World J. Surg. 29, 437–440 (2005)
DOI: 10.1007/s00268-004-7588-9

WORLD
Journal of
SURGERY

Dropped Gallstones During Laparoscopic Cholecystectomy: The Consequences

Ali Riza Tumer, M.D.,[1] Yunus Nadi Yüksek, M.D.,[2] Ahmet Cinar Yasti, M.D.,[2] Ugur Gözalan, M.D.,[2] Nuri Aydin Kama, M.D.[3]

[1]Department of Forensic Medicine, Clinical Forensic Sciences, Hacettepe University School of Medicine, , 3 Cad. 48. Sokak 5/3, 06510 Bahcelievler, Ankara, Turkey
[2]4th General Surgery Department, Ankara Numune Education and Research Hospital, 14.sakak 14/9, Bahcelievler, Ankara 06490, Turkey
[3]4th General Surgery Department, Ankara Numune Education and Research Hospital, Uzmanlar Tip Poliklinigi, 3.codde, Bahcelievler, 06500 Ankara, Turkey

Published Online: March 22, 2005

Abstract. During laparoscopic cholecystectomy, gallbladder perforation has been reported, leading to bile leak and spillage of gallstones into the peritoneum. Because the consequences can be dangerous, conversion to laparotomy as an instant management for gallstone spillage is one of the topics of current discussion in laparoscopic cholesystectomy. In this article, we discussed the option of not converting to laparotomy after intraperitoneal gallstone spillage as an acceptable approach to management or not.A prospectively maintained database of 1528 consecutive laparoscopic cholecystectomies performed during a 10-year period at the 4th Surgical Clinic of The Ankara Numune Education and Research Hospital was analyzed. Perforations resulting in gallstone spillage into the abdominal cavity were documented in 58 (3.8%) patients. Among those 58 patients seven (12%) experienced complications from retained stones. To maintain acceptable management of such patients, surgeons should inform each patient preoperatively that stones may be spilled. In the event of spillage, the patient should be informed postoperatively, and followed closely for complications. Follow-up should not waste time and money with unnecessary examinations, and it should avoid psychological trauma to the patient with a wrong diagnosis of cancer as a stone may mimic cancer radiologically. Thus the surgeon should not hesitate to record the events and inform the patient about the spillage of the stones and possible consequences.

Laparoscopy has become the procedure of choice for routine cholecystectomy. Although the overall complication rate is less than that with the traditional open approach, there appear to be at least two operative complications that occur with greater frequency at laparoscopy. One is bile duct injury or bile leakage, and the other appears to be late infection due to dropped gallstones [1]. During laparoscopic cholecystectomy, because of perforation of the gallbladder, the rate of bile leak and loss of gallstones into the peritoneum has been reported to be between 3% and 33% [2, 3]. Although rarely clinically significant, intraperitoneal gallstone spillage may cause localized or systemic infection, inflammation, fibrosis, adhesion, cutaneous sinuses, fistula, small bowel obstruction, generalized septicemia, empyema, and intraabdomina- and extraabdominal abscess [4, 5].

Most surgeons believe that free intraperitoneal gallstones are harmless and therefore not a justification for conversion to laparotomy, even if a large number are left in situ [5]. Nevertheless, recognition of this unusual entity is important because the clinical presentation can be confusing and the diagnosis significantly delayed [6].

Bile leakage can be diagnosed soon after operation, but intraperitoneal gallstone spillage can be manifested months to years after operation, and have a confusing preservation, leading to further diagnostic examinations. Most such diagnositic tests are time consuming and expensive. Because gallstone spillage can have long-term unwanted consequences, conversion to laparotomy as an instant management tool is one of the topics under discussion in laparoscopic cholesystectomy. In this article, we discuss the option of not converting to laparotomy after intraperitoneal gallstone spillage as an acceptable approach to management or not.

Material and Methods

A prospectively maintained database of 1528 consecutive laparoscopic cholecystectomies performed during a 10-year period between 1992 and 2002 at the 4th Surgical Clinic of Ankara Numune Education and Research Hospital was analyzed. In the preoperative period all patients were informed about the procedure and the possible complications. The patients in whom gallbladder perforation occurred were closely followed and consequences were recorded.

Results

Perforations resulting in gallstone spillage into the abdominal cavity were documented in 58 (3.8%) patients. When perforation of the gallbladder led to spillage of gallstones into the abdominal cavity, a concerted attempt was made to remove them using a

Correspondence to: Ali Riza Tumer, M.D., e-mail: tumeralir@hotmail.com

Table 1. Characteristics of the complicated patients.

Patient number	Complication	Time since LC (weeks)	Diagnostic test	Intervention	Outcome
1	Pain	60	US	Medical	Complete recovery
2	Ileus	1	X-ray + US	Medical	Complete recovery
3	Abscess	48	US	Wound exploration	Complete recovery
4	Abscess	84	US	Wound exploration	Complete recovery
5	Abscess	108	US + CT	Laparotomy	Complete recovery
6	Abscess	32	US + CT + ERCP	Percutaneous drainage	Complete recovery
7	Abscess	128	US + CT	Laparotomy	Complete recovery

LC: laparoscopic cholecystectomy; US: ultrasound; CT: computerized tomography; ERCP: endoscopic retrograde cholangiopancreatectomy.

variety of extraction instruments such as grasping forceps, Dormia basket, and a 10-mm irrigation and suction device. Nine patients were known to have a solitary stone at the intraoperative ultrasound study, and those stones were successfully extracted. All nine patients had no morbidity and no complaints about the matter in the follow-up period. Retained stones in the abdominal cavity were reported in the remaining 49 patients. Among the 49 patients seven experienced complications from the retained stones. As they were all informed about the possible complications and their records were successfully documented, diagnoses were made in the shortest time with the fewest examinations.

All seven patients were successfully managed, as shown in Table 1. Patient 1 had pain in the right hypochondrium and right shoulder pain an postoperative day 3; and had an ultrasound (US) examination that revealed a gallstone retained in the abdomen, and it was, managed medically. Patient 2 had an ileus which was thought to be the result of irritation from a gallstone that had been shown on US examination. The free fluid in the Douglas pouch resolved with medical management. Patients 3 and 4 both had a fistula at the site of the xphoidal trochar that drained abcess caused by retained gallstones at the trochar site. Both patients were managed by surgical removal of the stones under local anesthesia. Patient 5 had purulant leakage at the right port site, which comminucated with the abdominal cavity at local exploration. In the course of that abdominal exploration, a gallstone was removed from the hepatic confluence. Patient 6 was re-admitted with right upper quadrant pain, nausea, and jaundice. Computed tomography (CT) scan revealed an abcess, as well as dilatation of the intrahepatic biliary tree from the mass effect of abscess adjacent to the laparoscopic clips. The patient was succesfully managed by percutaneous drainage. Patient 7 was re-admitted with distention of the upper abdomen, and pain. A CT scan revealed a cystic mass at the subdiaphragmatic space between the right liver lobe and the diaphragm. The patient was known to have retained gallstones, and the abcess and all stones were cleared by laparotomy instead of percutaneous drainage because of the location of the abcess (Fig. 1).

Discussion

Bile duct injury as a complication of laparoscopic cholecystectomy has attracted the most attention, but perforation of the gallbladder resulting in intraperitoneal gallstone spillage is one of the most common intraoperative complications, although it is not usually considered to be serious [7]. Finding and removing all of the spilled gallstones can be laborious during laparoscopy and is often avoided. The stones left in the peritoneal cavity may, however, lead to intraperitoneal problems requiring a second procedure. It remains unclear whether stone spillage should be considered an indication for conversion to an open cholecystectomy [7].

A number of animal studies have been undertaken to determine the potential consequence of spilled gallstones in the abdominal cavity. Welch et al [8] and Cohen et al. [9] conclude that free intraperitoneal gallstones are harmless and thus do not warrant exploratory laparotomy. Johnson et al. [10] found that leakage of bile in combination with gallstones was associated with a significant risk of postoperative adhesion formation and possible intraabdominal abscesses. Leland and Dawson [11] and Tzardis et al. [12] further suggested that intraperitoneal stones could lead to an even higher incidence of adhesion formation in association with contaminated bile, and they therefore conculded that unretrieved gallstones are not benign and should be aggressively removed to decrease long-term complications, Gurleyik at al. [13] concluded that chemical composition plays a major role in the fate of intra-abdominal gallstones and that patients who have retained intra-abdominal pigmented stones should be followed closely because of the high prevalence of complications.

A number of retrospective and prospective clinical studies have been undertaken to determine the potential consequence of spilled gallstones in the abdominal cavity. Soper and Dunnegan [14] and Schafer et al. [15], who analyzed 10,174 laparoscopic cholecystectomies performed at 82 surgical institutions over a 3-year period, advised surgeons against converting laparoscopic cholecystectomy to an open procedure. Their findings showed that the mortality rate and the incidence of serious complications of retained gallstones are extremely low.

At the Mayo Clinic, Rice and associates addressed the long-term consequences of intraoperative spillage of bile and gallstones during laparoscopic cholecystectomy. These authors emphasized the need for removal of as many calculi as possible during laparoscop. However, they advised conversion to an open procedure only in patients for whom it is not possible to retrieve the majority of the gallstones laparoscopically, especially when bacteriobilia is suspected or confirmed by Gram stain of the bile. They also noted that percutaneous drainage of intraabdominal abscesses in most of their patients was ineffective if the inciting gallstones were not removed [16].

Hussain [17] reported that of seven patients who harbored dropped surgical clips or spilled gallstones, five had no complications; in the other two patients, subphrenic abscesses, empyemas, and a lung abscess developed. Hussain suggests that dropped gallstones and clips can be a risk factor for abdominal sepsis and that stones in the peritoneal cavity may long remain silent. Therefore, every effort must be made to avoid leaving any loose surgical clips or dropped gallstones in the peritoneal cavity. Laufer et al. strongly recommend that spilled gallstones be

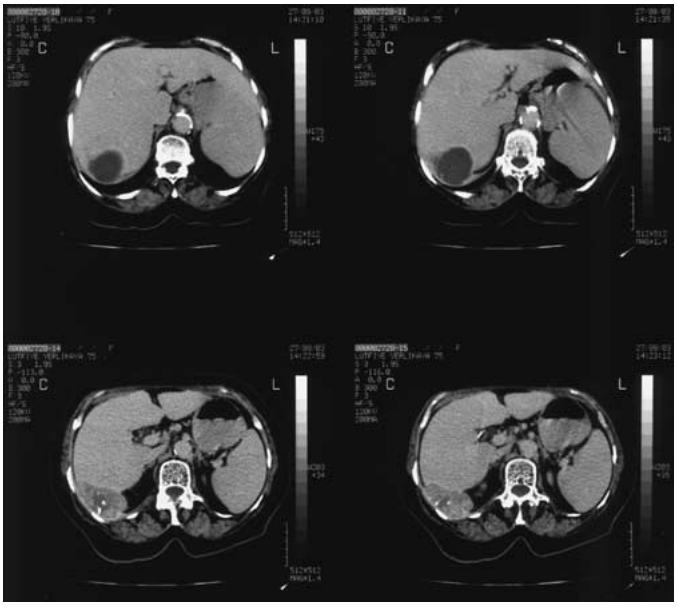

Fig. 1. Computed tomography scan of the patient 7, which shows intraabdominal abscess due to retained gallstones.

removed whenever possible, and that every attempt should be undertaken to prevent the spread of bile and calculi if the gallbladder is accidentally perforated [7].

Despite their extreme rarity, the characteristic appearance of intraabdominal abscesses from gallstones should be recognized because their radiographic appearance can mimic more ominous disease, such as tumors or bowel obstructions [6].

In our series, there were no misdiagnoses when the patients were readmitted for treatment of complications of the laparoscopic cholecystectomy. When the patients are well followed with appropriate recording systems, as we do and as we suggest, spillage of gallstones and their consequences are always kept in mind. If symptoms develop, being aware of the possible initiators allows physicians to easily direct the management of the problem to the true diagnosis. As in our series, retained stones can be managed with no mortality and morbidity.

In our opinion, every surgical approach has a potential of unwanted or unexpected outcome. The main goal for all surgeons should be to manage their own complications with minimal harm to the patient physically and psychologically. From this point of view, a complication can be accepted as an unwanted consequence of a surgical approach. If patients are not informed preoperatively that spillage of bile and gallstones are possible, they will be surprised and confused if related complications develop. In many institutions, the consequences of spilled stones are virtually never mentioned as a part of the preoperative consent process.

We suggest the following steps for appropriate management of spilled gallstones.

1. Preoperatively patients should be informed that dropped stones are common depending on the size of stones and condition of the gallbladder wall and liver bed.
2. When gallbladder perforation and gallstone spillage occur during laparoscopic cholecystectom, an effort should be made to retrieve the gallstones (using a grosping forceps, 10-mm irrigation and suction device, etc.) and the peritoneum should be irrigated with copious saline.
3. There is no indication, however, for converting the laparoscopic procedure to a laparotomy purely on the basis of spilled stones, but it should be essential to document spilled stones in the operation note.
4. The surgeon should inform the patient that stones were spilled and of the possible—but unlikely—consequences of the spillage.
5. The surgeon should be alert to the possibility of abscess formation and other complications because early recognition of the intraperitoneal gallstones is essential in the diagnosis and further treatment of symptomatic patients. Otherwise, the clinical presentation can be confusing and the diagnosis significantly delayed.

Conclusions

A negative outcome like a gallstone spillage is not evidence of malpractice, and negligence can never be imputed from unsatisfactory results. The prudent surgeon should inform the patient preoperatively about the possibility of gallstone spillage. If spillage does occur, the patient should be informed postoperatively of the event. Such patients should be kept under close control to avoid wasted time and money for unnecessary examinations, as well as the psychological trauma associated with wrong diagnoses like malignancy as spilled gallstone may mimic malignancy in years to come. Surgeons should not hesitate to record the events and inform the patient about the spillage of gallstones and possible consequences.

References

1. Horton M, Florence MG. Unusual abscess patterns following dropped gallstones during laparoscopic cholecystectomy. Am. J. Surg. 1998;175:375–378
2. Fitzgibbons RJ, Annibali R, Litke BS. Gallbladder and gallstone removal, open versus closed laparoscopy, and pneumoperitoneum. Am. J. Surg. 1993;165:497–504
3. Siewert JR, Feussner H, Scherer MA, et al. Fehler und Gefahren der laparoskopischen Cholecystektomie Chirurg 1993;64:221–229
4. Zorluoğlu A, Özgüç H, Yilmazlar T, et al. Is it necessary to retrive dropped gallstones during laparoscopic cholecystectomy?. Surg. Endosc. 1997;11:64–66
5. Memon MA, Deeik RK, Mafii TR, et al. The outcome of unretrieved gallstones in the peritoneal cavity during laparoscopic cholecystectomy. Surg. Endosc. 1999;13:848–857
6. Bennett AA, Gilkeson RC, Haaga JR, et al. Complication of ''dropped'' gallstones after laparoscopic cholecystectomy: technical consideration and imaging findings. Abdominal Imaging 2000;25:190–193
7. Laufer JM, Krahenbühl L, Baer HU, et al. Clinical manifestations off lost gallstones after laparoscopic cholecystectomy: a case report with review of the literature. Surg. Laparosc. 1997;7:103–112
8. Welch N, Hinder RA, Fitzgibbons RJ, et al. Gallstones in the peritoneal cavity: a clinical and experimental study. Surg. Laparosc. Endosc. 1991;1:246–247
9. Cohen RV, Pereira PR, Barros MV, et al. is the retrieval of lost peritoneal gallstones worthwhile? Surg. Endosc. 1994;8:1360
10. Johnston S, O'Malley K, McEntee G, et al. The neede to retrieve the dropped stone during laparoscopic cholecystectomy. Am. J. Surg. 1994;167:608–610
11. Leland DG, Dawson DL. Adhesion and experimental intraperitoneal gallstones. Contemp. Surg. 1993;42:273–276
12. Tzardis PJ, Vougiouklakis D, Lymperi M, et al. Septic and other complications resulting from biliary stones placed in the abdominal cavity: experimental study in rabbits. Surg. Endosc 1996;10:533–536

13. Gurleyik E, Gürleyik G, Yucel O, et al. Does chemical compossition have an influance on the fate of intraperitoneal gallstone in rat? Surg. Laparosc. Endosc. 1998;8:113–116
14. Soper NJ, Dunnegan DL. Does intraoperative gallbladder perforation influence the early outcome of laparoscopic cholecystectomy? Surg. Laparosc. Endosc. 1991;1:156–161
15. Schafer M, Suter C, Klaiber CH, et al. Spilled gallstones after laparoscopic cholecystectomy: a relevant problem? A retrospective analysis of 10,174 laparoscopic cholecystectectomies. Surg. Endosc. 1998;9:344–347
16. Rice DC, Memon MA, Jamison RL, et al. Long-term consequences of intraoperative spillage of bile and gallstones during laparoscopic cholecystectomy. J. Gastrointest. Surg. 1997;1:85–91
17. Hussain S. Sepsis from dropped clips at laparoscopic cholecystectomy. Eur. J. Rad. 2001;40:244–247