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Research Article

Laparoscopic Cholecystectomy in Management of Acute Cholecystitis

Marei Omar Al-Jahany*

Assistant Professor of General Surgery, Faculty of Medicine, Benghazi University, Benghazi, Libya

***Corresponding Author:** Marei Omar Al-Jahany, Assistant Professor of General Surgery, Faculty of Medicine, Benghazi University, Benghazi, Libya.

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Abstract

Background: The utilization of laparoscopic cholecystectomy (LC) has emerged as the most accepted and preferred method for managing symptomatic gallstones. The prevailing consensus about the management of acute cholecystitis (AC) is to initially pursue conservative treatment in order to mitigate the risk of problems associated with inflammation. Subsequently, the LC is typically performed after a period of 6 to 8 weeks. Nevertheless, the prevalence of early LC has risen due to the growing proficiency in laparoscopic techniques observed in recent years.

Objective: The main aim of the study is to find the incidence of Common bile duct injury (CBD) & the rate of conversion from LC to open cholecystectomy in treatment of AC and the epidemiological factors related to the patients with AC.

Methods: We conducted a prospective study in Ibn-Sina Hospital —Benghazi, on 123 patients suffering from AC, between first of January 2017 and 30th of June 2018.

Results: Female to male ratio was 6:1, average age was 44.11 ± 16.5 years, conversion rate was 3.3%, there was no complication and average post-operative stay was 2.5 ± 0.88 day.

Conclusions: we concluded that the LC is a clinically proven and reliable surgical intervention for the prompt and efficient treatment of patients suffering from AC.

Keywords: Laparoscopic Cholecystectomy; Acute Cholecystitis; Gallstones; Management

Introduction

Laparoscopic cholecystectomy (LC) is a well-established technique for the management of symptomatic gall stone disease. It is the first laparoscopic technique widely used in general surgery [1]. Acute cholecystitis (AC) has been considered a relative, if not absolute contraindication for LC because of the technical difficulties and a higher complication rate [2]. With accumulated experience in laparoscopic surgery, together with the technical advances, the laparoscopic approach for the management of AC has been considered a viable alternative therapy [3].

In the medical literature, several reports of large case series, normalized studies and 1 prospective normalized study, have been published, documenting the emergency use of LC for AC [2,4-6].

In these studies, LC was proven to be feasible and safe treatment for AC, the hospital mortality rate was less than 1% and the bile duct injury rate was also around 1% [7]. Furthermore, the post-operative hospital stays and the length of sick leave required by the patients after LC were significantly shorter [8]. There was also lower post-operative complication rate [9]. The overall benefits

conferred by the use of LC could lead to reduced cost of treatment, as a result of shorter hospital stay, rehabilitation, and sick leave needed by the patients [10].

LC has clearly displaced open cholecystectomy (OC) in the management of simple biliary lithiasis [11]. However, the role of LC in the treatment of AC is somewhat controversial because some surgeons claim that the inflammation, edema, and necrosis experienced by patients with AC make dissection more difficult, which can, therefore, increase the rate of complications [11]. Certain studies have recently found that LC is a safe, efficient technique for cases of AC, it has been considered that the Surgeon experience is associated with a decreased rate of major CBD injury during LC [12].

Diagnosis of acute cholecystitis

The clinical presentations of gallstone disease vary from recurrent epigastric pain, as in the case of chronic cholecystitis, to more acute presentations of gallstone (Biliary colic), acute cholecystitis, acute pancreatitis and bile peritonitis [13]. The clinical diagnosis of these different presentations is not always specific. Besides for a retrospective analysis involving a large number of hospitals and surgeons, the criteria used for a clinical diagnosis of acute choleccystitis may vary. Hence, for the purpose of uniformity, an objective pathologic definition of acute inflammatory cells infiltration of the gallbladder wall was taken as the minimal criterion for the diagnosis of AC in the present study as in other published series [14].

Moreover, there exists a range of different gallbladders, from minimally inflamed to grossly thickened edematous or even gangrenous cholecystitis with increasing technical difficulties, therefore, the clinicopathological extent of inflammation was also recorded [15].

Complications

The widespread acceptance of laparoscopy as the preferred approach to cholecystectomy was based on anticipated reductions in postoperative pain and recuperative time associated with minimal access [16].

Soon after LC introduction, however, it became clear that it was associated with unique complication compared with the “open” approach. Early reported rates of CBD injury were 2 to 15 times greater than those identified in historic series. The incidence of CBD injury appeared to be highest during the introduction of LC and was related to early experience with LC, the so-called learning curve [17]. As the procedure has become increasingly common, surgeons have tended to cite a rate of injury of 1: 300 [16].

The impact of’ a major CBD injury is staggering to both the patient and the health care system. Major CBD injury is associated with l1% case fatality and almost always requires a technically demanding, expensive operative reconstruction of the biliary tree [18]. Depending on the expertise of the surgeon reconstructing the bile ducts, reoperations may be common [19]. Despite its relative infrequency, CBD injury is by far the most important possible complication of LC [20].

Objective of the study

- To find the incidence of bile duct injury.
- To find out the rate of conversion from LC to open cholecystectomy in treatment of AC and to find out some epidemiological factors related to the patients with AC.

Patients and Methods

Study design

A prospective cohort study.

Subjects

Between first of January 2017 and 29th of February 2018, we conducted a prospective study of 123 patients with AC at Ibn-Sina Hospital, Benghazi - Libya, Informed consent was obtained from all patients who were enrolled in the study.

The diagnosis of AC was established by:

- Clinical and laboratory criteria.
- An ultra-sonographic indication of AC.
- Intra operative findings of AC.
- Pathological anatomical features revealing the presence of AC.

Data such as age, sex, duration of symptoms and history of previous abdominal surgery were recorded. An antibiotic and antithrombotic prophylaxis was supplied during the preoperative

period and continued until 24 to 48 hours postoperatively. Nor routine neither selective cholangiography was performed in any of the cases. All the patients underwent surgery within 24 hours of admission. The patients underwent LC by expert surgeon, who had experience in laparoscopic surgery (i.e., >I00 LCs performed in patients with cholelithiasis). The surgical technique used for OCs in all patients was a subcostal incision [21]. All operations done by the same surgeon.

Setting

All the patients were admitted to lbn-Sina Hospital, which considered a semi private hospital serving around 30,000 populations with 50 beds in the surgical unit and 3 operative rooms.

Results

Table 1 illustrated that 47.2% of patients age range from 34-53 years, 26.8% of patients age range from 14-33 years, while 17.1% of patients age was 54-73 years, on the other hand, 8.9% of the patients age was over 74 years, as shown on figure 1.

Age group/years	NO	%
33-14	33	26.8
53-34	58	47.2
73-54	21	17.1
≥74	11	8.9
Total	123	100

Table 1: Distribution of patients according to age.
Mean age = 44.1y std. = 16,47y Median = 38 y Mode = 38y
Minimum = 14y Maximum = 84y.

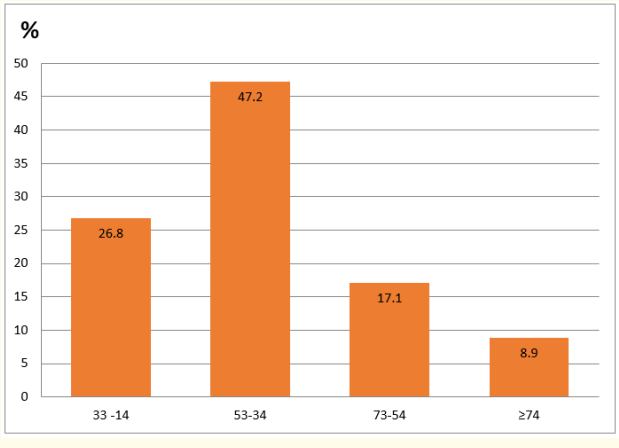

Figure 1: Distribution of patients according to age.

According to table 2, data represented that 94.3% of the patients were female, and 5.7% were males (Figure 2).

Sex	NO	%
Male	7	5.7
Female	116	94.3
Total	123	100

Table 2: Distribution of patients according to sex.

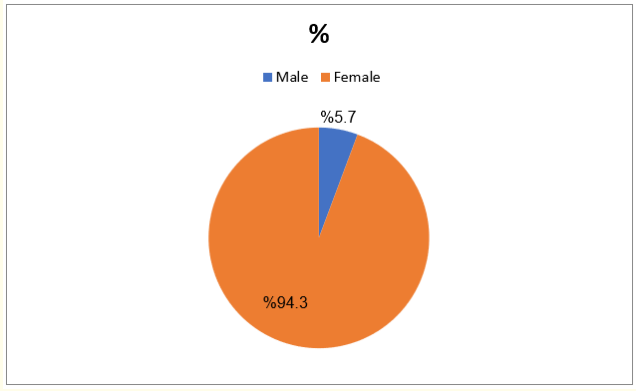

Figure 2: Distribution of patients according to sex.

Table 3 revealed that the distribution of patients according to duration of symptoms, 28.5% of the patients had symptoms for 4-6 days, and 26.8% of the patients had symptoms for 1-3 days. Symptoms last for 7-9 days in 21.1% of the patients, 10.6% for 10-12 days, and 4.1% for 19-21 days. Figure 3 illustrated the distribution of patients according to duration of symptoms.

Duration/days	NO.	%
1-3	33	26.8
4-6	35	28.5
7-9	26	21.1
10-12	13	10.6
13-15	11	8.9
16-18	0	0
19-21	5	4.1
Total	123	100

Table 3: Distribution of patients according to duration of symptoms.
Mean = 6.7days std. = 4.4days Median = 5 days Mode = 2 days
Minimum = 1day Maximum = 21 day.

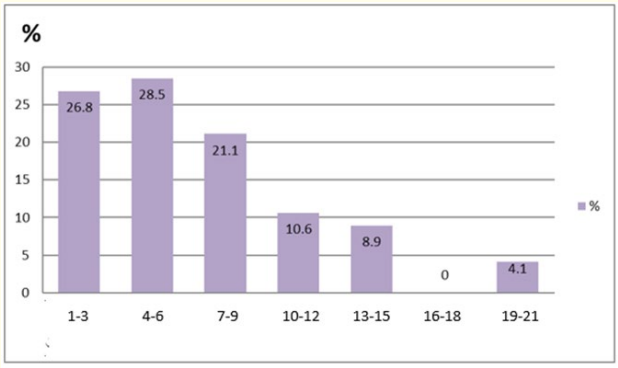

Figure 3: Distribution of patients according to duration of symptoms.

Figure 4, Table 4, demonstrated that 73.2% of the patients hadn`t a history of previous surgery, while 26.8% had a history of previous surgery.

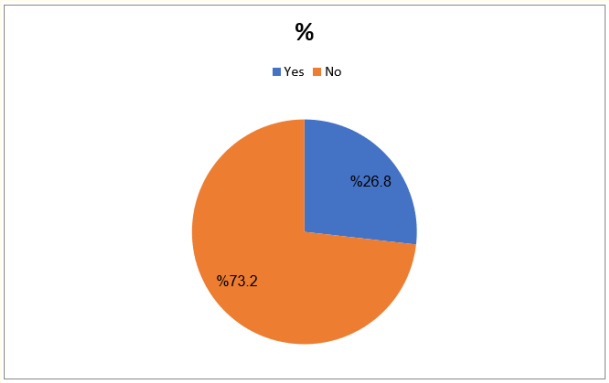

Figure 4: Distribution of patients according to history of previous surgery.

History of surgery	NO.	%
Yes	33	26.8
No	90	73.2
Total	123	100

Table 4: Distribution of patients according to history of previous surgery.

According to represented data in table 5, and figure 5, the history of previous abdominal surgery was 28.6% in males, and 26.8% in females. On the other hand, 71.4% males, and 73.2% females did not have any history of previous abdominal surgery.

History of Previous surgery	Male		Female	
	NO.	%	NO.	%
Yes	2	28.6	31	26.8
No	5	71.4	85	73.2
Total	7	100	116	123

Table 5: Distribution of patients according to sex and history of previous abdominal surgery.

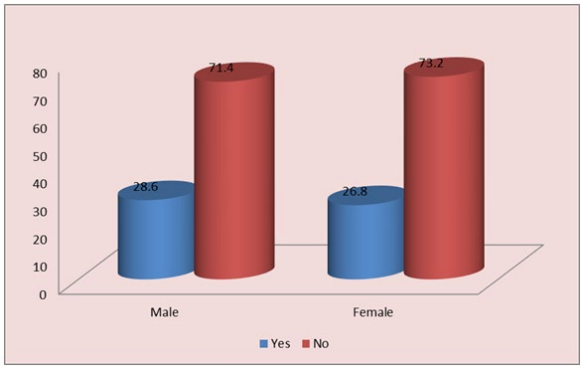

Figure 5: Distribution of patients according to sex and history of previous abdominal surgery.

The relation between duration of symptoms and sex was represented in table 6, and figure 6, there was 42.8 % of male patients had symptoms for 1-3 days, 28.6% males had symptoms for 7-9 days, and 28.6% males had symptoms for 19-21 days. In female patients 30.2% showed symptoms for 4-6 days, 25,9% had symptoms for 1-3 days, 20.7% females for 7-9 days, symptoms last for 10-12 days in 11.2% females, for 13-15 days in 9.5%, and for 19-21 days in 2.5%.

Duration/Days	Male		Female	
	NO.	%	NO.	%
1-3	3	42.8	30	25.9
4-6	0	0	35	30.2
7-9	2	28.6	24	20.7
10-12	0	0	13	11.2
13-15	0	0	11	9.5
16-18	0	0	0	0
19-21	2	28.6	3	2.5
Total	7	100	116	100

Table 6: Distribution of patients according to duration of symptoms and sex.

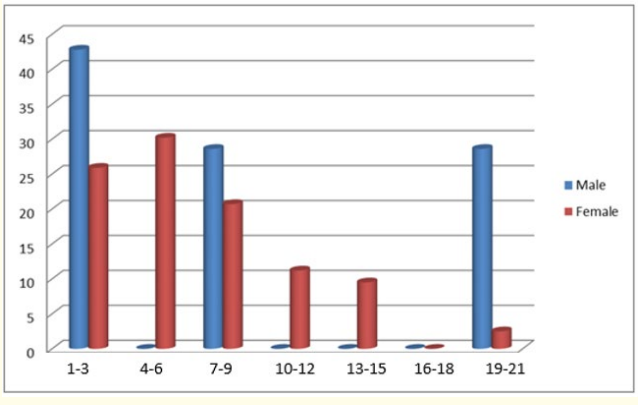

Figure 6: Distribution of patients according to duration of symptoms and sex.

Table 7 revealed that the conversion to open cholecystectomy occurred in 4 patients (conversion rate was 3.3%), all of them (100%) were presented more than 3 days after the onset of the symptoms (Figure 7). No one had BDI, incidence of BDI (0%).

Duration/Days	Yes		No	
	NO.	%	NO.	%
1-3	0	0	33	27.7
4-6	2	50	33	27.7
7-9	1	25	25	21
10-12	0	0	13	10.9
13-15	0	0	11	9.2
16-18	0	0	0	0
19-21	1	25	4	3.4
Total	4	100	119	100

Table 7: Distribution of patients according to duration of symptoms and conversion to open surgery.

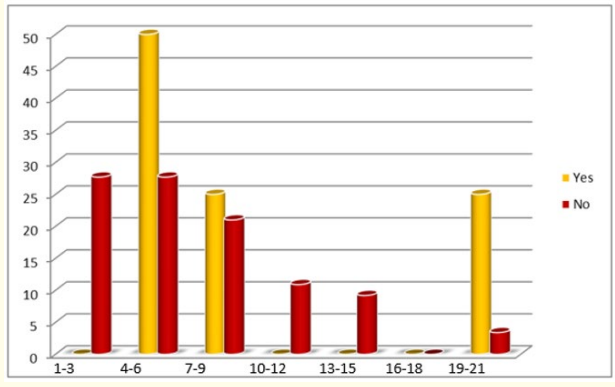

Figure 7: Distribution of patients according to duration of symptoms and conversion to open surgery.

Discussion

AC refers to the inflammatory condition of the gallbladder caused by chemical or bacterial factors. The severity of the condition varies, ranging from moderate edema and inflammation, which is referred to as simple AC, to more severe cases that involve complications such as empyema, hemorrhagic changes, or gangrenous alterations affecting the gallbladder wall. Despite initial concerns regarding the practicality and safety of the treatment in the context of abdominal cavity, LC is progressively being employed as the primary surgical method in a majority of these individuals, with positive outcomes [21].

The objective of this study was to investigate the expeditious utilization of laparoscopic techniques in the treatment of patients treated for AC in a district general hospital. The study encompassed a substantial cohort of patients presenting with a diverse range of AC cases, which were treated using laparoscopic techniques. The findings revealed a minimal rate of conversion to open surgery, a satisfactory duration of symptoms, and a manageable rate of complications. In this study female contribute to 94.3% of total patients with AC which is well known that the choleeystitis is more common in female than male. Mean age of the patients was 44.1 years, minimum and maximum age were 14 years and 84 years respectively. 74% of patients aged 53years or less. Duration of symptoms, 26.8% were 1-3 day duration while 73.2% with duration more than 3 days. Mean duration of symptoms was 6-7 day with minimum and maximum duration were l day and 21 days respectively. 26.8% of patients had past history of abdominal surgery. there was no statistical difference between male and female in past history of previous abdominal surgery (p = 0.740).

Male presented to medical serves earlier than female, were 42.8% of male presented in duration of symptoms between 1-3 day, while 75.1 % of females presented after 3 days of symptoms. Conversion to open cholecystectomy occurred in 4 patients (3.3%), all of them (100%) were presented more than 3 days after the onset of the symptoms. No patients had bile duct injury in this study in both OC and LC, the incidence of CBD injury in this study was 0%.

The correlation between an increase in conversion rate and the postponement of urgent cholecystectomy is contingent upon the specific stage of the acute inflammatory process. During the initial edematous phase, there is a distinct anatomical plane that can be observed between the gallbladder and the adjacent viscera, which facilitates the process of dissection. After the initiation of the inflammatory process, the subsequent formation of scar tissue hinders the dissection procedure, making it more challenging. Additional risk factors associated with conversion include advanced age, the presence of big stones, a non-palpable gall-bladder, gangrenous cholecystitis, and the presence of pericholecystic fluid or edema, as well as thickening of the gall-bladder wall [22-24].

There has also been a suggestion that the duration of gallbladder illness may play a significant role in the decision to perform open surgery. In an investigation, a total of 17 patients diagnosed with gangrenous cholecystitis, either presenting with gangrene or gangrene accompanied by empyema, were included. Among these patients, 12 individuals (70.6%) required a conversion to open surgery. Additionally, out of the same cohort, 17 patients exhibited preoperative indications of pericholecystic fluid collection on abdominal ultrasound, and 6 of them (35.3%) had conversion to open surgery. The presence of pericholecystic fluid hinders the visualization of anatomical structures and tissue planes, hence impeding the dissection process [25].

The administration of hydration, analgesics, and broad-spectrum antibiotics is a customary approach in the initial management of AC. During the initial stages of laparoscopic surgery, LC was identified as a condition that should be approached with caution in cases of AC. However, in recent years, there has been evidence to support the safety of LC in the management of AC. Nevertheless, the optimal timing for this treatment remains a subject of ongoing scholarly discourse. Certain studies suggest that the most favorable timeframe for doing LC is between 6 to 9 weeks following conservative therapy. This recommendation takes into account the overall health status and presence of other medical conditions in patients, while also assuming that the acute inflammation would subside within a 6-week period [26].

Acar., *et al*. [27] showed that there was three individuals underwent conversion to open cholecystectomy due to uncontrollable hemorrhaging. The process of conversion in these individuals should not be regarded as a complication, but rather as a proactive measure aimed at preventing issues. The overall rate of complications in this particular series, which stands at 6%, is comparatively lower than the rates reported in other extensive laparoscopic series for AC. There were no recorded fatalities or injuries related to CBD. The findings of this study provide confirmation that with LC, there is an improvement in cosmetic outcomes and a reduction in the incidence of postoperative herniation and wound infections. It was observed that the duration of hospitalization was rather short. This finding aligns with our study and the reports of other authors [28-30].

In another study, the age distribution of individuals diagnosed with AC ranges from 40 to 80 years. The prevalence of this illness is three times higher in women compared to men. The presence of persistent pain in the upper right quadrant, despite the administration of analgesic medication, may indicate the likelihood of acute inflammation in individuals diagnosed with gallstones. The individual's medical history encompasses intermittent episodes of biliary colic [27]. Condilis., *et al*. [31] categorized their patients into three distinct groups based on the timing of the surgical intervention. Group 1 consisted of patients who underwent the operation within the initial 48 hours, group 2 included those who received the surgery between 48 hours and 4 weeks, and group 3 encompassed individuals who underwent the procedure between 5 and 8 weeks following the initial injury. Group 2 exhibited the most pronounced rates of transitioning to open surgery, while group 1 displayed the highest rates of problems and postoperative hospitalization.

The patients in the investigations done by Popkharitov., *et al*. [32] and Lee., *et al*. [33] were categorized into three distinct categories. The patients who underwent surgery within the initial

72-hour period were categorized as the early-operated group. Both studies did not find any statistically significant differences between the groups in terms of the outcomes related to switching to open surgery, complications, or duration of hospitalization. The research conducted by Masayuki., *et al*. [34] did not reveal any significant variations between the groups in terms of transitioning to open surgery, operation duration, blood loss, postoperative morbidity, or length of hospital stay. All the above mentioned studies recommended that LC be conducted upon admission for patients diagnosed with AC.

Upon reviewing the conducted studies, it becomes evident that the rates of transitioning to open surgery exhibit significant variation, ranging from 0% to 39% [35]. The substantial variation observed can be ascribed to several factors, including variations in patient demographics, the extent of inflammation, the expertise of the surgeons, and the timing of the procedures.

Conclusion

The LC operation is a reliable and efficient method for the management of individuals presenting with a wide spectrum of AC severity. The procedure is correlated with decreased rates of conversion and complications, leading to a shorter duration of hospitalization. From this study we concluded that the LC in AC is a safe procedure when done by expert surgeon (especially in early presentation of onset of symptoms).

Recommendations

- Health education to the high risk population about signs and symptoms of AC and the importance of presented earlier to medical services.
- Further studies should be done in Benghazi (Multi-center study).

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