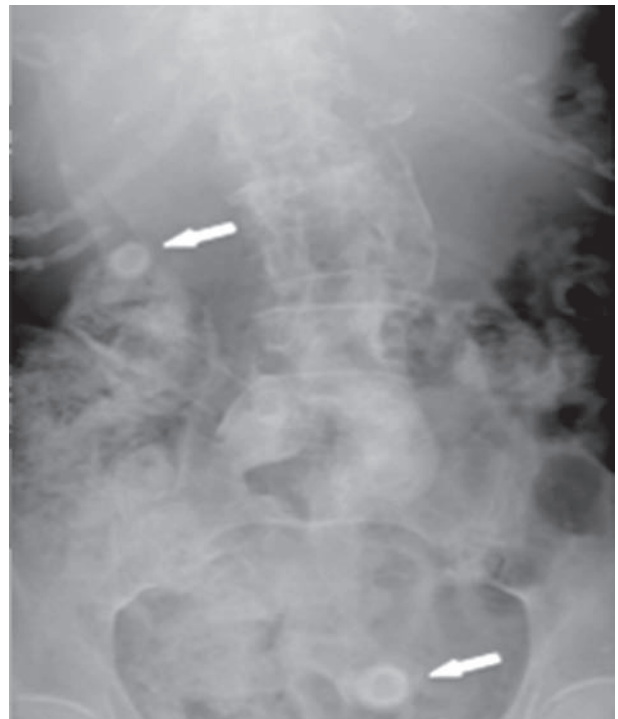
Reisner and Cohen reviewed 1001 cases of gallstone ileus and reported that the most common locations of impaction of gallstone are the terminal ileum and the ileocecal valve (60.5%) because of the anatomical small diameter and less active peristalsis. They also found that less common localizations are the jejunum (16.1%), and the stomach (14.2%), while the rarest are the duodenum (3.5%) and the colon (4.1%) (5).

Clinical presentation is typically non-specific, and often with intermittent symptoms of nausea, vomiting, abdominal distension and pain, frequently in patients who have a history of cholelithiasis or cholecystitis. Sometimes the main symptom is a “migration pain”, which is due to what is called “rolling phenomenon”: the gallstone, driven by peristalsis, stops and then restarts its migration to a more distal section of intestine, stopping again and so causing the symptoms of an intermittent and discontinuous intestine obstruction. The real disease beginning is at the occurrence of a very strong colic, localized in the right hypochondrium and epigastrium, which denounces the formation of a biliary-enteric fistula. Since it is quite difficult to recognize from clinical perspective this particular kind of intestine obstruction, which is often polymorphous, showing insidious onset, underestimated in patients already suffering from biliary colic, then Diagnostic Imaging (Abdomen Direct, Ultrasonography, CT), plays an important role in the management of patients with suspected gallstone ileus (6, 7, 8).

Gallstone ileus X-Rays diagnostics is based essentially on the Rigler triad (9): 1) intestine loops dilatation and air-fluid levels sign of intestine obstruction;

2) aerobilia; 3) visualization of a radiopaque image due to a gallstone mass in atypical position, position that can change during the following days. Such triad, actually, is present in less than half of patients affected by gallstone ileus (10), and this makes infrequent the diagnosis after only Abdomen Direct (sensitivity varies from 40% to 70%) (11-13) (Figure 3).

Recent literatures have shown that Ultrasonography was more helpful in diagnosing gallstone ileus



**Figure 3.** 94-year-old woman with gallbladder-colic fistula. RX shows two radiopaque formations (arrows), one in the gallbladder and the other into the pelvis

than plain abdominal radiography, but the detection rate in a large-scale US study was 74% at best (14).

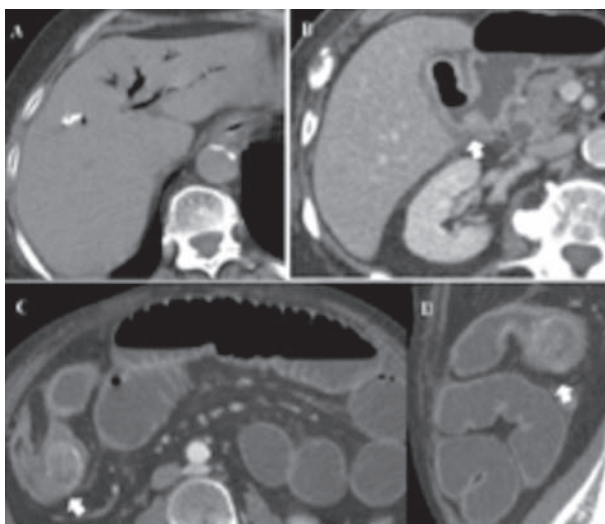
Ultrasonography findings are made of: 1) absent visualization of the gallbladder or presence of hyper-echoic foci with posterior acoustic shadowing in the gallbladder bed; 2) aerobilia; 3) intralumen hyperechoic image with posterior acoustic shadowing (gallstone obstructing intestine lumen); 4) image of intestine loops dilatation (7).

Several case reports have demonstrated that contrast enhanced CT have high sensitivity (93%), specificity (100%) and accuracy (99%) to diagnose gallstone ileus (15).

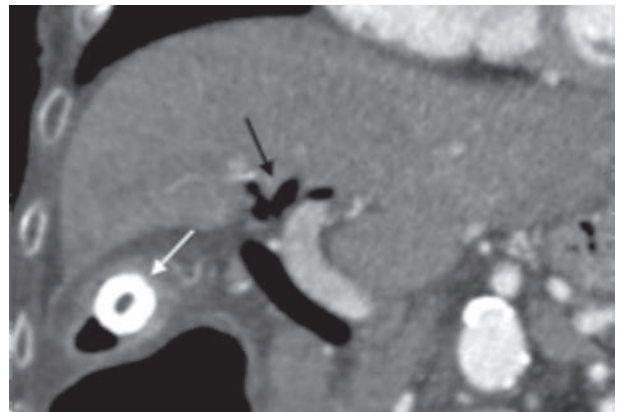
The diagnostic CT criteria include: 1) signs of intestine obstruction; 2) presence of ectopic gallstone, either rim-calcified or total-calcified and its size and exact location; 3) direct visualization of the biliary-enteric fistula; 4) abnormal gall bladder with complete air collection, presence of air-fluid level or fluid accumulation with irregular wall; 5) air in the biliary tree; (15) (Figure 4, 5, 6, 7, 8, 9).

Accurate diagnosis of the location of obstruction is essential for therapeutic planning (16).

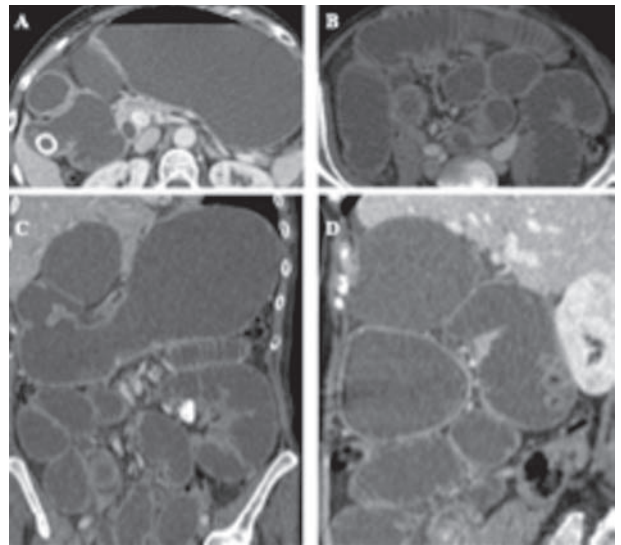
One previous report suggested primary surgical intervention is mandatory for all cases with gallstone ileus (17) but most recent reports demonstrated that a conservative treatment is also effective in the man-



**Figure 4.** CT signs of gallstone ileus. A: aerobilia; B: gallbladder-duodenal fistula (arrow); C-D: ectopic calculus (arrows) and bowel obstruction.



**Figure 5.** 94-year-old woman with intraluminal gallbladder air and coarse calculus (white arrow). Note also the air in the common bile duct and in intrahepatic bile ducts (black arrow)

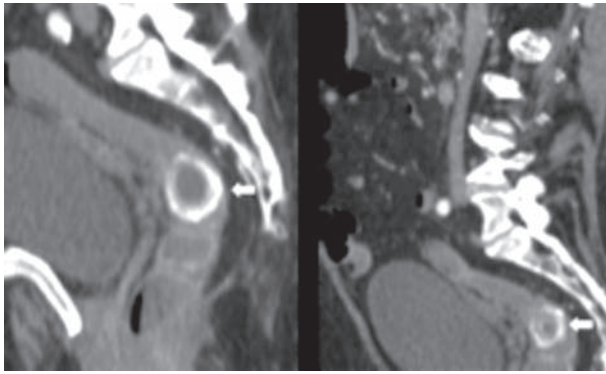


**Figure 6.** 60-year-old woman with (A) cholecysto-duodenal fistula probably “chronic”, (B-D) ileal occlusion due to coarse calculation, and (C) multiple small stones scattered in the gut

agement of gallstone ileus. Then, when the prospective CT estimation of ectopic gallstone sizes less than 2 cm in size (because they pass through the bowel spontaneously), patients should receive conservative treatment with constant monitoring of vital signs until complete clinical recovery (15).

When the surgical treatment is necessary, it consists of two phases. The first phase requires the search of the gallstone nested into the intestine and its extraction by enterotomy. The second phase is aimed to the solution of biliary-digestive fistula, the removal of the





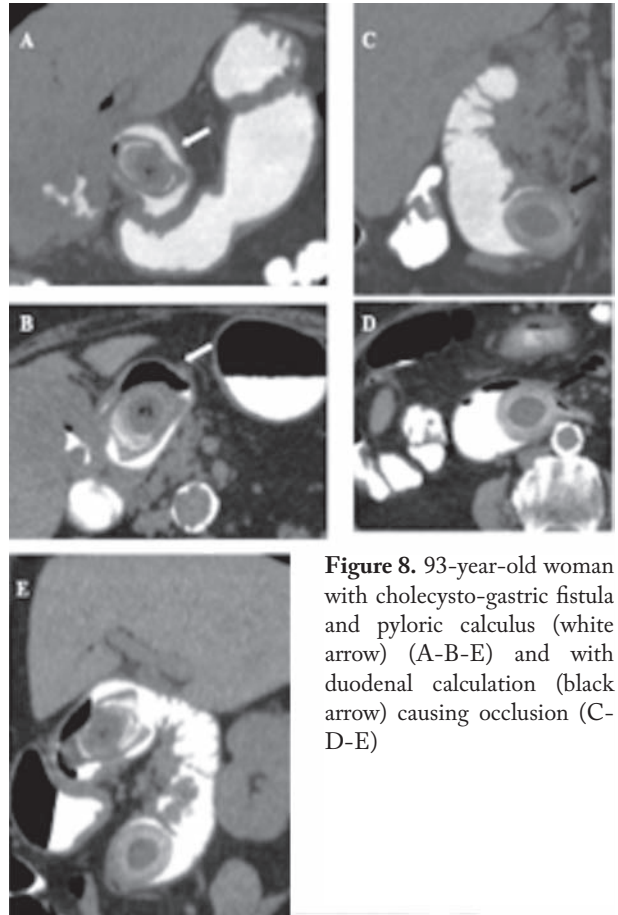
**Figure 7.** 78-year-old woman with cholecysto-colic fistula and calculus migrated to the recto-sigmoid transition (arrow) without bowel obstruction.

eventual residual gallstones, and the final cholecystectomy (7, 18).

CT is also important to search more stones throughout the intestinal tract because multiple stones can be expected in 3-44% of all patients with gallstone ileus and there could be a recurrent gallstone ileus. It is defined as a mechanical intestinal obstruction secondary to the occlusion of the intestine by an intraluminal biliary calculus that was present but not obstructing at the time of a previous episode of ileus, or secondary to the passage of new stones from a preexisting, not surgically treated fistula (19-24).

## Conclusion

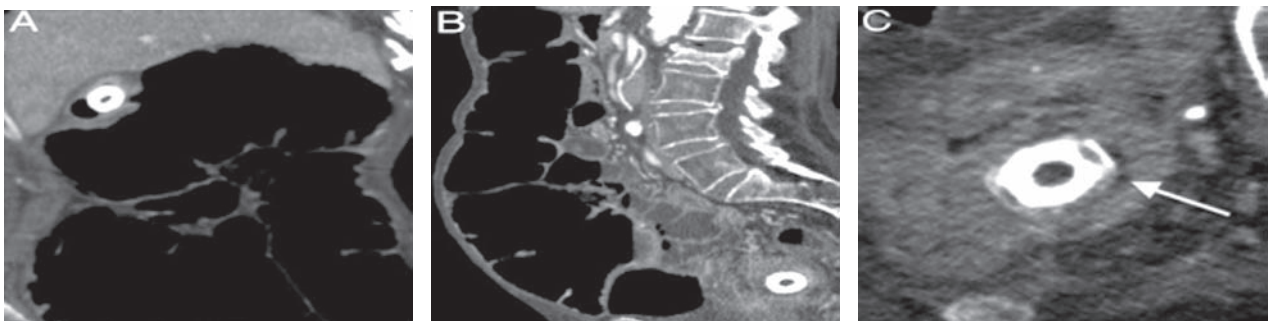
The morbidity and mortality rates of gallstone ileus remain very high (mortality ranges between 12 and



**Figure 8.** 93-year-old woman with cholecysto-gastric fistula and pyloric calculus (white arrow) (A-B-E) and with duodenal calculation (black arrow) causing occlusion (C-D-E)

27%), partly because of misdiagnosis, delayed diagnosis, senile patient and coexisting concomitant medical diseases. Thus, early diagnosis and prompt treatment could reduce the mortality rate (6, 15, 18).

The current routine use of CT for abdominal emergencies, allows to detect such condition earlier.



**Figure 9.** 94-year-old woman with gallbladder-colic fistula. A – B: abdominal CT coronal (A) and sagittal (B) scans highlight cholecysto-colic fistula, a residual calculus in the gallbladder, bowel obstruction and a calculus in sigma. C: Axial CT scan with calculus wedged into the lumen of the sigmoid colon

It also has the capability to estimate the size of ectopic gallstones, that contributes to decision making in management strategy (7, 15).

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