PERIOPERATIVE INCIDENCE OF IATROGENIC GALLBLADDER PERFORATION DURING LAPAROSCOPIC CHOLECYSTECTOMY IN SULAIMANIYAH TEACHING HOSPITAL

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ABSTRACT

Background

Iatrogenic perforation of the gallbladder has been reported in 28% of those patients who undergo laparoscopic cholecystectomy. It has been pointed out that gallbladder perforation can result in spillage out gallstones and bile.

Objectives

To investigate the perioperative incidence of iatrogenic gallbladder perforation during laparoscopic cholecystectomy in Sulaimani Teaching Hospital.

Patients and Methods

The present investigation was a single-centre, prospective observational study that was carried out in Sulaimani Teaching Hospital in 2018-2019. The study sample included 99 patients who had undergone elective cholecystectomy by multiple surgeons.

Required data on the possible risk factors and early outcomes and the patients' demographics, including age, BMI, and gender, were collected. The collected data were analyzed through the Statistical Package for the Social Sciences (version 22.0).

Results

The results revealed that 80% of the patients were females. Also, 42.4% had no chronic diseases. At the same time, diabetes mellitus (DM), DM along with hypertension (HT), and HT were the most prevalent chronic diseases among them with 18.2%, 16.2%, and 10.1% of prevalence, respectively. (Multiple attacks of cholestasis). Only 17.2% of the patients had an abdominal operation before, and acute cholestasis and chronic cholestasis were seen respectively in 13% and 17% of them. The most common causes of gallbladder perforation (GP) were found to be electrocautery (16.2%) and grasper (7.1%). 33.3% of the patients were overweight (BMI between 25 and 29.9), 45.5% were obese (BMI between 30 and 34.9), and 20.2% had a BMI of over 35. (Overweight or obese patients have a problematic view in laparoscopy) Most of the patients were aged 30 to 49 (62.6%). A majority of the patients (94.9%) were found to have gallstones.

Conclusion

Iatrogenic gallbladder perforation is prevalent among patients who undergo laparoscopic cholecystectomy. However, laparoscopic cholecystectomy is still a better choice and is associated with fewer complications than open cholecystectomy. Required measures need to be adopted for patients with perforated gallbladder to minimize spillage and remove as much spilt gallbladder content as possible.

Keywords: *Iatrogenic gallbladder perforation, Laparoscopic cholecystectomy, Gallstone, Spillage of bile.*

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INTRODUCTION

As a small hollow, pear-shaped organ, the gallbladder receives, collects, and stores bile produced by the liver through the common hepatic duct. Later, it releases the bile into the duodenum, in which the bile helps with the digestion of fats [1]. The gallbladder has a length of about 7 to 10 cm can hold about 30 - 80 millilitres of fluid; it is located in the upper right quarter of the abdomen and indentation under the liver [2].

Benign gallbladder disease is mainly treated through laparoscopic cholecystectomy as the first treatment instead of open surgery [3]. However, surgeons have pointed out that this procedure is associated with a higher risk of injury than open cholecystectomy [4]. That is why cholecystectomy is the second most widely conducted abdominal operation in general surgery practice [5]. Iatrogenic perforation of the gallbladder (PGB) has been reported to be 28% prevalent during laparoscopic cholecystectomy (LC). PGB can result in the formation of gallstones and spillage of bile [6]. According to Neimeir's classification, acute cholecystitis is a spontaneous preoperative gallbladder perforation, a rare, life-threatening condition.

The surgeon's judgment, skill, experience, training and the quality of the instruments used for the operation can remarkably affect the outcome of laparoscopic cholecystectomy. Stopping bile leak during laparoscopic cholecystectomy and examining its source can significantly affect the outcomes, which should be done by the surgeon [7]. In this surgical procedure, a few small incisions are made on the right side of the abdomen. Then, one of the incisions is then used to insert a laparoscope that shows the gallbladder on a screen. Afterwards, the gallbladder is removed through another small incision. Compared with open cholecystectomy, laparoscopic cholecystectomy is less invasive [8].

Compared with conventional techniques, laparoscopic cholecystectomy has some advantages, including an early return to daily activities, shorter hospital stays, lesser postoperative pain, and better cosmetic results. Moreover, laparoscopic cholecystectomy might be associated with severe complications, such as pancreatitis, abscess, bleeding, and bile duct injury [9]. The patient's health status, the surgeon's experience, and postoperative care can remarkably affect the complications of this treatment.

However, this procedure is believed to result in fewer postoperative complications [10]. Elevated risk of GP has been reported to be correlated with a complex operation, an inflamed or non-visualized gallbladder, a history of acute cholecystitis or previous laparotomies, and male sex [11].

The present study aimed to investigate the perioperative incidence of iatrogenic gallbladder perforation during laparoscopic cholecystectomy in Sulaimani Teaching Hospital.

PATIENTS AND METHODS

Study design and setting: The present single-centre, prospective observational study was carried out in Sulaimani Teaching Hospital located in Sulaimani, Kurdistan-Iraq, in 2018-2019.

Study sample and method: The study sample consisted of 99 patients who underwent an elective cholecystectomy in Sulaimani Teaching Hospital and were analyzed retrospectively. The inclusion criteria were all age groups with gallstone, and all cases who underwent laparoscopic cholecystectomy, not open cholecystectomy.

The exclusion criteria were patients who underwent open cholecystectomy, cases that did not respond to our phone call, and gallbladder perforation recorded in the operation note. The selected patients were assigned into two groups based on the presence of a GP.

Data collection: The patients' profiles collected the required data on the possible risk factors and early outcomes. Moreover, the patients' demographics, including age, gender, and BMI, were also gathered.

Statistical analysis: The collected data were analyzed through the Statistical Package for the Social Sciences (version 22.0). For this purpose, descriptive statistics were employed, and the results were presented as frequencies and percentages in appropriate tables.

Ethical considerations: The study protocol was approved by the Research Protocol Ethics Committee of the Kurdistan Board of Medical Specialties. Moreover, informed consent was obtained from the patients during our phone calls. In addition to these, required permission was obtained from the authorities of Sulaimani Teaching Hospital.

RESULTS

The present study results indicated that most patients (80.8%) were females, and 19.2% were males. The

results also revealed that 42% did not have any chronic diseases. On the other hand, the most frequent chronic diseases were diabetes mellitus (DM) in 18.2% of cases, DM and hypertension (HT) in 16.2%, and HT in 10.1%. In addition, it was observed 17 patients (17.2%) had abdominal operations. Moreover, chronic and acute cholecystitis was seen in 17 and 13 patients, respectively, (Table 1).

According to the results, endoscopic retrograde cholangiopancreatography (ERCP) was used for five patients (5.1%). A large number of the patients (72.7%) did not have gallbladder perforation (GP), while the causes of GP were electrocautery in 16% of the cases, grasper in 7.1%, clip in 2%, and removal in 2%. In terms of BMI, 65.7% of the patients were obese, with a BMI ranging from 30 to 39.9, and 33.3% were overweight with a BMI of 25 to 29.9. The patients' age ranged from 20 to 69 years, with 33.3% and 29.3% being 40-49 and 30-39 years, respectively, (Table 2).

The ultrasound findings demonstrated that 94.9% of the patients had stones, 3% had a polyp, and 2% had sludge (Figure 1).

According to the results, the patient's mean age was 42.10±11.46 years with a minimum of 20 and a maximum of 69 years. Their mean weight was 87.28±9.83 kg, with a minimum and maximum weight of 68 and 110 kg. Their mean height was 166.36±4.97 cm, with a minimum and maximum height of 158 and 178 cm, respectively. Their mean BMI was 31.56±3.50 with a minimum and a maximum BMI of respectively 22.98 and 38.46, (Table 3).

Table 1. The patient's gender and other variables.

	Frequency (N)	Percentage
Gender		
Male	19	19.2
Female	80	80.8
Total	99	100.0
Chronic diseases		
Normal	42	42.4
DM	18	18.2
HT	10	10.1
Respirator	1	1.0
DM and HT	16	16.2
DM, HT and Valvular	3	3.0
DM and Respirator	1	1.0
HT and Valvular	2	2.0
HT and Respirator	6	6.1
Total	99	100.0
Abdominal operation		
No	82	82.8
Yes	17	17.2
Total	99	100.0
Acute and chronic cholecystitis		
Normal	69	69.7
Acute	13	13.1
Chronic	17	17.2
Total	99	100.0

Table 2. The patients' age, BMI, and other variables.

	Frequency (N)	Percentage
ERCP		
No	94	94.9
Yes	5	5.1
Total	99	100.0
Causes of GP		
No GP	72	72.7
Electrocautery	16	16.2
Grasper	7	7.1
Clip	2	2.0
Removal	2	2.0
Total	99	100.0
BMI		
18.5 - 24.9 Normal weight	1	1.0
25 - 29.9 Overweight	33	33.3
30 - 34.9 Obesity class 1	45	45.5
35 - 39.9 Obesity class 2	20	20.2
Total	99	100.0
Age group		
20 - 29	13	13.1
30 - 39	29	29.3
40 - 49	33	33.3
50 - 59	13	13.1
60 - 69	11	11.1
Total	**99**	**100.0**

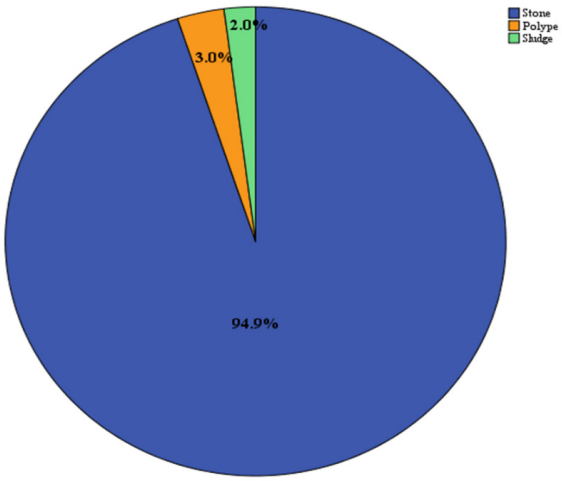

Figure 1. Ultrasound findings.

Table 3. The mean and standard deviation of the patients' age, weight, height, and BMI.

	Age (years)	Weight (kg)	Height (cm)	BMI
Mean ± SD	42.10± 11.46	87.28 ± 9.83	166.36 ± 4.97	31.56 ± 3.50
Min - Max	20- 69	68 - 110	158 - 178	22.98 - 38.46

DISCUSSION

Laparoscopic cholecystectomy was introduced in 1985, and since then, it has widely been employed to treat gallbladder perforation (GP). This technique can tackle complications associated with open surgery and the high cost of hospital stay.

Despite being the first chosen treatment technique for GP, laparoscopic cholecystectomy can cause GP [12]. Therefore, it is highly essential to classify and manage perforated cholecystitis appropriately. In addition, it has been shown that morbidity in gallbladder perforations can safely and feasibly be reduced through laparoscopic cholecystectomy [13].

As shown by the present study results, more than four-fifths of the participants were females, and less than half of them did not have any chronic diseases. In contrast, less than one-fifth of participants were detected with diabetes mellitus (DM). Whiting et al. (2011) demonstrated that diabetic patients are typically diagnosed with clinically silent gallbladder disorders, leading to sudden catastrophic complications that need emergency surgery. Furthermore, their study noticed a positive correlation between the duration of diabetes mellitus and the prevalence of gallbladder dysfunction and subsequent gallbladder diseases [14].

In their retrospective study, Gunasekaran et al. (2015) found that 18 patients with gallbladder perforation had comorbid diseases, among whom 12 patients had (DM), 4 had ischemic heart disease, and 2 had both DM and hypertension (HT) [15]. In this regard, the present study's findings showed that about 17% of the patients had abdominal operations, and chronic and acute cholecystitis were seen in 17 and 13 patients, respectively.

Düzenli et al. (2021) showed that endoscopic retrograde cholangiopancreatography (ERCP) is a valuable technique in detecting most biliary tract diseases. They also demonstrated that gallbladder and intrahepatic duct system diseases could be diagnosed through endoscopic selective biliary cannulation despite preponderance in extrahepatic biliary tract conditions [16]. The current study results indicated that ERCP was used as a diagnostic method for about 5% of participants, revealing that over two-thirds of them did not suffer from GP. Also, electrocautery was the leading cause of GP in 16% of the cases. In a similar study, Ahmad et al. (2013) showed that the harmonic scalpel could be used to safely and effectively dissect gall bladder and hemostasis in laparoscopic cholecystectomy. They also referred to electrocautery as an appropriate alternative for this purpose [17]. This study demonstrated that patients with a higher BMI were at a higher risk of gallbladder perforation.

A similar study by Enami et al. (2021) reported a higher risk of gallstones in adults with a higher BMI [18]. Female gender and elevated BMI have been referred to as definitive risk factors for gallstone growth [19]. Elevated BMI has also been reported to cause symptomatic gallstone disease [20]. Obesity can have a remarkable effect on most pathogenic mechanisms of gallstone formation, including defective gallbladder emptying, stone aggregation, and supersaturation of bile with cholesterol increased propensity to cholesterol crystallization [21].

A remarkable increase in the risk of gallstones has been reported during rapid weight loss (>1.5 kg/week) [22, 23]. Similar to these studies, nearly two-thirds of the patients in the present study were obese, and the other one-third were overweight. According to the results of some similar studies, a high prevalence of obesity can lead to an elevated incidence of benign gallbladder conditions [24]. The early outcomes of open surgical procedures can be unfavourably affected by obesity and obesity-related comorbidities; however, this influences changes in utilizing laparoscopy [25, 26].

The results of the present study demonstrated that nearly 95% of patients were detected with stone through conducting ultrasound examinations. Similarly, in a study by Salih (2020) in Iraq, it was shown that iatrogenic gallbladder perforation and spillage of gall stones are correlated. This association might result in abdominal infections, which can cause some abdominal problems. Therefore, the probability of more abdominal

infections and problems can arise due to the presence of any stones [10].

The results of another study conducted by Hanashe et al. (2021) in Iraq revealed that the risk of gallbladder perforation could drop by precisely detecting the presence of any stones. However, they also stated that gallbladder perforation could result in gallstone spillage and, in many cases, an unsuccessful retrieval of the stones. Most spilt stones are clinically asymptomatic, but 0.04% to 19% of the patients experience adverse events. Intra-abdominal abscess formation has been reported as the most widespread complication of any stones [27].

In this study, it was observed that the mean age of patients was 42 years with a maximum of 69 years. Similarly, Hanashe et al. (2021) showed that significant risk factors that cause gallbladder perforation include the patient's factors such as male gender, older age, and obesity and the surgeon's experience and the difficulty of the surgery (including palpable gallbladder preoperatively, pain >96 hours before surgery, adhesions in the right upper abdomen, and acute cholecystitis). Among these factors, the patient's age has been considered one of the most decisive factors that could affect gallbladder perforation [27]. Similar findings were reported by Akmoosh et al. (2019), who carried out a study in Iraq and concluded that both old age and female gender are significant risk factors for the development of gallbladder perforation [2]. This finding is in agreement with those of the present study.

In conclusion, iatrogenic gallbladder perforation occurs in one-third of patients undergoing laparoscopic cholecystectomy. Laparoscopic cholecystectomy is not always the best option; however, it is associated with less pain and potential complications. It has been accompanied by a number of complications as a result of a variety of factors, including the patient's health status.

Iatrogenic gallbladder perforation can be caused by inflamed gallbladders, old ages, and overweight males with acute inflammation. Moreover, patients with a higher BMI were at a higher risk of gallbladder perforation. The incidence of benign gallbladder conditions increases as the prevalence of obesity soars. Despite the low incidence of iatrogenic gallbladder perforation during laparoscopic cholecystectomy, the morbidity associated with this complication can be serious. As a result, it is necessary to make sufficient attempts to prevent iatrogenic PGB intra-operatively. In the case of the perforated gallbladder, measures need to be taken to minimize spillage and remove as much spilt gallbladder content as possible.

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