

Prevalence of Complications in Laparoscopic Cholecystectomy in Extracting Gallbladder by Using Supra-Umbilical Port Versus Epigastric Port in Sulaimani Teaching Hospital: A Prospective Case Series Study

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Abstract

Background: Depending on the surgeon's preference, different locations for trocar incision can be used to extract the gallbladder. Some studies are claiming that epigastric port is better for retrieval due to easiness for the surgeon as there is no need to change the position of the telescope and readjustment of the surgeon's position. Other studies show the superiority of umbilical port in terms of pain.

Setting: Sulaimani Teaching Hospital.

Aims: The current work aims at evaluating the port site for gallbladder retrieval in LC in terms of time for extracting the specimen, frequency of port site pain, surgical site infection, and incisional hernia.

Patients and methods: This is a prospective randomized study including 108 patients who underwent laparoscopic cholecystectomy. It was conducted in Sulaimani Teaching Hospital from October 1st, 2020, to September 30th, 2021. Patients were divided into two groups matched in gender and age: Group A: Gallbladder was extracted from the epigastric port while in Group B: Gallbladder was extracted from the supra-umbilical port.

Results: A two comparable groups of patients matched in gender and age were recruited with a mean age of 41.2 ± 11.04 years ranged 20-68 years. Overall, 52.78 % (n=57) were female and 47.22% (n=51) were male with F/M ratio of 1.11/1. The time of the LC for $[21 \pm 4 \text{ min}]$ was more in group B [n= 42, 38.9%] patients in contra to group A [n=37, 34.3%] patients, while for $[33 \pm 2 \text{ minutes}]$ it was more in group A [n= 6, 5.6%] patients. Retrieval of the almost all the excised gall bladder (n=54, 98.18% patients) via supraumbilical port needs less time (≤ 5 minutes) in comparison to epigastric port (n=40, 75.47% patients).

Conclusion: Based on these findings the safety and ease of supra-umbilical port for extraction of gallbladder during LC has been better than that in using epigastric port. Furthermore, it has taken less operative time with less patients complained of pain or surgical site infection, abscess, and port site incisional hernia.

Keywords: complication, cholecystectomy, incision, laparoscopy, ports

Introduction

In 1985, Erich Muhe initially performed LC(LC); the procedure had gained clinical acceptance in France by efforts of Mouret in 1987, then after the practice of laparoscopic cholecystectomy (LC) spread worldwide in the 1990s⁽¹⁾.

LC is a preferred method of gallbladder removal for symptomatic gallbladder stones and for other benign conditions; the use of LC in the management of gallbladder disease has shown several advantages over open cholecystectomies such as reduced postoperative pain, risk of surgical site infections, and incidence of incisional hernia, and quicker recovery⁽²⁾.

However, the complications of port-site following laparoscopic surgery is around 21 per 100,000 cases, but is increasing with the size of the incision for the ports and number of the trocars⁽³⁾. Retrieval of the gallbladder is an important terminal event of LC and is reported as the factor inducing postoperative port site pain⁽⁶⁾.

Both umbilical port and epigastric port have been recommended for retrieval of the gallbladder in LC; however, there is a huge debate on which one is superior⁽⁴⁾. Depending on the surgeon's preference, different locations for trocar incision can be used to extract the gallbladder⁽⁵⁾, some studies are claiming that epigastric port is better for retrieval due to ease for the surgeon as there is no need to change the position of the telescope and readjustment of the position of the surgeon^(4,5,7). Other studies show the superiority of umbilical port in terms of pain^(4,7).

To date, there is no evidence to support any one port being superior to the other for GB extraction while considering the postoperative-port site pain⁽⁷⁾.

The current work aims to evaluate the port site for gallbladder retrieval in LC in terms of time for extracting the specimen, frequency of port site pain, surgical site infection, and incisional hernia.

Patients, materials, and methods:

This is a prospective randomized study including 108 patients underwent LC. It was conducted in Sulaimani Teaching Hospital from October 1st, 2020, to September 30th, 2021. An originally-designed questionnaire was reviewed and accepted by four professors in surgery from the College of Medicine-University of Sulaimani.

The informed consents were signed by both patients and the surgeons prior to their inclusion in the study. The work was also approved by the appropriate Ethics Committee of Arabic Board of Medical Specialties (No.1703 on 23 /09/ 2021), and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki. The thesis was approved by qualified surgeons, board of surgery qualification, and did all the laparoscopic cholecystectomies with a four-port technique under general anesthesia (epigastric port and supra-umbilical port both as 10 mm while lateral ports both as 5 mm). No endobags was available for extraction of gallbladder. The fascia closed by aid of fascia closer in patients when the retrieval port was extended because of using Hasson's access technique and on extracting the large or rigid gallbladder specimens. A detailed questionnaire was used in the interview of the patients, regarding demographic, clinical, surgical, early postoperative course of the condition, and McGill Pain Questionnaire (MPQ) ⁽⁸⁾ included for evaluation of the postoperative port site pain.

Time of the cholecystectomies measured from skin to complete suturing of the incisions in minutes, and time of extraction of the gallbladder measured from separation to the complete delivery of the specimen out.

Exclusion criteria for patients and methods

1. Urgent LC.
2. Needs Exploration of common bile duct.
3. Operations by surgical trainees.
4. Covid-19 cases with gall stones.
5. Previous laparotomy or laparoscopy

A postoperative port site pain was assessed during the stay in the hospital. Other potential complications were observed clinically and ultrasonography when applicable, at first visit (one week after surgery), one month to 3, and 6 months. Patients were divided into two groups matched in gender and age; Group A: gall bladder was extracted from the epigastric port while Group B: gallbladder was extracted from the supra-umbilical port. The pain in all the incisions of the ports was estimated by analog pain scale. All the data were collected, organized, and analyzed by Statistical Package for the Social Sciences (SPSS) version 21.

The Results

A two comparable groups matched in gender and age were recruited with the mean age of patients was 41.2 ± 11.04 years ranged 20-68 years. Overall, 52.78 % (n=57) were female and 47.22% (n=51) were male with F/M ratio of 1.11/1. Table 1.

Gender was comparable in both groups A, B. However, male patients were slightly more [n=27, 25 %] in group B than [n=24, 22.2 %] in group A.

Overweight patients were larger in number in group B [n=12, 11.1%] patients than group A [n=9, 8.3%] patients. Obese

patients were larger in number in group B [n=9, 8.3%] patients than group A [n=7, 6.5%] patients table 2.

The time of the LC for [21±4 min] was more in group B [n= 42, 38.9%] patients than in group A [n=37, 34.3%] patients, while [33±2 minutes] was more in group A [n= 6, 5.6%] patients, see Table 3

Retrieval of the almost all the excised gallbladder (n=54, 98.18% patients) via supraumbilical port needs less time (≤ 5 minutes) in comparison to epigastric port (n=40, 75.47% patients) as seen in Table 4. No perforation of gallbladder was recorded during or on extraction of gallbladder.

The LC was complicated in twelve patients of group A, and ten in group B, while one patient in each group was converted into open Table 5

The parkland grading scale ⁽⁸⁾ was comparable for all grades in patients in both groups A and B, as in Table 6

More patients in group B stayed only 6-10 hours in the hospital, while 3, 2 patients in group A, B stay in hospital for over 24 hours, see Table 7 and Figure 1 respectively.

The port site pain post operation was present in group A [n= 17, 15.7%] patients verses group B [n=11, 10.1%] patients, and the port site superficial surgical; site infection, port site hernia were present only in group A. There were neither sepsis nor mortality in the patients of the both groups A, B, as detailed in Table 8.

Table 1: Number and percent of male and female patients.

| Male | Group A | Group B | Total |
|--------|---------|---------|-------|
| Female | 29 | 28 | 57 |
| Male | 24 | 27 | 51 |

Table 2: Frequency of the body weight of the patients in both groups.

| Body Wight | Group A | Group B | P value |
|----------------|---------|---------|---------|
| Normal weight | 32 | 31 | 0.56 |
| Under weight | 3 | 0 | |
| Over weight | 9 | 12 | |
| Obese | 7 | 9 | |
| Morbidly obese | 2 | 3 | |

Table 3: Time of the laparoscopic cholecystectomy from the skin to skin in both groups.

| Groups | 21±4 min | 28±2 min | 33±2 min | 40±4 min | P value |
|---------|----------|----------|----------|----------|---------|
| Group A | 37 | 8 | 6 | 2 | 0.39 |
| Group B | 42 | 7 | 5 | 1 | |

Table 4: Time needed for the gall bladder extraction from separation of the gall bladder from its bed to complete delivery of the gall bladder out of abdomen.

| Groups | 3min | 3-5min | 5-10min | Above11min | P value |
|---------|------|--------|---------|------------|---------|
| Group A | 23 | 17 | 9 | 4 | 0.032 |
| Group B | 29 | 25 | 1 | 0 | |

Table 5: History of open and laparoscopic surgery in patients of both both groups.

| Groups | Laparoscopy | Laparotomy | P value |
|---------|-------------|------------|---------|
| Group A | 4 | 7 | 0.046 |
| Group B | 5 | 13 | |

Table 6: Consequences of the operations in both groups.

| Groups | Straight forward | Complicated | Conversion to open | P value |
|---------|------------------|---------------|--------------------|---------|
| Group A | 40 | 12 22.64 % | 1 | 0.79 |
| Group B | 44 | 10 18.18% | 1 | |

Table7: Parkland grading scale for state of gall bladder in both groups.

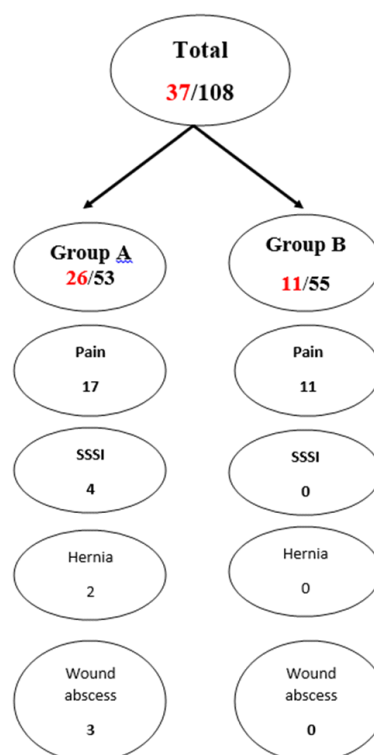
| Groups | Stage 1 | Stage 2 | Stage 3 | Stage 4 | Stage 5 | P value |
|---------|---------|---------|---------|---------|---------|---------|
| Group A | 43 | 5 | 4 | 0 | 1 | 0.98 |
| Group B | 44 | 6 | 4 | 0 | 1 | |

Table 8: Length of the Stay in hospital for patients of both groups.

| Groups | 6-10 hr.s | 11-15 hr.s | 16-20 hr.s | 21-24 hr.s | > 24 hr.s | P value |
|---------|-----------|------------|------------|------------|-----------|---------|
| Group A | 39 | 4 | 6 | 1 | 3 | 0.81 |
| Group B | 45 | 4 | 2 | 2 | 2 | |

Table 9. Surgical post operations complications found during follow up in both groups .

| Groups | Port site pain | SSSI | Port site abscess | Port site hernia | Sepsis | Mortality | P value |
|---------|----------------|------|-------------------|------------------|--------|-----------|---------|
| Group A | 17 | 4 | 3 | 2 | 0 | 0 | 0.17 |
| Group B | 11 | 0 | 0 | 0 | 0 | 0 | |

**Figure 1:** incoherence of post-operative complications in patients of both groups A, and B.

Discussion

The difference in body weight in patients of both group A, B had statistically non-significant correlation (P – value =0.56) with the ease of the operations and postoperative complications. More than half of the patients were with average weight in both group A, and B ($n = 32$, 29.6%) and ($n = 31$, 28.7%) in this order, meanwhile 3 patient were underweight in group A and larger number of patients were overweight in group B ($n = 12$, 11.1%).

Twenty-three patients in group B had an excess weight; others had comorbidity like diabetic mellitus and hypertension, in contrast to group A which contains nineteen patients with extra weight. Usually excess weight and obesity will make the LC difficult^(9,10) and needs more time^(11,12), but in the current work most of the operations in group B was straightforward and required shorter time. Meantime patients in group A were in need of longer operative time, and longer time for extraction of the gallbladder (Table 3 and 4) and it contains a smaller number of overweight and obesity. The time of the operations needed in both groups was less than that mentioned in the literature. Jacob, et al.,⁽¹³⁾ states in their study that the mean operation time was 50.92 ± 1.55 minutes, and prolonged surgery increases the risk of complications and prolongs the postoperative hospital stay⁽¹⁴⁾.

More than three quarters of the operations were completed within 17 to 25 minutes (from skin to skin) in both group; group A ($n = 37$, 34.3%) and in group B ($n = 42$, 38.9%).

Although the difference in time of the operation was statistically non-significant (P -value = 0.39) as seen in Table 3, the length of time of the laparoscopic cholecystectomies was greater in patients of group A.

The time for retrieval of almost all the excised gallbladder ($n=54$, 98.18%) was less than 5 minutes in supraumbilical port group versus two thirds of the patients in epigastric port group ($n=40$, 75.47%), table 4.

All patients with history of previous abdominal operations were excluded to avoid bias as it is well known that because prior abdominal surgery, raises the risk of abdominal wall adhesions, has been identified as one of the major risk factors", for complications during laparoscopy^(14,15,16,17,18).

Albeit the patients in both group A and B were with comparable scales in Parkland grading (43, 44) in grade 1 (5, 6) in grade 2 (4, 40) in grade 3 respectively as seen in Table 6. These declare that the state of the gallbladder (P – value 0.98) was comparable and did not affect the time of the operation and sequel, period of the stay in the hospital, as seen in Table 7, whatever the method used for of the extraction of the gallbladder (tables 3, and 6), while other studies found the higher grades of parkland scale associated with more difficulty and complications^(19,20,21,22).

Regarding the surgical complication of the port site incisions; there was pain at incision in eleven patients with supra-umbilical incision while seventeen patients in group A were with pain. Four patients developed (SSSI) three patients developed port site abscess, and two patient developed port site hernia. All these may mean that extraction of the gallbladder from supra umbilical port may be superior, easier and with less surgical complication in comparison to extraction from the epigastric port incision, as shown in Table 8, Figure 1. Meantime other studies considered other variables rather than port of extraction as a risk factor for complications, like male gender^(23,24), advanced age,⁽²⁵⁾ ASA grade,⁽²⁶⁾ excess weight⁽²⁷⁾.

In supra-umbilical port incision there will be no fat to traverse ⁽²⁸⁾, meanwhile in epigastric port incision, the trocar and contaminated gallbladder specimen will pass through the bulk of the adipose tissue of the falciform ligament, which will be traumatize, and infarcted partially, ⁽²⁹⁾ and contaminated by the extraction⁽³⁰⁾. It is well known that adipose tissue could be perturbed by pathogens, with inbuilt ability to store pathogens, and get infection easily ^(31,32).

Conclusion

Based on these findings the safety and ease of supra-umbilical port for extraction of gallbladder during LC has been better than using epigastric port. Furthermore it needs less operative time and with less patients complained of pain or surgical site infection, abscess, and port site incisional hernia.

Conflict of interest:

The authors declare that there is no conflict of interest

Acknowledgements:

Thanks to God, Who help me in every steps of my life.

Thanks for my patients, and Mrs. Rayan Husamalden for her statistics help.

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