



## The Pathogenic Mechanism of Gallstone Ileus, Rarely Objectivated Preoperatively, Through Clinical, Imaging and Videoendoscopic Correlations – A Clinical Case Presentation

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### Abstract

**Introduction:** Gallstone ileus is a rare and severe complication of cholelithiasis, that results in small bowel obstruction and surgical treatment represents the elective therapeutical method. The decision of applying the laparoscopic technique is strongly influenced by the accuracy of the diagnosis and the preoperative objectivation of the pathogenic mechanism.

**Case Presentation:** 70-year old male, with a known history of over 30 years of biliary microlithiasis, with one gallstone ( $\emptyset \approx 40-50$  mm), came to hospital with the symptomatology of high intestinal obstruction. The ultrasound exam revealed a gallbladder with extremely thickened walls, without being able to confirm cholelithiasis. The surgeon relied on the patient's biliary history and requested emergency computed tomography with the administration of contrast agent. The scan raised the suspicion of gallstone ileus, but could not fully confirm the existence of the Rigler triad (hypodense ectopic calculus hard to identify). The upper digestive endoscopy that completed the imaging investigations came to confirm the diagnosis by visualization and video exploration of the cholecystic-duodenal fistula. Full laparoscopic surgery was performed immediately and the patient's postoperative evolution was good, without complications.

**Conclusions:** Even if it represents a pathological entity rarely seen in practice, gallstone ileus must be taken into consideration in the differential diagnosis of small bowel obstruction and the pathogenic mechanism can be successfully objectivated before surgery through appropriate clinical and paraclinical correlations.

**Keywords:** Gallstone Ileus; CT Scan; Pathology

## Introduction

Gallstone ileus, first described by Bartholin in 1654 [1], represents a rare pathology in surgical practice, being an exceptional and severe complication of cholelithiasis, defined as a type of mechanic ileus that involves the impaction of gallstones in the intestinal tract [2-4].

The incidence of this condition is appreciated to 0,15% - 1,5% of cholelithiasis cases and <0,1% of ileus cases in general [2,3,5], with a recurrence ratio of 5% -8% [6].

In the clinical activity, these cases may come to the emergency room presenting clinical symptoms of bowel obstruction and the surgeon should take gallstone ileus into consideration in the differential diagnosis of acute surgical abdomen [2].

In 1941, Rigler, *et al.* [7], described the classical radiological triad of GSI (gallstone-ileus), namely: pneumobilia, SBO (small bowel obstruction) and ectopic gallstones. With the help of computed tomography, the Rigler triad is currently objectivated in up to 93% of cases with gallstone ileus.

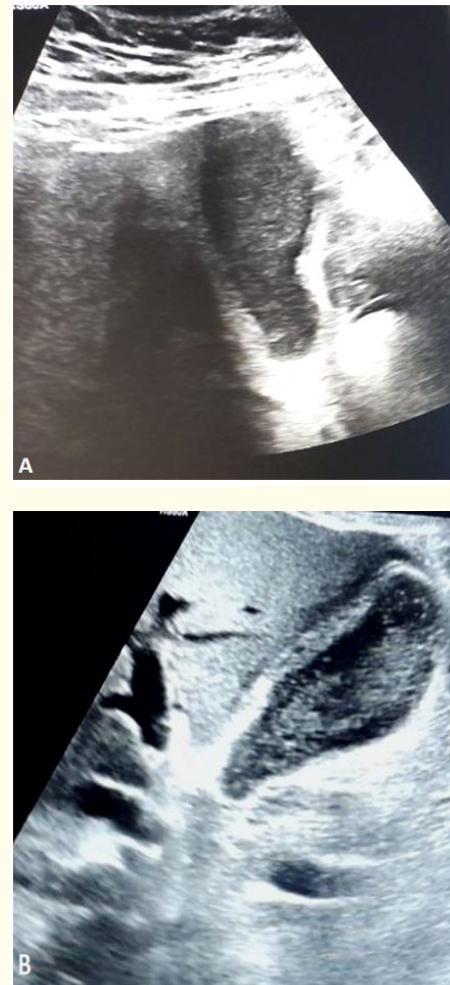
## Case Presentation

We present the case of a 70-year old patient, known with high blood pressure and chronic macrolithiasic cholecystitis, therapeutically neglected, who came into the emergency ward for intense diffuse abdominal pain, accompanied by absent bowel movement, nausea and vomiting. From what the patient told us, we found out that the current symptomatology had started suddenly about 2-3 days before and aggravated progressively. From the patient's personal pathological history, we retain the ultrasound diagnosis of cholelithiasis with a single, large size ( $\varnothing \approx 40-50$  mm) gallstone, more than 30 years old.

Clinically, the patient was afebrile, in a good general condition, hemodynamic and respiratory balanced, BP=150/90 mmHg, VR-20 bpm, SpO2-97%; slightly distended abdomen, painful at the level of the upper abdominal floor, without any signs of peritoneal irritation. He was mounted a gastric probe and spontaneously evacuated 500 ml of bile fluid.

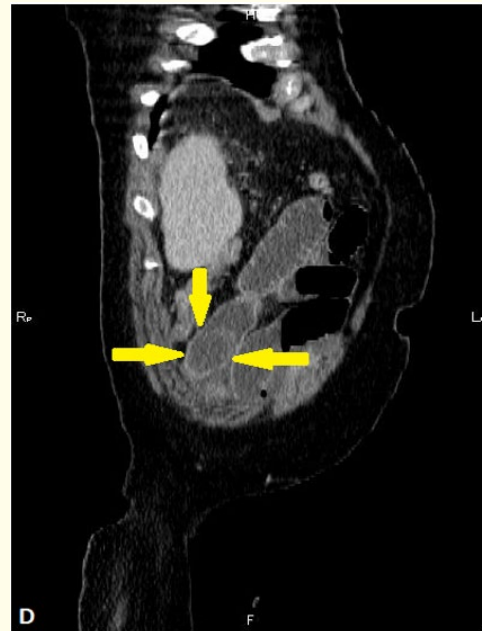
The laboratory tests and the cardio-pulmonary X-ray were within normal limits, and the abdominal ultrasound revealed hydro-aerial images on the small bowel, with no radio-opaque ectopic gallstones identified.

The abdominal ultrasound performed in the emergency room did not visualize the single large-size gallstone, known by the patient for many years, presently describing stone-free gallbladder, with thickened walls, with a double contour and transonic content (Figure 1 A and B). Based on the result of this first imaging investigation, the surgeon suspected the diagnosis of gallstone ileus and requested an emergency abdominal-pelvic computed tomography, with contrast agent.

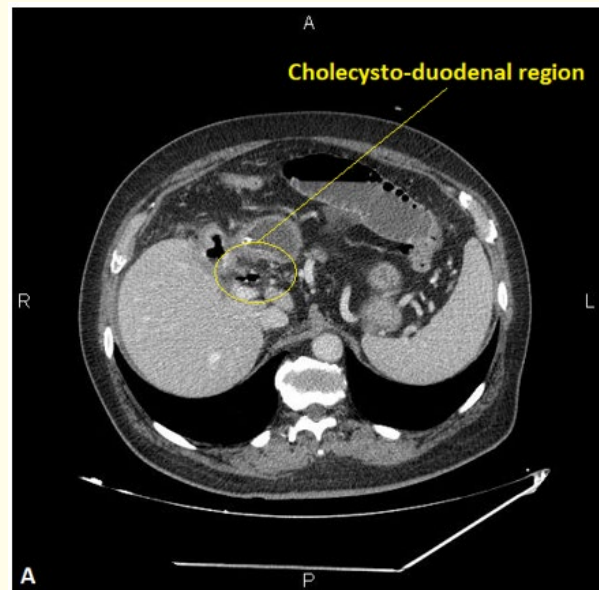


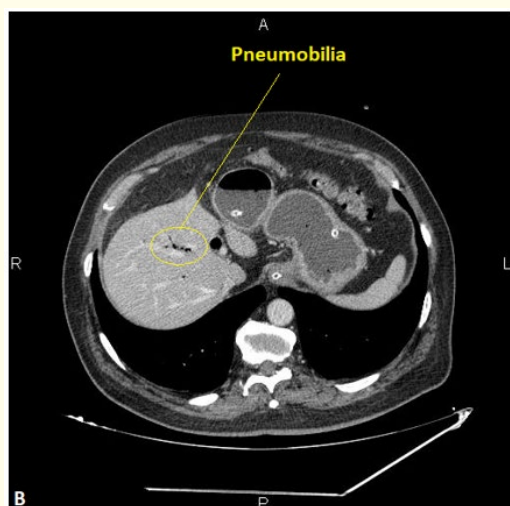
**Figure 1:** The ultrasound indicates tick-wall gallbladder and does not visualize the gallstone, in a patient diagnosed with a single, large-size (approx. 40-50 mm) gallstone many years ago.

The CT scan, partially non-conclusive due to the respiratory artefacts (the patient was hardly cooperative), before and after intravenous administration of the contrast agent, revealed the following: slightly distended jejunal and ileal loops in the mesogastrium, with hydro-aerial levels included, with decalibration in the right abdominal flank, where the scan reveals hypodense, non-iodophilic content, with a pseudo-nodular structure and the maintenance of the parietal integrity (Figure 2 A-D); fine blade of intraperitoneal fluid in the adjacent, in the right iliac fossa and in the posterior cul-de-sac; liver with shape, position and dimensions within normal limits, with an homogenous structure and iodophilia, without focused processes; absence of extra- and intrahepatic bile ducts dilatations, pneumobilia (Figure 3 A and B) in the left hepatic lobe (to be corelated with the patient’s history); the gallbladder cannot be visualized; spleen, pancreas, kidneys and adrenal glands without pathological contrast uptake; splenic-mesenteric-portal venous system normally opacified with the contrast agent; no abdominal-pelvic adenopathies.



**Figure 2:** The CT scan of the abdomen and pelvis, with contrast agent, indicated a few hydro-aerial levels in the mesogastrium and an intraluminal image in the right abdominal flank, with hypodense, non-iodophilic content, with pseudo-nodular structure (ectopic gallstone), in a patient suspected for gallstone ileus.



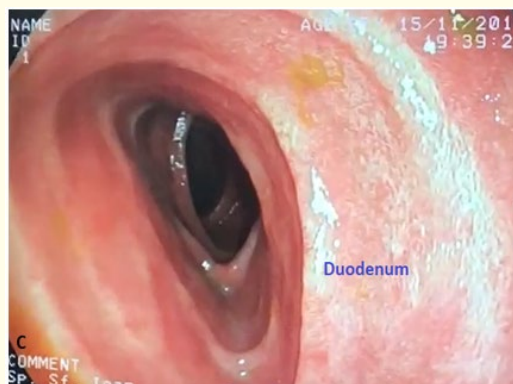


**Figure 3:** Absence of extra- and intrahepatic bile ducts dilatations, with pneumobilia present in the left hepatic lobe – Rigler triad present on the CT scan with contrast agent (Figure 2 A-D and Figure 3 A-B).

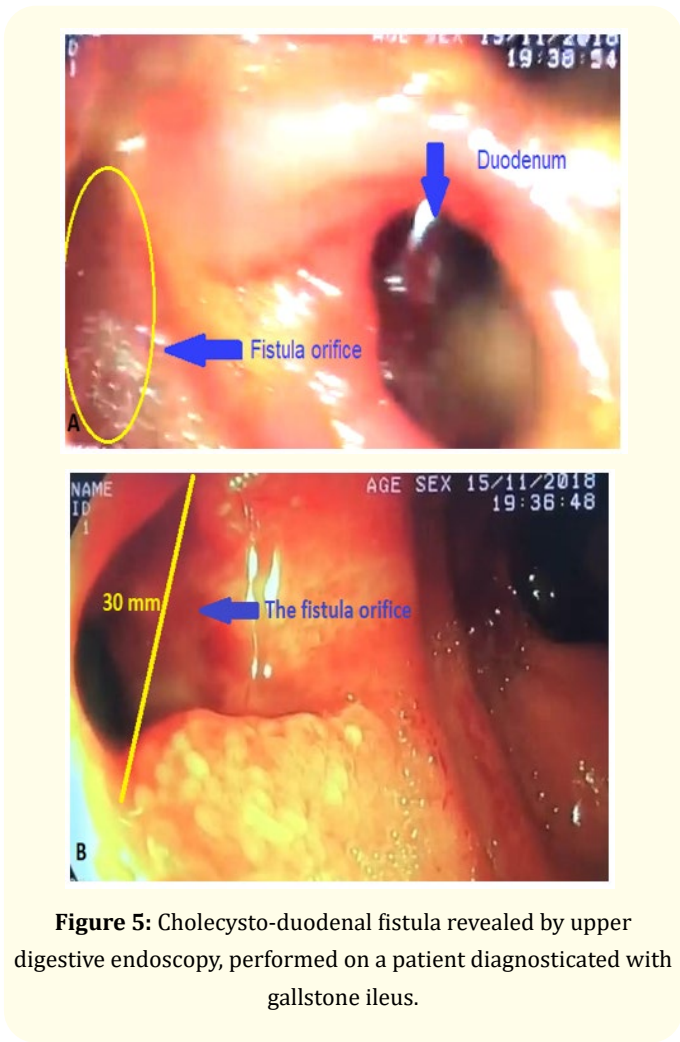
Based on the clinical symptomatology, the indirect data offered by the ultrasound and the CT scan, strongly suggestive for the diagnosis of gallstone ileus, the surgeon decided the urgent admission of the patient, with the purpose of objectivating the pathogenic mechanism consisting in biliary-digestive fistula, the hidden cause that led to the installation of the current upper intestinal obstruction syndrome.

The surgeon requested the performance of an upper digestive endoscopy (UDE), at the same time with the decision of performing emergency surgery. Thus, in the operation room, under general anesthesia with orotracheal intubation, preoperatively, the endoscopy performed with the flexible duodenoscope (Figure 4 A-D) revealed a cholecysto-duodenal fistula, with the diameter of approx. 30 mm, situated at the level of the upper duodenal knee (Figure 5 A and B). In addition, the transduodenal endocholecystoscopy performed through the fistula orifice revealed stone-free gallbladder, full of biliary fluid (Figure 6 A-D).

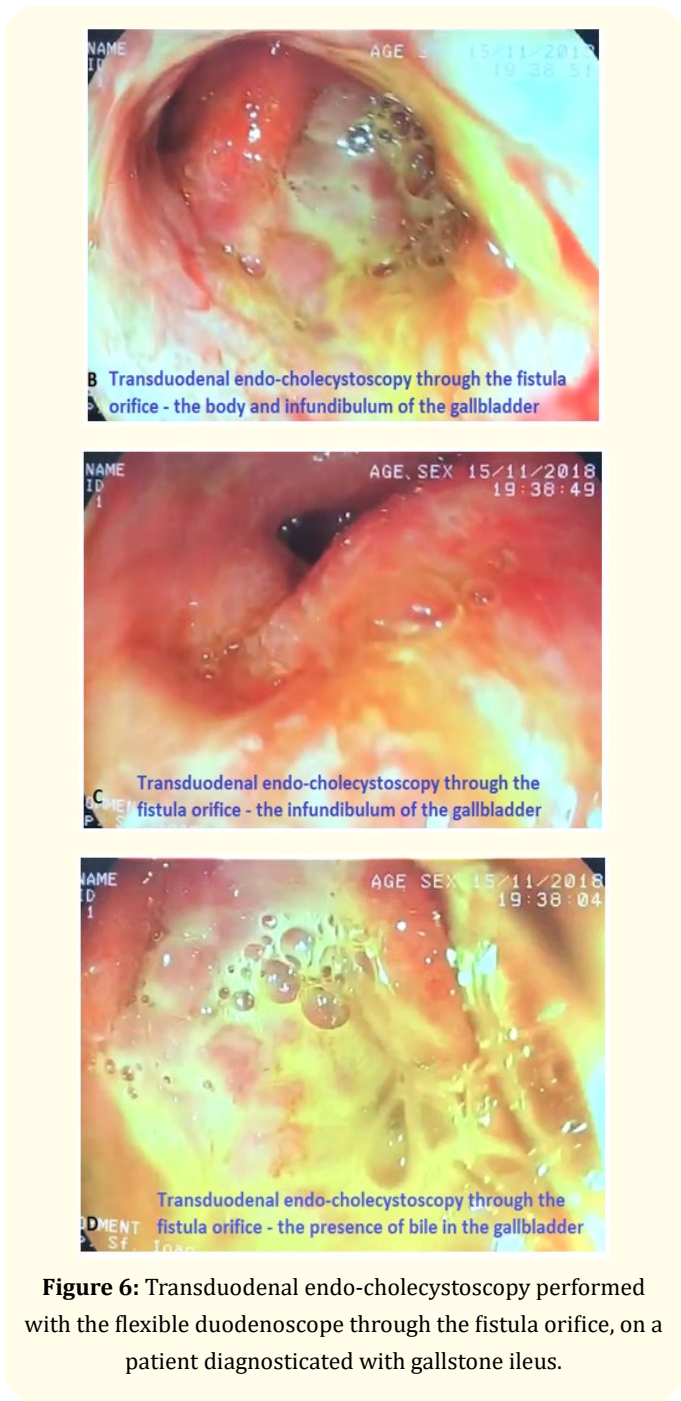
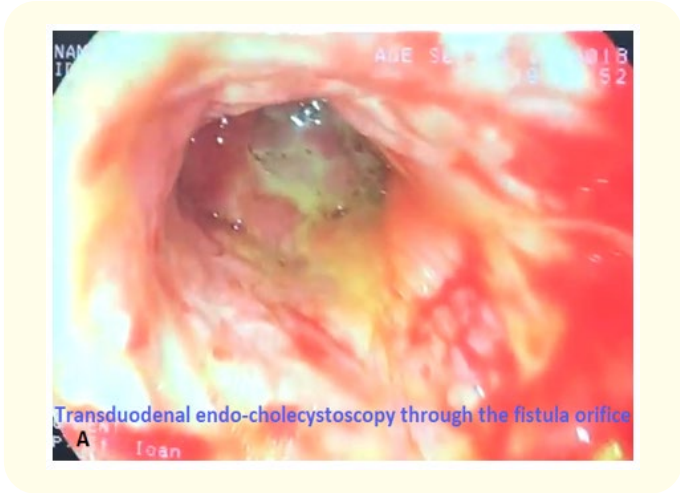
Under the same general anesthesia, the case was immediately resolved by enterolithotomy with laparoscopic enterorrhaphy, with favorable evolution.



**Figure 4:** Upper digestive endoscopy, performed with the flexible duodenoscope on a patient diagnosed with gallstone ileus.



**Figure 5:** Cholecysto-duodenal fistula revealed by upper digestive endoscopy, performed on a patient diagnosed with gallstone ileus.



**Figure 6:** Transduodenal endo-cholecystoscopy performed with the flexible duodenoscope through the fistula orifice, on a patient diagnosed with gallstone ileus.

**Discussions**

The diagnosis of gallstone ileus is often given intra-operatively, as an emergency, in degenerate and elderly patients, where the cause of surgery is bowel obstruction. The gallstone ileus incidence

is 1-4% of bowel obstruction causes. It mainly occurs in female patients, with high mortality.

Even if it is a rare cause of intestinal obstruction, gallstone ileus must be taken into consideration with regards to the causes of acute surgical abdomen and small bowel obstruction, in particular in elderly patients, where this diagnosis can be easy to omit. The clinical symptomatology is given depending on the localization of the obstacle and the size of the calculus: abdominal pain with diffuse localization, nausea, biliary-alimentary vomiting, constipation, usually non-specific and transitory symptoms, probably related to the passage of the gallstone into the digestive duct.

The case presented in this article is subject to the same coordinates, the patient's symptoms did not lead the specialist to a certain diagnosis, that being reserved to imaging investigations. The abdominal X-ray, usually performed on patients who come to hospital with intestinal obstruction, is useful, being able to reveal the Rigler triad: pneumobilia, the presence of an ectopic calculus, hydro-aerial levels, but these signs can only be noted in half of the cases [8]. The ultrasound can reveal indirect signs, that may lead to the correct diagnosis [8], but the CT scan with contrast agent is the "gold-standard" in the imaging diagnosis of this pathology, its sensitivity being over 90% [9]. For the case presented in the article, the high suspicion was given by the absence, during the ultrasound exam, of the large size gallstone, already known in the patient's history, as well as by the CT image suggesting an intraluminal hypodense content, non-iodophilic, with a pseudonodular structure and the maintenance of the parietal integrity.

Surgical treatment is the elective therapeutical method, and the selection of the laparoscopic technique is strongly conditioned by the accuracy of the etiopathogenic diagnosis. Early surgery is the treatment standard, even if the management of this pathology remains controversial.

That is why, before selecting the therapeutic modality, in the case of gallstone ileus, we consider it very important to know certain aspects related to the understanding of the pathogenic mechanism, the rapidity in giving an imaging (through abdominal ultrasound and abdominal-pelvic computed tomography with contrast agent) and an endoscopic diagnosis (through gastro-duodeno-fibrosopy), which are necessary conditions for the

surgeon's clinical orientation. In this sense, the patient's personal history of prolonged microlithiasis is suggestive for the diagnosis, being documented in 50-60% of cases [1,10].

The pathogenic mechanism of gallstone ileus involves the migration and inlavation of a gallstone into one of the gastrointestinal tract segments. This complication of cholelithiasis has two favoring aspects: gallbladder suffering and increased size and inlavation of the calculus into the intestinal lumen. The first stage is represented by the formation of cholecystoenteric adherences, later the inlavated calculus erodes the gallbladder wall, then the adjacent enteric wall, forming the cholecystoenteric fistula. Among the fistula partners, the duodenum has the highest incidence [10,11], as it also occurred in our case, and the most frequent impaction places of the calculus into the bowel are the terminal ileum, the ileocecal valve, followed by the jejunum and rarely the duodenum, stomach, colon [12]. 6% only of the biliary-digestive fistulas lead to bowel obstruction, and when the stone is impacted at the level of the duodenum, causing gastric outlet obstruction, that is called the Bouveret Syndrome, which represents only 1-3% of gallstone ileus cases [13-16].

In most cases, this pathogenic mechanism is rather suggested indirectly by clinical signs and imaging information, being very rarely objectivated preoperatively, that being only possible through direct visualization with the duodenoscope, of the biliodigestive fistula orifice. This aspect is benefic for fast diagnosis as well as for the differential diagnosis of gallstone ileus, with other rare causes of intestinal obstruction: tumors, adherences, calculi, foreign bodies, bezoars, invagination, volvulus.

Despite the complex medical-surgical therapy, gallstone ileus is associated with a high mortality rate (12-27%) [17], caused by the delay and/or omission of the correct diagnosis, as a consequence of a lack of objectivation and knowledge of the pathogenic mechanism involved (biliodigestive fistula).

The particularity of the case presented in this article consists in the fast diagnosis of gallstone ileus, in emergency, by preoperative duodenoscopy objectivation of the cholecysto-duodenal fistula orifice and the performance of a transduodenal exploratory endo-cholecystoscopy.

## Conclusions

In emergency cases, the pathogenic mechanism of gallstone ileus can be rarely objectivated successfully before surgery, through appropriate clinical-imaging and videoendoscopic correlations, only in excellent technical equipment conditions, allowing thus the fast orientation of the surgeon in order to select the best therapeutical method, with benefic results on the patients' evolution.

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## Bibliography

1. Gari MKM., *et al.* *International Journal of Surgery Case Reports* 51 (2018): 268-271.
2. Inukai K. "Gallstone ileus: a review". *BMJ Open Gastroenterology* 6 (2019): 1-4.
3. Halabi WJ., *et al.* "Surgery for gallstone ileus: a nationwide comparison of trends and outcomes". *Annals of Surgery* 259 (2014): 329-335.
4. Abou-Saif A and Al-Kawas FH. "Complications of gallstone disease: Mirizzi syndrome, cholecystocholedochal fistula, and gallstone ileus". *American Journal of Gastroenterology* 97 (2002): 249-254.
5. Nakao A., *et al.* "The oldest patient with gallstone ileus: report of a case and review of 176 cases in Japan". *Kurume Medical Journal* 55 (2008): 29-33.
6. Mir SA., *et al.* "Management and outcome of recurrent gallstone ileus: a systematic review". *World Journal of Gastrointestinal Surgery* 7 (2015): 152-159.
7. L Chang., *et al.* "Clinical and radiological diagnosis of gallstone ileus: a mini review". *Emergency Radiology* 25.2 (2018): 189-196.
8. Ripposle T., *et al.* "Gallstone ileus: increased diagnostic sensitivity by combining plain film and ultrasound". *Abdominal Radiology* 26 (2001): 401-405.
9. Yu CY., *et al.* "Value of CT in the diagnosis and management of gallstone ileus". *World Journal of Gastroenterology* 11 (2005): 2142-2147.
10. Reisner RM., *et al.* "Gallstone ileus: a review of 1001 reported cases". *American Surgery* 60.6 (199): 441-446.
11. Josè Vitale., *et al.* "Biliary ileus". *Lancet* 380 (2012): 366.
12. Rojas-Rojas DJ., *et al.* "Biliary ileus: 10-year experience. Case series". *Cir Cir* 80 (2012): 228-232.

13. Ruiz de la Hermosa A., *et al.* "Síndrome de Bouveret, una causa infrecuente de obstrucción duodenal". *Revista de Gastroenterología de México* 81 (2016): 55-56.
14. Rivera Irigoin R., *et al.* "Síndrome de Bouveret resuelto mediante litotricia mecánica endoscópica". *Revista Española de Enfermedades Digestivas* 98 (2006): 790-792.
15. Báez-García JJ., *et al.* "Bouveret's syndrome; a case report [Article in Spanish]". *Revista de Gastroenterología de México* 74 (2009): 118-121.
16. Doycheva I., *et al.* "Bouveret's syndrome: Case report and review of the literature". *Gastroenterology Research and Practice* 2009 (2009): 914951.
17. Clavien PA., *et al.* "Gallstone ileus". *British Journal of Surgery* 77 (1990): 737-742.