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Complications of "dropped" gallstones after laparoscopic cholecystectomy: technical considerations and imaging findings

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Abstract
New laparoscopic techniques have revolutionized the practice of surgery. Laparoscopic cholecystectomy has become one of the most commonly performed surgeries worldwide. Although shorter hospital stays and patient comfort have offered clear advantages over open cholecystectomy, the technique has resulted in several specific complications, including bile duct injury and gallbladder perforation. Although rarely clinically significant, intraperitoneal gallstone spillage can cause abscess formation and adhesions. Although these patients can present with a confusing clinical picture, their characteristic radiologic features should be recognized. We present two cases of complicated intraperitoneal gallstone spillage radiologically diagnosed and treated with laparoscopic and interventional radiologic techniques.

Key words: Cholecystectomy, laparoscopic—Complications—Interventional procedures—Abdominal abscesses.

Laparoscopic cholecystectomy has become an increasingly popular procedure in the treatment of uncomplicated gallbladder disease. The technique offers the patient a less invasive alternative to the traditional open cholecystectomy, thereby enabling a faster discharge and markedly shorter recuperation time. Although laparoscopic cholecystectomy offers many advantages, it has resulted in uncommon but characteristic complications. The most common of these is bile duct injury, although bilomas and liver lacerations can occur. Pneumomediastium and pneumothorax have also been reported.

Although seldom listed as an important complication, gallbladder perforation and intraperitoneal gallstone spillage have been estimated to occur in up to one-third of patients undergoing laparoscopic cholecystectomy [1]. Fortunately, clinically significant complications from intraperitoneal gallstones are extremely uncommon, and their descriptions have been limited to rare case reports. Despite this, recognition of this unusual entity is important because the clinical presentation can be confusing and the diagnosis significantly delayed. Prompt recognition of intraperitoneal spillage of gallstones is crucial because less invasive radiologic and laparoscopic techniques can allow rapid and definitive treatment. We describe two cases of laparoscopic cholecystectomy complicated by intraperitoneal spillage of gallstones. Although the clinical presentations were misleading, recognition of the characteristic radiologic appearances enabled appropriate therapy and resolution of the patient's symptoms.

Case reports

Case 1

A 35-year-old woman was referred to an oncologist for a 2-year history of progressive weight loss, fatigue, and early satiety. Although the presentation concerned an underlying neoplasm, laboratory values included an elevated sedimentation rate and polyclonal hypergammaglobulinemia, suggesting a chronic inflammatory process. The patient's history was remarkable for a laparoscopic cholecystectomy in 1996 for cholecystitis. The patient did well initially but began to complain of

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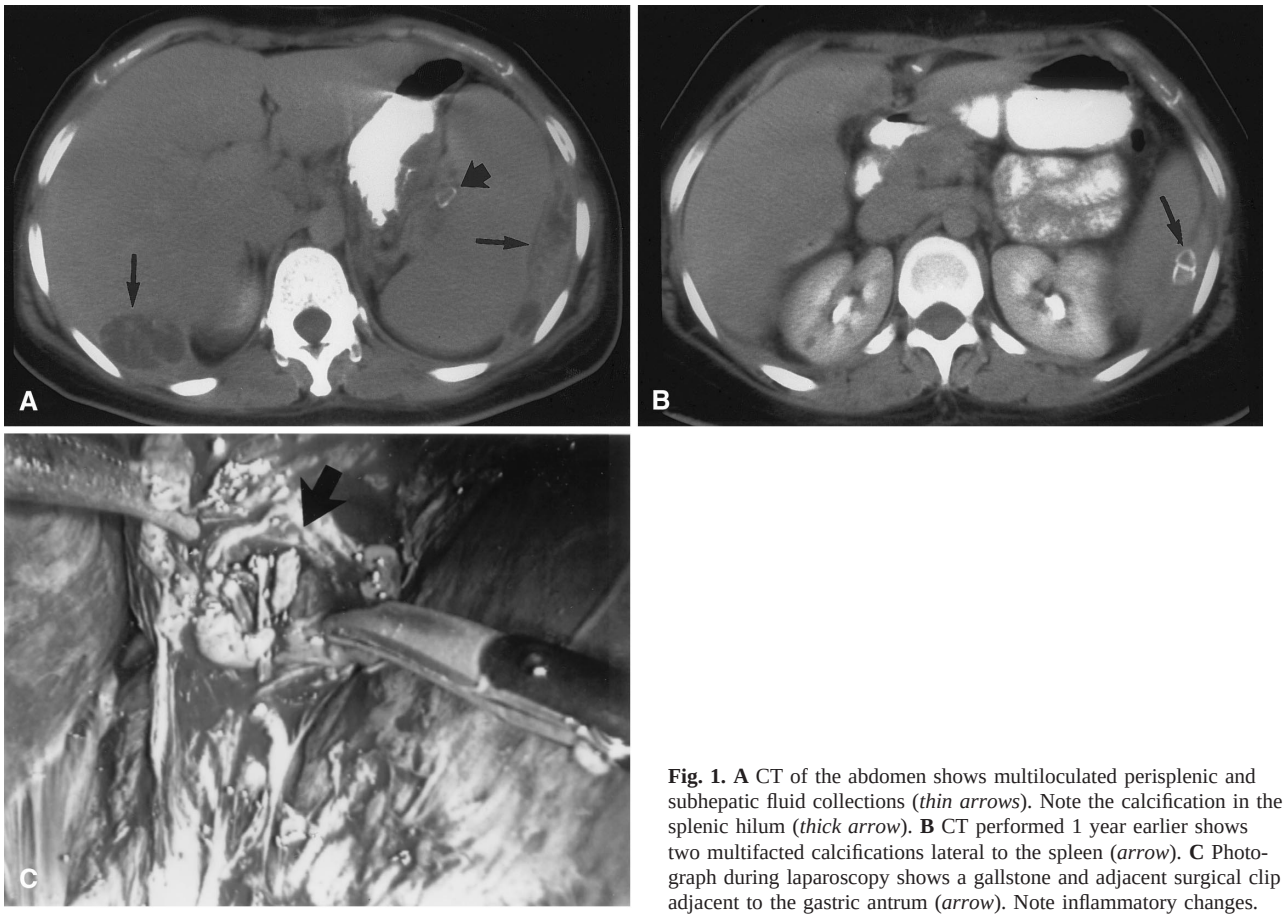

Fig. 1. A CT of the abdomen shows multiloculated perisplenic and subhepatic fluid collections (*thin arrows*). Note the calcification in the splenic hilum (*thick arrow*). **B** CT performed 1 year earlier shows two multifacted calcifications lateral to the spleen (*arrow*). **C** Photograph during laparoscopy shows a gallstone and adjacent surgical clip adjacent to the gastric antrum (*arrow*). Note inflammatory changes.

fatigue and early satiety several months after the procedure. A retrospective review of the patient’s outside computed tomographic (CT) scans showed marked splenomegaly and multiple cystic loculations adjacent to the liver, spleen, peritoneum, and lesser sac. Calcifications in the splenic hilum and anterior to the liver (Fig. 1A) were also noted. Review of the patient’s CT scans in 1996 and 1997 showed similar changes, with multiple, faceted calcifications in the perisplenic region (Fig. 1B).

With the clinical history and sequential CT findings, an inflammatory process from intraperitoneal gallstones was considered. During laparoscopy, extensive inflammatory changes and adhesions were identified throughout the peritoneal cavity. Many of these changes were seen adjacent to multiple retained gallstones. A significant adhesion with an associated gallstone was noted near the gastric antrum, causing significant gastric outlet obstruction (Fig. 1C). Pathologic analysis confirmed the presence of multiple calcium bilirubinate stones, with associated granuloma formation and inflammatory cell infiltrate. Following the laparoscopic removal of the gallstones and lysis of adhesions, the patient’s symptoms resolved, with improved appetite and resolution of fatigue.

Case 2

This 79-year-old man presented to his physician with a 2-week history of flank pain. Past medical history was remarkable for a laparoscopic cholecystectomy performed 3 months previously. At surgery, the gallbladder was gangrenous, with documented spillage of stones during the procedure. The patient was afebrile at presentation. A painful area of induration was palpated in the right flank. CT showed extensive subhepatic fluid collections and a right-sided pleural effusion. Inflammatory changes within the retroperitoneum and iliopsoas muscle were seen, with multiple calcifications identified in the posterior soft tissues (Fig. 2A). The diagnosis of intraperitoneal spillage of gallstones was suspected. Percutaneous drainage of these fluid collections was undertaken. During aspiration, numerous bile-colored stones were recovered. Chemical analysis demonstrated bilirubinate gallstones. The patient did well initially but returned to the hospital with recurrent fevers despite antibiotic treatment. At that point, more definitive drainage of the patient’s flank abscess was performed. Using fluoroscopic guidance, percutaneous aspiration of the remaining flank abscess and gallstones was performed with a 26-French pigtail catheter (Fig. 2B). The patient improved and was later discharged.

Discussion

Laparoscopic cholecystectomy has become the treatment of choice for patients with symptomatic cholelithiasis. As experience with the technique has grown, the incidence of complications has markedly diminished. Although bile duct injury is the most clinically significant complication, gallbladder perforation during cholecystectomy occurs in 25–30% [2] of cases. Despite this high incidence, intra-abdominal abscess from peritoneal stone spillage is ex-

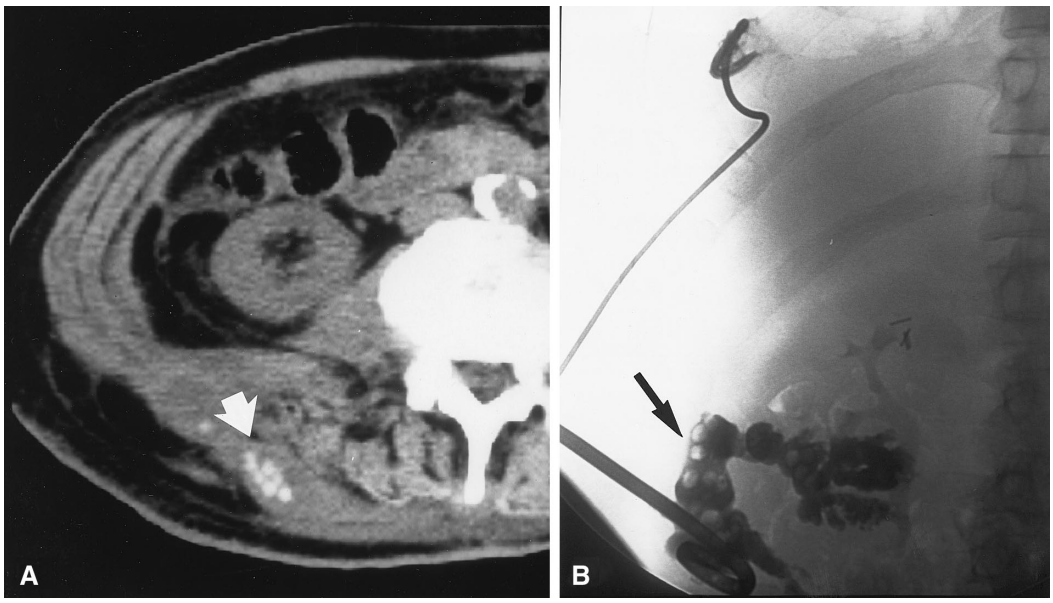

Fig. 2. A Noncontrast CT shows multiple calcifications in the superficial soft tissues of the right flank (*arrow*). Note surrounding inflammatory soft tissue changes. **B** Fluoroscopic image from sinogram during percutaneous removal of flank gallstones shows multiple filling defects within the cavity (*arrow*), consistent with retained gallstones.

ceedingly rare. In one series of 2201 patients with stone spillage, there were no documented intraabdominal abscesses [3]. In three series describing more than 6900 cases, intraabdominal abscesses occurred in two of 4600 patients [3–5]. The discussion of intraabdominal abscesses following cholecystectomy has been limited to case reports. Two of these cases reports have described cholelithoptysis, in which laparoscopic cholecystectomy was complicated by bronchobiliary fistula formation and expectoration of gallstones [6]. The third case report found in the literature was similar to one of our cases, in which a flank abscess developed months after laparoscopic cholecystectomy.

Despite their extreme rarity, the characteristic appearance of intraabdominal abscesses from intraperitoneal gallstones should be recognized because their radiographic appearance can mimic more ominous disease. In our first patient, the slowly growing nature of the multiloculated fluid collections, intraperitoneal calcifications, and the clinical history of weight loss mimicked the findings of metastatic ovarian cancer with carcinomatosis. The recognition of the multifaceted appearance of the calcifications and the remote history of laparoscopic cholecystectomy helped direct the clinicians to the proper diagnosis of intraperitoneal gallstone spillage and abscess formation.

Experimental animal data help explain this patient's symptom of early satiety and subsequent findings at laparoscopy. To investigate the clinical significance of spilled gallstones, Leland and Dawson introduced sterile cholesterol gallstones into the peritoneal cavity of rats [7]. Significant adhesions were found in 27% of these animals, most commonly in the omentum and along the undersurface of the liver. They conjectured that the simultaneous spillage of bile and stones during laparoscopic cholecystectomy would potentiate this inflammatory response [7]. This response was clearly present in our first patient, in whom a dropped gallstone was seen near the gastric antrum at laparoscopy. The severity of the subsequent inflammatory response caused a gastric outlet obstruction, resulting in the patient's early satiety and weight loss.

Because the incidence of complications from intraperitoneal spillage of gallstones is so rare, there is very little in the literature concerning its treatment. Citing their experimental data, Leland and Dawson stressed the importance of complete intraoperative removal of all spilled intraperitoneal gallstones to prevent adhesions and infection [7]. A single case report by Trertola et al. has described the percutaneous removal of dropped gallstones following laparoscopic cholecystectomy [8]. In our second patient, although multiple drainage procedures resulted in clinical improvement, definitive percutaneous stone removal was eventually required. To the best of our knowledge, this is the second reported case of percutaneous gallstone removal after complicated laparoscopic cholecystectomy.

Although laparoscopic cholecystectomy has become accepted as the treatment of choice for gall bladder disease, it is not without its complications. Intraperitoneal spillage of gallstones is a common occurrence. Although serious sequelae are extremely un-

common, early recognition of the characteristic imaging features of intraperitoneal gallstones is essential in the diagnosis and further treatment of symptomatic patients.

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