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Retained gallstones: an elusive complication of laparoscopic cholecystectomy

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SUMMARY

A young, healthy woman presented to the emergency department multiple times with right upper quadrant pain and subjective fevers for over a year after her laparoscopic cholecystectomy. The patient required multiple hospital visits and extensive work-ups before finally being diagnosed with retained gallstones in her abdomen. After surgical removal of the stones, her symptoms resolved completely. The case highlights the challenges in diagnosing retained gallstones, the substantial burdens they can impose on patients, and the importance of prevention and thorough documentation.

BACKGROUND

In the USA, the prevalence of gallstones is 8% among men and 17% among women with symptomatic cholelithiasis being the most common complication.[1] Other complications include choledocolithiasis, cholangitis and gallstone pancreatitis. As such, laparoscopic cholecystectomy for acute cholecystitis or symptomatic cholelithiasis has become one of the most commonly performed operations in the USA.[2] Advances in surgical apparatus and techniques decreased complication rates. However, gallbladder perforation with spillage of bile and/or gallstones is still relatively common occurring in 2.3%–40% of cases with remaining retained gallstones in 1%–40%.[3] Though most retained gallstones remain clinically silent, they can lead to significant morbidity.

CASE PRESENTATION

A 34-year-old woman with a medical history of obesity, hyperlipidaemia and cholelithiasis presented to the emergency department (ED) with 5 days of worsening right upper quadrant pain radiating to the right flank. Sixteen months prior to this index ED visit, she had an episode of choledocholithiasis complicated by acute cholangitis and cholecystitis requiring a prolonged inpatient stay. During that hospitalisation, she received intravenous antibiotics and percutaneous cholecystostomy tube placement which were eventually followed by common bile duct stone removal via endoscopic retrograde cholangiopancreatography. One month after her discharge, she underwent elective laparoscopic cholecystectomy. Her surgery was complicated by intraoperative spillage of two large cholesterol gallstones into the peritoneal cavity. Per the operative note, both stones were successfully retrieved intraoperatively via laparoscopy.

After multiple visits to her primary care doctor for continued right upper quadrant pain and intermittent episodes of subjective fever, fatigue, nausea and vomiting, she returned to the ED 14 months later for evaluation. During that visit, her work-up, described more in the investigations section below, uncovered a small, non-drainable subhepatic abscess for which she was admitted with intravenous ceftriaxone and metronidazole. She left on hospital day 3 against medical advice but did report compliance with a 14-day course of oral ciprofloxacin and metronidazole. Her symptoms at her index presentation 1 month later were similar to that visit: fevers and right upper quadrant pain. On her index visit, her vital signs were within normal limits, afebrile and haemodynamically stable. Abdominal examination demonstrated focal tenderness to palpation over the right upper quadrant without guarding or rebound pain. The rest of the physical examination was unremarkable.

INVESTIGATIONS

During the patient's ED visit 1 month prior to the index presentation, CT of the abdomen and pelvis with intravenous contrast revealed amorphous hyperattenuation in the right posterior subhepatic region containing a 1.3 cm rim-enhancing hypoattenuated lesion concerning for possible phlegmon with a small, evolving abscess (figure 1A). Laboratory tests were unremarkable with normal white blood cell count, aminotransferases, alkaline phosphatase, total bilirubin and lipase. Blood cultures and serologic testing for *Entamoeba histolytica* and *Echinococcus* were negative.

At her index presentation, abdominal ultrasonography did not show any obvious lesions or intrahepatic or extrahepatic biliary duct dilation. CT of the abdomen and pelvis demonstrated stable findings compared with the prior study, with subhepatic fascial enhancement and a small rim-enhancing area of hypoattenuation (figure 1B). Additional investigations using magnetic resonance cholangiopancreatography revealed an 8 mm rounded focus of signal void on all sequences corresponding to the hypoattenuated lesion seen on CT (figure 2). Together, these imaging findings and the patient's history suggested the presence of a retained gallstone serving as a source of chronic, low-grade localised subhepatic infection and inflammation.

Laboratory tests at the current visit were again unremarkable, including negative blood cultures, no leucocytosis and liver function tests within normal range.

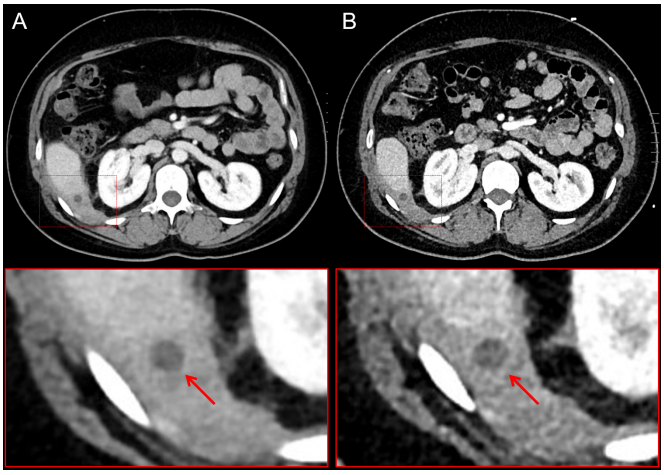

Figure 1 Abdominal CT images from the patient's first (A) and second (B) emergency department visits showing subhepatic retained gallstone (arrows) as a rounded focus of hypoattenuation with rim enhancement.

DIFFERENTIAL DIAGNOSIS

Given the patient's presentation, history, laboratory work-up and imaging findings, differential diagnosis at this time consisted of bacterial or amoebic liver abscess, echinococcosis or malignancy.

Pyogenic liver abscess, which was a presumed diagnosis on the patient's presentation 14 months post-cholecystectomy, more often occurs in the absence of a nidus such as retained gallstones. Common sources of infection include portal vein pyemia from peritonitis or bowel pathologies, underlying biliary tract diseases, haematogenous seeding, and iatrogenic or penetrating wounds.[4] Of these, our patient had a history of complicated biliary tract infection and multiple surgical interventions. However, her insidious onset of symptoms, history of intraoperative stone spillage during cholecystectomy and imaging findings collectively suggested retained gallstone as a more likely cause of the symptoms.

Amoebic liver abscess caused by *E. histolytica* also commonly manifests as a round, solitary subcapsular lesion in the posterior right lobe.[5] However, it was an unlikely diagnosis given the patient's lack of recent travel history to an endemic area, negative serology, and absence of fever, leucocytosis, transaminitis or elevated alkaline phosphatase.

Echinococcosis most often affects the liver and appears as a cystic lesion with or without a calcified rim on imaging.[6] However, symptoms are uncommon before the cyst ruptures or reaches a size large enough to exert a mass effect.[6] The presence of a symptomatic subcentimeter lesion in this patient, in addition to negative serology, made echinococcosis unlikely.

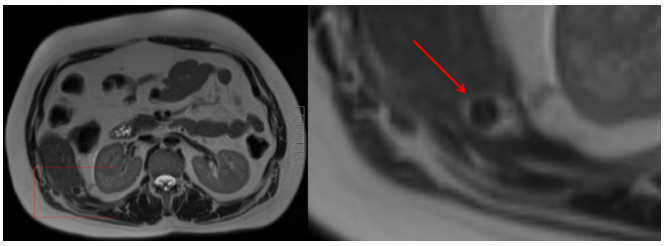

Figure 2 Magnetic resonance cholangiopancreatography demonstrating retained gallstone as a rim-enhancing signal void (arrow) corresponding to the lesion seen on CT.

Lastly, malignancy such as metastasis to the liver, hepatocellular carcinoma, cystadenoma or cystadenocarcinoma can present as a solitary hypoattenuated lesion with thickened and/or enhancing wall on CT.[7] However, the patient's young age, lack of family history of malignancy and a history of cholecystectomy made malignancy an unlikely aetiology of the patient's presentation.

TREATMENT

After an extensive discussion regarding the risks, benefits, alternatives and indications for laparoscopic retrieval of the retained gallstones, the patient elected to proceed with the surgery. Immediately prior to the surgery, a guide wire was placed under image guidance by interventional radiology to aid in localisation of the stones.

Intraoperatively, an abscess cavity was encountered at the tip of the inferior right lobe of the liver extending into the posterior retrohepatic space. The liver was found to be densely adherent to the abscess cavity and the right abdominal wall, and it was carefully dissected free from adhesions. Retraction of the liver and debridement of the abscess cavity revealed the tip of the guide wire, on which two round gallstones measuring approximately 1 cm were found in the abdominal cavity. Following extensive dissection of the abscess cavity, which required partial takedown of the right colic flexure, a third gallstone was found deep within the right retrohepatic space partially eroded into the abdominal wall. No additional stones were found. All three stones were collected and removed using a laparoscopic specimen retrieval bag.

OUTCOME AND FOLLOW-UP

The patient's postoperative course was uncomplicated, and she was discharged 2 days after the surgery. Over the subsequent outpatient follow-up visits, she demonstrated complete recovery to her baseline health without recurrence of the right upper quadrant abdominal pain or other postoperative complications. Given the remission of her symptoms, no follow-up imaging was performed.

DISCUSSION

Although initially regarded as benign, retained gallstones are increasingly being recognised as a rare but serious cause of morbidity in patients who have had complicated laparoscopic cholecystectomy. Common sequelae from retained gallstones include abscesses in various locations (eg, abdominal wall, intraperitoneal, perihepatic, retroperitoneal, subphrenic), fistula formation (eg, cutaneous, intestinal, urinary tract), recurrent bacteraemia, peritonitis, and infection of a hernia sac or port sites.[3 8] In rare instances, loose intra-abdominal stones can migrate and erode into surrounding organs, causing empyema, cholelithoptysis, obstructive ileus, middle colic vessel thrombosis, ovarian abscess, tubalithiasis, pelvic pain and infertility.[3 8] These complications occur in approximately 2.3% of laparoscopic cholecystectomies with gallstone spillage and up to 19% of the cases in which gallstones are left unretrieved.[9 10]

Predictive risk factors for developing adverse outcomes from retained gallstones include presence of pigmented bilirubin stones, perihepatic location, greater number (>15) and larger size (>1.5 cm) of the stones.[9 11] Other factors, such as male sex, obesity, advanced age, prior abdominal surgery, hydropic gallbladder and difficult hilar dissection, are associated with increased risk of intraoperative gallbladder perforation and gallstone spillage.[3 12] Surgeon expertise in laparoscopic techniques

and acute gallbladder inflammation have also been reported as major contributors to overall perioperative complications and morbidity including gallbladder perforation.[12]

Retained gallstones often pose a diagnostic challenge due to their variable and unusual presentations. As outlined above, complications from retained stones can involve multiple organ systems and frequently cause vague, non-specific reports such as fever, fatigue or weight loss. Moreover, they can manifest anywhere from the immediate postoperative period to years after the surgery, even up to 20 years in exceptional cases reported in the literature.[13 14] Complete history taking may be difficult if operative records are unavailable or patients cannot recall the details of complications during cholecystectomy, specifically whether any gallstones were lost or unretrieved. In our case, documentation from the patient's initial surgery had indicated that all spilled gallstones were successfully retrieved, which contributed to the delay in accurate diagnosis and treatment.

Our case also highlights the limitations of imaging in the setting of retained gallstones. Although ultrasound and CT are advocated as the modalities of choice in detecting lost stones,[3 8] the findings can be non-diagnostic or misleading. On ultrasound, gallstones appear as echogenic foci with posterior acoustic shadowing[15]; however, factors such as the patient's body habitus, depth, and location near the bowel or bony structures can impair visualisation. In our patient, abdominal ultrasonography failed to reveal the presence of a subhepatic stone. On CT, gallstones are seen as either hypodense or hyperdense nodularities with possible calcifications, which can mimic malignant seeding.[3 15] Moreover, stones within abscess cavities are easily missed, leading to undertreatment and increased risk of recurrence as in our patient.[15] In those instances, MRI may be useful in demonstrating gallstones as foci of hyperintensity on T1-weighted images without contrast enhancement or as signal voids on T2-weighted images.[15]

Management of retained gallstones primarily consists of surgical removal, usually via laparoscopy,[3] along with specific treatments for the complications they have caused (eg, abscess drainage, fistula repair, systemic antibiotics). As in our case, image-guided wire placement prior to the surgery may be useful in identification and localisation of the stones, especially when operating in less accessible areas with extensive adhesions or distorted anatomy. Postoperatively, patients should be strictly followed up to monitor for complications and confirm remission of symptoms, as additional gallstones may remain despite interventions.

Retained gallstones are an important complication of cholecystectomy to recognise due to their widely variable presentations, unpredictable time course, and diagnostic challenges that result in substantial financial and psychosocial burdens on the affected patients. Caution during cholecystectomy to avoid gallbladder perforation is the best measure against these consequences. If accidental perforation occurs, all dropped stones should be promptly identified and recovered, and the details clearly documented in the operative report. Patients should be given full disclosure of any intraoperative complications and education on possible sequelae. Most importantly, physicians should always bear the diagnosis of retained gallstones in mind when caring for patients with even a remote history of cholecystectomy.

Patient's perspective

I first noticed the pain 2 months after gallbladder surgery. I thought that it was just normal after the surgery or something I ate. But then, even if my nephew accidentally touched me on that right side, it hurt. The following year, I went to my doctor for a normal check-up. They told me my pain was ghost pain from the removed gallbladder. I was told it was part of the healing process even though I had this pain for over a year.

In October, I went to see my fertility doctor. A few days later, the pain just wouldn't go away, so I went to the emergency room (ER). They did blood work, but it came back normal. The ER doctor then offered me CT scan. I said, "of course I want it. I need to find out what is wrong." Another doctor came in and told me I had an abscess in my liver. He said I would need to be admitted to get intravenous antibiotics and might need surgery. A few days later, I got discharged with antibiotic pills and had surgery scheduled a few months later.

In December, I had the surgery to remove the stones. After I went home from that, I had a little pain from the surgery for a week. Afterwards, the pain was gone. Now, over a year later, I don't feel any pain anymore. I was so glad that they found it and got them out. I'm doing so much better now. For me, the experience at the Veterans Affair hospital has been nothing but positive, even though sometimes things happen. The way they talked to me and my family was really nice.

Now I'm able to exercise again without pain. I've lost weight and I feel so much healthier. I really hope my story helps other people be aware of this complication so they can help diagnose and treat them.

Learning points

- Retained gallstones are a rare but serious complication of laparoscopic cholecystectomy that are often challenging to diagnose.
- CT and ultrasonography are the imaging modalities of choice in detecting retained gallstones; MRI may be helpful if other imaging findings are non-diagnostic.
- Treatment of retained gallstones primarily consists of surgical removal, usually via laparoscopic approach. Radiological localisation of the stones with guide wire placement prior to the surgery may be beneficial.
- The best measure against retained gallstones is prevention—caution during the surgery to prevent gallbladder perforation, effort to retrieve all spilled stones in case of perforation and thorough documentation of any operative complications.

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