

Laparoscopic Cholecystectomy in Patients with Empyema of Gall Bladder

Alan Adnan Sabir

Department of Surgery, College of Medicine, Kirkuk University

Abstract:

Empyema of gallbladder is a potential fatal complication of gallstone. It is characterized by suppuration superimposed on acute cholecystitis. It is considered as a common factor of difficult laparoscopic cholecystectomy.

Aim of the study: to determine the safety and feasibility of laparoscopic cholecystectomy in patients with empyema of gallbladder.

Patient and method: A prospective study of 800 patients suffering from gallstone diseases from 2011 to December 2014 in Azadi teaching hospital in Kirkuk-Iraq. The procedure was performed by standard three – ports technique with a few modifications made to facilitate dissection subjected to situation.

Results: 800 patients with male to female ratio 1:5.25 undergone laparoscopic cholecystectomy. Among these, 50 patients (6.25%) were identified having empyema of gallbladder and were included in the study population. Laparoscopic cholecystectomy was successfully completed for 49 (98%) patients while only one (2%) patient was converted to open cholecystectomy due to uncontrolled bleeding.

Conclusion: In well-trained and skillful hands of an expert, laparoscopic cholecystectomy surgery is a safe and acceptable option for patients with empyema of gallbladder.

Key words: Empyema gallbladder, laparoscopic cholecystectomy, safety.

Introduction:

One of current worldwide health problem, especially among adults⁽¹⁾ is gallstone disease. The traditional open cholecystectomy was first time performed in 1882 by Carl August Langerbach. He stated “the gallbladder needs to be removed not because it contains stones, but because it forms them”. Then, it was replaced with laparoscopic cholecystectomy (LC). The first LC was performed in 1985 by Muhe. LC basically revolutionizes the treatment of gallbladder disease and is now the gold standard for the treatment of gallstone and the commonest operation performed^(2,3).

Laparoscopic surgery is limited in terms of a few technical aspects such as (1) limited tactile feedback during manipulation of tissues and dissection, (2) indirect contact with intra-abdominal structures, and (3) loss of three dimensional perception, through relatively limited and fixed view of operative field. When this happens, the operation becomes difficult, and resulting in the conversion to open cholecystectomy. However, practitioners define the “difficult LC” differently. Generally, it refers to multiple technical intra-operative challenges that intensify the risk of complications. Hence, the

operation time^(4,5) is prolong. Approximately 75% of all cholecystectomies are performed using laparoscopic technique, while conversion to open procedure ranges between 5% and 10%⁽⁶⁾ nationwide. However, the national institute of health (NIH) reports that the results of LC are significantly influenced by the skills the surgeons have, which includes factors gained through experience, and training, which develop their maturity and confidence in making rational judgment⁽⁷⁾.

Normally, conversion to open cholecystectomy is not preferred because it is always associated with some pulmonary infections and surgical site, increased overall morbidity, and extended ward-stay^(8,9). The fatal potential complication of gallstone is empyema of gallbladder. Its categories vary, determined through suppuration superimposed on

acute cholecystitis. Normally, its presentation in clinical form is more difficult than acute cholecystitis⁽¹⁰⁾.

Cases involving patients with advanced atherosclerotic disease⁽¹¹⁾ or diabetic are increasing. In surgical term, a calculus (or rarely from a malignant mass like underlying cholangiocarcinoma), which prevents pus from draining through the cystic duct⁽¹²⁾ obstructs the gallbladder neck. Although practitioners have described multiple sonographic indicators of acute cholecystitis, which include bladder distension^(13,14) and sonographic Murphy's sign, the ability to predict the ease or difficulty of cholecystectomy and acute cholecystitis is still weak⁽¹⁵⁾.

Features suggesting the seriousness of this disease and its diagnosis are still too few⁽¹⁶⁾, it used to be a contra-

indication for LC in response to some fears of complications^(17,18) leading to life-threatening. Accordingly, many cases have previously been decided for conversion⁽¹⁹⁾. In current advancement, the maturity of technology and experience for the purpose of laparoscopic surgery has changed the scenario significantly. Regarding this, practitioners have found that LC is an effective option and is safe for acute cholecystitis and its associated conditions like empyema of gallbladder^(19,20). Other people may face different complications, subjected to various factors. Generally, damage to nearby vital structures, uncontrolled bleeding, and obscured local anatomy are common factors leading to conversion⁽²¹⁾

(complication). However, the encouraging merits are not stagnant, while evaluation on the role of laparoscopic surgery in such acute condition is still continuously going on.

Patient and Methods:

This study involves 800 patients undergoing LC for different indications (usually pain in the right upper abdominal quadrant) between December 2011 and December 2014 in AZADI Teaching hospital in Kirkuk, Iraq.

Proper history, clinical examination and necessary pre-operative work-up including urea, complete blood count, creatinine, liver function test, sugar in blood, and Hepatitis B and C screening were done. To confirm gallstone, each patient was arranged for an ultrasound of the abdominal. Also, we assessed

the CBD diameter. For exclusion criteria, we used as a tool. Nevertheless, we run a chest X-ray and ECG for patients over 40 years old.

The LC was done using alaparoscope storz' with standard 3-part technique with some adaptations depending on thenecessity, such as in situations where there are additionalports.In case there is any adhesion, or if the gallbladder has previously been operated specially with upper midline incisions, it isreallychallengingdue to severe inflammatory condition of gallbladder. It is common to find some amount of omental and bowel adhesions when there areoperative scarsin thelower abdomen designed for previoussurgery.In that situation,we avoid umbilicus as the initialsides for verses needle insertion. In contrast, a safe side for thecreation of pneumoperitoneum is chosen. Thus, theeigagasticport, slightly above the transpyloric plane in the midline is selected. In fact, doing it at theleft hypochondrium, 2cm below thesub-costablemargin in the midclavicular line(palmar maneuver)is so comfortable. Releasing the lower abdominal adhesions is easy. We can see the benefitsof entering the abdomen in its ability to avoid any inadvertent injuryat the umbilicus, because it is provided withvisual guidance. Then, we could shift theoptical portto the umbilical site from the eqigastic.

The thick-walled gallbladder was difficult for the assistant to hold and retract.In that case, specialized toothed graspers (10 mm), with a wide and long

mouth were utilized.Similar maneuvers were also utilized, and were found effective in gallbladders packed with stones and contracted gallbladder.Percutaneous decompression of gallbladder by verses needle was done in 20 cases of distended gallbladder.In case of thick pus, the gallbladder was punctured and suction cannulawas directly introduced into gallbladder to aspiratepus.RouvieresSulcus (RS) (i.e. incisura hepatic dextra, Gans incisura) represented an important extra-biliaryanatomical incisura as an important extra-biliary anatomical landmark.It was found in most cases. Further, critical view of safety (CVS) technique was used over almost allpatients, in which the following three criteria wereconsidered in achievingit.

1. The lower one third of the gallbladder is separated from the liver to exposethe cystic plate (it lies in the gallbladder fossa, which is also known as liver bed of the gallbladder).
2. Thehepatocystic triangle (the triangle formed by the common hepatic duct, inferior edge of the liver and the cystic ductw) is cleared of fat and fibrous tissue.
3. The gallbladder should be entered by two and only two structures, as seen in Figures 1 and 2.

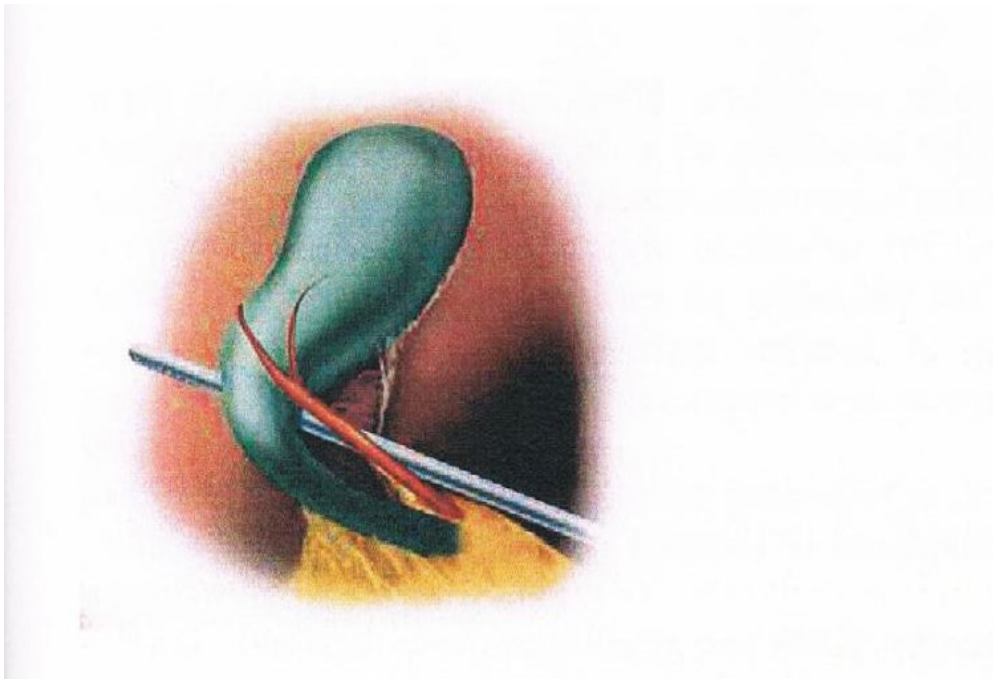


Figure1:anterior view

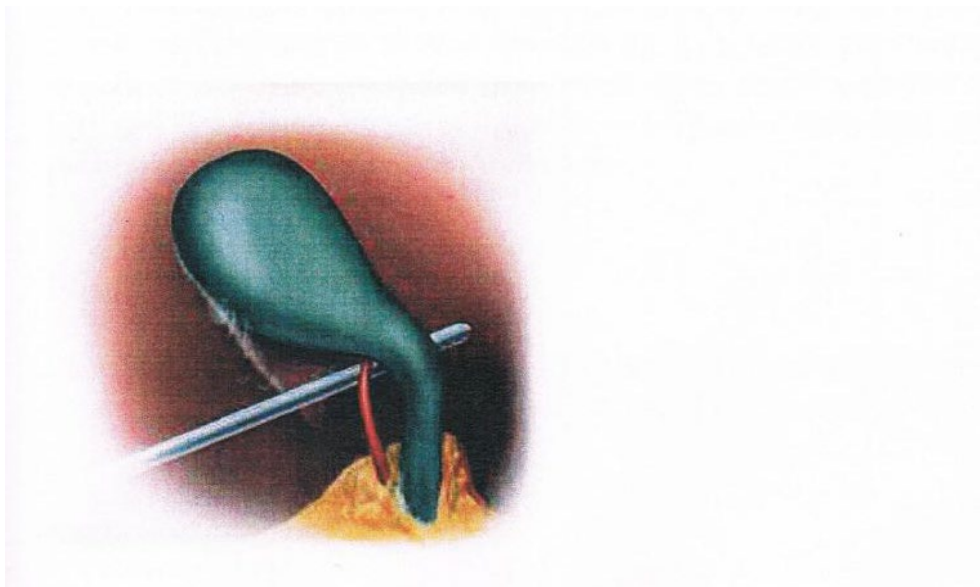


Figure 2:posterior view

Results:

Altogether, we carried out 800 LC for gallstone disease. We discovered that a hundred (12.5%) of them have complicated gallstone disease. Particularly, empyema of gallbladder is the biggest component for it. Hence, this study managed to identify

50 (6.25%) empyema of gallbladder patients and include them for further analysis.

(Figure 3) shows that there are eight male and 42 female (1:5.25 ratio) patients involved in this study. Their age ranges from 20 to 65 years old. The

major criteria for diagnostic are exhibited in Table 1 and Table 2. Pre-operative diagnosis was predicted in 38 (76%) patients while the remaining 12 (24%) patients were identified during surgery. These patients were all operated on laparoscopic (24 hour-admission). 49 (98%) LC were completed successfully, while the procedure on one (2%) patient was converted to OC due to uncontrolled bleeding. Total operating time ranged between 40 and 80 minutes (with a mean of 60 minutes). During the procedure, 11 (22 %) out of the 49 successfully-operated cases (as detailed in Table 3), have faced operative complications of varying severity and degrees.

Eight patients (2 males and 6 females) went through partial or subtotal cholecystectomy. It was found that one of the operated patients had liver cirrhosis. The operation was completed successfully by partial cholecystectomy. We operated on a patient with cholangiocarcinoma, diagnosed by MRCP and ERCP, intraoperatively found to have an empyema of gallbladder. Altogether, 40 patients (80 %) were discharged from the hospital after 24 to 48 hours, while only 9 patients (18 %) stayed in the hospital. Most of them stayed between 4 and 10 days due to post-operative complications mentioned in Table 4. The converted patient (2%) stayed 3 days in the hospital, before discharged well.

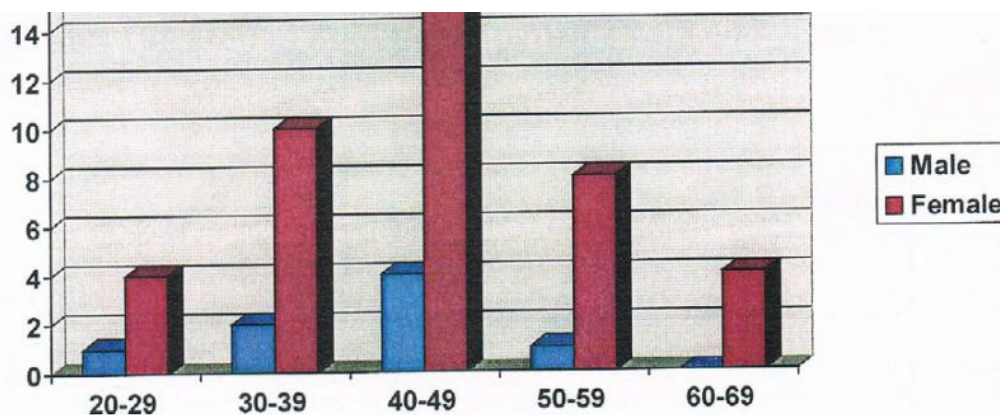


Figure 3: Gender and age (in year) distribution among patients with empyema of gallbladder

Table 1: Diagnosis clinical features in patients with empyema of gallbladder

	Number of patients
Palpable gallbladder	12 (24%)
Vomiting	15 (30%)
Fever	28 (56%)
Pain in right hypochondrium	50 (100%)

Table 2:Diagnosis: Ultrasound findings in patient with empyema of gallbladder

	Number of patient
Over distended gallbladder	38(76%)
Thickened wall gallbladder	39(78%)
Intraluminal sludge or stone	48(96%)
Pericholecystic fluid accumulation	7(14%)

Table 3:Operative complication in patients with empyema of the gallbladder

Complication	Empyema group Total n= 50
Perforation of gallbladder	9(18%)
Bleeding	8(16%)
Operating time more than mean (60 min)	10(20%)

Table 4:Post-operative complication in patients with empyema of gallbladder

Post -operative complication	Empyema patients Total n =50
Port site/ wound infection	4(8%)
Bile leak	3(6%)
Intra-abdominal collection	3(6%)
Chest infection	4(8%)

Discussion:

Patients between 40 and 49 years old are the most common age group to have empyema of gallbladder. Regarding this, this study found an overall mean age of 42.5 years, with a male to female ratio of 1:5.25. This is nearly the same as Elder S. et al (2015)⁽²¹⁾. The results also describe that the rate of occurrence of empyema of gallbladder is significantly higher among the males, and that there are more difficulties during laparoscopic Cholecystectomy.

Regarding Cholecystectomy, a consistent finding with Kamal I. A. et al (2014) has been found, which is perhaps due to the fact that men have a higher pain threshold (tolerance), increased musculature, easy to find, and take medication, besides they do not do regular medical check-up⁽²²⁾. The history of recurrent attacks of acute cholecystitis and increased gallbladder wall

thickness (seen through abdominal ultrasound) are the most valuable predictive value in the diagnosis of the empyema. Obviously, the ultrasound findings remain as an operator dependent and are difficult to diagnose empyema of gallbladder preoperatively. As recommended by the Odo et al (2017)⁽²³⁾, before proceeding to the dissection, we decompressed the distended gallbladder to facilitate the procedure. This procedure was also carried out by Tseng et al (2013)⁽²⁴⁾ for ensuring their surgery become easier and safer. By following the critical view of safety technique in almost all cases, except in those patients with frozen area of Calot's triangle with totally obscured anatomy, we avoided many preventable operative complications by handling such life-threatening situations through performing subtotal or partial Cholecystectomy.

with ligature and clipping after removal of all the stones and sludges. It is important to ensure that the patient is safe and avoided from prolonged complication.

As mentioned by Strasberg et al. (2018)⁽²⁵⁾, Laparoscopic subtotal or partial cholecystectomy is used for difficult hilar or difficult gallbladder bed, or for both conditions. The rate of conversion is subjected to the duration of post-operative ward stay, operating time, post-operative morbidity and complication, pre-operative blood loss, and resumption of diet. This goes similarly for all age groups and gender, which is consistent with Dilip Gode et al. (2014)⁽²⁶⁾. This study found that 15 (30 %) patients have a huge stone impacting in the neck of their gallbladder. Their gallbladders were complete with resultant hydrops or empyema. As a result, we handled the gallbladders by aspirate it with a hot hook after opening the fundus. Then we performed section irrigation. Then we made an incision at the neck of the gallbladder, approximately 2 to 3 cm above the junction of cystic duct and the neck. This incision allowed for the exteriorization of the stone generously. In this procedure, some technical problem may arise. Obviously, the size of cystic duct varies, either small or pouch. The way the pouch is held could lead to certain technical problems, as experienced by Chalco et al. (2014)⁽²⁷⁾.

One of the common difficulties in this procedure is bleeding. In fact, managing it intra-operatively was challenging. Based on the procedures in the 800 laparoscopic cholecystectomy, we would recommend that bleeding no matter in anyway it should be leading for conversion. The bleeding from Calot's vascular arcade is usually mild

and self-limited. It could be controlled by clearing the field by suction nozzle, initial compression, ligature or electrocautery, and application of a clip. Bleeding may also occur from injury to cystic artery or the liver bed. The use of harmonic scalpel makes the dissection easier, less bleeding and no smoke, but unfortunately it is not always available. However, Erol et al. (2018)⁽²⁸⁾ have found that cystic artery sometimes make profuse bleeding. It challenges the surgeon's patience. Obviously, the surgeon should stay calm although has to apply clips with inadequate vision. Technically, the surgeon has to release the cranial traction from the fundus of the gallbladder and use the infundibulum to compress the bleeding spot. The surgeon may use gauze pieces for help. Normally, the bleeding stops because of the vessel. In case the bleeding continues, the surgeon could suck out the blood clots by applying the suction cannula. Using the left hand grasper, the surgeon could grasp the bleeding vessel. The clips can be applied at the bleeding point only after the area is clean. Nevertheless, the gallbladder bed can also cause bleeding. It usually diffuses ooze, and surgeons can control it with an electrocautery. Gel foams and surgical also work for controlling bleeding from the liver bed. In our procedure, we advocated packing of liver bed in case of a sinus open up with surgical on top of which a wet gauze is placed and compressed by right hand forceps. Then the counter pressure was maintained by the left hand forceps on the liver. This manual compression was maintained carried out for five minutes.

Based on our experience, we believe that if we deal with any kind of sinus bleed this way, we can avoid conversion. The conversion rate to open cholecystectomy in this study is 2% (just in one patient), which is obviously less than that seen in similar studies like Kumaret al. (2014)⁽²⁹⁾ (which was 19.40%). This is mainly due to the surgeon's skills, experience, and judgment. However, a number of intra-operative complications have been encountered, but there was no significant trauma to the common bile duct or the bowel. The rate of major complication is not significant. However, being cautious is always a must in operation procedure, as warned by Hobbs et al. (2018)⁽³⁰⁾. Naturally, patients with liver cirrhosis (in which cirrhosis is considered a contraindication) have a higher rate of developing gallstones compared with the general population at the advent of laparoscopy for cholecystectomies. However, it does not mean that laparoscopic cholecystectomy in the setting of cirrhosis is unsafe. In fact, it is associated with acceptable morbidity and mortality (Schlenker et al., 2016)⁽³¹⁾.

The most important advantage of identifying Rouviere's sulcus (RS) lies in the fact that the cystic duct and the cystic artery, lies anterosuperior to the sulcus and the common bile duct lies below the level of the RS⁽³²⁾. Previously, Hugh RS (2013)⁽³²⁾ had exhibited the minimal common bile duct injury during LC. It happened by commencing the dissection ventral to the RS. During the induction, they gave all patients a gm-ceftriaxone injection, followed with another two doses after 12 hours. Depending on the clinical situation, patients with acute cholecystitis and

empyema of gallbladder were given a broad-spectrum antibiotic for a longer period. The commercially-available end bags can be safely used to remove the gallbladder for preventing contamination. However, Wang et al. (2013)⁽³³⁾ discourage it because it is only for single use and is not always available. Further, the infected gallbladder should be removed from the end bag to prevent spillage of stones and to prevent wound infection. Also, it is important for the occult malignancy in gallbladder. Therefore, in this study gallbladders were successfully retrieved from the abdominal cavity using an improvised end bag made from a simple surgical glove. The post-operative complications were managed conservatively in a period of less than 10 days in most cases. The common post-operative complications encountered include the bile leaks, the pulmonary complications (atelectasis and chest infection), and port sites infection. No major bile leak was encountered. In fact, all the three cases were minimal leaks that stopped in a period of not more than 10 days. Only one patient had a pleural effusion that needed a chest tube and 3 patients with intra-abdominal collection (subhepatic) were drained under ultrasound guide. However, the patient with conversion had a smooth post-operative course and only stayed in the hospital for three days, before the drain removal and discharged well. This has also been experienced by Johansson et al. (2015)⁽³⁴⁾.

Conclusion:

In LC, we recommend that surgeons should prioritize the patient's safety and keep the threshold for conversion lower. Besides, they could consider subtotal cholecystectomy when dissection gets dangerous. In short, LC is a safe and acceptable option in empty gallbladder. However, there are significant technical difficulties due to distorted anatomy, adhesions, and edema in the area of Calot's triangle.

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