



## Comparing Complications of Open and Laparoscopic Cholecystectomy in Patients with Acute Cholecystitis in Western Iran

Abdolreza Rouientan<sup>1</sup>, Sedigheh Nadri<sup>2</sup>, Massumeh Niazi<sup>3</sup>, Hormoz Mahmoudvand<sup>4\*</sup>

<sup>1</sup>Department of Plastic Surgery, 15 Khordad Educational Hospital, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

<sup>2</sup>Department of Anesthesiology, University of Medical Sciences, Khorramabad, Iran

<sup>3</sup>Student Research Committee, Lorestan University of Medical Sciences, Khorramabad, Iran

<sup>4</sup>Hepatitis Research Center, Lorestan University of Medical Sciences, Khorramabad, Iran

### ABSTRACT

*Background:* Here we aimed to investigate the early laparoscopic cholecystectomy results and compare them with those of open cholecystectomy among patients with acute cholecystitis.

*Methods:* The present analytical study was conducted on 74 patients with acute cholecystitis referring to the general hospitals in Lorestan province, Western, Iran during November 2013 to May 2014; who were candidate for cholecystectomy treatment method. The research variables included gender, age, surgery technique, postoperative pain intensity, analgesic requirement, number of hospitalization days, surgery duration, patient's postoperative NPO duration, wound infection, and bile leakage through drain, which were compared between the two groups. Then, the advantages and disadvantages of laparoscopic cholecystectomy compared to open cholecystectomy in patients with acute cholecystitis were investigated.

*Results:* The obtained results showed that there was a significant difference between the analgesic requirement, bile leakage rate, wound infection, postoperative pain intensity, average number of hospitalization days, postoperative NPO status among the patients with acute cholecystitis undergoing open and laparoscopic surgery ( $p < 0.05$ ).

*Conclusion:* Since findings of the present study showed that the laparoscopic cholecystectomy led to reduction in some of the complications and side-effects, including postoperative wound infection, bile leakage rate, postoperative pain intensity, analgesic requirement, postoperative NPO status duration, and surgery duration, laparoscopic cholecystectomy can be recommended as an effective and low-complication treatment, compared to open surgery for acute cholecystitis.

**Keywords:** Cholecystitis; surgery; complication; Iran

**HOW TO CITE THIS ARTICLE:** Hormoz Mahmoudvand, Massumeh Niazi, Sedigheh Nadri\*, Comparing Complications of Open and Laparoscopic Cholecystectomy in Patients with Acute Cholecystitis in Western Iran, Entomol Appl Sci Lett, 2018, 5 (2): 16-21.

**Corresponding author:** Dr. Hormoz Mahmoudvand, MD

**Received:** 22/12/2017

**Accepted:** 18/04/2018

### INTRODUCTION

Cholecystitis is a disease caused by inflammation or obstruction due to entry of a stone to the cystic duct or common bile duct (CBD). Gallstones are among the most common disorders in most of the populations, especially western countries; so that, some studies have shown that 20% of the women and 8% of the men living in USA are suffering from this disease [1].

Acute cholecystitis is a syndrome associated with RUQ pain, fever, and leukocytosis [2]. Acute cholecystitis is commonly diagnosed based on

the clinical examinations (RUQ pain and tenderness, fever, guarding, and positive Murphy's sign), laboratory findings (leukocytosis, etc.), sonographic findings (presence of gallstone, thickness of gallbladder walls, accumulation of liquid around gallbladder, etc.), perioperative findings, and pathological results [2, 3].

Laparoscopic cholecystectomy (LC) surgery was first introduced in late 1980s; however, in mid-1990s, it was introduced as a standard treatment for gallstones, and substituted open cholecystectomy (OC) [4, 5]. In cases of acute cholecystitis (with or without gallstones), there have been considerable disagreements on the best time for performing the laparoscopic

cholecystectomy; nevertheless, even in these cases, laparoscopic cholecystectomy has been known as the main treatment [6, 7].

Generally, the increasing use of surgery techniques with minimum damage level of 3 during the recent years, besides having more advantages, has led to significant changes in the patients' complications and problems. Some of these changes include reduced hospitalization duration (shorter hospital stay), minimum surgery scare, reduced pain, reduced postoperative infection, reduced wall infection, reduced incisional hernia, reduced postoperative adhesions, and shorter recovery time [8-11].

The present study aimed to investigate the early laparoscopic cholecystectomy results and compare them with those of open cholecystectomy among patients with acute cholecystitis referring to general hospitals in Lorestan province, Western, Iran during November 2013 to May 2014.

## MATERIALS AND METHODS

### Patient and study design

The present analytical study was conducted on 74 patients with acute cholecystitis referring to the general hospitals in Lorestan province, Western, Iran during November 2013 to May 2014; who were candidate for cholecystectomy treatment method. The first group included patients with acute cholecystitis undergoing laparoscopic cholecystectomy by the same surgeon; on the other hand, the second group included patients with acute cholecystitis undergoing open cholecystectomy by another same surgeon. The inclusion criteria included all the patients who had undergone medical treatment due to acute cholecystitis and had referred to the medical center in 72 hours after the disease process, or had not responded to the medical treatment in 72 hours after the disease process. Moreover, the inclusion criteria included: presence of CBD stone simultaneous with acute cholecystitis, diagnosed gallbladder cancer, uncontrolled coagulopathy, end-stage liver failure, presence of CHF with <20% EF, corticosteroid consumption, immune deficiency, and history of an open surgery on biliary tract. Sampling was performed using convenient random sampling method; besides, the samples were matched based on their age and gender. The research variables included gender, age, surgery technique, postoperative pain intensity, analgesic requirement, number of hospitalization days, surgery duration, patients' postoperative NPO duration, wound infection, and bile leakage through drain, which were

compared between the two groups. Then, the advantages and disadvantages of laparoscopic cholecystectomy compared to open cholecystectomy in patients with acute cholecystitis were investigated.

### Surgical procedure

For all the patients, after entering the operation room, vein-puncturing was carried out using angiocath; subsequently, infusion of Ringer's lactate serum began, so that they received 20 ml/kg/hr liquid during the operation. All the patients underwent surgery under general anesthesia. The perioperative monitoring included pulse oxymetry, ECG, and automatic noninvasive BP. Regarding the acute process of the disease, in addition to antibiotic-therapy, a drain was improvised for all the patients. After the surgery, during the post-surgery period, the patients were provided with continuous visits and follow-ups, and all the complications and side-effects were recorded in their records. The information was extracted from their records and then registered in a questionnaire designed specifically for this purpose.

### Statistical analysis

The analytical and descriptive statistics were carried out using SPSS 24.0 software (SPSS Inc., Chicago, IL, USA). Descriptive statistics were shown in terms of percent (for categorical) and mean (SD) (for continuous) variables. The Chi-square test was applied to evaluate the univariate association between independent variables and outcome.

## RESULTS

The present study was conducted on 74 patients with acute cholecystitis, 38 (51.3%) of whom underwent open surgery and 36 (48.6%) laparoscopic surgery. The average age of the patients undergoing open surgery and those undergoing laparoscopic surgery was  $52.03 \pm 14.9$  and  $52 \pm 16.61$  years, and thus there was no statistically significant difference between the two groups in terms of age ( $p=0.94$ ). Out of the patients undergoing open surgery, 28 (73.7%) were female and 10 (26.3%) were male; furthermore, the males and females accounted for 25% (9 individuals) and 75% (27 individuals) of the patients undergoing laparoscopic surgery. Accordingly, in terms of gender distribution, there was no significant difference between the two groups ( $p=0.89$ ).

Table 1 compares the hematoma frequency at surgical site in patients with acute cholecystitis based on the type of surgery technique. As indicated by this table, the postoperative hematoma frequency in patients undergoing open surgery and laparoscopic surgery was 4

(10.5%) and 1 (2.8%), respectively; thus, according to Fisher's exact test, the difference was not statistically significant ( $p=0.35$ ).

**Table 1.** The hematoma frequency at surgical site in patients with acute cholecystitis based on the type of surgery technique.

Surgery technique	Hematoma		P value
	Yes Number. (%)	No Number. (%)	
Open surgery	4 (10.5)	34 (89.5)	0.35
Laparoscopic surgery	1 (2.8)	35 (97.2)	

Furthermore, comparing the analgesic requirement during hospitalization among the studied patients indicated that 55.3% of the patients undergoing open surgery required analgesic drug after the surgery, while among the patients undergoing laparoscopic surgery, this rate was equal to 16.7%; therefore, based on the chi-squared statistical test, the analgesic requirement difference of the two group was statistically significant ( $p=0.001$ ). The analgesic requirement of the patients undergoing laparoscopy was significantly less than those undergoing open surgery (Table 2).

**Table 2.** The analgesic requirement during hospitalization in patients with acute cholecystitis based on the type of surgery technique.

Surgery technique	Analgesic requirement		Pvalue
	Yes Number. (%)	No Number. (%)	
Open surgery	21 (55.3)	17 (47.7)	0.001*
Laparoscopic surgery	6 (16.7)	30 (83.7)	

\* $P<0.05$  was statistically significant

One of the objectives of the present study was to compare the bile leakage rate from drain among the patients undergoing open and laparoscopic surgery. Accordingly, among the patients undergoing open surgery, 4 cases (10.5%) of

bile leakage through drain were observed, while none of the patients undergoing laparoscopic surgery exhibited bile leakage; therefore, based on Fisher's exact test, the difference was statistically significant ( $p=0.045$ ) (Table 3).

**Table 3.** The bile leakage rate from drain in patients with acute cholecystitis based on the type of surgery technique.

Surgery technique	Bile leakage		Pvalue
	Yes Number. (%)	No Number. (%)	
Open surgery	4 (10.5)	34 (89.5)	0.045*
Laparoscopic surgery	0 (0.0)	30 (100)	

\* $P<0.05$  was statistically significant

Moreover, comparing the wound infection frequency among the patients with acute cholecystitis undergoing open and laparoscopic surgery indicated that the open surgery patients exhibited 4 cases (10.5%) of wound infection, while no case of postoperative wound infection could be observed among the patients undergoing laparoscopic surgery; accordingly, based on Fisher's exact test, the difference was statistically significant ( $p=0.045$ ) (Table 4).

**Table 4.** The wound infection frequency among the patients with in patients with acute cholecystitis based on the type of surgery technique.

Surgery technique	Wound infection		Pvalue
	Yes Number. (%)	No Number. (%)	
Open surgery	4 (10.5)	34 (89.5)	0.045*
Laparoscopic surgery	0 (0.0)	30 (100)	

\* $P<0.05$  was statistically significant

In another statistical analysis, the two groups of patients were compared in terms of postoperative pain intensity. The average postoperative pain intensity in the open surgery group ( $4.84 \pm 1.46$ ) was significantly higher than that in the laparoscopic surgery group ( $3.19 \pm 1.16$ ); therefore, based on the independent-t

statistical test, the difference was statistically significant ( $p=0.001$ ). Moreover, the average number of hospitalization days (hospitalization duration) among the patients undergoing open and laparoscopic surgery was equal to  $5.42 \pm 1.7$  and  $2.94 \pm 0.71$  days, respectively; thus, based on the independent-t statistical test, the difference was statistically significant ( $p=0.001$ ). Another objective of the present study was to compare the postoperative NPO status duration among the patients with cholecystitis undergoing open and laparoscopic surgery. Accordingly, the postoperative NPO status duration in open surgery group was significantly higher than the laparoscopic surgery group ( $p<0.0001$ ).

In the open surgery group, the postoperative NPO status duration was  $47.53 \pm 11.56$  hours, while it was  $22.14 \pm 2.4$  hours in the laparoscopic surgery group. Finally, the two groups were compared in terms of cholecystectomy surgery duration. The average surgery duration in the open and laparoscopic surgery groups was equal to  $31.9 \pm 6.8$  and  $25.1 \pm 4.9$  minutes, respectively, accordingly, based on the independent-t test, the difference was statistically significant ( $p<0.0001$ ).

#### DISCUSSION

The present study was conducted on 74 patients with acute cholecystitis, who were divided into two groups, namely laparoscopic cholecystectomy and open surgery. The two groups had no statistically significant difference in terms of age; besides, there was statistically significant difference between the two groups in terms of gender distribution. Furthermore, the postoperative hematoma frequency showed no statistically significant difference. However, variables such as bile leakage rate, wound infection rate, average postoperative pain intensity, average number of hospitalization days, postoperative NPO status duration, average surgery duration, and analgesic requirement during hospitalization in the patients undergoing laparoscopic surgery were significantly lower than those of the patients undergoing open surgery [12, 13].

Another study was conducted by [14] in Libya on 114 patients with acute cholecystitis who had undergone laparoscopic cholecystectomy during 2002-2008 [14]. In this study, the average age of the studied patients was 34.5 years, while in the present study, the average age of the patients in open surgery and laparoscopic surgery groups was  $52.03 \pm 14.9$  and  $52 \pm 16.61$  years, respectively. In that study, the male-to-female ratio was 1/4; while, in the present study, the

male patients accounted for 25% of the laparoscopic surgery group and 26.3% of the open surgery group. In that study, the average hospitalization duration was 2.5 days; while in the present study, the average hospitalization duration in the laparoscopic surgery and open surgery groups was 2.94 and 5.42 days, respectively. Furthermore, in that study, 2 cases of bile leakage (1.7%) were observed, while the present study exhibited no case of bile leakage in the laparoscopic surgery group. In that study, 2 cases (1.7%) of postoperative wound infection were observed, while the present study exhibited no postoperative wound infection, which could be due to the lower number of the studied patients in the present study.

Additionally, in another study conducted in Pakistan, [15] investigated 50 patients with diagnosed acute cholecystitis undergoing laparoscopy. In that study, the patients aged between 28 and 73 years old, and majority of them were living the 5<sup>th</sup> decade of their lifetime; whereas, in the present study, the average age of the studied patients was about 52 years. In that study, the average hospitalization duration was 2.58 days, while in the present study, it was 2.94 days in the laparoscopic surgery group.

Furthermore, their study exhibited 2 cases of perioperative intense bleeding, no case of CBD damage, no case of the need for blood injection, and no death, which were similar the results of the present study. In addition to these studies, another study was conducted by [16] in China in order to compare the results of open and laparoscopic cholecystectomy surgeries among patients with acute cholecystitis aging 75 years old and above. In contrast to that study, the present study was conducted on the patients with acute cholecystitis regardless of their age, and the average age of the patients was 52 years. In that study, the operation duration in case of laparoscopic surgery was a little longer than that in open surgery, but the difference was not significant; while, in the present study, the operation duration in laparoscopic surgery was shorter. Moreover, in their study, the hospitalization duration for the patients in laparoscopic surgery group was significantly less than the other group, which was similar to the results of the present study.

In [16], the postoperative complications in the two groups were compared in general; accordingly, the complication rate in the laparoscopic and open surgery groups was 12.9% and 49.5%, respectively. However, in the present study, most of the complications were significantly lower in the laparoscopic surgery groups; thus, the two studies were consistent in

this regard. Additionally, [17] conducted a study in Romania, the results of which indicated that the average hospitalization duration in the laparoscopic surgery group was obviously less than the other group ( $P < 0.05$ ), which was consistent with the results of the present study. In that study, the postoperative elongated ileus duration in the two groups was compared, which indicated a significantly lower duration in the laparoscopic surgery group. Also, in the present study, the postoperative NPO status duration in the laparoscopic surgery group was lower than the other group; thus, the two studies were consistent in this regard. Furthermore, in their study, the average hospitalization duration in the laparoscopic surgery group was obviously lower than that in the open surgery group, which was similar to the results of the present study.

In another study conducted by [18] in Pakistan, the results of open and laparoscopic cholecystectomy surgeries were compared. In this study, the patients with symptomatic gallstones disease, including chronic and acute cholecystitis, were investigated; whereas, the present study was conducted merely on the patients with acute cholecystitis. In that study, the hospitalization duration among the patients undergoing laparoscopic cholecystectomy was less than the patients undergoing open surgery, which was in agreement with the present study. Besides, in that study, the pain intensity was lower and also the recovery period was shorter in laparoscopic surgery group. Similarly, in the present study, the postoperative pain intensity and hospitalization duration in the laparoscopic surgery group was lower than those in the open surgery group; thus, the two studies were consistent in this regard.

[19] conducted a study to compare the clinical complications and treatment costs in open and laparoscopic surgery methods in Bosnia and Herzegovina, the results of which showed that the surgery duration in laparoscopic and open surgery groups was equal to  $41.74 \pm 18$  and  $84.26 \pm 32$  minutes, respectively ( $P < 0.001$ ). Similarly, in the present study, duration of laparoscopic surgery was significantly shorter in the open surgery, which was consistent with that study. Moreover, in that study, the total complication rate in laparoscopic surgery group was significantly lower than that in the open surgery group, which was consistent with the results of the present study.

#### CONCLUSION

Since findings of the present study showed that the laparoscopic cholecystectomy led to

reduction in some of the complications and side-effects, including postoperative wound infection, bile leakage rate, postoperative pain intensity, analgesic requirement, postoperative NPO status duration, and surgery duration, thus laparoscopic cholecystectomy can be recommended as an effective and low-complication treatment, compared to the open surgery, for acute cholecystitis.

#### REFERENCE

1. Norton J, Greenberger, Gustar Paumgartner, Disease of the gallbladder and bile ducts, Harrison's principles of internal medicine 17th.Ed. (2008): 1880-1895.
2. Bellows CF, Berger DH, Crass RA: Management of gallstones. Am Fam Physician, 2005; 72:637.
3. Trowbridge RL, Rutkowski NK, Shojania KG: Does this patient have acute cholecystitis? JAMA, 2003; 289: 80.
4. Bellows CF, Berger DH, Crass RA: Management of gallstones. Am Fam Physician, 2005; 72:637.
5. Seymour I. Schwartz, Gallbladder and extra hepatic biliary system, Schwartz Principles of surgery 9th. Ed. (2010) Vol.2: 1136-1156.
6. Steven A. Ahrendt and Henry A. Pih, Biliary Tract, SABISTON Textbook of Surgery, 16th. Ed.(2001): 1076-1093.
7. Petelin JB. Surgical management of common bile duct stones. Gastrointestinal Endoscopic 2002; 56:183-9.
8. Laporte S, Navarro F. What is the best timing to perform laparoscopic cholecystectomy in acute cholecystitis? J Chir (Paris). 2002 ; 139(6): 324-7.
9. Ahrendt SA. Biliary tract surgery. Curr Gastroenterol Rep. 1999 ; 1(2): 107-15.
10. Di Vita G, Frazzetta M, Cortese E, Damiano A. Complications of the laparoscopic access. G Chir. 1996 ; 17(1-2): 31-6.
11. Shamiyeh A, Wayand W. Laparoscopic cholecystectomy: early and late complications and their treatment. Langenbecks Arch Surg. 2004 Jun; 389(3):164-71. Epub 2004 May 05.

12. Chang L, Sinanan M.N. Infection after laparoscopy. Current treatment options in infectious disease 2002, 4: 389-393.
13. Martinez Vieira A, Docobo Durantez F, Mena Robles J, Duran Ferreras I, Vazquez Monchul J, Lopez Bernal F, Romero Vargas E. Laparoscopic cholecystectomy in the treatment of biliary lithiasis: outpatient surgery or short stay unit? Rev Esp Enferm Dig. 2004; 96(7): 452-9.
14. Fassiadis N, Pepas L, Grandy-Smith S, Paix A, El-Hasani S. Outcome and patient acceptance of outpatient laparoscopic cholecystectomy. JSLS. 2004; 8(3): 251-3.
15. Glessa A, Elgazwi K. Laparoscopic management of acute cholecystitis: a single center experience in Benghazi Libya. Ibnosina Journal of Medicine and Biomedical Sciences. 2010; 2(6): 278-82.
16. Ahmad F, Soomro I, Maher M. Role of laparoscopic cholecystectomy in the management of acute cholecystitis. Annals. 2007; 13(4): 238-41
17. CH Chau, CN Tang, WT Siu, JPY Ha, MKW Li. Laparoscopic cholecystectomy versus open cholecystectomy in elderly patients with acute cholecystitis. Hong Kong Med J 2002; 8: 394-9.
18. Ion Gangan, Sergiu Duca, Ovidiu Bala, Nadim AL Hajjar, Alexandru R. Cota. Acute cholecystitis Laparoscopic Cholecystectomy versus Open Cholecystectomy. TMJ 2004; 54(1): 54-58.
19. Tariq S, M. Zarin, Mahmud Aurangzeb M. Aziz Wazir, Roohul Muqeem M. Comparative study of Open versus Laparoscopic Cholecystectomy. Pakistan Journal of Surgery, 2007; 23(2): 96-99.
20. Brekalo Z, Buntić A, Kraljević I, Šoljić K. Comparison of clinical and financial aspects of Open and Laparoscopic Cholecystectomy. BH Surgery. 2011; 1: 93-99.