

## SPILLED GALL STONES DURING LAPAROSCOPIC CHOLECYSTECTOMY : A PROSPECTIVE STUDY

**Jasim D Saud<sup>#</sup>, Mazin A Abdulla<sup>@</sup> & Mushtaq Ch. Abu-Alhail<sup>\*</sup>**

<sup>#</sup>MBChB, CABS, Specialist Surgeon, Basrah General Hospital, Basrah, Iraq. <sup>@</sup>MBChB, CABS, Consultant Surgeon, Department of Surgery, College of Medicine, University of Basrah, Basrah, Iraq.

### ABSTRACT

This study assesses the impact of spilled gall stones during laparoscopic cholecystectomy (LC) and its clinically significant complications resulting from stones left in the peritoneum.

This is a prospective analysis of laparoscopic cholecystectomies performed at The Surgical Unit in Basrah General Hospital from 1st January 2006 to 31st December 2010. There were 678 patients in the study who underwent LC. The inclusion criteria for LC were: patients of all ages and both genders, symptomatic gallstone disease, recurrent attack while waiting for interval LC, normal values of blood complete picture & liver function tests and ultrasound examination of abdomen demonstrating gallstone disease.

There were 73 cases of gallbladder perforation, i.e. a frequency of 10.7%. In 34 of these patients gallstones spillage also occurred in a frequency of 5%. An effort was made in each case to remove the spilled stones laparoscopically but in 25 patients unretrieved stones were left (frequency of 3.6%). Eight patients (1.17%) developed complications, one patient developed 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. Two patients developed sub-hepatic abscess, presenting with right hypochondrial & shoulder tip pain and fever post operatively; which confirmed by abdominal sonograph, one patient responded well to medical treatment while the other one required ultrasound guided drainage and broad-spectrum antibiotics. Three patients developed epigastric port site infection; two were treated successfully by daily wound care and appropriate antibiotics after culture and sensitivity. One developed persistent epigastric sinus, and a gallstone was retrieved on exploration. Two patients developed sub-hepatic and right sub-phrenic abscess respectively in the seventh post operative day and required open drainage. There was no mortality and long-term morbidity.

In conclusion, complications arising from spillage of gall stones during laparoscopic cholecystectomy are rare. They can present months after the cholecystectomy with septic complications. The patients should be informed preoperatively that spillage of bile and gallstones are possible. The surgeon should take utmost care to prevent spillage of stones and attempt to remove all visible stones at the time of surgery. If spillage occurred it should be recorded clearly in the operative notes and such patients should be kept under close follow up to aid in the early diagnosis of later complications. There is no indication for routine conversion to open surgery.

### INTRODUCTION

With the therapeutic option of laparoscopic cholecystectomy and popularity and quality of diagnostic ultrasound, more gall stones are now detected and consequently operated upon<sup>1,2</sup>. Laparoscopic cholecystectomy has become the gold standard for the surgical treatment of symptomatic gallstones, with better patient satisfaction and a shorter hospital stay<sup>1-3</sup>. However, this change in practice from open surgery

has led to problems such as intraoperative spillage of stone<sup>4</sup>. Gall stone spillage during laparoscopic cholecystectomy is common<sup>4,5</sup>. This problem occurs less frequently in open surgery and the spilt stones are easy to retrieve<sup>6</sup>. Fortunately, clinically significant complications resulting from stones left in the peritoneum are extremely uncommon and because of this there has not been much discussion of the problem<sup>6,7</sup>. Perforation

of the gall bladder occurs fairly frequently during laparoscopic cholecystectomy and is reported in the range of 10%–40% in various series<sup>2-14</sup>. The incidence of gall stone spillage is less frequent and the true incidence of unretrieved stones is difficult to determine. Some series quote a range of 6%–30%. The incidence is more common when operating on an acutely inflamed gallbladder<sup>4</sup>. Stones spilled may remain in the peritoneal cavity adjacent to the liver or may migrate to various distant sites. These stones can cause a range of complications. In the majority of cases, these stones usually cause no bother and remain benign<sup>10,13</sup>. Complications that result from these stones are said to occur in 0.08%–0.3% of patients<sup>9,11,13</sup>.

The aim of this study is to assess the impact of spilt gall stones during laparoscopic cholecystectomy and its clinically significant complications resulting from stones left in the peritoneum.

## PATIENTS AND METHODS

This is a prospective analysis of laparoscopic cholecystectomies (LCs) performed at Surgical Department, Basrah General Hospital, from January 2006 to December 2010. The inclusion criteria for LC were: patients of all ages and both sexes, symptomatic gallstone disease, acute attack and recurrent attack while waiting for interval LC, normal levels of blood complete picture and liver function tests, and ultrasound examination of abdomen demonstrating gallstone disease. Laparoscopic cholecystectomies were performed by attending surgeons. Both elective and emergency cases were included in the study. A four-trocar technique with a 30 degree angled laparoscopic video camera was used. Dissection of Calot's triangle was done by grip and strip blunt method using dissecting forceps (Maryland), or by electrocautery using surgical hook. Dissection of the gallbladder was

performed using a combination of electrocautery and blunt dissection with energized hook and suction irrigation tube sucker respectively. The cystic artery and cystic duct were ligated with titanium clips. The gallbladder was removed through either the epigastric or umbilical port. When perforation of the gallbladder occurred, attempts were made to retrieve all spilled stones, and the peritoneal cavity was irrigated with saline solution to evacuate the spilled bile. Patients typically received one preoperative and three postoperative doses of antibiotic, most commonly a cephalosporin. In patients with acute cholecystitis, broad-spectrum antibiotics were administered for a longer period depending on the clinical situation. During the operations assessment of perforation was done recording the cause of perforation, releasing gallstones, number and size of gall stones, ways of retrieval of spilt stones and the operative time in addition the bile was taken for culture and sensitivity study. We prescribed antibiotic for five consecutive days. The perforation of gall bladder and stone spillage was recorded in operative notes of patients and the patients were arranging for follow up in the post operative periods. The postoperative course was marked by recording post operative pyrexia, ileus and frequent follow-up of patients in out-patients department one week after operation, we take a history of any pain, fever, examination of gall bladder retrieval port for any signs of infection and we also performed abdominal and pelvic ultra-sonogram which was repeated monthly for six months and then every six months for mean of 2 years.

## RESULTS

There were 678 patients in the study who underwent LC. There were 73 (10.7%) cases of gallbladder perforation. In 34 (5%) of these patients gallstones spillage also occurred (Table I).

Table I: Demographic data of patients with GB perforation.

Characteristic	No. or Ratio	Range
Female/male	62/11	
Mean Age (yr)	36.6	(13–70)
GB perforation during D/R	57/16	
Gall stone spillage M/F	29/5	
Follow-up (months)	18	(9–24)
Re-admission	2	
operative time(minute)	40	(25- 75)
Hospital stay (day)	1-2	
Bile spillage infected/sterile	2/71	

Yr years, D dissection, R retrieval, M male, F female

Table II: Characteristics of the complicated patients.

Patient no.	Complication	Time since LC (weeks)	Diagnostic test	Intervention	Outcome
1	Persistent pain	2	US	medical	complete recovery
2	ileus	1	X-ray + US	medical	complete recovery
3	abscess	4	US	wound care and antibiotics	complete recovery
4	abscess	8	US	wound care and antibiotics	complete recovery
5	abscess	10	US	wound exploration	complete recovery
6	abscess	3	US	Percutaneous drainage	complete recovery
7	abscess	1	US + CT	laparotomy	complete recovery
8	abscess	4	US + CT	laparotomy	complete recovery

LC: laparoscopic cholecystectomy; US: ultrasound; CT: computerized tomography

When perforation of the gallbladder led to spillage of gallstones into the abdominal cavity, efforts were made to retrieve the lost stones and the peritoneal cavity was irrigated with saline. Many attempts were done to remove them using a variety of extraction instruments such as grasping forceps, and suction and irrigation device, attempts at repairing gall bladder perforations and retrieval bags( a surgical glove with a purse string attached to the opening) was made to collect any spilled stones and the gall

bladder. Copious irrigation and pressure ejection whereby the cannula is manoeuvred directly over these stones and the port opened rapidly to eject stones through it. Nine patients were known to have a range of one to three stone with average size of 1.6 cm at the ultrasound study 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 25 patients.

Among the 25 patients eight patients (1.17%) experienced complications from the retained stones. As they were all informed about the follow up and their records were documented in the operative notes, diagnoses were made in the shortest time with the fewest examinations. All eight patients were successfully managed, as shown in (Table II). Patient 1 had pain in the right hypochondrium and right shoulder pain at 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. Three patients (number 3, 4 and 5) developed epigastric port site infection; two were treated successfully by daily wound care and appropriate antibiotics after culture and sensitivity. One developed persistent epigastric sinus, and a gallstone was retrieved on exploration under local anesthesia. Patient number 6 had developed sub-hepatic abscess, presenting with right hypochondrial and shoulder tip pain and fever on day 3; they were confirmed by ultrasound, with ultrasound guided drainage and broad-spectrum antibiotics. Patient number 7 was re-admitted in the seventh post operative day with right upper quadrant pain, nausea, fever, rigor and mild jaundice. Abdominal ultrasonography was normal, no right sub phrenic collection, and no collection in liver bed or pelvic cavity. Abdominal computed tomography (ACT) scan revealed a sub-hepatic abscess 6 by 12 cm, as well as dilatation of the intrahepatic biliary tree from the mass effect of abscess adjacent to the laparoscopic clips. The patient was successfully managed by open drainage. Patient 8 was re-admitted with distension of the upper abdomen and pain.

Abdominal 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, the abscess and all stones were cleared by laparotomy. The operative time for patients with perforated gall bladder and stone spillage was 40 minute range from 25 to 75 minutes. Mean hospital stay is no longer increase in case of perforated group ranging from 1-2 days. From 34 patients with gall stone spillage 5 patients were lost for follow up. No mortality was recorded in our study.

## Discussion

Laparoscopic cholecystectomy is now the gold standard for the treatment of gallstones. When it was first introduced there were some concerns about its safety owing to its rapid adoption by untrained surgeons. However, when a careful, correct technique is employed, the operation is extremely safe procedure with a low incidence of major complications<sup>15-21</sup>. Although a large number of studies have examined clinical outcomes of laparoscopic cholecystectomy, few have directly addressed the consequences of spillage of bile and gallstones within the peritoneal cavity, an event that occurs more frequently with laparoscopic than with open cholecystectomy<sup>22,23</sup>. There are case reports of gallstones lost at the time of surgery subsequently causing intra-abdominal abscesses<sup>24-27</sup> empyema<sup>26</sup>, abdominal wall abscesses<sup>22,28,29</sup>, cutaneous sinus tracts<sup>30,31</sup> and bladder fistulas<sup>32</sup>. 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<sup>33</sup>. Although these complications appear to be rare, their actual incidences are unknown. 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<sup>34</sup> and Schafer et al<sup>18</sup>, 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. The fate of the intraperitoneal gall stone has provoked several exciting experimental studies. Cline et al implanted sterile gall stones in the peritoneal cavity of rats<sup>35</sup>. The results of the study suggested spillage of sterile stones should not cause increased morbidity during or after laparoscopic cholecystectomy. Zorluoglu et al implanted gall stones inside the peritoneal cavity of the rats in combination with either sterile bile or infected bile, and they came to the conclusion that the combination of multiple stones and infected bile increased the incidence of adhesions and intraabdominal abscesses<sup>36</sup>. In our study spillage of infected bile were recorded in two patients and surprisingly both of them did not had any complications in follow up period. Hussain<sup>37</sup> reported that of seven patients who harboured 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<sup>33</sup> strongly recommend that spilled gallstones be removed whenever possible, and that every attempt should be undertaken to prevent the spread of bile and calculi if the gallbladder is accidentally

perforated<sup>33</sup>. Every attempt should be made to avoid spillage during surgery. Careful dissection and identification of correct planes between the wall of the gall bladder and surrounding structures should be strictly adhered to. Use of retrieval bags to retrieve the gall bladder decreases the chances of spillage during extraction and avoids inadvertent spillage to or contamination within port site wounds. In case of spillage, efforts should be made to retrieve the lost stones and the peritoneal cavity should be irrigated with saline to dilute any infected bile. Attempts at repairing gall bladder perforations are often unsatisfactory. Use of retrieval bags or even a surgical glove with a purse string attached to the opening is recommended to collect any spilled stones and the gall bladder<sup>13</sup>. Conversion to open surgery for removal of spilled stones recognised during laparoscopic cholecystectomy is a controversial question. Although spillage can lead to severe postoperative complications, the incidence and mortality after it are extremely low. On this basis, routine conversion to open technique to retrieve the stones is not indicated. In the literature<sup>29,35,36</sup>, various methods have been described to deal with the infective complications associated with spilled stones. Treatment of complications basically depends on the location of the problem<sup>29</sup>. Abdominal wall abscess from stones caught at the port site can be dealt with by local drainage and evacuation of the stones<sup>38</sup>. Stones which are the foci of infection in these abscesses and sinuses should be completely removed for a cure<sup>13,30</sup>. Intra-abdominal abscesses can be dealt with percutaneously by minimally invasive technique<sup>38</sup> and laparotomy where this technique fails<sup>4,39</sup>.

In our series, the patients are well followed with appropriate recording systems, spillage of gallstones and their consequences are always kept in mind. If symptoms develop, being aware of the

possible initiators allows surgeons 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.

Every surgical approach has a potential of unwanted or unexpected outcome<sup>29, 30</sup>. The main goal for all surgeons should be to manage their own complications with minimal harm to the patient physically and psychologically<sup>29</sup>. From this point of view, a complication can be accepted as an unwanted consequence of a surgical approach<sup>11,13,15,30</sup>. If patients are not informed preoperatively that spillage of bile and gallstones are possible, they will be surprised and confused if related complications develop<sup>13,30</sup>. In many institutions, the consequences of spilled stones are

virtually never mentioned as a part of the preoperative consent process<sup>15,16,29, 38</sup>.

In conclusion, complications arising from spillage of gall stones during laparoscopic cholecystectomy are rare. They can present months or years after the cholecystectomy with septic complications. The patients should be informed preoperatively that spillage of bile and gallstones are possible. The surgeon should take utmost care to prevent spillage of stones and attempt to remove all visible stones at the time of surgery. If spillage occurred it should be recorded clearly in the operative notes and such patients should be kept under close follow up to aid in the early diagnosis of later complications. There is no indication for routine conversion to open surgery.

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