Evaluation of the Incidence of Complications of Lost Gallstones During Laparoscopic Cholecystectomy

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Background and Aim: Recently, an increasing number of reports in the literature have shown various complications of lost gallstones. This study aimed to evaluate patients with lost stones in the peritoneal cavity for any related complications for at least 12 months after the operation.

Materials and Methods: In a 3-year prospective study, of 900 patients with laparoscopic cholecystectomy, 50 patients with lost stones in the peritoneal cavity were enrolled as the case group. On the same day or the day after, an uncomplicated case was assigned to the control group. Postoperative complications were checked on the 10th day and 1, 6, and 12 months after surgery. They were also visited if they had any complaints at any time. All suspicious cases and also all patients in the last follow-up visit underwent abdominal ultrasonography and were observed for signs of abdominal and port site collections, abdominal and port site stone, abscess, and mass.

Results: In 50 cases (34 female and 16 male with a mean age of 59 y), the surgeon was doubtful about proper stone extraction. The mean duration of operation for patients with a ruptured gall bladder was 49.6 + 30.3 minutes, and in others, it was 27.9 + 11.7 minutes. During the early postoperative period, fever was detected in 3 (6%) patients in the case group and in 1 (2%) patient in the control group, which was resolved spontaneously. Postoperative pain on the 10th and the 30th days, unrelated to the lost stone, was resolved with analgesics. Abdominal collection was found in 8 (16%) patients in the case group and 5 (10%) patients in the control group, which was not significant. All these patients underwent ultrasonography-guided percutaneous aspiration. The aspirate was serous, and the patients' clinical findings were not clinically significant.

Conclusions: According to the study, serious complications related to the lost stones indicate prophylaxis as the best therapeutic approach for such patients. The patients should be informed about lost stones and their possible complications. Also, conversion to open surgery is not advised.

Key Words: complications, gallstones, cholecystectomy, laparoscopic

(*Surg Laparosc Endosc Percutan Tech* 2014;24:213–215)

An increasing number of laparoscopic cholecystectomies (LCs) and the performance of the procedure under special conditions such as acute cholecystitis and gallbladder empyema contribute to the growing risk of lost gallstones. Retrieval of dropped gallstones during laparoscopy is difficult and time consuming. Also, about 20% of stones are not removed because of their number, their fragmentation, and their location.[1]

Early reports on LC demonstrated that the stones dropped into the peritoneal cavity have no deleterious effect.[2] Recently, an increasing number of reports in the literature have shown various complications of lost stones such as sepsis, fistulas to other organs or the skin, and creation of adhesion bands, especially if they are large, pigmented, numerous, fragmented, and infected. Complications related to the lost stones occur in 0.5% to 6% of LCs.[1,2]

The aim of this study was to evaluate patients with lost stones in the peritoneal cavity for any related complications for at least 12 months after the operation.

MATERIALS AND METHODS

A prospective study was conducted after the ethics committee approval (Mashhad University of Medical Sciences, Iran) from August 2008 to August 2011. A total of 900 patients with gallstone disease with a mean age of 45 (range, 31 to 84) years underwent LC. Patients with cholelithiasis that was revealed by ultrasonography were candidates for elective LC. Patients who had a concomitant choledocholithiasis and those with an unusual problem at the time of operation—such as unusual hemorrhage, tense adhesion of the gall bladder to other organs, and evidence of acute cholecystitis—were excluded from the study. Other exclusion criteria were an operating time > 1 hour, patients with concomitant gastrointestinal disorders, and those with a history of abdominal operation or an abdominal operation during the observation period. Patients with postoperative complications with no relation to lost stones and those who had a conversion to the open approach were also excluded. Written informed consent was obtained from all participants. All patients underwent general anesthesia with the same anesthetic protocol. The operation was performed by 3 surgeons of our center with the same technique involving 4 ports, and the gallbladder was removed through a 10-mm subxyphoid port. To avoid misdiagnosis of the metal clips' density with that of the missing stones in future investigations, ligation of the cystic duct and the artery was

Received for publication December 27, 2012; accepted February 27, 2013.

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Supported by the Vice Chancellor for Research of Mashhad University of Medical Sciences.

The authors declare no conflicts of interest.

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performed using a plastic hemolock. Patients were considered as those having lost stones when the gallbladder ruptured during the operation and those in whom the surgeon could not remove all of the stones. Finally, 50 patients with lost stones were enrolled as the case group. On the same day or the day after, an uncomplicated case was assigned to the control group. All patients were followed for 12 to 24 months. All patients received prophylactic antibiotics. In the cases of perforation and lost stones, the operation field and port sites were irrigated with normal saline. The patients were discharged on the second postoperative day. Postoperative complications were checked on the 10th day and 1, 6, and 12 months after surgery. They were also visited if they had any complaints at any time. The stitches were removed on the 10th postoperative day. During the observation period, the patients were investigated for signs of sepsis, abdominal pain, ileous, external secretions or fistula, port site inflammation, hernia, and mass or any abdominal complications of retained stones. All suspicious cases and also all patients in their last follow-up visit underwent abdominal ultrasonography. The radiologist actively searched for signs of abdominal and port site collections, abdominal and port site stone, abscess, and mass.

After data collection, statistical analysis was performed using SPSS (version 11), using the Fisher exact test.

RESULTS

Among 900 patients with LC, 665 (73.91%) were female and the remaining 235 (26.09%) were male. The mean age of the patients was 45 years. The gallbladder was ruptured in 110 (12.2%) cases. One (0.1%) case of umbilical port site hernia was observed. In 50 (45.5%) cases (34 female and 16 male with the mean age of 59 y), the surgeon was doubtful about proper stone extraction. The mean duration of operation was 49.6 ± 30.3 minutes in patients with a ruptured gall bladder versus 27.9 ± 11.7 minutes in others. The difference was significant ($P = 0.022$). On the same day or the day after, an uncomplicated case was assigned to the control group. All patients were followed for 12 to 24 months.

Results of this investigation for signs of fever, sepsis, abdominal pain and mass, ileous, external secretions, port site inflammation and mass, pleural effusion, jaundice, intestinal obstruction during admission and on the 10th and the 30th days of postoperative follow-up are shown in Table 1. During the early postoperative period, fever was detected in 3 (6%) patients in the case group and in 1 (2%) patient in the control group, which was resolved spontaneously. Postoperative pain on the 10th and the 30th days, unrelated to the lost stones, was resolved with analgesics. Nausea and vomiting observed in the 2 groups were not statistically significant. One (2%) patient in the case group had a port site abscess, which was drained. One (2%) patient in the control group had an epigastric port site mass that was excised, and 1 lost stone was proved at the extraction port in this patient.

Ultrasonography was performed 62 times in the case group and 55 times in the control group. An abdominal collection was found in 8 (16%) patients in the case group and 5 (10%) patients in the control group, which was not statistically significant. All these patients underwent ultrasonography-guided percutaneous aspiration. The aspirate was serous, and the patients' clinical findings were not clinically significant. No mass or stone was found on abdominal ultrasonography. The results of the ultrasonography are shown in Table 2.

TABLE 1. Signs and Symptoms and of Complicated Lost Stones

Symptoms	Case Group (50)	Control Group (50)	*P*
Fever during 10th day	3	1	0.297
Fever in 30th day	0	0	—
Pain in 10th day	9	3	0.065
Pain in 30th day	3	0	0.242
Nausea	13	17	0.383
Vomiting	3	1	0.297
Peritonitis	0	0	—
Abdominal mass	0	0	—
Port site abscess	1	0	0.999
Cutaneous fistula	0	0	—
Enteric fistula	0	0	—
Intestinal obstruction	0	0	—
Port site mass	0	1	0.999

DISCUSSION

LC is a popular treatment method for the management of symptomatic gallstone disease worldwide, and lost gallstone during the procedure is a common problem.

In this study, no stone density was identified in the follow-up ultrasonography. As these patients are usually ambulated very soon, the stone may migrate in the abdomen. The lost stones are usually small and they can remain near the surgical bed or migrate into the peritoneal cavity.[1,2] They may be detected around the liver, under the diaphragm, in the Rutherford Morrison pouch, in the right paracolic gutter, between small bowel loops, on the omentum, in a hernial sac, in the pouch of Douglas, and in the port tract or the pelvis.[1–4] Thus, they may be ignored during ultrasonography.

In this study, 1 case of port site abscess was found in the case group and 1 case of port site mass in the control group. These stones may cause generalized peritonitis, abscess, or an inflammatory reaction. Depending on the site of abscess associated with the stones, they may migrate to different areas and cause various complications. They may also migrate through the port sites. In the sub-diaphragmatic area, they can migrate through the diaphragm and cause empyema or toward the tracheobronchial tree

TABLE 2. Findings of Ultrasonography (US) and Management of Complications in the 2 Groups

	Case Group (50)	Control Group (50)	*P*
No. US	62	55	—
Abdominal collection in US	8	5	0.372
Abdominal mass in US	0	0	—
Abdominal stone in US	0	0	—
Port site stone on US	0	0	—
Percutaneous aspiration	8	5	0.372
Reoperation	0	0	—

US indicates ultrasonography.

and cause hemoptysis or lithoptysis.[2] In the pelvis, they may penetrate the urinary bladder, the uterus, or the vagina.[3] Furthermore, they may result in bowel obstruction. They can also perforate the bowel wall, causing enterocutaneous, enterovesical, or enteroenteric fistula.[5]

Most of our patients were asymptomatic. Patients with lost stones may be asymptomatic until a complication occurs. The duration between LC and the occurrence of lost stone complications varies from a few days to several years.[6–8] The inflammatory reaction may create an abdominal wall or an intra-abdominal mass. Once encountered, it is very difficult to recognize a relationship between these complications and lost stones. These stones are usually detected during operation or at autopsy. Surgeons should consider lost stones as a causative factor in these groups of patients.[5,9,10] Although >85% of gallstones are radiolucent, and may remain undetected in plain abdominal radiography, it is helpful in identifying dilated small bowel loops in case of an obstruction. Ultrasonography may show the stone or its associated inflammatory reaction or mass. Computed tomographic scan or magnetic resonance imaging studies may also detect the stone location or inflammation and abscess related to the stones.[10] In this study, no lost stones were found in the abdominal cavity by ultrasonography. An abdominal collection was found in 13 (26%) patients. Ultrasonography-guided percutaneous aspiration showed that the aspirate was serous. The patients' clinical findings were not clinically significant. The abdominal collections may be bile, blood, and reactive peritoneal fluids. If the patient has the symptoms of peritoneal irritation and peritonitis, it is necessary to explore the abdomen. However, in asymptomatic abdominal secretions, the patient can be observed or referred for percutaneous aspiration.

We usually encounter complications of lost stones without enough information about the results of previous operations. Because most surgeons do not record lost stones and their high-risk parameters for complications in their notes, through the review of patients' medical records, one cannot recognize whether the patient is prone to lost stone complications.[2]

However, for the treatment of these patients, resolution of the complications should be taken into account.[11–13] If we are aware about the lost stones, we should search for the stones to prevent the recurrence of the current or other possible complications. Besides, in patients with a history of LC, we should consider lost stone as a causative factor.[2,5,7,9]

In conclusion, the incidence of lost stone complications is not common. Therefore, conversion to open surgery for retrieving the stones is not advised. However, the rare complications related to lost stone may become serious and need additional work-up. According to the study, serious complications related to the lost stones indicate prophylaxis as the best therapeutic approach for such patients. Hence, we recommend the following: (a) surgery should be performed by a certified experienced surgeon to prevent the loss of stones during surgery; (b) the surgeon's suspicion of possible lost stones during LC should be recorded; (c) patients should be informed of the lost stones and the potential complications; (d) with regard to the prolonged time between LC and occurrence of lost stone complications in patients with a history of LC, the stone should be considered as a causative factor even after several years; (e) furthermore, because of the low detection rate of intra-abdominal gallstones by ultrasonography, it cannot be used to rule out the presence of the stones in the peritoneal cavity.

ACKNOWLEDGMENT

The authors gratefully acknowledge the contribution of M. Hassanpour for editing the manuscript.

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