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Review Article

Attitudes and Practices of Surgeons towards Spilled Gallstones during Laparoscopic Cholecystectomy: An Observational Study among Surgeons at Nasser Medical Complex

Basim Alhamss*

Surgery Department, Nasser Medical Complex, Ministry of Health, Gaza, Palestine

***Corresponding Author:** Basim Alhamss, Surgery Department, Nasser Medical Complex, Ministry of Health, Gaza, Palestine. E-mail ID: bhamss91@gmail.com.

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Abstract

Background: The sequelae of spilled gallstones after Laparoscopic cholecystectomy (LC) and the occurring complications may go unnoticed for a long time and can be a diagnostic challenge. The aim of this survey was to study the knowledge, attitude, and practices of surgeons regarding spilled gallstones during LC.

Methods: An observational, cross-sectional survey, using a questionnaire based on 11 self-answered close-ended questions, was conducted among general surgeons at Nasser Medical Complex during October 2022.

Results: The study included 24 surgeons from different levels. The mean age among study participants was 43.21 ± 10.39 years with a median age of 47.5 years. The experience of this cohort with complications associated with gallstone spillage during laparoscopic cholecystectomy was only 29.2%. With regard to the incidence of spillage, the majority (83.3%) opined that it was less than 10%. When asked about the duration of follow-up, the majority (95.8%) thought 2 years was sufficiently long. Only 16.7% of the respondents had the opinion that the operating surgeon should be held legally responsible for the complications associated with the spilled gallstones.

Conclusion: There is need to educate surgeons regarding safe practices during LC to avoid gallstone spillage, early diagnosis, and management of complications. There is need to standardize practice to retrieve lost gallstones to reduce complication and legal consequences.

Keywords: *Gallstone; Surgeons; Laparoscopic; Cholecystectomy; Gaza Strip*

Introduction

It is widely agreed upon that laparoscopic cholecystectomy (LC) is a treatment that is both effective and risk-free, and that it ought to be made accessible as a regular option in institutions that do general surgery. The many benefits of the operation didn't become apparent until a few years after it had been done for the first time. These benefits include the fact that there is a low risk of postoperative morbidity and that the therapy has a significant economic effect. LC was suggested as the therapy of choice for patients who were suffering symptoms associated to gallstones in a consensus statement that was presented at the National Institutes of Health (NIH) Conference in 1992 [1].

The LC technique, like to any other kind of surgical operation, is not free of the possibility of experiencing difficulties. Iatrogenic perforation and gallstone leakage are the two problems that are recognized as occurring the most often. It has been shown that up to 36 percent of gall bladders perforate during laparoscopic cholecystectomy (LC), and that up to 16 percent of gallstones are removed during the procedure [2,3]. Even though problems caused by gallstones leaking during LC are quite uncommon, it is possible that they might be exceedingly hazardous if they are not collected [4]. A look through the tales of lost gallstones during LC that are included in the Medline database [5] revealed indications of intestinal, septic, and fistulous problems. According to the findings [3,6], the time it takes for these difficulties to become apparent after the treatment might range anywhere from one month to twenty years.

It is a debatable topic whether or not there is a best practice for dealing with gallstones once they have been extracted via LC. However, some surgeons may choose to disregard the possibility of changing the LC to an open surgery in order to rescue the stones that have been spilled, while others may choose to disregard the possibility of doing so. Others may insist that every effort be made to remove all gallstones that have been spilled because of the potential for negative outcomes. Others may insist that every effort be made to remove all gallstones that have been spilled. As shown by the research presented in Mullerat [7-10], even fewer surgeons counsel their patients in the event that the stones are dislodged during LC. Patients need to be made aware that this information, although it may be helpful in the detection of concerns, may also create unwarranted alarm and extra testing for unusual consequences. This is something that should be communicated to patients. Patients need to be made aware that this information, although it may be helpful in the detection of concerns, may also create unwarranted alarm and extra testing for unusual consequences. This is something that should be communicated to patients.

There are no studies that have been undertaken in Gaza Strip concerning surgeons attitude and practices toward spilled gallstone during laparoscopic cholecystectomy, to the best of our knowledge and based on a study of the most recent medical literature.

Purpose of the Study

The purpose of this research is to study the knowledge, attitude, and practices of residents and staff working in the department of surgery at Nasser Medical Complex with regard to spilled gallstones during laparoscopic cholecystectomy.

Methods

Study design and setting

This study was a descriptive, correlational cross-sectional study to achieve the objectives of the study. A cross-sectional study because of the capture information based on data gathered for a specific point in time. The data gathered in the form all surgeons at a single point of measurement. The advantages of cross-sectional study includes proof and disproof assumptions, not costly to perform and doesn't require a lot of time, captures a specific point in time, contains multiple variable at the time of the data snapshot, the data can be used for various types of research and may findings and outcome can be analyzed to create new theories or in-depth research. This study was conducted among all surgeons from different levels at the surgical department in Nasser Medical Complex. Data was collected during the first week of October, 2022.

Study population

All general surgeons staff at the surgical department in Nasser Medical Complex from all levels of proficiency.

Sampling

Due to the small number of total population (N = 24), researcher chose all surgeons in the department to be the study sample.

Instrument of the study

Study instrument was designed based on the data present in the latest literature. Study tool consisted of (1) baseline characteristics, (2) knowledge and attitude assessment, (3) postoperative complications knowledge.

Data collection

In this study, data was collected in a self-administered manner in which surgeons filled in the questionnaire and handled it to the research.

Statistical analysis

Data obtained from questionnaire were entered and analyzed using SPSS program version 23 computer software. Sociodemographic data are presented using descriptive statistics as means, median, percentages and standard deviation. Normality analysis was done in order to determine the use of either independent T test and one-way Anova are used to show statistical significance among participants characteristics or non-parametric tests. Chi square test is used to show relationship between categorical variables.

Ethical and administrative consideration

Approval of general directorate of human resources development in MOH were gained from the general director of human resources development-MOH (GDOHRD-MOH) to allow collect data from study participants. Furthermore, oral informed consent was gained from study participants.

Results

The study included 24 surgeons from different levels. The mean age among study participants was 43.21 ± 10.39 years with a median age of 47.5 years. Participants age ranged from 26 to 58 years. Figure 1 shows age groups distribution among study participants. All of study participants were males (100%).

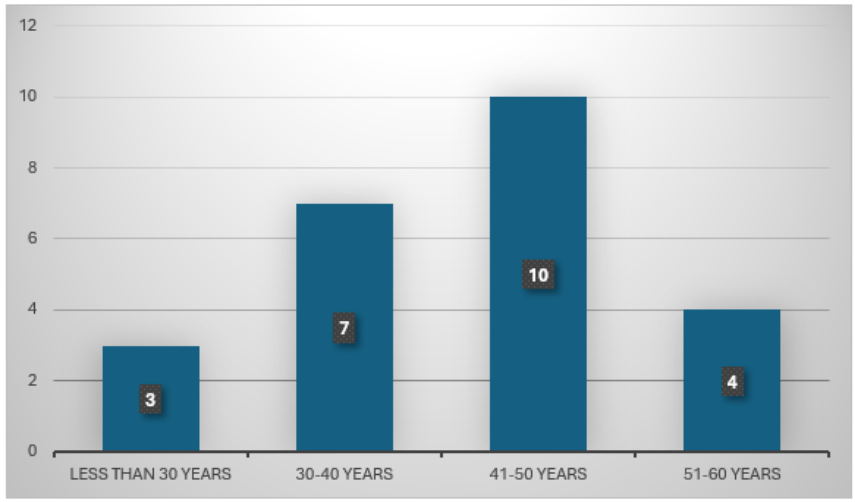


Figure 1: *Distribution of study participants according to the age groups.*

The level of proficiency varied among study participants with most of them being specialists (n = 9, 37.5%) followed by residents (n = 8, 33.3%). Figure 2 shows the level of proficiency among study participants.

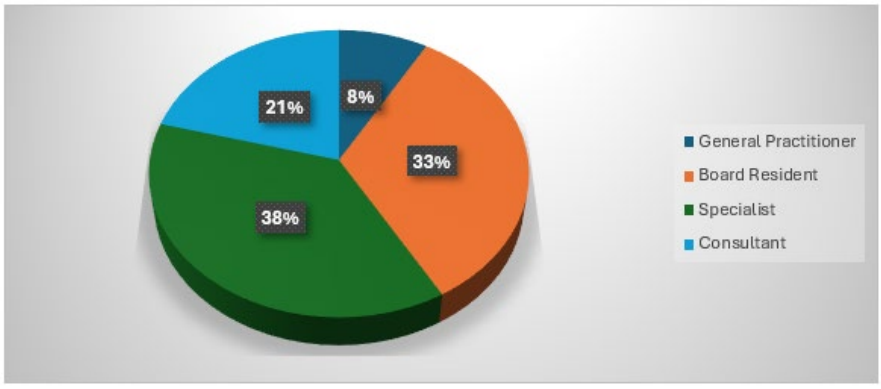


Figure 2: *Distribution of study participants according to the proficiency level.*

The number of years of experience ranged from 2 to 30 years among study participants. The number of working hours per week ranged from 36 to 75 hours. Table 1 shows the clinical experience and number of working hours per week among study participants.

Variable		Frequency	Percentage
Experience (Years)	Less than 5	4	16.67%
	5-10 Years	6	25%
	11-15 Years	3	12.5%
	16-20 Years	8	33.33%
	More than 20 Years	3	12.5%
Working hours per week	36	10	41.67%
	37-50 hours	7	29.17%
	More than 50 hours	7	29.17%
Number of performed laparoscopic cholecystectomy	Less than 50	5	20.83%
	50- 100	6	25%
	More than 100	13	54.17%

Table 1: *Clinical experience among study participants.*

The experience of this cohort with complications associated with gallstone spillage during laparoscopic cholecystectomy was only 29.2%. With regard to the incidence of spillage, the majority (83.3%) opined that it was less than 10%. When asked about the duration of follow-up, the majority (95.8%) thought 2 years was sufficiently long (Table 2).

Questionnaire item		Frequency	Percent
Incidence	0 - 10%	20	83.3%
	11 - 25%	3	12.5%
	26 - 40%	0	0
	> 40%	1	4.2%
Complication seen	Yes	7	29.2%
	No	17	70.8%
Should gallstone spillage be included in informed consent?	Yes	18	75%
	No	6	25%
Gallstone spillage included in informed consent	Yes	3	12.5%
	No	21	87.5%
Intervention for gallstone spillage	Convert to open for retrieval	1	4.2%
	Laparoscopic retrieval	20	83.3%
	Peritoneal wash and suction	3	12.5%
	None	0	0
Necessary to document gallstone spillage in operative notes	Yes	21	87.5%
	No	3	12.5%
Document gallstone spillage in operative notes	Yes	11	45.8%
	No	13	54.2%
Duration of follow-up for gallstone spillage	2 years	23	95.8%
	5 years	0	0
	10 years	1	4.2%
	20 years	0	0
Number of complications identified	< 5	23	95.8%
	> 5	1	4.2%
Can operating surgeon be held legally liable for complication following gallstone spillage?	Yes	4	16.7%
	No	20	83.3%

Table 2: *Response to questionnaire on gallstone spillage during LC.*

The questionnaire presented a list of 20 possible complications of which the respondents had to pick the ones which could be directly attributed to spilled gallstones. The complications and the responses are presented in figure 3.

In case of lost gallstones, 95.8% of the respondents would not convert to an open procedure and would attempt to retrieve the stones laparoscopically (83.3%) or give thorough peritoneal wash and suction (12.5%). Only one participants (4.2%) would convert to an open cholecystectomy whereas none of participants would rather not do anything.

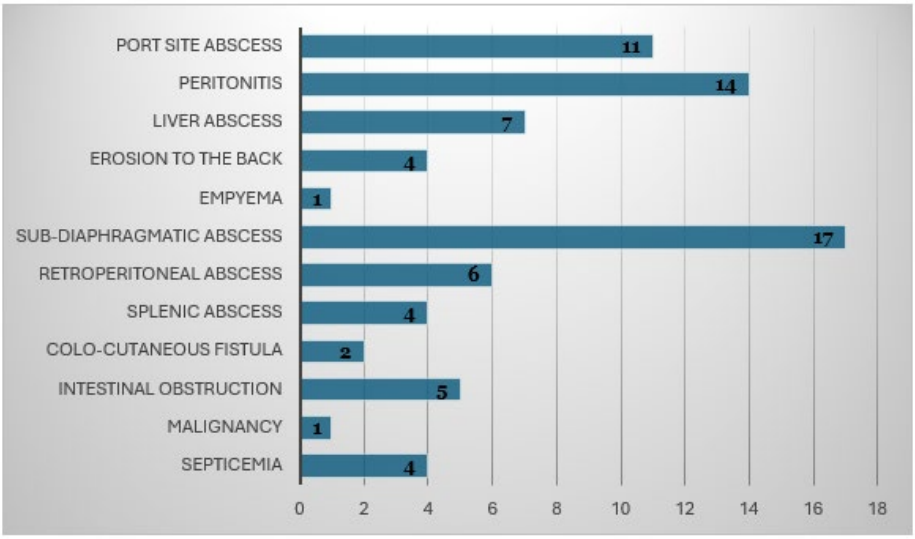


Figure 3: *"Which of the following can be complications following gallstones spillage?".*

There were 75% of the respondents thought it was necessary to include the risk of spillage and associated complications in preoperative consent, but only 12.5% actually did so. Furthermore, 87.5% considered it necessary to mention the lost gallstones in operative notes and 45.2% actually documented the same. Only 16.7% of the respondents had the opinion that the operating surgeon should be held legally responsible for the complications associated with the spilled gallstones.

Discussion

It is generally agreed that laparoscopic cholecystectomy is the best option for patients with gallstone symptoms. Gallbladder perforation during laparoscopic cholecystectomy is common, with reported incidences ranging from 10% to 40% [11-16]. While open cholecystectomy has a lower rate of gallstone leakage (reported at 6%-30% [16,17]), the stones are easier to extract if they do happen [15]. In our study, everyone who responded agreed that stones may break loose and pour out during laparoscopic cholecystectomy. Similar to the actual occurrence, 88% of respondents estimated that spillage occurred between 0% and 25% of the time. The most common causes of gallstone leakage during surgery include the use of gripping forceps (75% of the time), injuring the gall bladder, and removing the gallbladder via port sites (25% of the time) [18-20]. Stone spilling is more likely to occur after surgery on an acutely inflamed gallbladder [15] and in the presence of adhesions [16]. Approximately 0.08% to 0.3% of patients have complications due to these loose stones [16,21].

Seventy percent of respondents in our study said they had never had difficulties from gallstone spills. Abdominal wall abscess [22], broncholithiasis [23-27], lung abscess, empyema [28], back erosion [29-31], sub-diaphragmatic abscess [32], liver abscess [33], splenic abscess, retroperitoneal abscess [34], peritonitis [35], granulomatous peritonitis, intestinal obstruction [36]. Only 17% of respondents were able to name more than 5 of the 21 issues we highlighted [36]. Abscess development is the most prevalent consequence of gallstone leakage, occurring in 60% of cases [37,38]. Pneumoperitoneum and peritoneal irrigation, when used together, may spread calculi throughout the peritoneal cavity, leading to the aforementioned rare, far-flung problems.

In most cases, the most dangerous problems from spilled stones manifest themselves four months after surgery [39,40]. However, this time frame may range from as little as one month to as long as twenty years. Seventy-seven percent of respondents agreed that patients should be followed for up to two years in order to discover issues.

Acute cholecystitis, pigmented stone leakage, perihepatic stone localization, many stones (>15) or size (>1.5 cm), and advanced age are all major risk factors for these problems [41-46]. Most cases resolve on their own as the body's immune system adjusts. Older people are more likely to have infective problems due to a weakened immune system. Adhesions and intraabdominal abscesses are more common in those with a history of adhesions or infection due to multiple pigment stones or contaminated bile [44].

While 72% of survey participants thought that the possibility of gallstone spilling during surgery should be mentioned in informed consent, only 48% actually did so [46]. To better alert the doctor to the risk of stones causing any additional issues in the future, it is advised that the intraoperative gallstone leakage be well documented in the medical record. At least 80% of our respondents agreed that stone spillage should be included in the operational notes, and around 70% were really doing so [46].

Accurate diagnosis requires a high index of clinical suspicion. Diagnostic imaging techniques including ultrasound, CT scans, and MRIs are quite helpful. The hyperechoic acoustic signals from radiolucent biliary stones may be detected by ultrasound and used to locate the stones inside the inflammatory mass. Since it is difficult to distinguish between stones and gas in an abscess using MRI, ultrasound is more sensitive than MRI in identifying stones in abscesses [47]. Besides being more practical, ultrasound technology is less expensive [48].

Extraction of the gallbladder via the port may be performed without incident if the surgeon takes care to dissect the area and utilize a retrieval bag to catch any loose stones. If the gallbladder ruptures, an endobag and other suction devices must be used to contain the bile and gallstones that have leaked out. Using grab forceps or an endoclip or endoloop, the gallbladder incision should be closed if at all feasible [48].

After a stone spill, a thorough peritoneal wash with aspiration should be performed to try to recover all of the lost stones laparoscopically. After collecting the obvious stones, you should do vigorous irrigation and suction to recover as many stones as possible [48]. It is important to go cautiously so as not to disperse the gallstones to less accessible areas. An intra-abdominal bag with a laparoscopic grasper, a 10 mm suction device, or a "shuttle" stone collector might be helpful for stone collection [49-52]. There is no need to perform a conversion during a laparoscopic cholecystectomy in order to collect any loose stones [50]. In situations of acute cholecystitis with obviously contaminated bile or in people at high risk for losing gallstones, the use of therapeutic antibiotics is warranted. The majority of our participants (68%), those who thought peritoneal lavage with suction should be performed (20%), and those who opted for conversion to open surgery (9%), all agreed that the spilled stones should be retrieved laparoscopically [53-56].

In order to address the complication, the cause of it must first be eliminated. These abscesses and sinusitis can only be cured by the whole excision of the stones at the sites of infection [52,53]. Local drainage and evacuation of the stones is effective treatment for abscesses in the abdominal wall caused by stones stuck at the port site. Percutaneous removal of the stones is an option in certain patients [54]. It has been reported that gallstones can be removed percutaneously using a minimally invasive urological approach [55]. Elective laparoscopy for gallstone removal has been described in the literature [56], as has CT-guided percutaneous insertion of a radio-opaque harpoon under local anesthesia, pointing out towards the calcification center of the upper gallstone. Percutaneous minimally invasive approach [57] may be used to treat intra-abdominal abscesses, and in cases where this fails, laparotomy is the next best option. Drainage of pus is first performed using a pigtail catheter under CT guidance. A few weeks later, a dilator device is used to widen the tract so a nephroscope may be inserted, and the stones are removed [58].

When the stone is smaller than 1 cm in size, it is generally possible to remove it using a nephroscope and a basket. If the stone is too large to be removed in one piece, it must be broken up using a mechanical method or lithotripsy [59]. Electrohydraulic lithotripsy in conjunction with choledochoscopy is a viable option for treating a deep-seated abscess with a convoluted path [60]. Abscessograms, or completion contrast studies, may determine whether or not the cavity is still whole and whether or not any stones have been retained. The cystoscopic removal of vesical granulomas responsible for haematuria due to gallstones has been successfully treated.

Conclusion

There is a lack of knowledge on the impacts and symptoms of problems that are linked with a gallstone that has been removed. The management of patient data, the documentation of patient data, and the exchange of patient data may each be handled in a number of ways. Surgeons are required to get training on the correct handling of gallstones, the early recognition of potential complications, and the treatment of such complications following laparoscopic cholecystectomy (LC). It is necessary to create standard operating procedures for the retrieval of lost gallstones in order to reduce the likelihood of encountering any problems or legal repercussions.

This research recommends for strict follow up at longer durations of patients who underwent laparoscopic cholecystectomy and to conduct further studies with follow up in order to ascertain the current observation.

References

Annex 1: Data collection tool.

Age		**Gender**	Male	Female
Age group	Less than 30	30-40	41-50	51-60
Level of proficiency	GP	Board	Specialist	Consultant
Work experience (years)		**Work hours per week**		
Estimated number of performed laparoscopic cholecystectomy				
Incidence				0 - 10%
11 - 25%				
26 - 40%				
> 40%				
Complication seen				Yes
No				
Should gallstone spillage be included in informed consent?				Yes
No				
Gallstone spillage included in informed consent				Yes
No				
Intervention for gallstone spillage				Convert to open for retrieval
Laparoscopic retrieval				
Peritoneal wash and suction				
None				
Necessary to document gallstone spillage in operative notes				Yes
No				

Document gallstone spillage in operative notes	Yes	
No		
Duration of follow-up for gallstone spillage	2 years	
5 years		
10 years		
20 years		
Number of complications identified	<5	
>5		
Can operating surgeon be held legally liable for complication following gallstone spillage?	Yes	
No		

Table A

Which of the following can be complications following gallstones spillage?

Septicemia	Thrombosis
Cellulitis	Retroperitoneal abscess
Incarcerated Hernia	Sub-diaphragmatic abscess
Bladder Obstruction	Empyema
Infertility	Lung abscess
Dyspareunia	Erosion to the back
Malignancy	Liver abscess
Intestinal obstruction	Peritonitis
Colo-cutaneous fistula	Broncholithiasis
Splenic abscess	Port site abscess

Table B

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