

DON'T CRY OVER SPILLED STONES? COMPLICATIONS OF GALLSTONES SPILLED DURING LAPAROSCOPIC CHOLECYSTECTOMY: CASE REPORT AND LITERATURE REVIEW

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The gallbladder is perforated and stones are spilled more frequently during laparoscopic cholecystectomy than during open cholecystectomy. Recent reports have implicated spilled gallstones as a source of infrequent but serious complications of laparoscopic cholecystectomy. They can cause serious morbidity, and in most cases the patient will require open surgery for management of these complications. The authors report the case of a patient who was ill for 14 months after laparoscopic cholecystectomy when spilled stones formed a nidus for intra-abdominal abscess and colocutaneous fistula. Every effort must be made to prevent gallbladder perforation. When it does occur, all stones should be retrieved. Attempts at repairing gallbladder perforations are often unsatisfactory. A simple solution to this potential problem is to retrieve all stones immediately, place them in an intraperitoneal specimen bag, and "park" the bag on the liver. As soon as the gallbladder is dissected off the liver it should be placed in the specimen bag with the stones and removed through the umbilical port opening.

On perfore la vésicule biliaire et échappe des calculs plus souvent au cours d'une cholécystectomie par laparoscopie que pendant une cholécystectomie sanglante. Selon des comptes rendus récents, des calculs échappés ont causé des complications peu fréquentes mais graves à la suite de cholécystectomies par laparoscopie. Ils peuvent causer une morbidité grave et, dans la plupart des cas, il faudra procéder à une intervention chirurgicale sanglante pour traiter ces complications. Les auteurs décrivent le cas d'un patient qui a été malade pendant 14 mois après avoir subi une cholécystectomie par laparoscopie à suite de laquelle des calculs échappés ont formé un nid pour un abcès intra-abdominal et une fistule côlo-cutanée. Il faut faire tous les efforts possibles pour éviter de perforer la vésicule. En cas de perforation, il faut récupérer tous les calculs. Les tentatives de réparation de perforations de la vésicule sont souvent insatisfaisantes. Une solution simple à ce problème éventuel consiste à récupérer tous les calculs sur-le-champ, à les déposer dans un sac à pièces opératoires intrapéritonéal et à «poser» le sac sur le foie. Dès que la vésicule est séparée du foie, il faut la déposer dans le sac à pièces opératoires avec les calculs et enlever le tout par l'ouverture ombilicale.

Gallbladder perforation with spillage of bile and gallstones is common during laparoscopic cholecystectomy. Retained intraperitoneal stones often appear to be clinically innocuous, but some patients suffer significant mor-

bidity. We report the case of a man who had right upper quadrant abdominal pain, nausea, vomiting and weight loss 1 month after he had undergone a laparoscopic cholecystectomy during which bile and gallstones were spilled.

CASE REPORT

A 59-year-old man underwent laparoscopic cholecystectomy for symptomatic cholelithiasis at another institution. The intraoperative course was remarkable only for intraperitoneal

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spillage of bile and gallstones. Postoperatively he experienced prolonged right upper quadrant pain, nausea, vomiting, anorexia and an 18-kg weight loss over 1 month. He underwent laparotomy and drainage of a subphrenic abscess. The nausea, vomiting and fatigue continued, and 4 months later a right upper quadrant mass, measuring 3 × 5 cm, developed. An abscess was drained via a subcostal incision.

The patient presented to our institution 9 months later with chronic right upper quadrant pain and a painful right subcostal fistula with purulent drainage. On CT, a subphrenic abscess was noted. On reopening the right subcostal incision, an inflammatory mass, colocutaneous fistula and subphrenic abscess were found. After mobilization and closure of the colonic fistula with a GIA stapler (United States Surgical Corp., Norwalk, Conn.), a sinus tract was noted extending into the subhepatic space, and a smooth, tan gallstone was identified and removed. The subphrenic abscess was drained and the abdomen copiously irrigated. The patient was discharged on postoperative day 5 and was well 1 year later, except for an incisional hernia that required surgical treatment.

DISCUSSION

Laparoscopic cholecystectomy was introduced in 1987 by Phillippe Mouret of Lyon, France, and has rapidly become the standard treatment for symptomatic cholelithiasis.¹ The overall morbidity of laparoscopic cholecystectomy is between 2% and 11%, which compares favourably with an incidence of 4% to 6% for elective open cholecystectomy.² The introduction of a new method of access for an old operation has been associated with new complications, such as trocar injuries, and an increased

incidence of some existing complications.¹

Bile and gallstone spillage during laparoscopic cholecystectomy is more common than during open cholecystectomy, occurring in 32% to 40% of laparoscopic procedures.^{3,4} Whereas stones spilled during open cholecystectomy are easily retrieved either by mopping up with a laparotomy sponge or by irrigation and aspiration with a large-bore suction device, neither of these manoeuvres is available during laparoscopic cholecystectomy.⁵ Thus, stones are left in the peritoneal cavity at the end of 13% to 32% of laparoscopic cholecystectomies.⁴

Although spillage of gallbladder contents during laparoscopic cholecystectomy is common, infectious complications of this operation have been rare in large series, with a reported incidence of postoperative intra-abdominal abscess of 0.1%.⁶ Thus, surgeons have logically concluded that the intraoperative loss of gallstones is relatively innocuous.^{6,7} In fact, a detailed review of the complications of laparoscopic cholecystectomy in 1994 failed to mention spilled gallstones as a complication;² thus, the true incidence of this underreported event is difficult to quantify.

The natural history of retained intraperitoneal gallstones is not well documented, and few clinical studies have addressed this topic. Soper and Dunnegan⁴ found no late complications in 60 patients whose gallbladders were opened during laparoscopic cholecystectomy, with a follow-up of 3 to 16 months. Welch and colleagues⁸ followed up 11 patients with unrecovered intraperitoneal gallstones and found that no symptoms suggestive of intra-abdominal abscess or bowel obstruction had developed after a mean follow-up of 9.5 months, but 1 patient had an umbilical wound infection. No large series of laparo-

scopic cholecystectomies have studied the long-term consequences of spilled stones.

There have been several experimental animal studies on the potential danger of retained gallstones in the peritoneal cavity.⁸⁻¹² Most of these experiments examined the effects of intraperitoneal stones for a duration of 3 months or less, and generally no adverse sequelae were found or only minimal abdominal adhesions. Johnston and associates¹¹ found that placing sterile bile and human gallstones in the rat peritoneum for 4 weeks led to hard adhesions in 73%, and intra-abdominal abscesses in 2 rats, supporting the theory that stones may be a nidus for abscess formation. Surprisingly, no abscesses formed in rats that received gallstones and bile infected with *Escherichia coli*.

Cumulative case reports of severe complications related to spilled gallstones demand the surgeon's attention because of the potential morbidity for patients and the potential for litigation, which is now apparent in Canada. Targarona and colleagues¹³ recently reviewed 49 cases in which there were complications of spilled stones and found that the clinical manifestations were variable and diverse, and 86% of patients required open surgical treatment. Reported complications have included subhepatic,¹⁴ subphrenic,^{9,15,16} intra-abdominal^{14,17} and pelvic⁷ abscesses. Bowel obstruction¹⁸ or perforation¹⁹ have resulted from an inflammatory intra-abdominal mass, and dyspareunia has been reported after migration of stones into the ovary²⁰ or implantation in the pouch of Douglas.⁷ Empyema^{15,21} and cholelithoptysis^{9,22} have developed from stone migration into the chest and loculation in the pleura or expulsion through the bronchi.

Most commonly, a cutaneous abscess develops which may or may not be near a trocar site. This is drained

and debrided, and results in chronic sinus and fistula formation until all the stones and debris are evacuated.^{17,23-30} In selected cases, antibiotic therapy with percutaneous abscess drainage and stone removal have been successful,³¹ but surgical drainage and stone removal are usually required for complete resolution. The patient may present with symptoms related to stones in the peritoneal cavity at any time postoperatively, but it is usually after 4 months or more. This may explain why few problems developed in the animal experiments described above, which generally were of less than 3 months' duration.

Risk factors for the development of intra-abdominal abscesses after spillage of gallbladder contents may be the presence of infected bile and bacteria-laden pigment stones.¹³ Bile is contaminated in 15% of noncomplicated cases and 60% of patients who are elderly, jaundiced or who have suffered a previous episode of acute cholecystitis.³² Stewart and colleagues³³ showed that 78% of pigment or mixed stones contained bacteria, in contrast to cholesterol stones that did not contain bacteria. However, cholesterol stones are not completely innocuous, since their spillage at the umbilicus has led to the formation of abdominal wall and omental abscesses.²⁸

Prevention and recommendations

There are 3 main situations during laparoscopic cholecystectomy that may lead to perforation of the gallbladder and stone and bile spillage:

- the gallbladder may be perforated by the sharp teeth of a grasper instrument or sheared by the back-and-forth traction on the gallbladder as it is moved to enhance exposure;
- the gallbladder may be entered inadvertently during its dissection from the liver bed;

- stone spillage may occur during the forced delivery of a freed tense gallbladder through a too-narrow umbilical port orifice.⁵

Current instruments are cumbersome and do not always hold tissue without slipping. It is hoped that delicate tissue handling and less tissue trauma will result from the development of improved laparoscopic instruments, preventing some of the grasper-related gallbladder perforations.¹

A large number of perforations occur during the dissection of the gallbladder from the liver bed. This is often considered the "easy" part of the operation, and the surgeon may rush to make up lost time during a "difficult" or time-consuming dissection of the cystic duct and artery. It is better to spend the time initially to do a careful dissection, with a bevelled spoon dissecting instrument and judicious cautery application, than to hastily perforate the gallbladder and spend time retrieving spilled stones.

Gallbladder rupture and stone spillage during extraction of the gallbladder from the abdomen is largely preventable. Routine placement of the gallbladder into a specimen bag before extraction from the abdomen will prevent the all-too-common spillage of stones at the umbilical port. The open laparoscopy technique described by Hasson³⁴ allows large gallbladders to be removed from the abdomen easily. Simple extension of the incision for removal of the gallbladder packed with stones or containing very large stones is optimal.³⁵

Despite the surgeon's best efforts at prevention, gallbladder perforation and bile and stone spillage will sometimes occur. At this point, we believe the surgeon should not waste time trying to close the gallbladder, since clips and loops will often slip off with ongoing traction, but should concen-

trate efforts on a thorough and efficient clean up as follows: immediately insert a sterile specimen bag into the abdomen and place in it all spilled stones and any stones remaining in the gallbladder. The specimen bag containing the gallstones can then be safely "parked" on the liver while the dissection is completed. Once the gallbladder is freed it should be placed into the specimen bag with the stones and the bag delivered through the umbilical port. The subhepatic and subphrenic spaces and the right paracolic gutter should be copiously irrigated with normal saline and suctioned, preferably with one of the new laparoscopic large-bore suction devices. The instillation of large volumes of fluid (approximately 500 mL) into the peritoneal cavity can help in stone retrieval because gallstones will often float to the gas-fluid interface.¹¹ For complete irrigation and suctioning the patient should be taken out of the reverse Trendelenberg position into the neutral position to avoid leaving large volumes of fluid in the pelvis. Placement of a closed suction drain for 24 hours and antibiotic coverage for 72 hours postoperatively is recommended if gross spillage of bile or stones has occurred, and unretrieved stones should be followed up carefully.¹³ Any spillage of gallbladder contents intraoperatively and all attempts to rectify the problem should be documented in the operative notes.

Stone spillage has not been considered an indication for conversion from laparoscopic to open cholecystectomy, but we now know that spilled stones are a source of infrequent but severe complications that often require an open operation for treatment. Thus, every effort must be made to retrieve spilled stones and, in selected cases, if a large number of stones are unretrievable, conversion to an open procedure should be considered.

CONCLUSIONS

Spilled stones can lead to intra-abdominal abscess and fistula many months after the "uneventful laparoscopic cholecystectomy." Serious effort must be made to prevent gallbladder perforation, and accidental stone spillage should be promptly recognized and properly managed. Spilled stones should be considered an operative complication of laparoscopic cholecystectomy and should be recorded and reported as such. Only with more accurate estimation of the numerator and the denominator in the problem of infectious complications and spilled stones can we estimate the risk associated with spilled stones in the individual patient. Large prospective studies with long-term follow-up are needed.

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