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Abdominal abscess from gallstones spilled at laparoscopic cholecystectomy

Case report and review of the literature

E. Shocket

General Surgery, VA Medical Center, Bay Pines, FL 33504, USA

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Abstract. One case is reported and 14 others are culled from the literature. Each patient experienced an intraperitoneal abscess with a gallstone nidus following laparoscopic cholecystectomy. Each required open surgical drainage weeks or months after the initial laparoscopic cholecystectomy.

The natural biology of spilled intraperitoneal gallstones is not known. Two short-term animal studies suggest initial partial lysis and fibrotic encapsulation.

At least 15% of completed laparoscopic cholecystectomies leave intraperitoneal gallstones. Almost all prove to be clinically innocuous but the rare instances of later intraabdominal abscess formation deserve recognition and reporting.

Key words: Spilled gallstones — Abdominal abscess — Laparoscopic cholecystectomy

Case report

A 76-year-old male presented in mid-November 1993 with an exquisitely tender 3 × 7 cm mass just above and parallel to the right inguinal ligament. There was no fever and there were no gastrointestinal symptoms. For 4 years he had been on daily Azulfadine for colitis of the left colon. He had had a coronary artery bypass operation in 1991 and a successful laparoscopic cholecystectomy in September 1993 at another hospital. He had experienced episodes of congestive heart failure that had required occasional thorocenteses.

Immediate fine-needle aspiration of the mass was performed since tumor was suspected. The aspirant contained inflammatory cells but no neoplastic cells; and there were no organisms on bacterial culture. Because of the tenderness of the mass and the elevated blood white cell count (12,000 per mm^3), antibiotics were initiated. CT scan (Fig. 1) confirmed a mass process adherent to the anterior abdominal wall in the right lower quadrant.

Under local anesthesia an incision and drainage was performed. It yielded 30 ml of pus which cultured Klebsiella pneumoniae and five black stones of various sizes (Fig. 2). On infrared spectroscopic analysis each stone contained calcium bilirubinate, compatible with gallstone.

The wound drained for 8 weeks, spontaneously yielding an additional gallstone in the 5th week before final healing. In the 7th week a new, less tender, 4-cm mass was palpable halfway between the point of initial drainage in the right lower quadrant and the umbilicus. CT scan was negative. Drainage under local anesthesia yielded two gallstones and pus. *Klebsiella* was again cultured. It completely healed in 4 weeks and the patient has remained well since.

Discussion

Gallstones unintentionally spilled into the intraperitoneal cavity during cholecystectomy is a more common occurrence during laparoscopic than during open cholecystectomy.

During laparoscopic cholecystectomy, the gallbladder may be torn by the penetrating bites of a grasper instrument or be sheared by the to-and-fro traction on the gallbladder wall as it is moved to enhance exposure. The gallbladder may be inadvertently entered during its dissection from the liver bed. Finally, stone spillage may occur during the forced delivery of a freed tense gallbladder through a too-narrow umbilical-port orifice.

Whereas gallstones spilled during open cholecystectomy are easily retrieved either by mopping with a laparotomy pad or by large-bore irrigations and aspirations, neither of these two maneuvers is available during laparoscopic cholecystectomy. Thus stones must be left intraperitoneal at the end of some laparoscopic surgeries. This incidence is variously reported to be from 13% [4] to 32% [11].

Surgeons have regarded intraperitoneal stones as innocuous. Leland and Dawson [9] polled surgeons as to what they thought happens to intraperitoneal gallstones. The tabulated responses included the following: ". . . they dissolve . . ."; ". . . they are walled off

Fig. 1. CT scan. *Arrow* points to a mass process adherent to right lower quadrant abdominal wall. (Stones are not identified.)

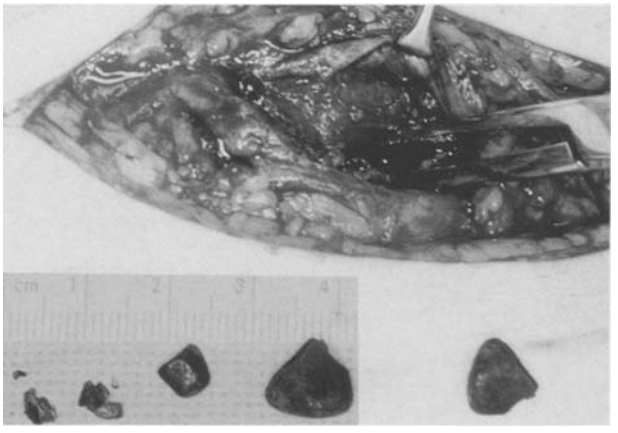

Fig. 2. Operative incision with delivered stones.

. . ."; and ". . . they just float around. . . ." Thus far, there have been only two basic studies. Welch et al. [13] collected human gallstones in an aseptic manner during uneventful laparoscopic cholecystectomies and placed them, within 6 h of collection, into the peritoneal cavity of New Zealand white rabbits. Two gallstones were placed into each of six rabbits and each gallstone was inserted into a separate omental pocket. At 3 weeks two rabbits were sacrificed and at 2 months the remaining four rabbits were sacrificed. No wound or abdominal infections were found. There were only intraabdominal adhesions thought to be related to the initial implantation procedure. Two stones, both pigmented, shrank 25% in the 2 months. Microscopic studies of the tissues adjacent to the implanted stones revealed localized foci of acute and chronic inflammation at the 3-week point but at the end of the study, at 2 months, there was only fibrosis with foci of fat necrosis. There was no persistent inflammation; there were no micro-abscesses. This 1991 article also include a mail survey of 11 patients who had had gallstone spillage during a laparoscopic cholecystectomy. No infection problems were reported by any of these patients during a mean followup period of 9-½ months. It was concluded that "intraperitoneal gallstones did not cause complications in either the animal model or the patients." In summary, Welch et al. [13] stated: "Although it is aesthetically pleasing to retrieve 'escaped' calculi, we cannot demonstrate the necessity for this practice. There is no indication for laparotomy to retrieve free calculi from the peritoneal cavity during laparoscopic cholecystectomy."

In a 1993 experiment, Leland and Dawson [9] fabricated gallstone equivalents using USP chemically pure cholesterol heated and then allowed to cool into solid spheres. These were implanted into 24 Sprague-Dawley rats. Eighty-eight days later the peritoneal cavity revealed moderate adhesions and all the adhesions were related to implanted gallstones. The authors concluded that intraperitoneal gallstones are not benign and that they, indeed, have the potential to cause long-term adhesive complications. There were, however, no abscesses. To avoid late adhesions they recommended avoiding spillage of gallstones during cholecystectomy, and if spilled, they recommended reasonable efforts to retrieve spilled gallstones.

Soper and Dunnegan [11], summarizing an initial 1 year's experience with laparoscopic cholecystectomies in a teaching hospital, noted a 32% incidence of spillage but no "untoward early complication" and, yet, also encouraged "an effort to remove all such calculi."

To date, literature review reveals six well-documented case reports of intraabdominal abscess formation after laparoscopic cholecystectomy with spilled gallstones [6, 8, 10], (Table 1). An additional eight less-detailed cases are made reference to in three overview papers [1, 3, 4]. These overview articles each describe a large series of laparoscopic cholecystectomy cases in which numbers of various early and late postoperative complications are listed. Amongst these are some late postoperative intraabdominal abscesses due to spilled stones. The numbers of such are mentioned. They are tabulated without specific case details in Table 1.

These 15 total cases provoke two questions. The first is, "What is the natural physiology of intraperitoneal gallstones?" The second is, "Do spilled gallstones require conversion from laparoscopic to open cholecystectomy?" As to the first question, additional studies for longer periods of time are needed on the fate of intraperitoneal stones. The two animal studies quoted suggest encapsulation with transient fat necrosis and they also hint at partial initial dissolution of some stones.

Unknown is the possible contributory role of bile bacteria spilled at the same time. In 1987 Stewart et al. [12] found bacteria cocooned in pigmented gallstones 78% of the time, but no bacteria were ensconced within cholesterol stones. Further one may conjecture that the foreign-body stone's presence may by synergy enhance the virulence of intraabdominal spilled bile bacteria, much as foreign-body barium spilled intraperitoneally compounds the noxiousness of spilled fecal organisms [14]. Alternatively, is it possible that the stones spilled and caught within the interstices of the omentum are passive bystanders to an abscess simply due to spilled bacteria? The 15 case reports impugn a

Table 1. Gallstone intraabdominal infection after laparoscopic cholecystectomy

Author	Center	Year	Age	Sex	Months since laparoscopic cholecystectomy	Details
Detailed case reports						
1. Nicolai [10]	Bedford, U.K.	'92	29	F	5	Left iliac fossa stone eroding sigmoid
2. Nicolai [10]	Bedford, U.K.	'93	60	F	11	Persistent discharge at umbilicus until stone and sinus tract excised
3. Kakami and Bhullar [6]	U. Alabama	'93	35	F	6	RLQ[a] abscess; omentum with granulomata and appendix inflammation
4. Kakami and Bhullar [6]	U. Alabama	'93	54	F	1?	Retrocecal abscess with gallstone nidus
5. Lee et al. [8]	Duke	'93	58	F	5	Coughed-up gallstone; at laparotomy subdiaphragmatic abscess with gallstones
6. Lee et al. [8]	Duke	'93	52	M	11	Coughed up gallstones; at laparotomy subdiaphragmatic abscess with gallstones
7. Shocket (this paper)	Bay Pines	'94	76	M	3; 4	Two separate RLQ[a] abscesses with gallstones as nidus
Cases without details						
8. Donohue et al. [4]	Mayo	'92		One case		Intraabdm.[b] abscess due to spilled stone
9. Bowen et al. [1]	Ochsner	'92		One case		Intraabdm.[b] abscess with retained stone
10–15. Deziel et al [3]	Rush, Chicago	'93		Six cases in course of survey of 77,604 lap cholecystectomies		Three intraperitoneal abscesses and 3 draining umbilical sinuses, all due to gallstones

[a] RLQ, Right lower quadrant of abdomen.
[b] Intraabd, intraabdominal.

positive role to the stones found since the stones appear at the very center of all these abscesses. There are, of course, many documented instances of postoperative abscess formation without the presence of gallstones after both open and laparoscopic cholecystectomy. These, however, almost always occur within days of the initial surgery and usually within the subhepatic operative field. They do not usually occur months later or at a distance from the surgical site.

The second issue is that regarding conversion to open surgery in order to retrieve spilled stones It is readily decided by comparing the rarity of this complication against the frequency of spilled stones. The reported incidence of spilled gallstones in laparoscopic cholecystectomy varies from 13% [4] to 16% [2] to 32% [11]. Some 570,000 cholecystectomies are performed in the United States yearly [5], and about 80% (Blue Cross statistics) [7] are performed laparoscopically. The extraordinarily small percent of reported intraabdominal abscesses following such spilled gallstones supports the current concensus that conversion of laparoscopic cholecystectomy to open, simply to retrieve spilled gallstones, is not appropriate. The vast majority of spilled gallstones prove to be innocuous. These 15 cases alert us to an uncommon complication, namely, an intraabdominal abscess due to spilled gallstones.

Summary

Spilled gallstones occur in at least 15% of laparoscopic cholecystectomies. Almost all prove to be innocuous. Fifteen cases of later abdominal abscesses are summarized: 14 from a literature search and one, this case report.

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