

Risk of port site hernia after laparoscopic sleeve gastrectomy

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Abstract

Aim: Recently, one of the most preferred options in the surgical treatment of obesity is laparoscopic sleeve gastrectomy. The purpose of this study is to investigate the incidence of port site hernia formation and the factors affecting the fascial defect in the group with and without closure after LSG.

Material and Methods: The data of patients who were operated due to morbid obesity in a single center between March 2014 and June 2018 was reviewed and analyzed retrospectively. The patients were divided into two groups, being those in whom the fascial defect at the 12-mm trocar insertion site from which the gastric remnant was removed during surgery was closed, and those in whom the fascial defect was not closed. The incidence of port site hernia and the factors affecting the development of port site hernia were evaluated with physical and ultrasound examinations 1 year after surgery.

Results: The study was completed with a total of 207 patients, of which 112 fascias were not closed and 95 fascias were closed. The rate of hernia formation was significantly lower in the fascial closure group than in the non-fascial closure group ($p:0,036$). Aside from this parameter, no significant difference was identified in the other parameters of the two groups. Age was significantly higher in patients that developed hernias following surgery than in those who did not develop hernias.

Conclusion: This study determined that the closure of the fascial defect is a protective factor against the development of port site hernia when compared to non-fascial closure.

Keywords: Laparoscopic sleeve gastrectomy; obesity; port site hernia

INTRODUCTION

When compared to open surgery, the laparoscopic approach in abdominal surgery has been associated with faster wound healing, less pain and a reduced rate of such complications as incisional hernia and wound infection. Laparoscopic surgery has developed as the preferred approach in bariatric surgery (1-3), and laparoscopic sleeve gastrectomy (LSG) is a preferred surgical method among bariatric surgeons due to the associated reduced morbidity and mortality rates and the short learning curve for surgeons (4-6). Port site hernia (PSH) is a rare complication of laparoscopic surgery that requires additional surgical procedures. Bariatric surgery is associated with an increased risk of herniation due to the difficulties in fascial closure linked to the necessary small skin incision in the trocar insertion site and the depth of subcutaneous tissue (7,8). In addition, fascial damage that occurs during the removal of the remnant stomach resected during LSG through the 12-mm trocar insertion site can theoretically increase the risk of herniation (9,10).

Various methods have been attempted to reduce the risk of herniation, such as endoscopic suturing, the use of different trocar insertion techniques and the use of special devices for suturing, however all of these precautions result in additional cost. The present study compares the risk of PSH in patients undergoing LSG with and without the closure of the 12-mm trocar insertion site through which the gastric remnant was removed.

MATERIAL and METHODS

This study included patients who underwent laparoscopic sleeve gastrectomy due to morbid obesity in a single center between March 2014 and June 2018, and who were evaluated retrospectively. All operations were performed by the same surgeon. BMI (body mass index) was measured preoperatively, and all patients underwent abdominal ultrasound and routine laboratory tests. At the postoperative 1-year follow-up, general physical examination was performed. The patients diagnosed or suspected with hernia were confirmed by ultrasonography. Blood tests and BMI measurements were performed.

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The study included patients with a body mass index of 40–60 kg/m². Patients that had undergone a previous laparotomy, those converted to an open procedure during surgery, those with a BMI of less than 40 and greater than 60 kg/m², and those using steroids were excluded from the study. The complications that developed during and after surgery were defined as hemorrhage, leakage and surgical site infection. Demographic data of the patients, surgical data and comorbid conditions were retrieved from the archived patient records. The two groups, which were closed with fascia and without fascia, were compared in terms of PSH.

Procedure

All procedures were carried out with the patients in a beach chair position with legs split (French position). The attending surgeon was positioned between the patients' legs, whereas the assistant was positioned on the left side of the patient. Pneumoperitoneum was achieved with a Veress needle inserted at the Palmer's point. All operations were performed five port technique. The first supraumbilical 10 mm trocar was inserted after the pneumoperitoneum with a Veress needle; and two additional working 12 mm bladed trocars were placed on the right and left upper sides of the camera port, and then other two 5mm working trocars were entered (11) At the end of the gastric resection, the gastric remnant

was grasped at the caudal tip using Foerster forceps and was removed through the port site using a gauze sponge (12). The right 12-mm trocar site defect through which the gastric remnant was removed was suture closed with absorbable suture material under laparoscopic view in the fascial closure group.

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Statistical analysis

Standard deviation, median, minimum, maximum, frequency and ratio were used in the descriptive statistics of the data. The distribution of variables is also with kolmogorov simirnov test. In the analysis of quantitative independent data, mann-whitney u test was used. Wilcoxon test was used to analyze dependent quantitative data. In the analysis of qualitative independent data, chi-square test, fischer test was used when chi-square test conditions were not met. SPSS 22.0 program was used in the analysis.

RESULTS

The study was completed on a total of 207 patients, 112 in the non-fascial closure group and 95 in the fascial closure group. During surgery and in the postoperative period, eight patients suffered hemorrhage, one patient had staple line

Table 1. The general characteristics and demographic data

		Min-Max	Median	Med.±s./n-%	
Age		17.0 - 65.0	37.0	36.7 ± 10.5	
Sex	female			143	69.1%
	male			64	30.9%
BMI		40.0 - 59.0	46.0	45.9 + 3.5	
1.year BMI		22.0 - 38.0	27.0	27.0 + 2.8	
smoking				61	29.5%
alcohol user				26	12.6%
DM				145	70.0%
HT				111	53.6%
CAD				64	30.9%
cholelithiasis				12	5.8%
gastroesophageal reflux				49	23.7%
hernia formation	(-)			195	94.2%
	(+)			12	5.8%
hernia surgery	(-)			2	16.7%
	(+)			10	83.3%
fascia closed	(-)			112	54.1%
	(+)			95	45.9%
postoperative complication	(-)			192	92.8%
	(+)			15	7.2%
	bleeding			8	3.9%
	stapler leak			1	0.5%
	wound infection			6	2.9%

BMI: Body Mass Index, DM: Diabetes Mellitis, HT: Hypertension, CAD:Coroner Arter Disease

Table 2. Fascia defect closed and not closed groups

Age	fascia not closed (-)		fascia closed (+)		P
	Med.±s.s./n-%	Median	Med.±s.s./n-%	Median	
Sex	37.6 ± 11.2		38.0		0.183 ^m
	female	83 74.1%	60 63.2%		0.089 ^{x²}
	male	29 25.9%	35 36.8%		
BMI	46.4 ± 3.6		46.0		0.052 ^m
1.year BMI	27.5 ± 2.9		27.0		0.056 ^m
smoking	38 33.9%		23 24.2%		0.126 ^{x²}
alcohol user	13 11.6%		13 13.7%		0.653 ^{x²}
DM	85 75.9%		60 63.2%		0.046 ^{x²}
HT	63 56.3%		48 50.5%		0.411 ^{x²}
CAD	38 33.9%		26 27.4%		0.309 ^{x²}
cholelithiasis	4 3.6%		8 8.4%		0.137 ^{x²}
gastroesophageal reflux	32 28.6%		17 17.9%		0.072 ^{x²}
postoperative complication	(-)	103 92.0%	89 93.7%		0.836 ^{x²}
	(+)	9 8.0%	6 6.3%		
hernia formation	(-)	102 91.1%	93 97.9%		0.036 ^{x²}
	(+)	10 8.9%	2 2.1%		
hernia surgery	(-)	2 20.0%	0 0.0%		1.000 ^{x²}
	(+)	8 80.0%	2 100.0%		

^m Mann-whitney u test / ^{x²} Ki-kare test (Fischer test)

BMI: Body Mass Index, DM: Diabetes Mellitis, HT: Hypertension, CAD:Coroner Arter Disease

leakage and six patients developed surgical site infections. No patient had bleeding in the trocar site. No hernia was observed in other trocar site. The demographic data of the patients is shown in Table 1. The rate of hernia formation was significantly lower in the fascial closure group than in the non-fascial closure group (p:0.036). The rate of DM was significantly lower in the fascial closure group than in the non-fascial closure group (p:0.046). Aside from these parameters, no significant difference between the two groups was identified in any other parameters (Table 2).

DISCUSSION

In this study, hernia formation was found to be statistically significantly lower in the fascial closure group than in the nonfascial closure group. The incidence of PSH in non-obese patients has been reported to be 0.5–2% in literature (13). Various factors related both to patient characteristics and the surgical technique employed affect the risk of PSH. Obesity is an important predisposing factor for the development of PSH due to the associated increased intraabdominal pressure, the more remarkable peritoneal thickness, the wide preperitoneal area, technical difficulties in the closure of the defect and the risk of infection at the trocar insertion site (14,15). The incidence of PSH has been found in a wide range of 0.5–13% among patients undergoing bariatric surgical procedures for obesity (16), with the reason being that each bariatric procedure involves a different surgical technique. When compared to other bariatric procedures, the risk of PSH is higher with

LSG due to the fact that a fascial defect is created while removing the remnant stomach through a 12-mm or 15-mm trocar (16). The European Hernia Society guidelines recommend closure of the fascia in laparoscopic surgery in 2014 when using a trocar larger than 10 mm. However, recommendation strength weak (17). In a retrospective cohort study, Ece et al. (9) reported an incidence rate of 2.8% for PSH following laparoscopic sleeve gastrectomy (3.8% in the non-fascial closure group and 1.3% in the fascial closure group). Similarly, Tranchart et al.(18) in their study using propensity score matched analysis, the incisional hernia rate was 0.3% by closing the fascia defect in the group undergoing conventional laparoscopic sleeve gastrectomy (CLSG), incisional hernia rate was %1,6 in singleport sleeve gastrectomy group (SPSG). Contrasting these findings, Pilone et al. (8) reported 10 patients with PSH among 624 patients who underwent bariatric surgery without closure of the fascial defect. In a meta-analysis of 25 studies, Karampinis et al. (19) compared studies involving routine fascial closures with studies in which fascial defects were not closed, and, interestingly, found a higher incidence of PSH in the fascial closure group, although the difference was not statistically significant (1.13%/0.77%). The overall incidence rate was reported to be 5.8% in our study (12/207), with 8.9% (10/112) in the non-fascial closure group and 2.1% (2/95) in the fascial closure group. The rate of PSH was found to be higher than in previous studies of bariatric surgery, which may be attributed to the fact that all patients in their study

underwent a sleeve gastrectomy that caused fascial damage during the removal of the remnant stomach. In fact, the incidence of PSH in the present study is consistent with previous studies involving sleeve gastrectomy in literature. There is also no comparison between closure versus non-closure of small wounds in abdominal/incisional hernias. However, the beneficial effect of muscle layers and fascia closure has been proven in the literature (20,21). A comparison of the fascial closure group with the non-fascial closure group in the present study revealed a significantly lower rate of PSH in the fascial closure group. Accordingly, the authors believe that fascial closure reduces the risk of PSH.

There are additional risk factors for PSH other than fascial closure. In a cohort study, Ece et al. (9) identified surgical site infection and early surgical complications as risk factors for the development of PSH. Advanced age, male gender, nutritional status, anemia, steroid use, renal failure, cancer history and the use of large trocars are the main factors associated with PSH (22). In a comparison of patients that developed hernia with those who did not develop hernia, the parameters of advanced age, alcohol use, coronary artery disease and the development of postoperative complications (hemorrhage, leakage, and surgical site infection) were found to be significantly associated with the development of PSH. Other parameters were found to be of no significance. Aside from obesity, these parameters are also independent risk factors in the normal population that need to be taken into consideration prior to surgery. The limitations of the study the groups could not be randomly assigned due to the retrospective nature of the study.

CONCLUSION

The present study found closure of the fascial defect to be a protective factor against the development of PSH when compared to non-fascial closure. Age, coronary artery disease, alcohol abuse and the development of postoperative complications that unfavorably affect wound healing were found to be risk factors in the present study. The authors of the present study recommend fascial closure during surgery and the closer follow-up of patients who develop complications.

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