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Original article

# Outcomes of Laparoscopic Cholecystectomy in patients with Previous Upper Abdominal Surgery

**Khaled Mohamed Saad Beih, Tamer.A.A.M.Habeeb, Mohamed Fekry khairy*, Mohamed Mahmoud Mokhtar**
Department of General Surgery, Faculty of Medicine, Zagazig University, Egypt

***Corresponding author:**
Mohamed Fekry khairy,

**E-mail:**
Theboylove4ever@gmail.com

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## Abstract

**Background:** Previous upper abdominal surgery was considered a contraindication to laparoscopic cholecystectomy; Patients who have had surgery in the upper abdomen were advised against having laparoscopy due to the creation of adhesions and the challenge of seeing the gallbladder. This raises the risk of harm to the bowel or blood vessels caused by the first trocar. This study aims to evaluate the possibility and results of laparoscopic cholecystectomy in patients who had previously had surgery in the upper abdomen. **Subjects and Methods:** This prospective study was conducted at the General Surgery Department of Zagazig University Hospital. Thirty patients with gallstone disease (13 males and 17 females), aged 30–62 years with a mean age of 47.03±7.61 years, all of whom had a previous upper abdominal incision and were subjected to laparoscopic cholecystectomy. **Results:** In our study, laparoscopic cholecystectomy was feasible and completed safely in 27 patients, while in 3 patients, it was converted to open cholecystectomy due to intra-abdominal adhesions; we failed to create pneumoperitoneum in one of the converted cases; in another patient, there were dense adhesions in the periportal area, and the last patient to be converted was due to small intestine injury, which was managed by direct repair of the injury. **Conclusion:** Patients with previous upper abdominal surgeries reported difficulties during their procedure of laparoscopic cholecystectomy, but only those who had prior major abdominal surgery and incisions near the cholecystectomy laparoscopic area reported longer operating times, higher rates of conversion, high-grade adhesions, and longer hospital stays.

**Keywords:** Laparoscopic Cholecystectomy, Adhesions, Feasibility, Upper Abdomen.

## INTRODUCTION

Laparoscopic cholecystectomy (LC) has significantly enhanced the care of people with cholelithiasis and cholecystitis symptoms. The swift adoption of this method by both patients and doctors has resulted in a boom of minimally invasive surgical approaches **[1]**.

This method results in a faster enhancement in quality of life when considering the advantages of this method over open cholecystectomy. In comparison to the open method, this technique offers advantages in terms of better cosmetic results, less discomfort following surgery, and a faster recovery time **[2]**.

Nevertheless, a significant proportion of patients still experience challenges with the effective completion of LC, leading to either the need for open surgery or incomplete removal of the gallbladder due to adhesion **[2]**. Several factors, including as severe obesity, past surgery on the upper abdomen, and acute inflammation of the gallbladder, have been suggested to evaluate if a patient is suitable for LC**[3].**

Pregnancy, prior abdominal surgery, obesity, cirrhosis, and acute cholecystitis were considered absolute contraindications for employing laparoscopic surgery when LC first began in the early 1990s. With advancements in laparoscopic skills and equipment, a range of

increasingly complex procedures have been performed, which means that these old contraindications are now only relatively applicable **[4]**.

Typical LC involves making two or three incisions outside the belly button in the upper right location in order to gain access to the abdominal cavity. It is estimated that 50% of patients who undertake LC have had prior abdominal surgery. Adhesions are not necessarily the result of UAS use,Which can make it difficult to safely access the right upper quadrant **[5]**.

Prior abdominal surgery is specifically linked to challenges in positioning the first trocar and achieving sufficient visibility of the gallbladder. The two primary particular concerns that prevent surgeons from doing laparoscopic correction (LC) on patients who have had prior abdominal surgery are the potential risk of injury to organs linked to the abdominal wall during Veress needle or trocar insertion and the necessity of adhesiolysis and the problems that accompany it **[6]**.

Sixty% of Adhesiolysis is required during laparoscopic cholecystectomy in patients with a history of prior abdominal surgery. Individuals who have undergone prior abdominal surgery present two special challenges: ensuring safe entry into the abdominal cavity to create pneumoperitoneum and safely removing adhesions to achieve sufficient visibility of the surgical area. Disruption of access is greatly influenced by the site of the prior surgery **[7].**

The majority of vascular injuries are linked to a technique of inserting the initial port without visual guidance, and over 50% of bowel injuries are tied with this technique. The likelihood of intestinal or vascular damage is even greater if the needle is inserted without guidance through a previous surgical cut**[ 8]**.

Frequency of umbilical adhesions can be significant (68%) among individuals who have undergone prior abdominal surgery, particularly those with a midline scar that reaches the umbilical area. More secure options involve placing the needle and initial trocar at a spot that is distant from the prior scar. This provides for better visibility of the abdominal cavity as there are no adhesions obstructing the view, and it also enables a more accurate assessment of the placement of the subsequent ports. Surgeons have the right distance required for handling the instruments. Palmer's point is a widely used and safe alternative. It is located in the left mid-clavicular line, 3 cm below the subcostal arch **[9]**.

**Aim of the work:**

This study aimed to assess the feasibility and outcomes of laparoscopic cholecystectomy in patients who had undergone previous upper abdominal surgery.

**Patients and Methods**

The study protocol was approved by our Local Ethics Committee (IRB #10537-7-3-2023). This investigation was carried out with the intention of on 30 patients with gallstone disease who had previous upper abdominal incisions and had admitted to the General Surgery Department, Zagazig University Hospital, between October 2022 and October 2023. All the patients provided written informed consent to participate in the study. The study protocol conformed to the ethical guidelines of the Declaration of Helsinki (1975) for human studies. The inclusion criteria were Patients with chronic calcular cholecystitis who had undergone a previous upper abdominal surgery were included in the study. The exclusion criteria were Patients who were unfit for general anesthesia were excluded. Those suffering from gallbladder cancer, severe coagulation abnormalities, portal hypertension, extensive liver cirrhosis, and bile duct disease. Every patient exhibited symptoms of cholecystitis and pancreatitis, along with empyema and perforation. Not any of the pregnant women were included in the research.

All patients had their medical history recorded, received physical examinations, and underwent various laboratory tests. A complete blood count, blood urea level evaluation, fasting blood sugar measurement, and serum creatinine level measurement were among these assays, liver enzyme analysis [aspartate aminotransferase (AST) and Alanine transaminase (ALT)], serum alkaline phosphatase level measurement, serum bilirubin level measurement (total and direct), serum albumin level measurement, and assessment of prothrombin time and activity., and viral markers for HBV and HCV. Abdominal ultrasonography (U/S) to examine liver size and echo patterns

Confirmation of presence of Gallbladder stones, gallbladder size, wall thickness, stones (size and number), common bile duct diameter, and Common bile duct (CBD) stones.

The patients underwent magnetic resonance cholangiography (MRCP) to rule out the presence of blocking lesions or stones in the biliary system if there was a dilated CBD by U/S or high alkaline phosphatase enzyme. When a patient has acute abdominal pain and tenderness, contrast-enhanced

computed tomography (CT) is often performed as part of the initial workup. Patients who have contraindications to CE-CT, such as pregnancy, acute kidney failure, or an allergy to iodinated contrast agents, typically undergo US only electrocardiogram in patients older than 40 years old or known to be cardiac patients.

**Operative technique:**

Patients were permitted to eat up until midnight and then fast for at least six hours before surgery, or nil by mouth (NPO). Karl-Storz endoscopic set was utilized. Every patient received the same general anesthetic protocol: 1-2% isoflurane for maintenance. Preventive antibiotics were given in three dosages of one gramme. Third-generation cephalosporins: the first one was taken right before surgery, the second one during it, and the third one eight hours afterward. The patient's position: On the surgical table, every patient was positioned supine. placing a naso-gastric (NG) tube in order to compress the stomach. With the helper holding the camera, the surgeon stood to the left of the patient. On the patient's right side stood a second assistant who held the forceps used to remove the fundus. On the right side, next to the patient's feet, was the scrub nurse. On a different platform that was placed on the patient's left side, the laparoscopic instruments were placed.. This setup enables surgeons to easily reach equipment with minimal disorder. Instruments for open surgery were prepared before the start of the laparoscopic session, which was used in cases of failure to complete laparoscopic surgery.

Laparoscopic ports were placed according to the site of the previous ions. Standard procedure applied in LC. Using a zero-degree laparoscope, a four-port method was used, as per **Reddick et al.** First, a rotatory movement was used to insert a 10 mm port through the umbilical site incision. Next, a 10 mm port was inserted in the epigastrium, just below the xiphisternum, under direct vision. Third, a 5 mm port was inserted in the mid-clavicular line, approximately 2.5–3 cm below the right costal margin. Finally, a 4 mm port was inserted in the right anterior axillary line, at the level of the umbilicus underneath direct vision.

We used four options for creating pneumoperitoneum and insertion of 1$^{st}$ trocar: if the prior scar was not at the belly button, A closed approach with a Veress needle was used to produce pneumoperitoneum. In patients with umbilical scars or adhesions, Hasson's technique or the open operation was used; a centimeter horizontal cut was made. Until the underlying fascia was identified, a direct dissection was performed. Kocher's clamps were used to lift the fascia. The underlying layer of skin was carefully separated and released. It was then cut to allow the trocar to enter the abdominal cavity. Two large absorbable stitches were put on both sides of the incision in the fascia, similar to how the umbilical hernia is repaired. Precautions were made when administering these stitches to avoid harm to the underlying organs. The Kocher clamps were then taken off, and a 10 mm blunt trocar was inserted into the peritoneal cavity. The device was taken out and the covering was fixed in place using two sutures that were already in position. In some patients with substantial umbilical adhesions, we also used Palmer's point, which is 3 cm below the subcostal arch in the left mid-clavicular line, as a safe choice for inserting the first trocar. In the area of the abdominal wall that was distant from the previous scars, a cut measuring approximately 1 centimeter was made. There were clamps used to raise the abdomen. A telescope-equipped Visiport optical trocar was showcased. The abdominal wall's many layers were gradually penetrated by the optical trocar. The blade on the end of the visiport slices the tissue that can be seen, and there is a small possibility of harming organs inside the abdomen. Carbon dioxide was originally introduced using automatic devices set at a flow rate of 1 L/min. Then, the flow rate was adjusted to achieve a maximum pressure of 12 mmHg. The patient's right shoulder was elevated while they were in the reverse Trendelenburg posture. After safely reaching the peritoneal cavity, only the adhesions that actually obstructed the view of the area of interest were removed. Intra-abdominal adhesion scores were given based on criteria that were similar to those established by **Blauer and Collins [10].**

Using electrocautery, adhesions that were found between the GB and the omentum or duodenum were gently dissolved. The helper gripped the fundus of the GB and turned it upward and over the superior margin of the liver's right lobe after all four ports were in place. **(Figure 1).**

The sulcus of Rouviere, a stable anatomical landmark, was found, and the hepatocystic triangle was divided above the sulcus. **(Figure 2 )**.

The dissection started right next to the gall bladder using Maryland forceps, and the adhesions were removed until reaching the bottom of the gall bladder. Once the junction of the gallbladder cystic duct was located, the peritoneal covering in Calot's triangle was dissected. After Calot's triangle's peritoneal covering was removed, the

cystic duct and cystic artery were easily distinguished and dissected independently using blunt dissection **(Figure 3).**

The discovery that the gallbladder is only accessible through the cystic duct and cystic artery, two dissected structures, developed a critical view of safety (CVS). The artery and cystic duct were both snipped, with one clip on the gallbladder side and two on the cystic duct side. Dividing the artery before the duct was preferable (Figure 4a, b). Using traction, countertraction, and a monopolar cautery hook, the gall bladder was separated from the liver bed. (Figure 4c).

The gallbladder's tainted fluid that had spilled was removed. The strewn rocks were removed right away. The liver bed was examined once more to make sure there was no bleeding or bile leakage before the gallbladder was fully removed. To make that the previously placed clips or sutures were still in place and held firmly, the remaining portions of the cystic duct and cystic artery were also checked. The remaining portion of the separation was completed and the gallbladder was removed via the epigastric port once the body's equilibrium had been established.

Afterwards, the gallbladder was opened externally to prevent any spills into the port area, the bile was suctioned out, and stones were extracted with sponge-holding forceps. Large boulders were fractured or crushed and gradually removed. The gallbladder inside the abdomen was kept visible using a laparoscope to make sure there were no signs of spillage or rupture. If a larger egress port is required. The gallbladder was removed, and the paracolic gutter, GB bed, Morrison's pouch, and perihepatic areas were all carefully cleaned and suctioned using a lot of saline solution. Suction was used to remove the saltwater. The porta hepatis, the gallbladder bed, and other abdominal regions all remained homeostasis.. A tube was placed in all patients through the side armpit opening to monitor for any issues after surgery such as bile leakage, intestinal damage, or bleeding. The trocars were taken out while being directly observed and sutures were used to close the last port site. If, at any time during the procedure, the surgeon believed that it would be more beneficial for the patient to have open cholecystectomy, they would switch to the open approach. In the treated individuals, gallbladder removal was done using a typical incision below the ribs on the right side.

**Intra-operative data that were assessed:** The surgeon evaluated the challenges encountered during the operation, which included problems with creating pneumoperitoneum, inserting the first trocar, dealing with excessive adhesions that made the anatomy hard to see, performing difficult dissections, potential injury to the organs, bleeding, and the duration of the operation. These difficulties were documented from the initial insertion of the first port until the final closure of the last port, and in cases where the operation had to be converted to an open cholecystectomy.

**Post-operative management:**

Analgesic medication was given with ketorolac for the first 24 hours following the surgery, and then as requested by the patient. Pain after surgery was evaluated using the visual analog scale (VAS) within 24 hours after the operation. A score of zero meant no pain, while a score of 10 indicated the most severe pain. The patients were kept under observation for bile leakage, intestinal leakage, infection, and bleeding. Usually, these problems start to show about 24 hours following surgery. Warm oral fluids were administered to all patients in the evening, provided they were free of nausea or vomiting (ileus) and had regular bowel movements. After a whole day, the bulk of patients were discharged from the hospital. In addition, the length of the hospital stay was assessed. In the surgical outpatient clinic, the patients were evaluated one and four weeks following the procedure.

**Statistical analysis**

Data were fed to the computer and analyzed using the IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp) Qualitative data were described using number and percent. The Kolmogorov-Smirnov test was used to verify the normality of the distribution, and quantitative data were described using range (minimum and maximum), mean, standard deviation, and median. Significance of the obtained results was determined at the 5% level.

## RESULTS

The age of the patients ranged from 30-62 to years with a mean age of 47.03 ± 7.61 years. (Table 1). Seventeen of patients were female (17.30, 56.7%) and 13 were male (13/30, 43.3%) with a female to male ratio1.3:1 and the statistical analysis revealed non-significant predominance of any sex ($p = 0.21$).

All patients in the present study were diagnosed by ultrasonographic examination of the abdomen, 26 patients (26/30, 86.7%) were diagnosed with chronic calcular cholecystitis (CCC); acute calcular cholecystitis (ACC) was the presenting complaint in two patients (2/30, 6.7%), and two patients (2/30, 6.7%) presented with mucocele of gallbladder (Table 2).

In the present study, we used different methods for the first trocar insertion and creation of pneumoperitoneum that were applied according to the site of the previous incision. Methods used were: Veress needle (closed method) wasused in 10 patients (10/30, 33.3%), Hasson's technique (open method) was used in 15 patients (15/30, 50%), visiport trocar was the technique used in 1 patient (1/30, 3.3%), and entry through the Palmer's point was used in 4 patients (4/30, 13.3%) (Table 3).

After safe entry to abdomen and successful pneumoperitoneum established the degree of adhesions was assessed and classified according to their severity by a grading system similar to that of Blauer and Collins, 4 degrees of severity from 1 to 4 were applied; 4 patients had adhesions of grade 1 (4/30, 13.3%);the most common among patients in the present study was grade 2 adhesions that were found in 14 patients(14/30, 46.7%), 6 patients (6/30, 20%) had adhesions of grade 3 while grade 4 (the most severe) was encountered in 6 patients(6/30, 20%) with a mean grade(mean ± SD 2.47 ± 0.97) (Table 4).

The operative time in our patients ranged to 45-125 min with a mean operative time of 66.03±19.62 min, Laparoscopic surgery was completed in less than 1 h in 15 patients (15/30, 50%), while it exceeded 1 h in the other 15 patients (15/30, 50%); among them, 3 cases that were conversion to open surgery and required more time for conversion (>100 min). (Table 5)

Intraoperatively, nine patients (9/30, 40%) had complications in the form of bleeding in six patients (6/30, 26.7%), three of them(3/30, 10%) bleeding was from adhesiolysis, while in two patients(2/30,6.7%) bleeding was from injury to the cystic artery and in the sixth case there was combined bleeding from adhesiolysis and from injury to cystic artery, rupture of the gall bladder encountered in three patients (3/30, 10%), two of them had only GB rupturebut in the other case, GB rupture was combined with bleeding, surgery was completed laparoscopically, and ruptured gallbladder didn't affect the conversion rate.(Table 6)

In the present study, 30 patients underwent to laparoscopic cholecystectomy. 27 patients (27/30,90%) were completed laparoscopically, while 3 patients (3/30,10%) were converted to open surgery with a conversion rate of 10%; the cause of conversion was as follows: one patient we failed to initiate pneumoperitoneum (1/30, 3.3%) due to dense adhesions, weencountered in a second converted patient (1/30,3.3) dense adhesion in the periportal area, which was very difficult to perform adhesiolysis; in the third converted patient(1/30,3.3%), small intestine injury was developed that resulted during performance of adhesiolysis, cholecystectomy completed by open laparotomy, and SI injury treated by direct suturing and closure of the injured part without any post-operative complications(Table 7).

Postoperatively 12 patients (12 /30, 26.7%) had complications in the form of port site wound infection in 3 patients (3/30, 10%),1 case (1/30, 3.3%) had bile leakage, MRCP was done and there was neither CBD and hepatic ducts injury nor CBD stones, the patient was treated conservatively and the leakage stopped after 4 days and the patient was discharged in the seventh day, the exact cause of the leakage wasn't detected moreover cystic duct stump or accessory bile duct in liver bed would be the cause of leakage; bleeding was encountered in two cases (2/30,6.7%) conservative treatment were applied to both patients and the bleeding stopped after 1day in one case and after 2 days in the other case, bleeding most occasionally was generated from sites of adhesion dissection during operation, intraperitoneal collection of pus were manifested in one patient (1/30,3.3%) diagnosed by U/S that occurred after discharge of the patients in the seventh day of operation and the patient was readmitted to hospital and was treated by inserting a pig-tail catheter under U/S guidance, we observed that this patient had intraoperative gallbladder rupture as a result of periportal adhesion dissection with spillage of stones and infected mud inside the abdomen and that would be the cause of pus formation in spite of administered proper irrigation and suction of the spilled contents, chest infection was detected in 5 patients (5/30)whom were treated by parenteral antibiotics and follow up, they improved without any long term sequels.(Table s1)

Pain score in our study ranged from1 to 7 using visual analog scalethat graded pain from 1 to 10 according to severity, with mean ± SD 3.70 ±1.60 %. (Table s2)

**Table (1):** Distribution of the studied cases according to demographic data (n=30)

| | No. | % |
|---|---|---|
| **Sex** | | |
| Male | 13 | 43.3 |
| Female | 17 | 56.7 |
| **Age (years)** | | |
| <50 | 20 | 66.7 |
| ≥50 | 10 | 33.3 |
| Min. – Max. | 30.0 – 62.0 | |
| Mean ± SD. | 47.03 ± 7.61 | |
| Median | 48.0 | |

**Table (2):** Distribution of the studied cases according to presentingcomplain (n=30)

| Presenting complain | No. | % |
|---|---|---|
| Chronic calcular cholecystitis | 26 | 86.7 |
| Acute calcular cholecystitis | 2 | 6.7 |
| Mucocele of gallbladder | 2 | 6.7 |

**Table (3):** Distribution of the studied cases according to techniques usedin first trocar insertion (n=30)

| Techniques used in first trocar insertion | No. | % |
|---|---|---|
| **Hasson's technique** | 15 | 50.0 |
| **Veress needle** | 10 | 33.3 |
| **Palmer's point** | 4 | 13.3 |
| **Visiport** | 1 | 3.3 |

**Table (4):** Distribution of the studied cases according to intra-abdominal adhesion score (n=30)

| Intra-abdominal adhesion score (0 – 4) | No. | % |
|---|---|---|
| 1 | 4 | 13.3 |
| 2 | 14 | 46.7 |
| 3 | 6 | 20.0 |
| 4 | 6 | 20.0 |
| Min. – Max. | 1.0 – 4.0 | |
| Mean ± SD. | 2.47 ± 0.97 | |
| Median | 2.0 | |

**Table (5):** Distribution of the studied cases according to operation time (min) (n=30)

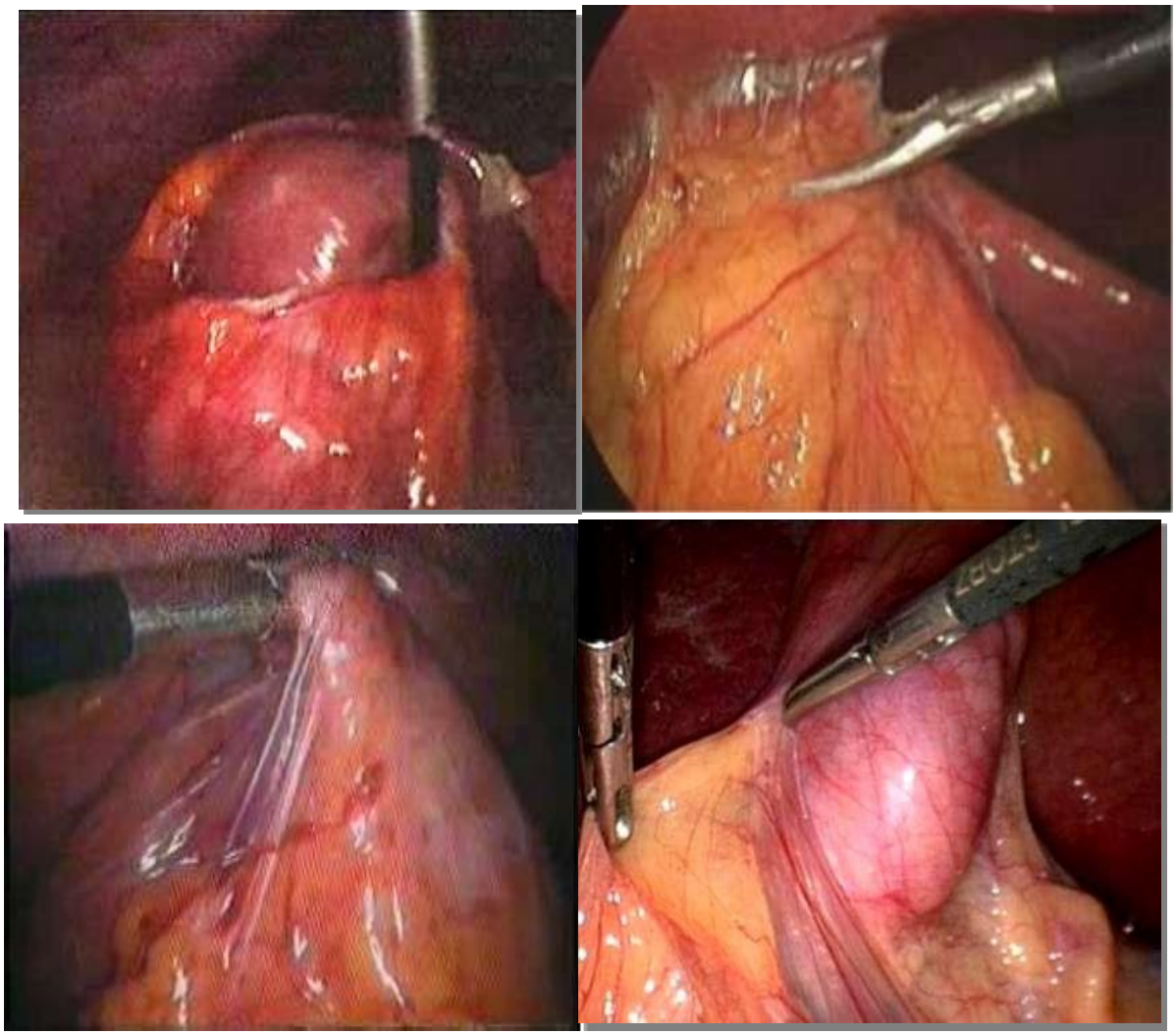
| Operation time (min) | No. | % |
|---|---|---|
| <60 min. | 15 | 50.0 |
| ≥60 min. | 15 | 50.0 |
| Min. – Max. | 45.0 – 125.0 | |
| Mean ± SD. | 66.03 ± 19.62 | |
| Median | 60.0 | |

**Table (6):** Distribution of the studied cases according to intra operative complications (n=30)

| Intra operative complications | No. | % |
|---|---|---|
| No | 21 | 70.0 |
| **Yes** | **9** | **30.0** |
| **Bleeding** | **6** | **20.0** |
| From adhesiolysis | 3 | 10.0 |
| Injury o Cystic artery | 2 | 6.7 |
| Combined | 1 | 3.3 |
| **Rupture of GB** | **3** | **10.0** |
| Alone | 2 | 6.7 |
| Combined with bleeding | 1 | 3.3 |

**Table (7):** Distribution of the studied cases according to conversion toopen and causes of conversion (n=30)

| Conversion to open | No. | % |
|---|---|---|
| No | 27 | 90.0 |
| **Yes** | **3** | **10.0** |
| Failed pneumoperitoneum from massive intraperitoneal adhesions | 1 | 3.3 |
| Dense adhesions in periportal area | 1 | 3.3 |
| Small intestine injury | 1 | 3.3 |



**Figure(1):** Dissection of peri-cholecystic adhesions.

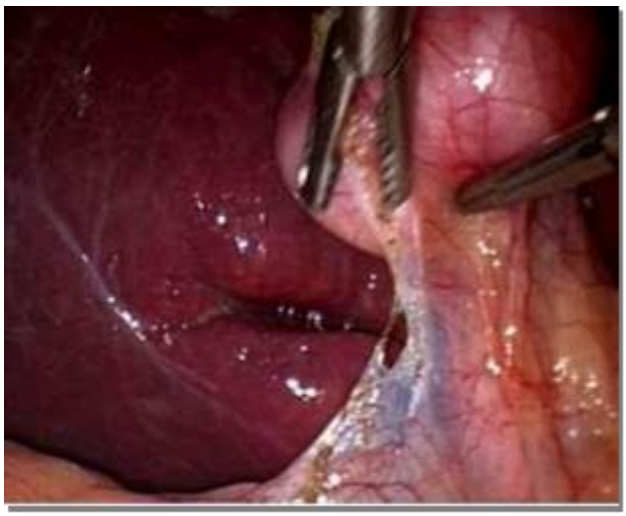


**Figure (2):** Dissection is close to GB above Rouviere's sulcus

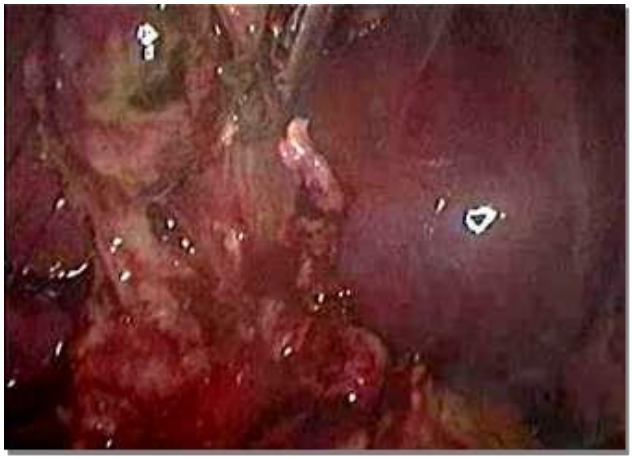


**Figure (3):** Identification of Calot's triangle.

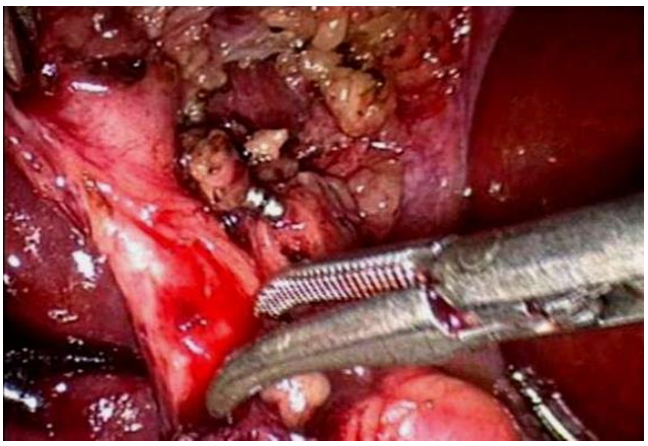


Fig 4a: Clipping of cystic artery.

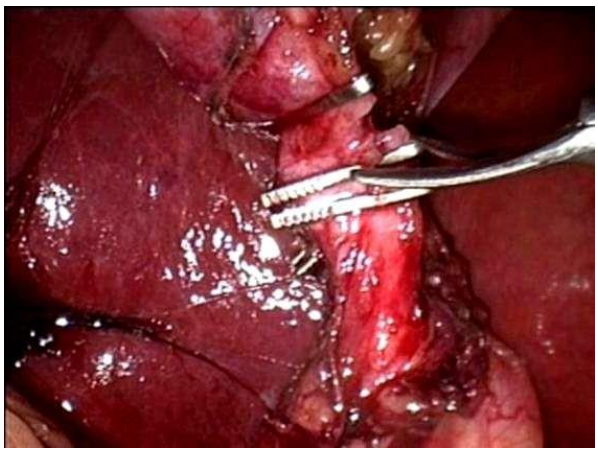


Fig 4b: Cutting of cystic duct after its clipping.

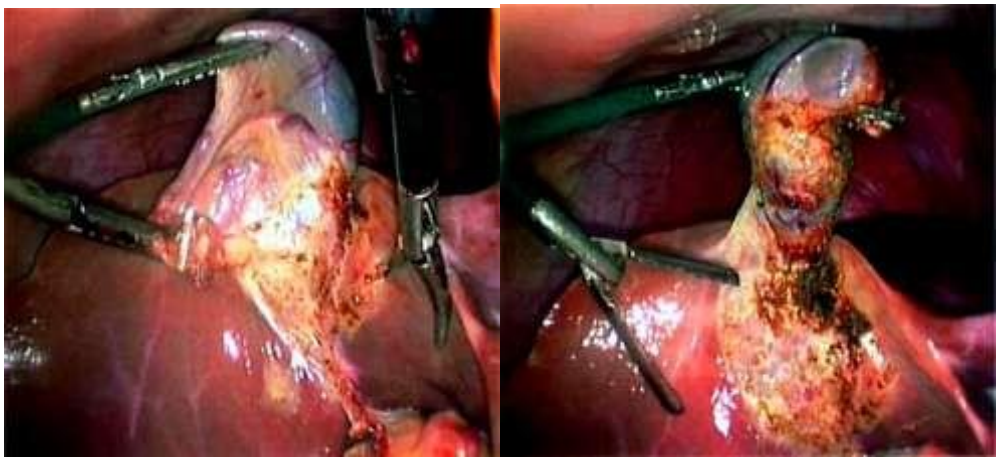


Fig 4c: Removal of GB from its bed.

**Figure (4):** Clipping of cystic artery

## DISCUSSION

In the present study laparoscopic cholecystectomy was performed to 30 patients17(56.7%) were females while 13 (43.3%)were males, the age of the patients ranged from 30 to 62 years with a mean age of47.03 ± 7.61 years, all of them had previous upper abdominal incision.

The study by **Bukhari et al. [11],** 255 (51%) of the 500 patients that were part of the trial were men, and 245 (49%) were women. The patients ranged in age from 35 to 45. In a similar vein, **Karayiannakis et al. [6]** conducted a retrospective analysis of 473 patients who had previously undergone abdominal surgery (58 patients with UAS and 415 patients with LAS). Our study included both upper and lower abdominal incisions, with 55% of patients having previously undergone lower abdominal surgery and 45% having previously undergone upper abdominal surgery. Of them, 402 patients had undergone one previous surgical procedure, 59 had undergone two previous operations, 11 had undergone three prior procedures, and 1 had undergone four prior surgeries. On the other hand, participants in our study had only one incision.

Regarding the same topic, **Kohli R. et al. [12]** conducted a study that looked at the number of patients included and the viability of laparoscopic cholecystectomy in patients who had and had not had prior abdominal surgery.

The 195 patients in this study ranged in age from 18 to 70 years, with 8 having previously undergone upper abdominal incisions, 97 not having previously undergone abdominal surgery, and 90 having previously undergone lower abdominal surgery.

In the present study, out of the 30 patients, elective laparoscopic cholecystectomy was performed in 26 (86.7%) patients whose main complaint was chronic calcular cholecystitis, while in 2(6.7%) patients; acute cholecystitis was the presenting diagnosis. Mucocele of GB was the presenting complaint in the other 2(6.7%) patients. Although that one patient with mucocele and one patient with acute cholecystitis were converted to open surgery, there was no association between these conditions and the conversion, as failed pneumoperitoneum was the cause of conversion in the patient with mucocele, while small intestine injury during adhesiolysis was the precipitating factor in conversion in the patient with acute cholecystitis. As a consequence of, we observed that acute cholecystitis or mucocele of GB in previously operated abdomen would increase operative time, intraoperative complications but didn't affect the rate of conversion to open cholecystectomy. Hence, **Ercan et al., [13],** excluded patients with acute cholecystitis from their study to examine only one variant (previous UAS) on the outcome of LC, and like **Ercan et al. [13],** all cases inthe study of **Kohli et al. [12],** were diagnosed with CCC.

Our aim was to ensure the safe insertion of the first trocar in all patients. To do this, we employed various ways for inserting the first trocar, so avoiding any harm to the intestine or any structure that might be attached to the abdominal wall. We utilized the Veress needle in 10 (33.3%) patients, while the open Hasson technique was the most commonly employed procedure in 15 (50%) individuals. Another technique employed in four (13.3%) patients involved inserting the first trocar through Palmer's point, which is situated in the left upper quadrant. In one (3.3%) patient, we accessed the abdomen using a Visiport.

We determined which approach to utilize based on the type of incision observed. For patients with

incisions located far from the umbilicus, we employed a veress needle. However, for patients with incisions near the umbilicus or those who had previously undergone hernial repair with mesh placement, we utilized the open approach. In patients with midline incisions, we employed the Palmer's point. We discovered that all the techniques we employed were secure for the initial trocar insertion, as long as the appropriate approach was utilized for each individual patient. **Karayiannakis et al. [6]**, employed the open technique in around one-third of the cases they analyzed, along with other methods such a Veress needle or a visiport trocar. They found that the open method was more effective than other methods in preventing injury to blood vessels or internal organs.

After achieving safe access, our interests shifted, and the major objective was to execute adhesiolysis adequately to insert a second cannula for the purpose of viewing, retraction, and dissection, as well as for the planned and flexible use of additional ports. We removed tissue connections that were obstructing proper access to the surgical area and the execution of the treatment. We noticed adhesions in all patients in our study, but with different grades; therefore, we graded adhesions according to their severity from 1 to 4. grade 1 found in 4(13.3%) patients while grade 2found in greater number of patients that were 14(46.7) patients grade 3 and 4 adhesions were found in 6(20%) patients respectively. Adhesiolysis was needed only in 20(66.7%) patients, while 10(33.3%) patients experienced adhesiolysis distant from operative field thus there was not necessary for adhesiolysis.

Consistent with the findings, we found that the style of incision and indication of prior surgery were the main factors influencing the degree and severity of adhesions. The effects of various upper and lower abdominal surgical incision types on the outcomes of laparoscopic cholecystectomy were investigated by **Ercan et al. [13].** Consistent with our results, 90.2% of patients who had previously undergone upper abdominal surgery had adhesions, and 77.1% of these patients needed adhesiolysis **[14].** Similar findings were made by Vikas et al. (2015), who found that 92.3% of patients had adhesions and that 92.3% of those cases required adhesiolysis.

Adhesions were found to be more common in individuals who had previously undergone upper abdominal surgery (70.7%) as opposed to lower abdominal surgery (58.8%) in a research done in 2004 by Karayiannakis et al. But compared to those seen following lower abdominal surgery, the adhesions in the upper abdomen were denser and more widespread. The majority of adhesions from prior upper abdominal surgery, according to **Akyurek et al. [14],** did not alter the anatomy of the upper right quadrant of the abdomen or negatively impact the outcome of laparoscopic cholecystectomy.

However, **Singh K and Ohri [15]** demonstrated that adhesions were the primary reason for switching to open cholecystectomy in patients having upper abdominal surgery. They also noted that a skilled surgeon can reduce this conversion rate through their expertise**. Caprini et al. [16],** recommended intraoperative ultrasonography to detect intra-abdominal adhesions.

We reported intraoperative complications in 9 patients (30%); GB rupture was present in 3 patients, acute inflammation was the cause of rupture in 1 patient, traction on GB during performance of adhesiolysis was the precipitating factor for GB rupture in 2 patients, bleeding was an annoying peroperative complication that was encountered in 6 patients and occurred either during dissection of the highly vascularized adhesions or due to injury to cystic artery. Both of these complications did not affect the conversion rate but increased the mean operative time.

In a comparative study by **Kohli et al. [12],** bleeding was observed in 11% of Patients having prior upper abdominal surgeries, yet in the majority of instances, it was readily managed. After that, they suggested some measures to manage bleeding: avoiding hasty use of cautery, irrigating and aspirating the bleeding area, closing the bleeding vessel, and applying pressure for five minutes with a gall bladder, sponge piece, or roll of gauze. They recommended considering open surgery if, following these measures, the source of the bleeding could not be clearly determined. The incidence of gall bladder rupture was reported to be 28% in the same study, up from 12% in the prior study. in the study by **Schafer et al. [17] ,** and **Phillips et al. [18],** reported a higher incidence of GB rupture of 40%.

In the current study, 27(90%) cases were completed laparoscopically despite intraoperative complications that took place in 9 cases (bleeding in 6 patients and gallbladder rupture in 3 patients), while 3 (10%) cases were converted to open cholecystectomy; the cause of conversion was as follows ;1 case due to failed pneumoperitoneum as there were dense adhesions inside the abdomen, this case had a midline upper plus lower incision that operated for stab injury to abdomen, dense adhesions around hepatoduodenal ligament were the cause of conversion, in another

patient who had a midline upper plus lower incision that operated for RTA trauma. The last case was due to injury of the small intestine during adhesiolysis. This case had an upper midline incision and was operated for perforated peptic ulcer, while the presenting complaint was acute cholecystitis, which made the dissection of the well-formed adhesions more difficult.

The conversion rate of our study was 10 % and to some extent matched with the study of **Karayiannakis et al. [6],** Analyze the conversion rate (19%, 3.3%, and 5.4%, respectively) among patients who had prior upper, lower, and no abdominal surgery. This rate was higher than that of the study by **Akyurek et al. [14],** where the conversion rate for patients who had previously undergone upper abdominal surgery was 2.2%, and lower than that of the study by Kohli et al., 2014, which had a rate of 30%. excluding those with acute cholecysistitis., biliary pancreatitis, CBD stone and morbid obesity from their study and reported that failure of creation of pneumoperitoneum and dense adhesions in Calot's triangle were the leading causes of conversion, In the same study, it was found that if a person had previous upper abdominal surgery together with any of these excluded disorders, it would lead to an increase in the risk of preoperative complications, the average time taken for the operation, the rate of conversion to another procedure, and the average time spent in the hospital after the operation..

Although the results of prior abdominal procedures have been somewhat inconsistent, they have contributed to the shift to open surgery. Some studies (**Akyurek et al. [14],** and **Kanaan et al. [19]** Claim that prior abdominal surgeries do not serve as a reliable indicator for the need to switch to a different procedure, as the adhesions resulting from These procedures don't change the upper right quadrant's structure, thus they don't negatively affect how well laparoscopic cholecystectomy works. However, others **Ibrahim et al. [20],** have proposed that prior upper abdominal surgeries may serve as a predictor of conversion risk. Our findings lie between the two opinions: when the previous incision is located away from our laparoscopic field, the procedure passes without any complications, and the operative time is similar to that without previous abdominal operations, while when the previous incision was closely related to the field of interest, the operative time, rate of conversion, and intraoperative complications increased.

Operative time ranged from 45 min to 125 min with a mean duration of surgery (66.03 ± 19.62 min). Operative time in 14(43.3%) cases was less than 1 h, while it exceeded 1 h in patients with intraoperative complications or the converted cases due to difficult operation and time taken for conversion. The duration of surgery for patients with gallbladder rupture (3 patients) was around 10 minutes longer, perhaps due to the time required for cleaning up the surgical area. When a hole happens, the bile should be totally sucked out and irrigation should be utilized generously. The opening in the gallbladder is most effectively secured with a gripping tool. Additionally, we observed that patients requiring adhesiolysis (20 patients) took longer than patients who did not require adhesiolysis. (10 patients ).

Differences in surgical duration were significant in various investigations, as shown in table 5. The extended duration of the procedure reported in the study by **Lee et al. [21],** was attributed to patients who had a prior gastrectomy scar.

In the present study, 12 patients (40%) experienced postoperative problems, including port site wound infection in 3 patients.,1 patients had bile leak, which treated conservatively; bleeding occurred in 2 patients and stopped after from 1 to 2 days post operatively; chest infection was encountered in 5 patients, and the last case showed intra-abdominal collection of pus that occurred after discharge of the patient treated by insertion of pig tail for drainage of pus, Our results indicated that these issues did not have an impact on the patient's condition in terms of postoperative impairment or long-term unfavorable effects..

Post-operative pain was assessed using the visual analog score (VAS) ranging from 0 (no pain) to 10 (the worst pain) and reported a range from 1 to 7 with a mean (3.70 ± 1.60); intra operative complications, in addition to conversion to open surgery, could increase the postoperative pain score.

In the present study, two thirds (67.7%) of our patients were discharged after 1 d, while in the other third (33.3%) of patients their discharge ranged from 2 to 7 days according to presence of intra-or post-operative complications also prolongation of hospital stay was found in converted cases.

Though perspectives on the matter may differ, in the current study, all patients who had previously undergone surgery had drains inserted in order to screen for potential intestinal damage.

**Limitations:**

This study conducted at a single location had a limited number of participants. This is a study that describes different varieties, rather than comparing them. Individuals with various upper abdominal

incisions were enrolled in this study.

## CONCLUSION

It was discovered that not every patient who had undergone upper abdominal procedures had complications while undergoing a laparoscopic cholecystectomy. However, only individuals who have already undergone significant abdominal surgery and had incisions near the area where the cholecystectomy was performed reported an increase in the time it took for the operation, the presence of severe adhesions, complications during the surgery, the need to convert to another procedure, and a longer hospital stay.

**Declaration of interest**

The authors report no conflicts of interest. The authors along are responsible for the content and writing of the paper.

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**Table (s1): Distribution of the studied cases according to post-operativecomplications (n=30)**

| Post-operative complications | No. | % |
|---|---|---|
| No | 18 | 60.0 |
| **Yes** | **12** | **40.0** |
| **Chest infection** | **5** | **16.7** |
| **Port site wound infection** | **3** | **10.0** |
| **Bleeding** | **2** | **6.7** |
| Stopped after 1 days | 1 | 3.3 |
| Stopped after 2 days | 1 | 3.3 |
| **Bile leakage** | **1** | **3.3** |
| **Intra peritoneal collection** | **1** | **3.3** |

**Table (s2): Distribution of the studied cases according to post-operativepain score (n=30)**

| Post-operative pain score (0 – 10) | No. | % |
|---|---|---|
| 1 | 1 | 3.3 |
| 2 | 7 | 23.3 |
| 3 | 7 | 23.3 |
| 4 | 7 | 23.3 |
| 5 | 3 | 10.0 |
| 6 | 3 | 10.0 |
| 7 | 2 | 6.7 |
| Min. – Max. | 1.0 – 7.0 | |
| Mean ± SD. | 3.70 ± 1.60 | |
| Median | 3.50 | |

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