CASE REPORT

Missed diagnosis of a gallstone ileus: an incomplete laparoscopy due to a putative ventriculoperitoneal shunt infection

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SUMMARY

A 90-year-old woman presented with abdominal pain and vomiting. Initial investigations revealed diffuse abdominal tenderness and fever, combined with leucocytosis and marked elevation of C reactive protein levels. Abdominal CT demonstrated segmental bowel wall thickening in the jejunum near the tip of a ventriculoperitoneal (VP) shunt, which had been placed 17 years before because of hydrocephalus. Pneumobilia was present but no ectopic gallstone was detected at the initial analysis and there were no signs of mechanical ileus. Immediate laparoscopy was performed to exclude small bowel ischaemia. Owing to purulent ascites the VP shunt was externalised, supposing VP shunt infection with reactive jejunitis to be the main problem. Antibiotic treatment was then administered and the remaining part of the shunt was removed 6 days later. However, clinical signs of intestinal obstruction have been aggravated. Therefore, a laparoscopy was repeated 3 days later and a gallstone ileus was diagnosed. After enterolithotomy through a minilaparotomy, the patient was fully recovered.

BACKGROUND

Gallstone ileus is a well known but rare cause of intestinal obstruction. Overall, accounting for only 1–4% of mechanical bowel obstruction, it has been reported to be responsible for up to 25% of small bowel obstruction in patients older than 65 years.^{1 2} Diagnosing gallstone ileus is often challenging because of oligosymptomatic conditions in patients with associated comorbidities. Therefore, missed or delayed diagnosis is common. Incomplete diagnostic laparoscopy may lead to misdiagnosis and should not rely on radiology reports when clinical signs and symptoms are necessitating complete exploration. Particularly, loss of tactile sensation can lead to incomplete laparoscopy.³

We consider the described case to be illustrative of the challenge of diagnosing gallstone ileus in the elderly patient with relevant comorbidities. The presented case also highlights the risk of relying on radiology reports, when clinical signs are contradictory, and the perils of incomplete diagnostic laparoscopy.

CASE PRESENTATION

A 90-year-old female patient was admitted to the emergency room with a history of abdominal cramps, nausea and vomiting during the last 3 days. On admission, the haemodynamically stable patient

presented with fever, diffuse abdominal rebound tenderness and reduced bowels sounds. Furthermore, the patient had a ventriculoperitoneal (VP) shunt in situ, which had been placed 17 years previously because of normotensive hydrocephalus. Otherwise stated, the patient was remarkably fit for her age.

INVESTIGATIONS

Laboratory studies on admission revealed a high elevated white blood cell count ($20 \times 10^9/l$) and a C reactive protein of 294 mg/l. The rest of the routine blood analysis did not reveal any significant disturbance.

Plain abdominal x-ray examination showed discrete signs of bowel obstruction. Consequently, an abdominal CT was performed, which revealed segmental inflamed small bowel located close to the tip of the VP shunt. There were also signs of cholecystitis with pneumobilia, yet the attending radiologist found no presence of an ectopic gallstone and no signs of mechanical ileus, for example, a collapsed distal ileum. Retrospectively, the removed gallstone in the jejunum was unfortunately missed in the first analysis because of the similar density compared with the surrounding intraluminal fluid (Figure 1).

DIFFERENTIAL DIAGNOSIS

A febrile patient with a VP shunt presented with diffuse peritonism and elevated infection parameters. This made us assume a VP shunt infection as a possible diagnosis. The CT scan showing segmental bowel wall thickening of the jejunum,

Figure 1 Abdominal CT scan showing a gallstone impacted in the small bowel (arrow 1), segmental bowel wall thickening of the jejunum (arrow 2) and the tip of the ventriculoperitoneal shunt (arrow 3).

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which was located close to the tip of the VP shunt, was interpreted as reactive jejunitis because of a putative VP shunt infection. Pneumobilia, as a pathognomonic sign of cholecystoenteric fistula, was also present, but neither an ectopic gallstone nor a mechanical ileus was seen. Consequently, we interpreted this radiological sign as a chronic state rather than an acute event. However, gallstone ileus had to be considered as another differential diagnosis. Finally, other causes of segmental small bowel thickening, such as ischaemia or bacterial infection, were considered in the differential diagnosis.

TREATMENT

Few hours after admission, the patient was transferred to the operating room. A diagnostic laparoscopy was performed, showing purulent ascites in all the abdominal quadrants and segmental inflamed and thickened jejunum. Nonetheless, there was no evident small bowel obstruction. Exploration of the gallbladder was not performed because of massive adhesions in the right upper abdomen. As the tip of the VP shunt was surrounded by the seropurulent fluid and in contact to the inflamed part of the jejunum, a putative VP shunt infection was believed to be the main problem. Consequently, the shunt was externalised during the same operation by the attending neurosurgeon. The treatment of a putative VP shunt infection was completed by broad-spectrum antibiotic administration. Microbiological analysis revealed growth of coagulase-negative staphylococci on the shunt tip. Analysis of cerebrospinal fluid showed no bacterial growth and inflammation markers in the blood were almost normalised. Six days later, the remaining part of the VP shunt (ventricular drain) was removed by the neurosurgeons.

During follow-up on the neurosurgery ward, biliary reflux through the stomach tube persisted and a gastrografen swallow study was performed which revealed, now obvious, signs of a mechanical obstruction (figure 2).

We finally decided to reperform a diagnostic laparoscopy because clinical signs of ileus aggravated and became more accentuated despite the treatment of the putative VP shunt infection. At last, clear signs of an intestinal obstruction in the jejunum with a palpable intraluminal mass could be found intraoperatively. A longitudinal enterotomy was performed

Figure 2 Gastrografen swallow study showing contrast agent accumulating in the distended small bowel (arrows).

Figure 3 Removed gallstone measuring 3.6x2.9 cm.

through a minilaparotomy and a gallstone, measuring approximately 3 cm in diameter, was removed (figure 3).

OUTCOME AND FOLLOW-UP

Further postoperative course was uneventful and after recovery, 2 weeks later, the patient could be transferred to a rehabilitation clinic. Owing to the advanced age of the patient and considering her good clinical recovery, we refrained from the therapy of the underlying disease, this being surgical repair of the cholecystoduodenal fistula and cholecystectomy.

DISCUSSION

Gallstone ileus is a rare disease. According to the literature, it accounts for only 1–4% of mechanical bowel obstruction. Nevertheless, in patients older than 65 years it has been described to be responsible for up to 25% of cases of small bowel obstruction.^{1 2} Owing to the geriatric population and often delayed diagnosis, it is associated with high morbidity and mortality. The aetiology is either acute or chronic cholecystitis owing to cholecystolithiasis leading to cholecystoenteric (mostly cholecystoduodenal) fistula. Migration of one or more gallstones into the intestine can cause intestinal obstruction. Typical size of stones leading to gallstone ileus is between 2 and 5 cm.^{1 4} Impacted gallstones are most commonly located in the terminal ileum, but can also possibly be found in the jejunum, duodenum, stomach and colon.²

It is well known that diagnosis of gallstone ileus is often delayed because of different reasons. Gallstone ileus is a disease of the elderly, the mean age being approximately 72 years.⁴ These patients often present themselves late, with vague and poorly defined symptoms and may suffer from relevant comorbidities. Typical signs of obstructive ileus can be absent. Also, history of cholelithiasis is only present in approximately 50% of patients.⁴ Another reason is the so called ‘tumbling obstruction’, caused by a moving stone that can lead to incomplete obstruction and therefore to remission and recurrence of symptoms.⁵

The classical radiological Rigler’s triad of pneumobilia, ectopic gallstone and mechanical bowel obstruction is only observed in a minority of cases. In a series of 27 patients with gallstone ileus, ectopic stones could only be detected in one-third of the cases in a plain abdominal film.⁶ Abdominal ultrasound might be an adequate technique for diagnosing biliary pathologies, but accuracy for the diagnosis of gallstone ileus is also limited. Abdominal CT scan is considered the gold standard and facilitates early diagnosis of gallstone ileus with high sensitivity and specificity.⁷ In particular, it is useful for the

precise definition of location and size of ectopic gallstones. However, less calcified stones can be missed on the initial CT scan analysis like in our case. In two studies by Lassandro *et al*,^{6,8} ectopic gallstones were missed in the CT scan analysis in 4 of 27 and 3 of 40 cases of gallstone ileus.

There is little controversy concerning the necessity of early surgical intervention in obstructive gallstone ileus to relieve the bowel obstruction by means of enterolithotomy. Some authors favour a one-stage procedure with a simultaneous cholecystectomy and closure of the cholecystoenteric fistula to reduce the risk of recurrent gallstone ileus and cholangitis. Others prefer a two-stage procedure with an elective cholecystectomy and fistula closure 4–6 weeks later or an enterolithotomy alone without treatment of the underlying problem, because of high perioperative risk in patients with relevant comorbidities.⁴

The present case highlights the difficulties in diagnosing gallstone ileus in patients with other relevant comorbidities and also the perils of incomplete laparoscopy. On patient admission, fever, elevated infection parameters in the blood analysis and diffuse peritonism primarily suggested a bowel infection or ischaemia. The CT scan showed segmental thickening of the bowel wall in the jejunum without evident signs of intestinal obstruction supported our tentative diagnosis. Infection is one of the most common complications of VP shunts (with a documented incidence of 5–47%) and CT scan findings showing ascites and bowel wall thickening are typical signs of intra-abdominal VP shunt infection.⁹ The presence of pneumobilia without an ectopic gallstone or signs of mechanical ileus were not considered as important hints, also because the patient's clinical signs were more suggestive of an infectious cause. Unfortunately, the gallstone in the jejunum was only seen retrospectively.

After initial laparoscopy to exclude bowel ischaemia, the findings fit for VP shunt infection. Satisfied with this hypothesis, laparoscopy was terminated without complete examination of the affected bowel for luminal obstruction or exploring the gallbladder for signs of cholecystoenteric fistula. The incomplete laparoscopy and the limited tactile sensation using this operation technique³ led to missed diagnosis of a gallstone ileus.

After removal of the VP shunt and antibiotic treatment, symptoms of diffuse peritonism and signs of infection decreased significantly and increasing signs of intestinal obstruction were unmasked. The second diagnostic laparoscopy was the one that led to the right diagnosis and adequate treatment.

In a literature search, more than 400 case reports of gallstone ileus could be found. In these reported cases delay of diagnosis was commonly because of late admission of the patients. There were only few reports of delayed diagnosis because of other reasons, for example concomitant pneumonia leading to initial misdiagnosis of gallstone ileus.¹⁰ In the published data, no analogue case describing a gallstone ileus masked by a putative VP shunt infection could be found. Furthermore, it is known that one of the main disadvantages of laparoscopy is the loss of tactile sensation, which is known to bear a risk for misdiagnosis, especially, cancerous lesions.^{3,11}

In summary the presented case shows an unusual situation of a combination of gallstone ileus with a putative VP shunt infection. Incomplete emergency laparoscopy and missed ectopic gallstone in the CT scan led to a significant delay of diagnosis.

Learning points

- ▶ Diagnosis of gallstone ileus is often delayed owing to atypical clinical presentation and concomitant medical problems.
- ▶ Gallstone ileus requires a higher index of suspicion in elderly patients with symptoms of small bowel obstruction as compared with the younger patients.
- ▶ Abdominal CT is the gold standard for diagnosis—but approximately 10% of ectopic stones can be missed.
- ▶ Incomplete laparoscopy in the emergency situation can lead to a significant delay in diagnosis and should not fully rely on radiology reports when clinical signs are contradictory.
- ▶ One-stage procedure with enterolithotomy as well as cholecystectomy and fistula closure at the same time should only be offered to patients in a good general condition.

However, the patient recovered fully after enterolithotomy. In conclusion, the presented case emphasises the recurrent insidious presentation of patients with gallstone ileus, demonstrates the difficulty of diagnosis and highlights the need for complete diagnostic laparoscopy in an unclear emergency situation.

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Competing interests None.

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