

ORIGINAL RESEARCH**Comparative study of port site fascial sheath closure versus only skin closure in cases of laparoscopic cholecystectomy**

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Abstract

Introduction: Gallstones are among the most common gastro-intestinal diseases. Laparoscopic cholecystectomy is the gold standard treatment for symptomatic gallstones. Laparoscopic cholecystectomy is associated with a new spectrum of intraoperative and postoperative complications. The overall complications/injuries that occur following laparoscopic surgeries involve, gastrointestinal including trocar site hernia (0.6 per 1,000), genitourinary (0.3 per 1000), laparoscopic oncosurgery, and port site infections (PSIs). Trocar site hernia (TSH) is an incisional hernia occurring at the trocar insertion sites after different types of laparoscopic surgeries

Aims: To evaluate the outcomes & complications of port site closure, with fascial closure in addition to skin versus only skin closure, in laparoscopic cholecystectomy in terms of: 1. Port site hernia 2. Wound infection 3. Cosmetic appearance

Materials & Methods: This study was a prospective comparative study on 100 patients consisting of group A and group B. Group A: Patients undergoing port site closure with fascial closure in addition to skin closure. Group B: Patients undergoing port site closure with only skin closure

Conclusion: The present study found that both the techniques were comparable with respect to port-site hernia and infection. However, cosmesis with port site fascial closure in addition to skin closure technique was found to be better than that with only skin closure technique.

Introduction

Gallstone disease is one of the most common gastrointestinal diseases.^[1] Gallstones are common with prevalence as high as 60% to 70% in American Indians and 10% to 15% in white adults of developed countries.^[2] In India, prevalence of gallstones has been reported to be 4.15%;^[3] Now the laparoscopic cholecystectomy is the gold standard treatment for symptomatic gallstone. Laparoscopic cholecystectomy introduced a new spectrum of associated intraoperative and postoperative complications. Minor complications (biliary and non-biliary) are usually managed conservatively. Major complications (biliary and vascular) need conversion to open surgical approach.^[4,5,6] The overall complications/injuries that occur following laparoscopic surgeries involve, gastrointestinal including trocar site hernia (0.6 per 1,000), genitourinary (0.3 per 1000), laparoscopic oncosurgery, and port site infections (PSIs).^[7,8,9,10] Trocar site hernia (TSH) is an incisional hernia occurring at the trocar insertion

sites after different types of laparoscopic surgeries.^[11]TSH classified into three types: (i) the early onset type characterized by anterior–posterior fascial plane and peritoneum dehiscence; (ii) the late onset type occurring months or years post operatively and characterized by anterior and posterior fascial plane dehiscence whereas the peritoneum constitutes the hernia sac; and (iii) a special type of hernia, occurring immediately post operatively and characterized by dehiscence of the whole abdominal wall and visceral protrusion.^[12] Various factors are attributed for TSH: a) removal of the ports prior to complete deflation of the peritoneal cavity, b) inadequate/faulty closure of the port site incisions, and c) large incision at the port site, d) umbilical port e) preoperative umbilical hernia.^[13,14] Fascial defects created by 10-mm or larger trocar sites should be closed whenever possible to prevent hernia formation.^[15,16] Port site infections (PSI) is a type of Surgical Site Infection (SSI) but limited to laparoscopic surgery. Spillage of bile, pus or stones which can be retained inside the abdomen or in the wound is highly associated with port site infection and abscess formation. Escaped stones composed primarily of cholesterol that pose little threat of infection, however, pigment stones frequently harbour viable bacteria and may potentially lead to subsequent infections if allowed to remain in the peritoneal cavity.^[17,18]The purpose of this study was to evaluate the outcomes & complications of port site closure with fascial closure in addition to skin closure versus only skin closure in laparoscopic cholecystectomy as well as to compare both the techniques in terms of port site hernia, wound infection, and cosmetic appearance.

Aims and objectives

Aims- : To evaluate the outcomes & complications of port site closure with fascial closure in addition to skin closure versus only skin closure in laparoscopic cholecystectomy.

Objectives- To compare fascial closure of port in addition to skin closure versus only skin closure of port site in terms of 1.Port site hernia 2 Wound infection 3.Cosmetic appearance.

Materials & methods

The present prospective comparative study was done on 100 patients. Patients were divided into two group Group A- patients undergoing port site closure with fascial closure in addition to skin closure. Group B- patients undergoing port site closure with only skin closure.

Inclusion criteria

- 1) Patient with documented gall bladder disease.
- 2) Patient undergoing laparoscopic cholecystectomy.
- 3) Patient who gave informed consent

Exclusion criteria

- 1) Patient not giving valid consent.
- 2) Medically unfit patients.
- 3) Patient undergoing Open cholecystectomy/ Laparoscopic converted to open cholecystectomy.
- 4) Patients with history of ventral hernia.(repaired/unrepaired)
- 5) Patients with history of COPD, BPH and chronic constipation.

Procedure

Standard Four-Port Laparoscopic Cholecystectomy

In group A, involving 50 patients port site fascial closure was done in addition to skin closure.Fascial closure was done on 10mm ports by prolene 1.0 suture with Deschamps needle. After this skin was closed with nylon 2.0 cutting needle suture. In group B, involving 50 patients no port site fascial closure was done and only skin closure was done

with nylon 2-0 cutting needle suture.

Post operative analysis

Follow up done at regular intervals of two, four and six months for:
1. Port site hernia: Patient examined for any protrusion at 10mm port site.
2. Port site infection: Patient examined at POD7 for following symptoms and signs of infection: wound discharge, erythema, pain, tenderness and fever.
3. Cosmesis: Assessed by the patient and independent nurse in the ward/OPD. Each was asked to rate cosmesis on a scale of 1 (worst) to 10 (best). The mean of both the patients' score and nurse's score was taken as the final score.

Observations

TABLE 1: Distribution of patients according to age

Age Range (in Years)	Group A		Group B	
	Frequency	Percent	Frequency	Percent
≤20	0	0%	3	6%
21-30	12	24%	11	22%
31-40	10	20%	12	24%
41-50	13	26%	12	24%
51-60	5	10%	6	12%
≥61	10	20%	6	12%
Total	50	100%	50	100%
Mean± SD	44.70±15.00		42.10±15.94	
p-value	0.403 (>0.05)			

We observed, that the Maximum number of individuals was in the age group of 41-50 years in both the groups. Statistically, there was no significant difference in mean age of both the groups (p= 0.403). Hence, both the groups were comparable.

Table 2: Distribution of patients experiencing port site hernia

Timelines	Group A		Group B		p-value
	Frequency	Percent	Frequency	Percent	
2 months	0	0%	0	0%	-
4 months	0	0%	0	0%	-
6 months	0	0%	1	2%	0.3173 (NS)

It was observed that in group A and B, none of the patients experienced port site hernia on follow-up at 2, 4, months. In group B, 1 patient (2%) experienced port site hernia. At 6 months, the difference between the two groups was non-significant (p= 0.3173)

Table 3: Comparison of various parameters of Port Site Infection between Group A and Group B

Parameters	Group A	Group B	p- value
	Frequency (Percentage)	Frequency (Percentage)	
Discharge	1 (2%)	2 (4%)	0.559 (NS)
Erythema	1 (2%)	2 (4%)	0.559 (NS)
Pain	1 (2%)	1 (2%)	1.00 (NS)
Tenderness	1 (2%)	1 (2%)	1.00 (NS)
Fever	0 (0%)	0 (0%)	-

It was observed that, there was no significant difference between the groups in terms of various parameters of infection (e.g., discharge, erythema, pain, and tenderness). Hence, both the groups were comparable.

Table 4: Inter group comparison of cosmesis between Group A and Group B

Timelines	Group A	Group B	p-value	Sig.
2 months	7.84±0.68	7.62±0.69	0.1115	NS
4 months	8.14±0.53	7.88±0.59	0.0225	S
6 months	8.60±0.53	8.34±0.47	0.0109	S

Statistically, there was no significant difference between the groups at 2 months ($p= 0.1115$). However, there were significant difference between the groups at 4 and 6 months ($p= 0.0225$ and 0.0109).

Discussion

Gallstone disease is one of the most common gastrointestinal diseases.^[1] Gallstone disease is a global medical problem, even though there are geographical variations in prevalence.

Demographic distribution

Age distribution: The mean age in group A was 44.70 ± 15.00 years and the mean age in group B was 42.10 ± 15.94 years. Maximum number of individuals was in the age group of 41-50 years in both the groups. Statistically, there was no significant difference in mean age of both the groups ($p= 0.403$).

Table 5

S. no	Author	Patients with fascial closure
1	Present study	44.70 ± 15.00 years
2	Jamil et al (2016),	16 to 60 years

Our findings were similar to the study conducted by **Jamil et al (2016)**, who reported that the mean age of patients undergoing laparoscopic surgery with fascia closure was 44 years (range 16 to 60 years).^[19]

Distribution of patients experiencing port site hernia:

In group A, and B none of the patients experienced port site hernia on follow-up at 2, 4 months, 1 patient (2%) experienced port site hernia. At 6 months, the difference between the two groups was non-significant ($p= 0.3173$).

Table 6

S. no	Authors	Port site hernia in fascial closure	Port site hernia without fascial closure
1	Present study	Nil	2%
2	Jamil et al in 2016	Nil	1.1%
3	Rabo AA et al (2020)	Nil	1%

Jamil et al in 2016, reported that 5 patients (1.1%) undergoing laparoscopic surgery developed port site hernia and all of them were at the umbilical site.^[19] **Rabo AA et al (2020)** reported only one case of port site hernia in group with laparoscopic surgeries without fascial

sheath closure and no cases of port site hernia with laparoscopic surgeries with fascial closure of the port site (with non-significant statistical difference between two groups ($p=0.827$)).^[20] The prevalence of port site hernia varies among institutions. It depends upon numerous factors such as surgeon experience as well as surgical technique. The risk factors accounted for port site hernia are the trocar design, trocar diameter, pre-existing fascial defects, host factors, the direction of insertion of the trocar, operating surgeon, drain insertion, and site of port.^[21] Port site hernia often develops late after surgery and therefore prolonged follow up is required to identify the cases.^[18]

Port site infection

We observed that on 7th post operative day, in group A, 1 patient (2%) had port site infection. While in group B, 2 patient (4%) had port site infection. Statistically, there was no significant difference between the groups in terms of various parameters of infection (e.g., discharge, erythema, pain, and tenderness). Hence, both the groups were comparable.

Al-Dhahiry JKS et al (2017) reported that 2.1% patients undergoing surgery by non-closure of laparoscopic trocar site fascia developed port site infections.^[22] **Rabo AA et al (2020)** reported no cases of port site infection in group with laparoscopic surgeries without fascial sheath closure and 1 case of port site infection with laparoscopic surgeries with fascial closure of the port site (with non-significant statistical difference between two groups ($p=0.827$)).^[19] **Muzhir A et al (2021)** reported that the incidence rates of port site infection, for both the groups (closure versus non-closure of the fascial sheath opening of the sub-umbilical port site during laparoscopic cholecystectomy) were zero through the follow-up period.^[23]

Cosmesis

We observed that, in group A at 2 months The mean cosmesis score was 7.84 ± 0.68 . While in group B, The mean cosmesis score was 7.62 ± 0.69 . Statistically, there was no significant difference between the groups ($p= 0.1115$). In group A at 4 months, The mean cosmesis score was 8.14 ± 0.53 . While in group B, The mean cosmesis score was 7.88 ± 0.59 . There was significant difference between the groups ($p= 0.0225$). At 6 months, in group A, The mean cosmesis score was 8.60 ± 0.53 . In group B, The mean cosmesis score was 8.34 ± 0.47 . There was significant difference between the groups ($p= 0.0109$).

Summary and conclusion

The present study was conducted with the objectives to evaluate the outcomes & complications of port site closure; with or without fascial closure in addition to skin closure in laparoscopic cholecystectomy; in terms of Port site hernia, Wound infection, and Cosmetic appearance.

It was concluded that the port site fascial closure does not affect the incidence of port site hernia at 2 and 4 months (no case reported in both groups). In the group involving port site closure with only skin, the incidence of port site infection at 7th post-operateday and incidence of port site hernia at 6 months was more than the group involving port site closure with fascial closure in addition to skin, but the result was statistically non-significant. Cosmesis score at 2, 4 and 6 months was better in the group involving fascial closure in addition to skin, the results were non-significant at 2 months and significant at 4 and 6 months.

The present study found that both the techniques were comparable with respect to port-site hernia and infection. However, cosmesis with port site closure with fascial closure in addition to skin closure technique was found to be better than that with only skin closure technique.

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