



Laparoscopic Surgery: Is it Essential to Close the Trocar Site Fascial Defects of 5 and 10 Millimeters in Diameter?

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Abstract

Background: Port Site Hernia (PSH) is potentially a serious complication of laparoscopic surgery. Many surgeons close the fascia, especially in those sites where a trocar diameter ≥ 10 mm is inserted. Suturing the fascia may lead to damage of other tissues, such as the bowel, hence, some surgeons prefer not to close the fascia.

Objective: to clarify whether non-closure of 5 and 10 millimeters (mm) laparoscopic trocar site fascial defects is actually a risk factor for development of port site hernia.

Design and Setting of the study: This study was a prospective cross-sectional one performed in AL-Karama Teaching Hospital/ Kut/ Wasit /Iraq.

Patients and Methods: a total of 570 patients, laparoscopically cholecystectomised for symptomatic cholelithiasis during period from April 2011 to December 2016, were included in this study. The port site fasciae were not closed. Skin only was closed with 2/0 Nylon. The incidence rate of PSH was calculated. All patients were followed up by outpatient clinic visits.

Results: statistical analysis of the study data revealed that, out of 570 laparoscopically cholecystectomised patients, only two patients developed PSH at the 10mm umbilical port site during the follow-up period range between 1 - 68 months. No major complications nor mortality were reported.

Conclusion: This study revealed that closure of 5 and 10 mm laparoscopic port site fasciae is not essential because non-closure was associated with very low incidence of PSH. Also, closure of the laparoscopic port site fascia prolongs time of surgery and unnecessarily uses suture material thus, it economically increases cost of surgery.

Keywords: Port site hernia, laparoscopic cholecystectomy, umbilical hernia.

Introduction

Port site hernia (PSH) is a rare complication of laparoscopic surgery, its incidence rate is 1% of all laparoscopic surgeries^[1]. PSH is defined as an incisional hernia which occurs after minimally

invasive surgery in the trocar incision site^[2]. PSH occurs usually in the umbilical port site^[3]. There is no early superficial bulge at the port site, so the diagnosis may not be early apparent. CT scan has been recommended for establishing its diagnosis^[4]

There are various factors implicated in the development of PSH that can be divided into patient-related factors and surgery-related factors [5]. The patient factors include: presence of pre-existing umbilical / paraumbilical hernia, obesity, wound infection, large-sized gall stones and a variety of medical co-morbidities such as chronic obstructive pulmonary disease, diabetes mellitus, renal failure and connective tissue disorders [5,6]. The operative factors include: large-sized trocar, improper closure of fascial defect at the port site, midline port sites, cutting trocars, prolonged manipulation and re-insertion of the laparoscopic cannula, wound extension or stretching for tissue retrieval and increased duration of surgery [5,6].

This study was performed to evaluate incidence rate PSH following laparoscopic cholecystectomy when the fasciae of the laparoscopic port sites were not closed (only skin was closed) versus fascial closure. The various methods for port site fascia closure after laparoscopic surgery are: standard closure (via skin wound), laparoscopic direct visualization fascial closure methods, usage of a spring-loaded needle or suture passer needle and angiocatheter technique.

Patients and Methods

This is a cross-sectional study conducted in the surgical department at Al-karama Teaching Hospital/College of Medicine / Wasit University / Iraq during the period from April 25, 2011 to December 27, 2016. A total of 570 patients with symptomatic cholelithiasis underwent laparoscopic cholecystectomy performed by one laparoscopic surgeon were included in this study. A full history, physical examination and investigations were completed for each patient. The investigations included: complete blood count, blood urea and creatinine, fasting blood sugar, liver function test, hepatitis viral screening, Chest-X-Ray and abdominal ultrasonography. Patients with previous history of upper laparotomy, patients with large umbilical/paraumbilical hernias, those unfit for laparoscopic surgery and patients in whom there was need to dilate the laparoscopic port incision to extract large

gallbladder/gallbladder containing large stone(s) and patients in whom laparoscopic cholecystectomy was converted to open technique, were excluded from this study.

Direct trocar insertion for creation of pneumoperitoneum was routinely used. Four ports technique, 10-mm infraumbilical port for the telescope, a 5-mm right mid-axillary line port, 5-mm right mid-clavicular line port and a 10-mm epigastric port, was used. Laparoscopic cholecystectomy was performed without closure of any fascial defects at the four port sites.

Signed and informed consent was obtained from every patient or his/her guardian. Once the operation was completed, all instruments were carefully removed under direct vision. Carbon Dioxide was evacuated out through valves of 10 mm cannulae. The primary port (infraumbilical one) was the last one to be removed. Only skin of the port sites was closed with 2/0 Nylon. The patients were given prophylactic third generation cephalosporin (Cefotaxime) 1gm / 8 hourly, three doses, the first dose was given at time of induction of anesthesia.

In order to assess the incidence of PSH, the study patients were clinically (and ultrasonically for doubtful cases) followed up after their operation at; one, three, six and twelve month intervals then annual checking. The study results were statistically analyzed using SPSS version ²².

Result

This study included 570 laparoscopically cholecystectomised patients their ages ranged 16 - 77 years with age median of 38 years. Their ages Mean±SD was 38.7± 12.37. Their sex distribution was: 495 females and 75 males (Table .1)

Table .1 Age and Sex Distribution of The Study Patients.

Sex	Patients	Percentage	Age Mean±SD / year	Age Range / year
Male	75	13.5 %	47.13±13.25	20 - 77
Female	495	86.5 %	38.57±11.85	16 - 75
Total	570	100 %	38.7±1.13	16 - 77

Most patients were complaining of calculous cholecystitis with its spectrum of subtypes including: 526 patients complained of chronic calculous cholecystitis, 16 patients complained of acute cholecystitis, 5 patients complained of empyema of gall bladder and 23 patient complained of mucoceles of gall bladder.

Intraoperative port site complications that occurred in this study were minor bleedings which occurred in 36 patients (6.31%). All these bleeds spontaneously stopped up. Extraperitoneal emphysema occurred in 25 patients (5.38 %), it spontaneously resolved. At a median follow-up period of 13.3 months (range 1-68 months), postoperative port site complications included: superficial infections occurred in 12 patients (2.1 %). These infections were conservatively treated, two patients. (0.35%) developed PSHs surgically treated. This study had neither major postoperative complications nor mortality (Table.2.)

Table .2 . Intraoperative and Postoperative Port Site Complications .

The Complications	No. of Patients	Percentage
<i>Extra peritoneal Emphysema</i>	25	5.38
<i>Bleeding</i>	36	6.31
<i>Wound Infection</i>	12	2.1
<i>Hernia</i>	2	0.35

Discussion

Hernias at port sites following laparoscopic surgery were reported, with use of port sites of diameters more than 10mm or when extraction of distended gall bladder needed extension of the 10mm port sites. It may be expected that incidence rate of port site hernia will increase as larger laparoscopic cannulae are used [7]. Incidence of Port Site Hernia (PSH) can be reduced by avoiding unnecessary port site extension and use of nonabsorbable sutures for closure of fascial defects larger than 10 mm [8]. It has been suggested that when the pneumoperitoneum is expelled before the extraction of the port cannulae, the pressure gradient between the intraperitoneal gas and the atmosphere allows small bowel or omentum to become attached to

the end of the cannula whose subsequent withdrawal may results in a hernia [9]. New laparoscopic cannulae and bladeless trocars have decreased the incidence of PSH to 0 %. These new trocars are atraumatic and they split rather than cut muscle fibers at entry. After removal of a laparoscopic cannulae the abdominal layers contract, reducing the fascial defect to a diameter much smaller than that trocar [10,11].

This study results are consistent with several previously performed studies. In our study, incidence of PSH was 0.35 %, while it has ranged from 0.02 to 3.6%, [12] 0.5% [13] and as low as 0.08% [14]. Hussain A, *et al* study reported, that during 43 months of follow-up period after laparoscopic surgery with fascial closure, the incidence rate of PSH was 0.14% [15]. Also, Nezhat C., *et al* [16] and Voiculescu et S ,*et al* [17] reported that the incidence rates of PSH in laparoscopic surgery with fascia closure were 0.2 % and 0.08 % respectively, they were lower than results of our study which was performed without fascial closure. Azurin DJ, *et al* has shown that out of 1300 laparoscopic cholecystectomies, 0.8% of their patients developed PSH [18]. Coda .A., *et al* reported a series of 1287 patients underwent laparoscopic cholecystectomy whose fascias were sutured, only 1% of them developed PSH [19].

Review of English-written literature revealed that there are several reports suggesting prolonged manipulation coupled with reinsertion of the laparoscopic trocar may be associated with an increased risk of PSH [19].

The choice of port site closure after laparoscopic procedure depends on the number and size of port trocars, the surgeon's preference, and available facilities in addition to the individual patient characteristics (such as body habitus). This choice should be individualized. For example, all port sites > 10 mm in diameter should be closed. Some 5mm port sites should be closed when the peritoneal and/or fascial defect has significantly enlarged. Enlarging the port site to allow proper closure will take precedence over obtaining a good cosmetic result. Port site closure will include fascia and peritoneum, it is advised to check the

intraperitoneal side of each wound during fascial closure by the laparoscope^[20,21].

The pre-existing umbilical/ paraumbilical hernia has been identified in several reports as a risk factor for port site hernia. Azurin *DJ, et al* study included 1300 patients, they found PSHs developed in 10 patients, 9 of these PSHs occurred in patients who were found at operation to have umbilical hernias^[3]. Nasser *et al* found that 12% of patients undergoing laparoscopic cholecystectomy had pre-existing paraumbilical or umbilical hernias, 83.7% of them were asymptomatic. The hernias were closed at the end of operation. Laparoscopic PSH developed in 1.8% of patients, 25% of whom had a hernia with fascial closure at the time of surgery^[22].

Table .3. shows a comparison between results our study and those of other studies

International Studies	Study Year	Patients	Fascia closure status	PSH Rate%
Azurin <i>et al</i> ^[18]	1995	1300	closure	0.8
Nezhat <i>et al.</i> ^[16]	1997	5300	closure	0.2
Coda <i>et al.</i> ^[19]	2000	1287	closure	1
Liu <i>et al.</i> ^[11]	2000	110	Non-closure	0
Shalhav <i>et al.</i> ^[23]	2002	90	Non-closure vs. closure	0 vs. 0
Sequeira <i>et al.</i> ^[24]	2004	70	Non- closure	0
Hussain <i>et al.</i> ^[15]	2009	5541	closure	0.1
Sorosh A <i>et al.</i> ^[25]	2013	220	Non-closure	2.3
Jamil Mohammad <i>et al.</i> ^[26]	2016	450	closure	1.1
Rikki Singal <i>et al.</i> ^[1]	2016	200	Non closure vs. closure	0 vs. 0
Our study	2017	570	Non-closure	0.35

Conclusion

This study concluded that closure of 5 and 10 mm laparoscopic port site fasciae is not essential because non-closure is associated with very low incidence of PSH. Also, closure of the laparoscopic port site fascia prolongs time of surgery and unnecessarily uses suture material. Thus, laparoscopic port site fascia closure economically increases the cost of surgery.

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Author Contribution

Assistant Professor Dr. Jawad Kadhim S. Al-Dhahiry: Participated substantially in conception, design, surgical performance, collection and analysis of data.

Dr. Hassan Khalil Melek Participated substantially in conception, design of the study, collection and statistical collection of study data and postoperative follow-up of the study patients.

Dr. Dr Tareq Khalid Abduljabbar: Participated in the surgical performance, collection and postoperative follow-up of the study patients.

Conflicts of Interest: The three authors have no any conflict of interests.

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