

# Post-Operative Mortality Rate in Open and Laparoscopic Cholecystectomy: A Comparative Study

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## ABSTRACT

**Background:** Laparoscopic cholecystectomy has become the gold standard of biliary surgery and is widely used in Iraq and worldwide. **Objectives:** To determine the operative mortality in 2 hospitals; Al-Hakim general hospital and Al-Arby private hospital of 5 years of the laparoscopic cholecystectomy compared with the traditional cholecystectomy. **Material and Method:** We included all patients undergoing cholecystectomy, either laparotomic or laparoscopic, between January 2009 and December 2018 (10 years). We analyzed the causes of mortality, the age group in which it occurred and the type of surgical approach. **Results:** A total of 6248 patients were operated on, with an average of 625 operated per year. The overall mortality was 0.11%, being 0.13% for open cholecystectomy and 0.09%, for laparoscopic cholecystectomy. The main causes of mortality were severe medical conditions. Only 16 patients had a complication directly derived from surgery as a cause of mortality. **Conclusions:** Laparoscopic cholecystectomy is a very low mortality operation. This complication occurs mainly in patients with severe biliary disease, elderly and with multiple medical complications.

**Keywords:** Cholecystectomy, Laparoscopic, Open, Cholecystolithiasis, Mortality

## **1.INTRODUCTION**

Benign biliary surgery is the most frequently general and abdominal operation performed in the field of surgery, for many years in all the surgery services in many countries. (1)

Cholecystectomy was first described in 1882 and, at present, it is the most frequent intervention which is done in digestive surgery. On the other hand, Biliary surgery has progressed around this basic intervention and the treatment of its complications: Kehr described in 1899 a biliary repair of a Intraoperative injury using a latex tube, Mirizzi used intraoperative cholangiography in 1932, whereas Hepp and Couinaud described, in 1956, the treatment of a biliary stricture by decreasing the hilar plate and hepatico-jejunal anastomosis ascending on the left branch.(2)

In 1981, the Association Française de Chirurgie (AFC) published a remarkable work and that maintains its validity, written by Bismuth and Lazorthes he describe the surgical traumatism of the canal choledochus. Therefore, cholecystectomy is a technique standardized; its complications are relatively infrequent and their number is in retreat, although they know in detail and their treatment is fine systematized then, at the end of the 1980s, we attended an authentic revolution, thanks to the appearance of laparoscopic cholecystectomy.(3)

With the dissemination of this technique, the number of cholecystectomies has increased, the postoperative period is simpler, but it has also been assisted in the appearance of new complications and, all, to the increase of the biliary lesions, whose presentation and gravity seem to be different. These complications they talk about a "medical disaster and economic". (4)

### ***Incidence:***

Acute cholecystitis cases account for 3%–10% of all patients with abdominal pain. The percentage of acute cholecystitis cases in patients under 50 years old with abdominal pain (n = 6317) was low, at 6.3%, whereas that in patients aged 50 and over (n = 2406) was high, at 20.9% (average, 10%). Cholelithiasis accounts for 90%–95% of all causes of acute cholecystitis, while calculus cholecystitis accounts for the remaining 5%–10% (level 4). (5)

### ***Etiology:***

The causes of cholecystitis are related to lineage infections (anaerobic and gram negative) such as Streptococcus. HIV), Hepatitis A and B virus, Epstein Bar, Toxoplasmosis However, a relationship with the use of prolonged parenteral nutrition, as well as extensive burns, abdominal trauma, dehydration and heart disease with this condition has been proven. The main factors described as risk of CAA are major surgery, use of opioids and vasopressors, trauma, mechanical ventilation,

dehydration, burns, shock, systemic inflammatory response syndrome (SIRS), multiple transfusions and prolonged fasting. (6)

### ***Embryology of the gall bladder and biliary tree***

The liver primordium appears in the middle of the third week as an outgrowth of the endodermal epithelium at the distal end of the foregut. This outgrowth, the hepatic diverticulum, or liver bud, consists of rapidly proliferating cells that penetrate the septum transversum, that is, the mesodermal plate between the pericardial cavity and the stalk of the yolk sac. While hepatic cells continue to penetrate the septum, the connection between the hepatic diverticulum and the foregut narrows, forming the bile duct. A small ventral outgrowth is formed by the bile duct and this outgrowth gives rise to the gall bladder and the cystic duct. Liver cords differentiate into the parenchyma and form the lining of the biliary ducts. (7-9)

### ***The gall bladder***

The gall bladder is a slate blue, piriform sac partly sunk in a fossa in the right hepatic lobe's inferior surface. It extends forwards from a point near the right end of the portal hepatic to the inferior hepatic border. It is 7-10 cm long, 3 cm broad at its widest and 30-50 ml in capacity. It is described as having a fundus, body and neck. The fundus, the expanded end, projects down, forwards and to the right, extending beyond the inferior border to contact the anterior abdominal wall behind the 9th costal cartilage. (10)

The body is directed up, back and to the left; near the right end of the portal it is continuous with the gall bladder neck. The neck (cervix) is narrow, curving up and forwards and then abruptly back and downwards, to become the cystic duct, at which transition there is a constriction. The neck is attached to the liver by loose connective tissue containing the cystic artery. The neck also shows a dilatation; the infundibulum (Hartmann's pouch), which hangs downwards and is often connected to the duodenum by folds, which may be either congenital or inflammatory in origin. (11)

The present study aimed to analyze the causes of mortality in operation by both traditional (open) and laparoscopic cholecystectomy, in the last 10 years (2009-2018) in the Department of Surgery of the Al-Hakim general hospital

## **2. PATIENTS and METHODS**

A retrospective data base study which including all patients undergoing cholecystectomy (open or laparoscopic) in the period from the 1st of January 2009 until December 31, 2018, in the Department of Surgery of the Al-Hakim general hospital and Al-Arby private hospital.

***Exclusion criteria:***

1. The Patients who did choledochotomy due to choledocholithiasis residual or recurrent, coledocostomy along with the cholecystectomy
2. Cancer patients of the gallbladder which was diagnosed intra-operatively or postoperative.

***Operative mortality***

It was defined as the death of a patient up to 30 days post-surgery or during hospitalization, independent of the elapsed time since the intervention.

***Statistical analysis:***

All data were collected by the researchers and the SPSS-IBM version 22 was used, statistical tests were applied according to the variable type.

**3. RESULTS:**

The total number of patients undergoing cholecystectomy for biliary lithiasis between 2009 and 2018 was 6,810, with an annual average of 681 patients operated on / year .

**Table 1** shows the total number of cholecystectomy (open and laparoscopic) that performed in Baghdad city/in Al-Hakim general hospital in 2 period of time each for five years duration. In the first period (2009-2013) only (33.2%) were performed by laparoscopic, and (60.3%) by open cholecystectomy. Until the second period this figure was start to rising successively then reach (66.8%) in the last quinquennium.

**Table 2** shows the global figures of operative mortality and the figures of each quinquennium, separated according to the laparotomic approach or laparoscopic. The overall mortality was 0.11%, being 0.13% for open cholecystectomy and 0.09%, for laparoscopic cholecystectomy. The mortality figures for traditional surgery show a decrease in the 2nd quinquennium with the 1st ( $p < 0.000$ ). However, the mortality figure for Laparoscopic surgery was decreased in the 2nd than in the first quinquennium.

**Table 3** shows the age groups of those who died, depending on whether they were under 50, between 51 and 69 and over 70 years. It is appreciated that the majority of the deceased was over 50 years old, with predominance of the group over 70 years. Reviewing the causes of Operative mortality in patients less than 50 years, which corresponds to the "young" group, all died for some medical cause that was intractable, without presenting surgical complication. These 8 deceased after traditional surgery had as main cause of death was large liver abscess, severe fulminant hepatitis and severe acute pancreatitis. The group of 12 deceased between 51 and 69 years presented a similar behavior, with a complication surgical that was a massive hemo-peritoneum after

laparoscopic cholecystectomy. The 3 deceased after cholecystectomy laparoscopic surgery corresponded to massive embolism pulmonary, sudden death from dysplasia of the right ventricle and a vascular accident encephalic at 48 hrs. after surgery.

The main causes of mortality after surgical Laparotomies were 2 cases with acute pancreatitis, 1 liver failure due to cirrhosis, cholangitis suppurated and 2 patients with acute necrotic cholecystitis and septic shock. The other 4 deceased after of laparoscopic cholecystectomy corresponded to a massive myocardial infarction, acute pancreatitis, intracranial hemorrhage with hydrocephalus and a chronic renal failure in hemodialysis. The causes of mortality in the 40 patient's  $\geq 70$  years were mainly acute necrotic cholecystitis in 33 patients with septic shock, biliary peritonitis due to permeation and liver abscess.

There was also one patient with multiple myeloma, a pulmonary embolism, a massive myocardial infarction and 4 patients with liver cirrhosis and acute liver failure. Mean days of hospital stay of the patients in open cholecystectomy (3.2) days which is more than that in laparoscopic (2.1) days (Figure 1)

***Table 1. Distribution of the cholecystectomy according to the ten years duration***

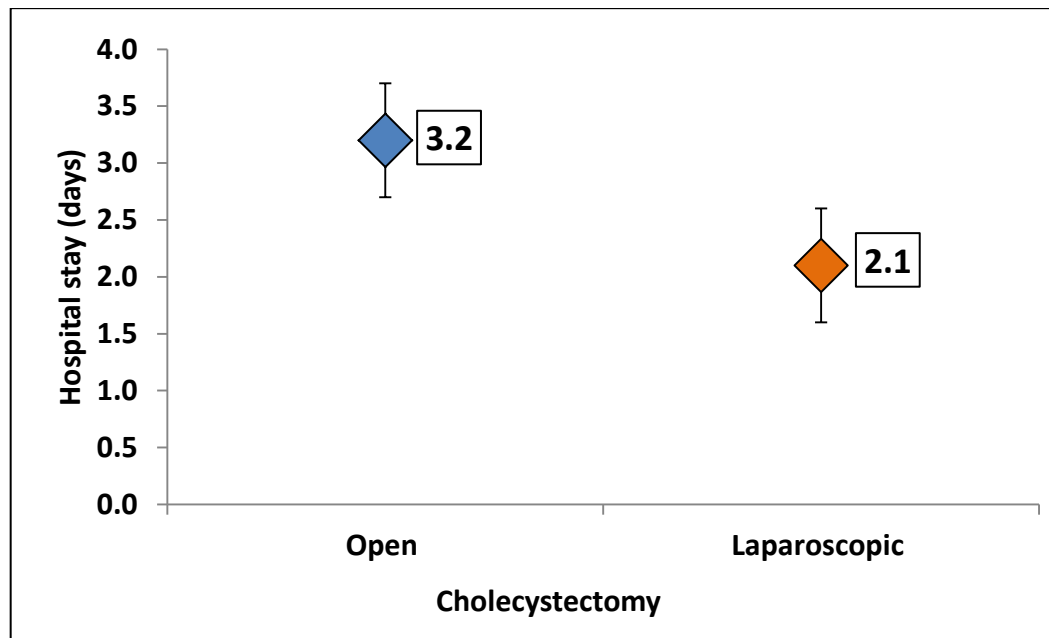
| Years period | Total |       | Open cholecystectomy |       | Laparoscopic cholecystectomy |       |
|--------------|-------|-------|----------------------|-------|------------------------------|-------|
|              | No.   | %     | No.                  | %     | No.                          | %     |
| 2009-2013    | 3229  | 47.4  | 2084                 | 60.3  | 1145                         | 33.2  |
| 2014-2018    | 3581  | 52.6  | 1374                 | 39.7  | 2307                         | 66.8  |
| Total        | 6810  | 100.0 | 3458                 | 100.0 | 3452                         | 100.0 |

***Table 2. Mortality rates of the cholecystectomy (open & laparoscopic) during the period from 2009—2018.***

| Years period | Total (76) |       | Open Cholecystectomy (N=44) |       | Laparoscopic Cholecystectomy (N=32) |       |
|--------------|------------|-------|-----------------------------|-------|-------------------------------------|-------|
|              | No.        | %     | No.                         | %     | No.                                 | %     |
| 2009-2013    | 48         | 63.2  | 28                          | 63.6  | 20                                  | 62.5  |
| 2014-2018    | 28         | 36.8  | 16                          | 36.4  | 12                                  | 37.5  |
| Total        | 76         | 100.0 | 44                          | 100.0 | 32                                  | 100.0 |

**Table 3. Distribution of deceased patient's age, according to types of cholecystectomy.**

| Age (year)          | Open cholecystectomy<br>(N=44) |      | Laparoscopic cholecystectomy<br>(N=32) |      |
|---------------------|--------------------------------|------|--|------|
|                     | No.                            | %    | No.                                    | %    |
| < 50                | 8                              | 18.2 | -                                      | -    |
| 51-69               | 16                             | 36.4 | 12                                     | 37.5 |
| ≥ 70                | 20                             | 45.4 | 20                                     | 62.5 |
| Mean age (64.5±9.3) | (60±3.4)                       |      | (69±5.2)                               |      |



**Figure 1. Time of patients stay in hospital**

#### **4. DISCUSSION**

Laparoscopic cholecystectomy (LC) causes less pain after surgery, shorter hospital stay, faster return to work activities and a lower metabolic-endocrine-immune response to trauma (REMIT). This procedure has been the gold standard for elective cholecystectomy for the general population in the last two decades. The mean age of deceased patients in this study were (64.5±9.3) and mean of the days stay in hospital was 3.2±1.5days for open and less than for laparoscopic surgery 2.1±0.7 which is not in agreement with that found by Rubert C et al, (12) when mean age was 70.1, and the length of stay was shorter in patients undergoing LC, averaging 2.01±0.9 days, while the OC group stayed for 2.95±1.5 days. The total number of mortalities reported in this study was died patients in this study was the overall mortality was 0.11%, being 0.13% for traditional cholecystectomy and 0.09%, for cholecystectomy laparoscopic. However, LC has demonstrated results superior to OC in elderly patients with symptomatic cholelithiasis in terms of morbidity and hospital stay. (13) Leardi S et al, have reported that LC is associated with shorter hospital stay. (14) Steiner C et al, (15) revealed that the operative mortality associated with laparoscopic cholecystectomy was less than that with open cholecystectomy (adjusted odds ratio, 0.22; 95 percent confidence interval, 0.13 to 0.37) and the overall mortality rate for all cholecystectomies declined from 0.84 percent in 1989 to 0.56 percent in 1992, there was no significant change in the total number of cholecystectomy-related operative deaths because of the increase in the cholecystectomy rate.

#### **Conclusions:**

Laparoscopic cholecystectomy is a very low mortality operation. This complication occurs mainly in patients with severe biliary disease, elderly and with multiple medical complications.,

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