

# Laparoscopic Cholecystectomy; It's Complications and Causes of Conversion to Open Cholecystectomy.

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## Summary:

**Background:** The laparoscopic cholecystectomy is the gold standard for treating the symptomatic cholelithiasis. Conversion is sometimes necessary due to finding unexpected pathology, intraoperative complications or unexpected technical errors .

**Objectives:** The aims of this study were to determine the complications and the predictive factors of conversion in patients undergoing laparoscopic cholecystectomy for various indications in elective and acute settings in a general hospital in order to reduce the incidence rates of both , complications and conversion of laparoscopic cholecystectomy to the open technique .

**Patients and Methods:** This is a prospective study included 128 patients [their ages ranged from 18 -65 years; the mean =39.60 ± 11.37 SD years]. Female patients were 111 (86.7 % ), male patients were 17 (13.3 % ) . These patients underwent a laparoscopic cholecystectomy in AL-Karama Teaching Hospital / College of Medicine / Wasit University-Iraq, from April 2011 till December 2012. Recorded data were sex, age, indications for laparoscopic cholecystectomy , complications, conversion to the open technique , reasons of conversion, co- morbidity , length of the hospital stay and 30- day mortality.

**Results:** The intraoperative complications were; bleeding from the cystic artery in 9 patients (7.03 %), perforation of the gallbladders in 17 patients (13.28% ) and spillage of the stones from cystic duct stump in 12 patients (9.37% ). All these complications were successfully treated laparoscopically. This study has no postoperative complications during follow-up period . Conversion from a laparoscopic cholecystectomy to an open cholecystectomy was performed for 7 patients ( 5.49 % ). The reasons for conversion were ; dense fibrosis of Calot's triangle in two patients ( 1.56 % ) and one patient (0.78 % ) for each of the following pathologies : cholecystoduodenal fistula , postoperative adhesions , impacted stone in the cystic duct , Mirizzi's syndrome and incidental CBD stone. The intraoperative findings and postoperative histopathologic diagnoses were: 114 patients (89.1 % ) with chronic calculous cholecystitis, 5 patients ( 3.9 % ) with acute calculous cholecystitis, 5 patients ( 3.9 % ) with empyema of the gall bladder, 4 patients ( 3.1 % ) with mucocele of the gall bladder . There was no mortality in this study .

**Conclusions:** In this study, there were simple complications being laparoscopically treated . Male gender, age older than 50 years that were associated with dense fibrosis of Calot's triangle , postoperative upper abdominal adhesions, cholecystoduodenal fistula Mirizzi's syndrome , impacted stones in the cystic duct and incidental CBD stone were the main factors of conversion .

**Key Words:** Laparoscopic Cholecystectomy, Cholecystitis, Cholelithiasis .

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## Introduction

Laparoscopic cholecystectomy (LC) has been established as the "gold standard" in the treatment of symptomatic gallbladder disease. Currently, more than 80% of cholecystectomies are laparoscopically performed [1]. Carl-Langenbuch performed first cholecystectomy on 15<sup>th</sup> of July 1882 in Berlin on a 42 year-old man. The first laparoscopic cholecystectomy performed by Philippe Moret in Lyon- France in March 1987 had revolutionized the treatment of cholelithiasis [2]. Since the National Institutes of Health Consensus Conference in 1993, laparoscopic cholecystectomy has replaced open cholecystectomy as the gold standard in the treatment of patients with a symptomatic cholelithiasis [3]. Concerning uncomplicated cholelithiasis,

laparoscopic cholecystectomy is the procedure of choice even in patients with serious concomitant diseases, such as circulatory insufficiency, ischemic heart disease or morbid obesity [4]. Predominantly in patients concomitant diseases, a special attention should be drawn to the importance of avoiding the open approach due to possible surgical complications including a wound suppuration which can lead to prolonged hospitalization and sometimes difficult treatment of associated incisional hernias [5]. These facts bring significant importance to the ability of preoperative determination of the risk of conversion to the open approach. It should be underlined that the conversion should not be perceived as a mistake or a complication, but on the contrary as a reasonable decision in the context of the conditions or situations found during the laparoscopy [6].

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Such a decision will be made with a full confidence, and any prolongation of the conversion, in the lack of progress of surgery, will never take place. Decreased postoperative pain, decreased ileus, earlier oral intake, decreased length of hospital stay, improved cosmetic results, and decreased mortality are known advantages of the laparoscopic cholecystectomy over the open cholecystectomy [7,8,9,10]. Laparoscopic cholecystectomy is relatively a safe operative procedure with reported mortality less than 1% [8,9,10]. Individual risk factors of conversion have been identified by several published reports. Brunt et al [11] reported that the conversion rate in extremely elderly patients (80 years) was four times higher than in those younger than 80 years [12]. Male gender with severe symptomatic cholelithiasis is also associated with higher conversion [13]. Patients with previous upper abdominal surgery have a higher conversion rate, as much as 19% [14]. Gangrenous cholecystitis is associated with a conversion rate of 35% [15]. Patients with liver cirrhosis have an average conversion rate of 10% and a morbidity rate from 13%–20% [15]. In patients with difficult pathology such as Mirizzi's syndrome, the conversion rate can reach 74% [14]. Thus, several factors influence the conversion from laparoscopic cholecystectomy to open cholecystectomy, but some appear to have more impact as risk factors [15]. This study is a prospective one, reporting reasons for conversion from the laparoscopic cholecystectomy to the open cholecystectomy with the intraoperative and postoperative complications.

**Patients and Methods**

This study was conducted on 128 patients who underwent a laparoscopic cholecystectomy in AL-Karama teaching hospital, Medical College / Wasit University, Iraq from April 2011 till December 2012. The gallstone disease was diagnosed by clinical and ultrasonic examinations. The routine preoperative investigations including Chest X-Ray, E.C.G, Hb gm/dc, blood group, fasting blood sugar, blood urea and screening for Hepatitis B and Hepatitis C were done at the day before surgery. Prophylactic antibiotic such as Cefotaxime vial 1gm or Amikacin vial 500mg was given intravenously just at induction of general anesthesia and two doses postoperatively eight hourly. All cholecystectomies were performed under general anesthesia. Patients with obstructive jaundice, those with suspicion of cancer of gall bladder and biliary ducts and those who had contraindication for general anesthesia were not included in this study. Standard laparoscopic cholecystectomy was performed with putting the patient in Reverse-Trendelenburg's position (The American approach). Four ports technique was used. The primary trocar was directly inserted without veress needle nor prior pneumoperitoneum. Adhesions

of gall bladder to the nearby structures were separated by blunt and sharp dissection. Distended gall bladders were decompressed by aspiration and suction. Cystic duct and cystic artery were identified and dissected off using Maryland forceps. The cystic duct was clipped with three clips and divided. Wide cystic ducts were double clipped or ligated with endoloops. The cystic artery was clipped or coagulated with electrocautery or harmonic hook. The gall bladders were dissected off their hepatic beds by use of electrocautery hook, harmonic hook or scissors. Hemostasis was secured by using either monopolar cautery or harmonic hook. Gall bladders were extracted through epigastric port using condoms (the type used for male contraception which is sterile, their use had no complications noticed during follow-up period) or surgical glove fingers. The spilled stones were retrieved using either condoms or surgical glove fingers. Gall bladder fossas were re-examined. The clean operative fields were not drained. When there were spilled gallstones, empyema or blood oozing, drains were put in the subhepatic space through the 5 mm port at anterior axillary line. The 10 mm port sites were closed with nylon suture 0/0. Skin closure was done with vicryl 3/0.

Statistical Analysis: Data was analysed using Statistical Package of Social Sciences (SPSS version 18).

**Results:**

This study included 128 patients; 111 females (86.7%) and 17 males (13.3%). Ninety two (71.9%) patients were having no comorbidity (Table-1). There was no mortality in this study.

The results of this study were statistically analysed using SPSS version 18 and tabulated in the following tables: All patients presented with various forms of calculous cholecystitis as shown in Table -1-:

**Table- 1 -: Baseline characteristics of patients who were prepared for a laparoscopic cholecystectomy (No\* = 128).**

Patients' Characteristics	*No=128	%
Sex Male	17	13.3 %
Female	111	86.7 %
Comorbidity: Yes	36	28.1 %
No	92	71.9 %
<b>The indications :</b>		
Chronic calculous cholecystitis	114	89.1 %
Acute calculous cholecystitis	5	3.9 %
Empyema of the gall bladder	5	3.9 %
Mucocele of the gall bladder	4	3.1 %
<b>Total</b>	<b>128</b>	<b>100 %</b>

No\* =Number of patients of the study

**Table-2:-Distribution of the patients converted from (LC) to (OC) according to causes of conversion.( No\* =7 out of 128 ).**

Causes of Conversion From (LC)** to (OC)***	No*=7	% of The Converted Group	% of The Study Group
Postoperative adhesions due to previous upper mid-line laparotomy	1	14.28	0.78
Unclear anatomy due dense fibrosis at Calot's triangle	2	28.57	01.56
Cholecystoduodenal fistula	1	14.28	0.78
Mirrizzi's syndrome	1	14.28	0.78
Incidental stone in CBD	1	14.28	0.78
Impacted stone in the cystic duct	1	14.28	0.78
<b>TOTAL</b>	<b>7</b>	<b>100 %</b>	<b>5.46 %</b>

No\*= number of the patients with conversion. LC\*\*= Laparoscopic Cholecystectomy . OC\*\*\* = Open Cholecystectomy .

**Table – 3 - : The Study Group Characteristics / Statistics (No\*=128 ) .**

Surgical Technique Statistics	Age/ Year	Time Of Operation/m	Hospital Stay/day
Range of all patients	18-65	20-75	1-4
	Mean	38.62	38.14
	Std. Deviation	± 10.67	8.22
Successful Laparoscopic Cholecystectomy	No**	121	121
	Mean	56.43	62.71
	Std. Deviation	± 10.47	6.34
Conversion to Open Cholecystectomy	No***	7	7
	Mean	39.60	39.48
	Std. Deviation	± 11.37	9.86
Total	No*	128	128
	Mean	39.60	39.48
	Std. Deviation	± 11.37	9.86
	P-Value	0.64	0.27

No\*= number of all patients involved in laparoscopic cholecystectomy .

No\*\*= number of patients with successful laparoscopic cholecystectomy .

No\*\*\*= number of patients with conversion to open cholecystectomy .

**Table- 4 - Conversion Group Characteristics / Statistics (No\*= 7) .**

Patient's Characteristics	Range	Mean	± SD	P-Value
Age/Year	30-65	56.43	± 10.47	0.00
Sex	Male = 4 (7.1%) Female = 3(42.9%)	1.43	± 0.53	0.00
Operative Time/ Minute	50-75	62.71	± 6.34	0.00
Hospital Stay/Day	3-5	3.00	± 0.58	0.00

No\*=number of patients converted to the open technique .

**Table -5- Intraoperative complications of this study**

Intraoperative Complicatins	(No* =38 out of 128) (29.68 %)	Conversion
Bleeding from the cystic artery,other regional arteries & gallbladder bed	9 ( 7.03 %)	0.0
Perforation of the gallbladder during its dissection with/without spillage of stones	17 ( 13.28 %)	0.0
Spillage of gallstones from gallbladder side of the cystic duct stump	12 ( 9.37 %)	0.0
<b>TOTAL</b>	<b>38 ( 29.68 %)</b>	<b>0.0</b>

No\*=number of patients with intraoperative complications

### Discussion

Conversion from LC to OC can be categorized as elective conversion or enforced (emergency) conversion. Elective conversion is defined as the decision made by the surgeon at any stage of the operation to desist from the laparoscopic approach and to resort to laparotomy before being forced to do so because of a major intraoperative complication. The reasons can be difficult or obscure anatomy, advanced pathology, or lack of progress of the laparoscopic intervention for any reason. By contrast, enforced conversion is an intraoperative emergency (as distinct from a considered elective decision) when the surgeon has to resort to laparotomy because of a severe iatrogenic injury or severe laparoscopic uncontrollable bleeding [4]. In this study, the conversion rate was 5.5 % ( 7 out of 128) as seen in Table .1., while in the other studies, the conversion rates were ranging from 1.5 – 10 % [16] . Also, the Table shows the predominancy of the female gender; females were 86.7 % ,while males were 13.3 % . It also shows that chronic calculous cholecystitis was the most common indication for laparoscopic cholecystectomy 89.1 % ( 114 out of 128)



. Causes of conversion in this study (Table .2.) were as following: unclear anatomy due dense fibrosis at Calot's triangle was the common cause of conversion ( 1.56 % of the study group and 28.57 % of the converted group [ 2 out of 7 ] ). This result was similar results of Bartosz S. et al [16] and Volkan Genc et al [17] . In study of H. J. J. van der Steeg et al, the most frequent cause of conversion was dense fibrosis of Calot's triangle (30%) [18] . Previous upper abdominal surgery can also be a cause of conversion [19] . In this study, nine patients had history of previous lower abdominal surgery and one patient with history of upper abdominal surgery, only the patient with history of upper abdominal surgery was converted to the open technique. Omental and visceral inflammatory adhesions to the gallbladder, liver and the abdominal wall can cause visual blockade of access to the gallbladder [20,21]. There were 23 patients (17.96 %) with adhesions in this study. Adhesions were successfully separated laparoscopically in 21 (91.30 %) patients by means of blunt and sharp dissection, and by electrocautery. The remaining two patients were converted to the open technique due to dense adhesions at Calot's triangle. Other causes of conversion, in this study, included; one patient ( 0.78 % ) for each of the following pathologies : postoperative adhesions with parietes and viscera , cholecystoduodenal fistula, Mirizzi's syndrome, incidental stone in CBD (in this patient, intraoperatively the CBD was dilated ,by Maryland dissector a small stone was grasped in the CBD, after conversion ,the stone was retrieved through the dilated cystic duct stump with a stone forceps. Conversion was done because we have not experience in laparoscopic exploration of CBD at time being nor ERCP is available ) and impacted stone in the cystic duct nearby the CBD. In this study ,the ages of the patients ranged from 18- 65 years (mean 39.89±11.29 SD,P-value =0.65) as seen in Table .3. Seven out of 128 whose laparoscopic cholecystectomy was converted to an open cholecystectomy had a mean ; 56.43 ± 8.47.52 SD, P-value= 0.00 . In this study ,the operative time ranged from 20-75 minutes (mean=39.48 ± 8.22 SD minutes ,P-value= 0.27 ) .The hospital stay ranged from 1-4 days (mean=1.94 ± 0.64 SD ,P-value=0.70 ) . In this study, the conversion rates in male and female patients were 3.30% and 2.28%, respectively, similar to results of the studies [4,16,22] . In study of Volkan Genc et al, the conversion rates in male and female patients were 5.6% and 2.2%, respectively [17] . In study of Umar F et al, operative time mean was 55.9 minutes in the conversion group and 54.2 minutes in the laparoscopic cholecystectomy group [23] while in this study,conversion group had operative time mean 64.29± 8.38 SD minutes, the laparoscopic cholecystectomy group had an operative time mean = 38.14±9.86 SD minutes and the study group had an operative time mean 39.48 ± 9.86

SD minutes. So, this study had longer operative time mean of the conversion group, but shorter operative time mean of the laparoscopic cholecystectomy group . Regarding the characteristics / statistics of the conversion group (Table .4) ,their ages ranged from 30-65 years, mean = 56.43± 8.47 SD,, which was higher than that of both ,the study group (mean 39.60± 11.37 SD ) and the laparoscopic cholecystectomy group 38.62 ±18.67 SD . Regarding the gender ,they were four males and three females .The hospital stay of the converted group ranged from 3-5 days,,mean=3.00 ± 0.58 SD ,P-value = 0.00 ,while in the study group, it ranged from 1-4 days , mean=1.94 ± 0.64 SD ,P-value= 0.00 . These results are similar to the results of the studies [23,24] . In study of ( Ashfaq C 2009 ) [25] the operative time mean was 100 ± 29.03 SD minutes, hospital stay mean was 6.28 days .In this study ,the operative time of the conversion group ranged from 50-75 minutes,mean = 62.71 ± 6.34 SD ,P-Value=0.00 (Table -3-) . Table .5. shows the intraoperative complications of this study ; perforation of the gallbladder during its dissection with/without spillage of stones was the common intraoperative complication 13.28 % (17 out of 128 ) ,while Toma F metaanalysis study stated that during the laparoscopic cholecystectomy, incidence of gallbladder perforation was 13- 40 % with a mean of 18.3 [26] . In this study, spillage of gall stones from gallbladder side of the cystic duct stump was 9.37 % (12 out of 128 ) . In all of the 29 cases ,the spilled stones were successfully retrieved laparoscopically using condom or surgical glove finger to keep the port site through which gall bladders and the spilled stones were retrieved, clean . Spillage of stones as a cause of conversion had been observed by Frazee R.C. et al. (1992) [27] . Cystic artery bleeding has been reported as a cause of conversion by Cuschieri et al [28] . In this study, bleeding from the cystic artery, other regional arteries & gallbladder bed occurred in 9 patients ( 7.03 % ) . These bleedings were laparoscopically controlled by means of electrocautery and clipping without conversion to the open technique ,while in studies ; Perissat et al [29] and Sanabria et al [30] ,some bleedings could not laparoscopically controlled necessitating conversion to the open technique . Wide cystic duct can be a cause of conversion. In this study, there was a wide cystic duct in 13(10.15 %) cases. These wide cystic ducts were managed by double clipping or the use of the eduloop ligature . In this study, there was no conversion of any of case with a wide cystic duct to an open technique ,similar to study of Trondsen et al. (1994) [31] . Regarding the postoperative complications of this study, seven patients (5.46 % of the study group) showed bile leakage through the subhepatic drains that stopped spontaneously within 24-48 hours. Six patients (4.68 %) showed mild bleeding through the drains that also stopped



spontaneously . Morbid obesity had been considered as a contraindication for laparoscopic cholecystectomy, and can contribute to conversion, especially in early experience of the laparoscopic surgery , trocar and instruments were too short or decreased mobility of instruments due to restricted movement of trocar . In this study ,there were 3 obese patients(2.34 % ) for whom laparoscopic cholecystectomy was successfully performed by insertion the primary trocar 3 to 5 cm above the umbilicus in the midline without using extralong trocars or instruments. In this study ,there was no mortality .

When the raw data of this study was reviewed,it was found that four of the seven converted cases were done in the first six months of the study period,while the remaining three conversions were done during the last fifteen months of the study.Also,the operative time was reduced from 60-75 minutes during the early period of the study to 20-35 minutes during the last period of the study .This means the learning curve was improving with more experience .

#### Conclusions:

I- In this study, there were simple complications being laparoscopically treated .

II- Both,male gender and age older than 50 years, were associated with dense fibrosis of Calot's triangle,cholecystoduodenal fistula, Mirrizi's syndrome, postoperative adhesions due to upper abdominal surgery ,unexpected intraoperative findings as CBD stones and impacted stones in the cystic duct were factors of conversion of laparoscopic cholecystectomy.

III- Good laparoscopic skill, adequate experience and innovations are prerequisites for safe and cost-effective laparoscopic cholecystectomy to reduce both,complication and conversion rates.

IV- However, when a difficult cholecystectomy is anticipated, preoperative knowledge of the increased likelihood of conversion and increased morbidity for patients with previous upper laparotomies, male patients with chronic cholecystitis older than 50 year-old and unexpected intraoperative findings will inform surgical planning for both the surgeon and the patient.

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