

# Minimizing Complications of Port Insertion after Laparoscopic Cholecystectomy

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## ABSTRACT

**Background:** The morbidity associated with cholecystectomy is attributable to injury to the abdominal wall in the process of gaining access to the gallbladder (i.e., the incision in the abdominal wall and its closure) or to inadvertent injury to surrounding structures during dissection of the gallbladder. Efforts to diminish the morbidity of open cholecystectomy have led to the development of laparoscopic cholecystectomy, made possible by modern optics and video technology.

**Objective:** To study the complications that occur at port site insertion and to minimize complications that occur after laparoscopic cholecystectomy.

**Methods:** Between May 2017 and June 2018, 200 patients with symptomatic gall stone disease were admitted to Al-Mosul general hospital and Mosul private hospitals. They were subjected to laparoscopic cholecystectomies. Using antibiotics preoperatively, povidine iodine 10% and left it to dry and fascial repair under vision decrease the complications.

**Results:** Intra-operative and post-operative complications noted mainly in umbilical port site, mainly bleeding, wound infections and hernia. The incidence of gall stone disease was more common in female age 31-40 years, most of them obese with obesity class II, majority of patients presented with repeated attacks of biliary colic.

**Conclusions:** Laparoscopic cholecystectomy is one of the most frequently performed laparoscopic operations. It has a low rate of mortality and morbidity. It is a safe and effective procedure in almost all patients presenting with cholelithiasis.

**Keywords:** Complication, Laparoscopy, Ports, Port site bleeding, Port site hernia, Port site infection.

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Cholecystectomy is the treatment of choice for symptomatic gallstones because it removes the organ that contributes to both the formation of gallstones and the complications ensuing from them<sup>(1)</sup>. Laparoscopic techniques have revolutionized the field of surgery. Benefits include decreased postoperative pain, quicker return to normal activity, and less postoperative complications<sup>(1)</sup>. Inadvertent bowel injury or major vascular injury are uncommon but potentially life-threatening complications, usually occurring during initial access<sup>(2,3)</sup>. Port site complications can be grouped into access-related complications and postoperative complications, and have been reported in all age groups and in both genders. The literature shows that obesity is associated with increased morbidity related to port site

due to various factors like the need for longer trocars, thick abdominal wall, need for larger skin incision and excessive manipulation to expose fascia adequately, and limitation in mobility of the instrument due to increased subcutaneous tissue. The overall complications/injuries that occur following laparoscopic surgeries involve, gastrointestinal (0.6 per 1,000), genitourinary (0.3 per 1000), vascular (0.1 per 1,000), and omentum (0.4 per 1,000)<sup>(4,5)</sup>. However, the rarer complications include pyoderma gangrenosum<sup>(6,7)</sup>, metastasis at the port site following laparoscopic oncosurgery<sup>(8,9)</sup> and port site infections (PSIs)<sup>(10)</sup>.

The aim of this study was to determine the morbidity associated with the port site in laparoscopic surgery and to minimize the complications.

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## Methods

All patients who underwent laparoscopic surgeries, between May 2017 to June 2018, at Mosul general hospital in the Department of General Surgery were included and port sites were monitored for complications prospectively. A total of 200 cases were operated upon. Those with a past history of open abdominal surgery and who were converted to open procedures were excluded from the study (because patient care is our aim and those patient take longer time to gain access).

All patients were evaluated for age, sex, BMI and previous scar. All patients were investigated for (hepatitis B and C, HIV, Hb and PCV, blood sugar, WBCs, blood urea and serum creatinine, S. bilirubin direct and Indirect, ALK phosphatase, PT, PTT, INR, U/S of abdomen, MRCP for patients with high direct S. bilirubin and Alk. phosphatase. ECG, CXR, echocardiography for patients with history of chest pain. All surgeries were performed under general anesthesia. All patients received antibiotics preoperatively. Reusable ports were used in all cases. After skin preparation (using povidine iodine 10% and left it to dry) and draping, the access to the peritoneal cavity was done via open technique in all cases. In all cases a transverse infra-umbilical incision is made 1-2 cm from umbilicus (easy to gain access), with use of artery forceps the wound deepened down until reaching the fascia, then the fascia grasped with Allis tissue forceps and opened longitudinal, thus the peritoneum opened under vision the fascia repaired with vicryl 1.0 and keeping the knot loose, port  $\geq 10$  mm was inserted, the graspers released and the knot tightened temporarily over the cannula. CO<sub>2</sub> gas insufflation was done to create pneumoperitoneum followed by insertion of available telescope with light source. Other ports were inserted under vision (epigastric and lateral ports). The assistant grasps the fundus of gall bladder and pushed over the liver toward the right shoulder exposing the Calot's triangle. The surgeon grasps the Hartman pouch and pull it laterally, the

dissection started at the junction of gall bladder and cystic duct, then peritoneal reflexion dissected to clear the Calots' triangle, controlling the branches of the cystic artery and exposing the cystic duct. The duct is clamped at the level of Lund LN, with the use of scissor the duct is cut and complete peeling using hooked cutterly. Endobag used to extract gall bladder via epigastric wound. Control of bleeding of the gall bladder bed, suctions of residual collection of blood and bile if present. Desufflations, all cannulas were removed and in the umbilical port the knot was tightened over the fascia, the skin closed with nylon 0.0. The epigastric port, the skin and subcutaneous tissue are closed only (no need to close the fascia because muscle splitting technique used, unless there is muscle cutting to widen the port site to extract large gall bladder), the lateral ports remain opened without suture with only dressing (muscle splitting technique used with 5mm port) .

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## Results

In the current study, a series of 200 patients including 30 males and 170 females were operated upon with a female to male ratio of 5.7:1. The majority of the cases were aged between 31-40 years followed by age 51-60 years, (Table 1).

Port site complications more in the umbilical port than the epigastric and the lateral port sites. Main complications reported is bleeding, infections, hernia and cutaneous bruises, (Table 2).

Obesity was the main risk factor for complications followed by diabetes mellitus. Inverted umbilicus was a risk factor for infection, (Table 3).

A total of 8 (4%) patients had port site bleeding were controlled immediately during operation, (Table 3). Other complications (infections, hernia and cutaneous bruises) were seen in seven females and one male ( $p > 0.05$ ). Most port site complications occur in patients with age group of 31 to 40 years ( $p > 0.05$ ). Mean BMI was 35.0-39.9 (SD  $\pm 3.12$ ) had

significance relation to the frequency of port site complications.

Most common ports involved were the umbilical port sites (62.5%, n = 9), (Table 3). Technique of port closure had an influence on incidence of complication especially

post-operative hernia, however inverted umbilicus with excessive manipulation related to increase risk of bleeding and infections.

Class II obesity report highest complications rate, (Table 4).

**Table 1: Age and sex of patients in the study.**

| Age of patients | Male patients | Female patients | Total No. |
|-----------------|---------------|-----------------|-----------|
| 20 – 30         | 3             | 14              | 17        |
| 31 - 40         | 9             | 77              | 86        |
| 41 – 50         | 7             | 20              | 27        |
| 51 – 60         | 6             | 58              | 64        |
| 61 – 70         | 5             | 1               | 6         |
| Above 70        | 0             | 0               | 0         |
| Total           | 30            | 170             | 200       |

**Table 2: Port site complications.**

| Site and size of the port | Complications     | No. of patients |        |
|---------------------------|-------------------|-----------------|--------|
|                           |                   | Male            | Female |
| Epigastric (10mm)         | Bleeding          | 1               | 1      |
|                           | Infection         | -               | 1      |
|                           | Hernia            | -               | -      |
|                           | Cutaneous bruises | -               | -      |
| Umbilical (10mm)          | Bleeding          | 1               | 3      |
|                           | Infection         | 1               | 3      |
|                           | Hernia            | -               | 1      |
|                           | Cutaneous bruises | -               | 1      |
|                           | Hematoma          | -               | -      |
| Lateral (5mm)             | Bleeding          | 1               | 1      |
|                           | infections        | -               | 1      |
|                           | Cutaneous bruises | -               | -      |

**Table 3: Risk factors related to complications.**

| Risk factor          | Complications |        |
|----------------------|---------------|--------|
|                      | Male          | Female |
| Diabetes Mellitus    | 2             | 7      |
| Hypertension         | 1             | 5      |
| Obesity              | 1             | 10     |
| Umbilicus (inverted) | 1             | 3      |

**Table 4: BMI related complications.**

| Classification   | BMI       | Complications |        |
|------------------|-----------|---------------|--------|
|                  |           | Male          | Female |
| Normal weight    | 18.5–24.9 | -             | -      |
| Overweight       | 25.0–29.9 | -             | 2      |
| Class I obesity  | 30.0–34.9 | -             | 4      |
| Class II obesity | 35.0–39.9 | 2             | 8      |

## Discussion

Care must be taken during placement of trocars to align their axis as needed for the procedure. In the present study, there was increase in the rate of morbidity related to port site and obesity. The present study showed that umbilical port site was the commonest site of complications. This is comparable to observations made by Sarker SK, Chang A, Vincent C, Darzi SA. et al<sup>(11)</sup>.

Had shown that port site complications were increased with more number of ports, while in the present study no additional ports were used as observed by Podolsky ER, St John-Dillon L, King SA, Curcillo PG et al<sup>(12)</sup>. Fascial closure is recommended for umbilical port as we use muscle cutting; the fascia is closed with sutures to reduce the risk of developing a port site hernia as compared with Kramp KH, van Det MJ, Totte ER, Hoff C, Pierie JP. et al, Khorgami Z, Shoar S, Anbara T, Soroush A, Nasiri S, Movafegh A, Aminian A. et al, Shindholimath VV, Seenu V, Parshad R, Chaudhry R, Kumar A. et al.<sup>(13,14,15)</sup>. Reapproximation of the fascia can be accomplished in a variety of ways. Ideally, the fascia is directly visualized with the aid of retractors. The fascial edges are grasped and closed with interrupted or continuous suture. A number of specialized instruments have been devised for fascial closure at the port site (e.g., Grice<sup>®</sup> suture needle, Carter-Thomson needle-point suture passer, Endo Close<sup>™</sup> instrument, Reverdin suture needle)<sup>(18)</sup>. The benefit of these devices is yet to be proven.

In the present study closure of rectus sheath prior to port insertion gain great benefit in reducing port site hernias especially in umbilical port site while in the epigastric port no need to close the fascia unless muscle cutting used to widen the port site.

Laparoscopic procedures have a reduced incidence of SSIs and other wound-related complications<sup>(10,11)</sup>. Nonetheless, they can produce significant

morbidity. A necrotizing fascial infection not reported in the present study, the presence of significant peri-incisional erythema, wound discharge, and fever may indicate the presence of a necrotizing fascial infection as described by Johnson WH, Fecher AM, McMahon RL, Grant JP, Pryor AD et al and Shaher Z et al<sup>(17,18)</sup>. The incidence of SSI was 3.0% in the present results were comparable with many other studies. Kownhar H, Shankar EM, Vignesh R, Sekar R, Velu V, Rao UA. et al<sup>(20)</sup> who found the incidence to be 5.3%, Shindholimath et al<sup>(15)</sup> 6.3% and Colizza et al<sup>(19)</sup> < 2%. All SSIs were superficial. Superficial SSI is more common and has been reported by another study. Umbilical port site was the most common site of SSI followed by epigastric port site<sup>(10)</sup>. In the literature, there is great emphasis on the increased frequency of umbilical site SSIs and the role of umbilical flora in the development of SSIs. Emphasis is also there on the increased frequency of SSI and the trocar site of extraction. All gall bladder specimens in cholecystectomy were removed through the epigastric port. Wound infections are prevented by appropriate administration of antibiotic prophylaxis, sterile techniques, and the use of specimen bags during specimen extraction. Once present, infections are treated with drainage, packing, and antibiotics as appropriate.

Incidence of port site bleeding was found to be 4% compared with Faruquzzaman, Hossain SM et al<sup>(21)</sup> 9.97%. Bleeding from the abdominal wall may not become apparent until after the port is removed because the port may tamponade muscular or subcutaneous bleeding. In addition to visually inspecting the access site upon its creation, the site should also be inspected during and following removal of the port. Bleeding points can usually be identified and managed with electrocautery. On occasion, the skin incision may need to be enlarged to control the bleeding.

Incidence of port site hernia in our study is 0.5% as compared with Shaher Z et al<sup>(18)</sup> study is 2.14%. These were treated by

herniotomy and herniorrhaphy after control of infection.

In conclusion; The meticulous closure of laparoscopic ports is important to prevent or reduce the incidence of port-site incisional hernia and its complications. Although the classical closure method with a curved or J-shaped needle has been associated with an acceptable incidence of port-site hernia, development of a new technique of closure is suggested to further prevent or reduce this.

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