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Gallstone ileus. A case treated with minilaparotomy and a review of the literature

Gallstone ileus is a rare complication of cholelithiasis which occurs in less than 1% of patients and is the cause of 1-4% of cases of small bowel obstruction. The pathogenesis involves the formation of a bilioenteric fistula.
We report the case of gallstone ileus in an 81-year old woman with typical abdominal pain, arterial hypertension and coronary artery disease. An abdominal computed tomography (CT) scan showed pneumobilia, dilated loops of small bowel and an ectopic gallstone obstructing the intestinal lumen.
The patient underwent enterolithotomy and a 5-cm stone 20 cm from the ileocecal valve was removed. In the literature enterolithotomy alone is the procedure most frequently used for gallstone ileus. Enterolithotomy plus cholecystectomy and/or fistulectomy is only indicated in selected patients.
The clinical signs and symptoms depend on the site of the obstruction and usually include abdominal pain, nausea and vomiting. The diagnostic test of choice is an abdominal CT scan.

KEY WORDS: Cholecystoenteric fistula, Gallstone ileus, Minilaparotomy

Introduction

Gallstone ileus is a form of small bowel occlusion caused by the impaction of one or more stones in the intestinal lumen. The first case was reported by Bartholin in 1654, but Courvoisier, in 1890, was the first to describe a large series, 131 patients with gallstone ileus, most of whom had undergone surgical treatment with a high mortality rate (44%).

Gallstone ileus is the cause of 1-4% of all cases of small bowel occlusion and 24% in patients over 65 [1,2]. Thus the condition is rare, except in the elderly, and responsible for around 3 of every 10 million hospital admissions, and 15 of every 1 million surgical procedures (0.0015) [2,3]. It is more common in women than in men, with a female-to-male ratio of 5:1 on average [4]. Although cholelithiasis is the main pathogenic factor only 0.4% of patients with gallstones develop gallstone ileus [2,5].
Treatment is surgical, except in rare, carefully selected cases where watchful waiting for spontaneous resolution is appropriate. However there is no agreement about what constitutes the best surgical strategy: some surgeons advocate minimal intervention, others a 2-step approach, and others again radical surgery.

Case report

An 81-year-old woman was admitted for evaluation of a 1-week history of worsening of abdominal pain, associated with worsening nausea and vomiting and abdominal distension as well as failure to pass stools and gas. She had a past medical history of hypertension and coro-

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Fig. 1: Preoperative CT scan showing pneumobilia, distension of intestinal loops and a large gallstone in the ileum

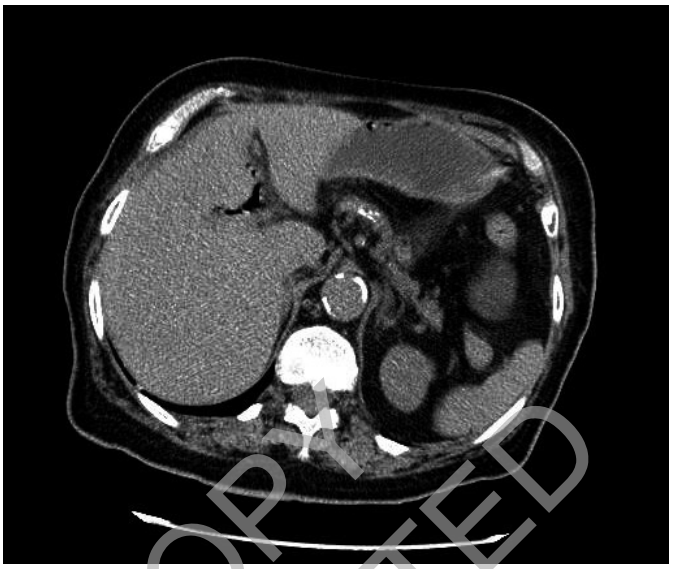

Fig. 2: Preoperative CT scan showing pneumobilia

Fig. 3: Preoperative CT scan showing air-fluid levels and distension of intestinal loops.

nary artery disease for which she was taking medication, but no history of cholelithiasis or biliary colic. On physical examination the abdomen was distended, with hypertympanic abdominal sounds on percussion and tender on palpation, especially in the right upper quadrant. A nasogastric tube was inserted and gastric contents were aspirated. An abdominal computed tomography (CT) scan performed in the emergency room on admission showed air in the gallbladder and bile ducts (indirect sign of cholecystoenteric fistula), a large stone in the ileum, and distended ileal loops with air-fluid levels (Figs. 1-4).

Blood tests revealed leukocytosis (16,000 μL) with neutrophilia, urea and creatinine levels above normal, and electrolyte levels within range. The preoperative imaging studies had revcaled the type of intestinal occlusion, the site of the obstruction, and the presence of a cholcystoenteric fistula which it was not advisable to treat immediately given the poor condition of the patient after 7 days of intestinal occlusion and the local anatomy. Therefore, a minilaparotomy was performed with a McBurney incision measuring about 10 cm, the empty intestinal loops distal to the obstruction were identified, and the inspection proceeded proximally until the part of the ileum containing the gallstone was reached. The entire ileum was inspected up to the ligament of Treitz to rule out the presence of other stones. The loops were replaced in the abdominal cavity except for the part containing the stone which was approximately 20cm from the ileocecal valve. The stone was dislodged and pusher proximally into the dilated bowel to avoid performing an enterolithotomy in the most severely affected seg-

Fig. 4: Preoperative CT scan showing a large gallstone in the ileum.

Fig. 6: The gallstone after removal.

Fig. 5: Intraoperative photograph showing the extraction of the gallstone

Fig. 7: Minilaparotomy with a McBurney incision.

ment. A longitudinal enterolithotomy was performed approximately 15cm proximal to the point of obstruction and the stone was extract (Figs. 5, 6).
The enterotomy was sutured transversely, an aspiration drain was positioned in the pouch of Douglas, and the abdominal wall was closed in layers (Fig. 7). The patient's postoperative course was unremarkable and she was discharged home on postoperative day 7.

Discussion

Gallstone ileus is uncommon and diagnosis and treatment can therefore be problematical.

Gallstone ileus causes 1-4% of all cases of small bowel obstruction but 24% in patients over 65 [1,2], and is responsible for approximately 3 of every 10 million hospital admissions and 15 of every 1 million surgical procedures (0.0015%) [3]. It is more common in women than in men, with a female-to-male ratio of 5:1 [2,4].
The initial presentation is usually characterized by symptoms such as nonspecific abdominal pain and therefore a correct preoperative diagnosis is made in only about 50% of patients and is normally based on clinical findings and information from imaging tests [5,6].
Advaced age and a history of symptomatic cholelithiasis (50% of the patients examined) and advanced age should raise a suspicion of gallstone ileus. The determining fac-

tor in the pathogenesis of spontaneous biliodigestive fistulas is recurrent pericholecystitis which usually causes adhesions to form between the gallbladder and neighboring structures (duodenum, colon, stomach, bile duct) followed by tissue necrosis and fistula formation due to persistent inflammation and pressure from the ectopic stone [7].

Frequent unexplained episodes of partial bowel obstruction prior to admission should raise suspicion of gallstone ileus since partial obstruction can occur repeatedly until the gallstone finally becomes impacted in the bowel lumen.

The medical history of our patient was negative for prior episodes of biliary colic and/or cholangitis and/or partial bowel obstruction.

A review of the literature revealed that fistulization is most often choledystoduodenal (69%) as in our patient, but may also be cholecystoileal (20.9%), cholecystocolic (8.5%) and cholecystogastric (1.6%) [2,8].

The most common site of stone impaction is the ileocecal valve, the narrowest part of the intestine. However, the stone (s) may become impacted in any intestinal segment due to inflammation, local anatomy, or neoplasia. Both the size of the intestinal lumen and the size of the gallstone(s) are important: it is generally agreed that the stones that usually cause obstruction are 2.5cm in diameter. There are cases reported in the literature of stones <2.5cm as well as of stones >5cm which pass through the entire intestine and are eliminated with the feces [9]. In our case the stone had a longitudinal diameter of approximately 5 cm (Fig. 6).

If gallstone ileus occurs in elderly patients with comorbidities the symptoms are often vague and intermittent and this can delay diagnosis for days [10]. The presentation is usually nonspecific with intermittent nausea, vomiting, abdominal distention and pain. abdominal distention. More care should be taken in diagnosing patients with a history of cholelithiasis and the above symptoms. Since our patient's history was negative for cholelithiasis there was no obvious reason to strongly suspect gallstone ileus.

Diagnosis of gallstone ileus has been greatly facilitated by the advent of CT scanning and magnetic resonance imaging [11,12]. Plain abdominal x-rays which are routinely performed when bowel obstruction is suspected can reveal the pathognomic triad of findings first described by Rigler in 1941: pneumobilia, air-fluid levels, ectopic gallstone(s).

Intestinal obstruction can be seen in 70% of cases, one or more ectopic stones in 35% and pneumobilia in 34% [8,9].

A small bowel series with water-soluble contrast may reveal the characteristic sign of a *serpent à tête claire* and, with a bit of luck, the bilioenteric fistula [13].

Abdominal ultrasound imaging can show ditended bowel loops, pneumobilia and one or more hyperechoic ectopic formations with a cone-shaped posterior shadow in the intestinal lumen.

The widespread use of CT scanning, with an overall sensibility, specificity, and diagnostic accuracy of 93%, 100%, and 99% respectively, has proven to be of great assistance [14]. In our case the diagnosis was made with abdominal CT images that revealed the typical signs of gallstone ileus: pneumobilia, abdominal distension and ectopic stone(s).

In 50% of cases laparotomy is needed to make a diagnosis [10].

The management of gallstone ileus is a controversial issue. Treatment includes enterotomy with extraction of the stone(s), cholecystectomy and closure of the fistula, intestinal resection alone, intestinal resection with closure of the fistula [15-19].

An aggressive approach is favored by some surgeons who consider a one-stage procedure consisting of enterolithotomy with cholecystectomy and fistula repair the ideal treatment which not only relieves the obstruction but also prevents alarming complications such as recurrence of gallstone ileus and the sequelae of cholangitis and cholecystitis as well as an increased risk of developing gallbladder cancer, all of which are associated with a high mortality rate [9,19-22].

On the other hand, according to most authors the most suitable solution is enterolithotomy alone, while cholecystectomy or fistula repair may be performed later [23-27]. They point to the low incidence of recurrence and the possibility that the fistula will close spontaneously after the obstruction has been removed [3].

Thus preoperative diagnostic procedures identify the nature and site of the obstruction and raise a strong suspicion that there are tenacious cholecystoenteric adhesions, and surgical treatment can, as in our case, be limited to minilaparotomy with the aim of eliminating the intestinal obstruction. This may be followed by elective interval surgery to treat the gallbladder pathology [28] if symptoms persist and there is residual cholelithiasis or if there is acute inflammation in the cholecystoenteric fistula in which case it is unlikely that there will be spontaneous resolution [29].

Conclusions

Gallstone ileus is an uncommon type of mechanical bowel obstruction that most commonly occurs in the elderly, especially in women.

Diagnosing gallbladder ileus can be challenging because the symptoms are usually nonspecific and it is difficult to identify the two most important signs of the condition, namely, pneumobilia and ectopic gallstone(s), with commonly used diagnostic imaging techniques such as abdominal x-rays and ultrasound. CT scanning is the imaging modality of choice due to its high levels of specificity and sensitivity.

The accepted treatment for gallstone ileus is surgery except in those cases where the stone is expelled spon-

taneously or is impacted in the pylorus-duodenum and can perhaps be extracted endoscopically.
The most hotly debated question is what is the optimal surgical strategy, i.e.is it better to treat the obstruction and fistula in a one-stage procedure, postpone fistula repair (two-stage surgery), or not repair the fistula at all. The one-stage procedure should be reserved for carefully selected patients who are not too old, have no severe concomitant disease, and are in satisfactory general condition. However this is not the case with most patients since gallstone ileus most commonly occurs in the elderly with severe comorbidities, often with electrolyte imbalances at the time of surgery. Seventy-three percent of these patients are therefore treated with enterolithotomy alone.
We agree with the majority of authors that the most rational approach seems to be minimal intervention such as minilaparotomy, aimed at eliminating the obstruction and avoiding surgical procedures that may cause damage given the presence of tenacious adhesions resulting from inflammation. Since the patient's clinical course is usually unremarkable, watchful waiting may be justified although this strategy must obviously be abandoned if the patient develops symptoms that indicate a need for repair of a persistent bilioenteric fistula and/or residual gallstones.

Riassunto

Gli Autori presentano un caso di ileo biliare, osservato in una donna di 81 anni con sintomatologia addominale tipica, perdurante da circa sette giorni con ipertensione arteriosa e cardiopatia ischemica. L'esame TC dimostrava la presenza di aerobilia, dilatazione delle anse intestinali e calcolo ostruente in sede ectopica.
Non si riteneva opportuno trattare la fistola bilio-enterica in prima istanza sia per le condizioni generali della paziente, compromesse da storia di sette giorni di occlusione intestinale, sia per la situazione anatomica locale.
Si procedeva pertanto ad una minilaparotomia con incisione alla McBurney . Si esaminava tutto l'ileo fino al legamento del Treitz per escludere la presenza di altri calcoli. Si estrinsecava il tratto di ileo contenente il calcolo e si procedeva a dislocare il calcolo a monte nel tratto dilatato onde evitare di effettuare la enterolitotomia nel tratto sofferente. Veniva quindi praticata l'enterotomia con estrazione del calcolo
La terapia è chirurgica se si escludono i rari casi in cui il calcolo viene eliminato spontaneamente o si riesce ad estrarlo per via endoscopica nel caso abbia una localizzazione piloro-duodenale. Il problema più dibattuto è sicuramente rappresentato dagli orientamenti non univoci in tema di tattica operatoria, e cioè se sia più corretto trattare contemporaneamente l'ostruzione e la fistola biliare (one stage) oppure effettuare la correzione della fistola in un secondo momento (trattamento in due tempi) o non correggerla affatto.
L'enterolitotomia semplice rappresenta il 73% di tutti gli interventi per ileo biliare e ciò perché l'ileo biliare colpisce prevalentemente pazienti con età avanzata e gravi patologie associate spesso con squilibri metabolici al momento dell'intervento chirurgico. In accordo con la maggior parte degli autori, sembra che l'approccio più razionale sia rappresentato da un intervento chirurgico di minima, anche con minilaparotomia, come nel nostro caso, volto a risolvere l'occlusione intestinale astenendosi da atti chirurgici potenzialmente dannosi in presenza di estese e tenaci aderenze infiammatorie.

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