Port Site Closure versus Non-Closure in Morbidly Obese Patients who Underwent Laparoscopic Bariatric Surgery

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Introduction: Laparoscopic bariatric surgery (LBS) has established itself as the premier method for handling morbid obesity, but optimal management of port sites remains debated. This study aimed to compare outcomes between port site closure and non-closure approaches in morbidly obese people undergoing LBS.

Patients and methods: One hundred individuals aged 18-65 years who had LBS were included in this retrospective analysis. Patients were divided into two equal groups: Group C (port site closure using absorbable sutures) and group N (only skin closure).

Results: Operative time and average pain scores in 1st 24 hours were significantly higher in Group C (89.4±20.69 vs 80.7±19.06 minutes, p=0.031 and median 3 vs 2, p<0.001, respectively). Wound healing and recovery time were significantly faster in Group C (1.44±0.5 vs 2.02±0.94 weeks, p<0.001 and 3.06±0.79 vs 3.54±1.13 weeks, p=0.061, respectively). Complications were comparable between groups, with no conversions in either group.

Conclusion: Port site closure in morbidly obese people undergoing LBS increases operative time and immediate postoperative pain but significantly enhances wound healing and accelerates recovery without raising complication rates.

Key words: Bariatric surgery, laparoscopy, port site closure, morbid obesity, complications.

Introduction

Obesity is one of the most pressing issues in modern public health, affecting around 600 million adults worldwide and contributing to various comorbidities, but for severe cases bariatric (BS) surgery has shown to be a successful option, promoting sustained weight loss, improving or resolving related conditions, enhancing quality of life, and increasing longevity.[1]

BS has evolved significantly over the past five decades, marked by technical advancements in procedures and the introduction of laparoscopic techniques.[2]

Laparoscopic techniques have revolutionized surgical practice by offering substantial advantages over conventional open procedures, including less blood loss, less wound-related issues, faster healing, less post-operative pain, shorter hospital stays, and less major incisions.[3] These benefits have established laparoscopic surgery as the gold standard for managing conditions affecting multiple organ systems, particularly the digestive and reproductive systems.[4] Recent studies support these advantages by demonstrating that deep neuromuscular blockade with low-pressure pneumoperitoneum in laparoscopic abdominal surgeries significantly reduces postoperative pain and opioid consumption, while maintaining optimal surgical conditions.[5]

A key technical aspect of laparoscopic bariatric surgery (LBS) is managing port sites, which are closed after the procedure to ensure proper healing, reduce infection risk, and prevent hernias.[6] Port-site closure in patients with morbid obesity poses unique challenges, and while complications are rare, they can lead to serious consequences, including the need for reoperation and potential permanent damage.[7]

The optimal management of port sites in morbidly obese patients remains debated, with traditional practice favoring closure, while some surgeons advocate non-closure for potential benefits like reduced operative time and lower suture-related complications.[8]

The present study aims to compare outcomes between port site closure and non-closure approaches in morbidly obese people undergoing LBS.

Patient and methods

This is a retrospective analysis of 100 patients aged 18–65 of both sexes who underwent LBS at Mansoura University Hospitals, Egypt from October 2022 to October 2024.

The indications for BS procedures adhered to the recommendations established by the International Federation for the Surgery of Obesity (IFSO).[9] Specifically, patients were considered candidates for surgery if they presented with chronic morbid obesity, defined as a body mass index (BMI) ≥40 kg/m² or ≥35 kg/m² with associated comorbidities, and had experienced failure of conservative treatment measures.

The study excluded patients with secondary obesity from hormonal disorders like hypothyroidism or Cushing's syndrome, mental instability, active wounds, substance abuse, pregnancy, a history of malignancy, uncooperative behavior affecting postoperative adherence, or previous BS.

The cohort was divided into two equal groups of 50 patients each. The closure group (Group C): underwent port site closure using absorbable sutures after surgery, while the non-closure group

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(Group N): received only skin closure.

The closure was performed by absorbable suture as the port wound is a muscle splitting wound not muscle cutting so just muscle approximation was enough.

The preoperative evaluation for both groups followed identical protocols as those used for conventional LBS. This evaluation involved assessment by a multidisciplinary team consisting of a nutritionist, endocrinologist, gastroenterologist, cardiologist, pneumologist, psychiatrist, psychologist, anesthesiologist, and bariatric surgeon.

Preoperative preparation included patient education regarding the importance of adherence to a low-calorie diet for at least 2 to 4 weeks prior to surgery. This dietary regimen served the dual purpose of reducing liver volume and assessing patient compliance. Prophylaxis against deep vein thrombosis was implemented through both chemical and mechanical modalities. A prophylactic dose of low molecular weight heparin administered 12 hours before surgery, while mechanical prophylaxis involved the use of compression stockings. Surgical site infection prophylaxis was achieved through intravenous antibiotic administration immediately before the skin incision.

All surgical procedures were performed under general anesthesia. All patients received standardized surgical therapy based on a revised clinical route before, during, and after surgury. The operations were performed using a 5mm port in combination with either a 12mm or 15mm port.

In the Group C, the port-site closure method for the 12mm or 15mm port was performed by simple suture through the skin wound to close the abdominal muscles or by sheath closure as showen in **Fig. 1.**

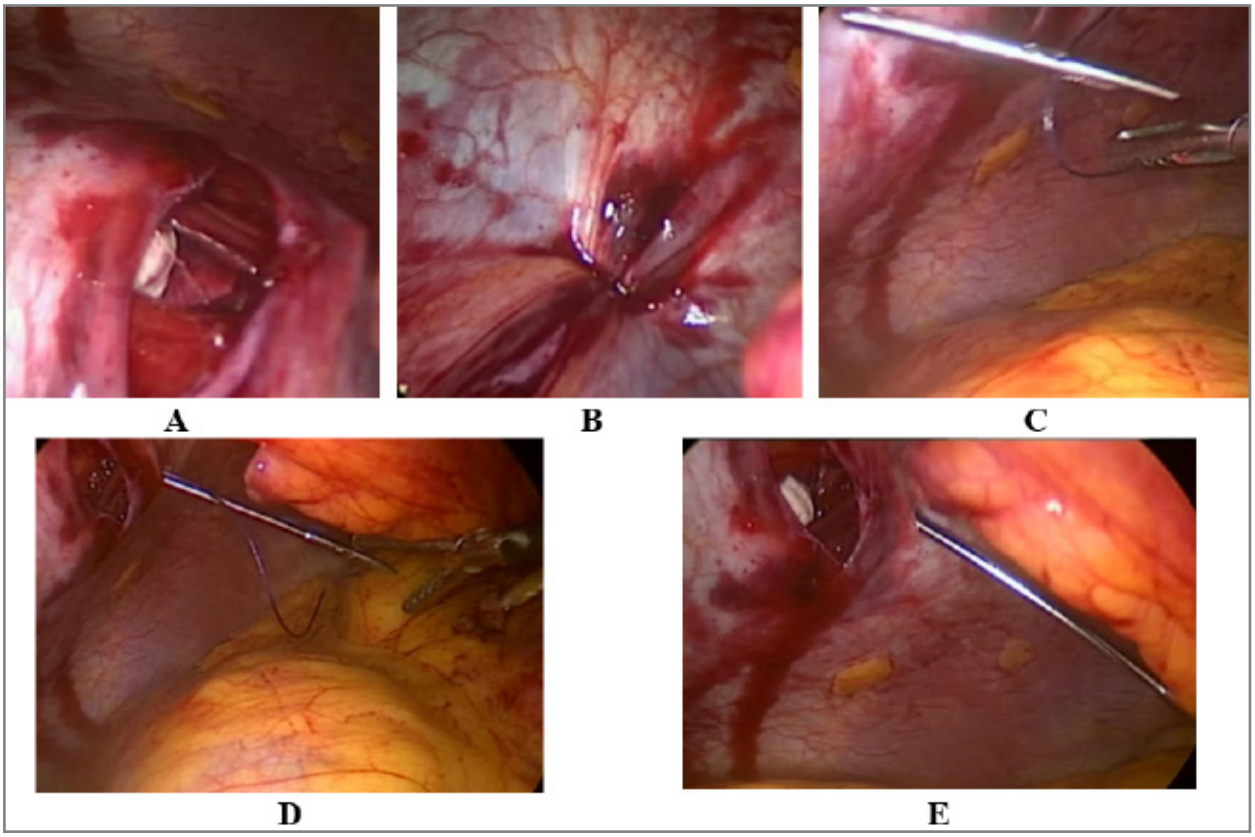

Fig 1: Closure of the port site by sheath closure.

In the Group N, only skin closure was performed, without fascial or peritoneal suturing.
Following the surgical procedure, patients were administered intravenous fluids to ensure sufficient urine production. They were also encouraged to mobilize early, commencing walking with assistance within 4 to 6 hours post-surgery. A clear liquid diet was initiated 24 hours postoperatively. Patients were typically discharged on the first postoperative day, provided they were consuming adequate oral fluids (>2 L/day). Treatment with enoxaparin, a low-molecular-weight heparin, at a dosage of 40 mg daily was initiated 12 hours before surgery and continued for 14 days postoperatively. Discharge criteria included hemodynamic stability, absence of fever, ability to ambulate, tolerance of a bariatric full liquid diet, and pain control with oral analgesics. Evaluation after surgery included evaluation of operative time, incidence of conversion to open surgery, need for blood transfusions, development of fistulae, requirement for reinterventions, and occurrence of parietal herniation at one and three months after surgery. Additionally, postoperative pain in 1st 24 hours was assessed using visual

analogue scale (VAS),[10] along with specific port site complications including herniation, bleeding, and infection. Patients were fellowed up for six months from October 2024 to March 2025.

The primary outcome was the postoperative pain score, while secondary outcomes included the length of hospital stay, postoperative complications, operative time, wound healing, and time to recovery.

Sample size calculation:

G*Power 3.1.9.2 (Universitat Kiel, Germany) was used to calculate the sample size. Five patients were included in each group in the pilot research, which found that Group C had an average postoperative pain level of 2.6 ± 1.67 and Group N had an average score of 1.8 ± 0.84. A 1:1 group ratio, an effect size of 0.605, a 95% confidence level, and 80% research power were the parameters used to calculate the sample size. Each group has six more instances to accounted for possible dropouts. Therefore, fifty patients were included in each group.

Statistical analysis

We used SPSS version 27 (IBM©, Armonk, NY, USA) to conduct the statistical analysis. Using histograms and the Shapiro-Wilks test, we checked whether the data was normally distributed. The mean ± standard deviation (SD) was used to describe quantitative data that was normally distributed, and the unpaired Student's t-test was used for analysis. We used the median and interquartile range (IQR) and the Mann-Whitney U test to analyze quantitative data that did not follow a normal distribution. The qualitative variables were examined using Fisher's exact test or a Chi-square test, depending on the situation, and were provided as percentages and frequencies. Statistical significance was determined by a two-tailed P value that was less than 0.05.

Results

Demographic data and comorbidities were insignificantly different between both groups **(Table 1).**

Group C showed much greater operational time and pain score than Group N (P<0.5). Group C had much earlier wound healing and recovery time than Group N (P<0.05). The length of the hospital stay for both groups was little different **(Table 2).**

Port site hernia, obstructed hernia, port site bleeding, port site infection and reintervention were insignificantly different between both groups. Conversion rate did not occur in any patients in both groups **(Table 3).**

Table 1: Demographic data and comorbidities of the studied groups

		Group C (n=50)	Group N (n=50)	P value
Age (years)		34.64 ± 9.29	37.36 ± 13.33	0.239
Sex	Male	21 (42%)	18 (36%)	0.539
	Female	29 (58%)	32 (64%)	
Weight (kg)		140.2 ± 11.27	142.22 ± 9.88	0.343
Height (cm)		165.68 ± 5.98	167.6 ± 5.85	0.108
BMI (kg/m^2)		51.12 ± 3.75	50.77 ± 4.63	0.679
Comorbidities	Hypertension	12 (24%)	10 (20%)	0.629
	DM	7 (14%)	8 (16%)	0.779
	Dyslipidemia	6 (12%)	4 (8%)	0.740
	Sleep apnea	4 (8%)	5 (10%)	1

Data are presented as mean ± SD or frequency (%). BMI: Body mass index, DM: Diabetes mellitus.

Table 2: Outcome variables of the studied groups

	Group C (n=50)	Group N (n=50)	P value
Operative time (min)	89.4 ± 20.69	80.7 ± 19.06	0.031
Average pain score in 1st 24 hours	3(2 - 3)	2(1 - 3)	<0.001
Length of hospital stay (days)	2.38 ± 0.49	2.52 ± 0.5	0.163
Wound healing (weeks)	1.44 ± 0.5	2.02 ± 0.94	<0.001
Time to recover (weeks)	3.06 ± 0.79	3.54 ± 1.13	0.016

Data are presented as mean ± SD or median (IQR).

Table 3: Complications of the studied groups

	Group C (n=50)	Group N (n=50)	P value
Port site hernia	0 (0%)	3 (6%)	0.242
Obstructed hernia	0 (0%)	1 (2%)	1
Port site bleeding	1 (2%)	3 (6%)	0.617
Port site infection	4 (8%)	3 (6%)	1
Conversion rate	0 (0%)	0 (0%)	---
Reintervention	0 (0%)	1 (2%)	1

Data are presented as frequency (%).

Discussion

Port site closure techniques in LBS, particularly for morbidly obese patients, help minimize the risk of postoperative complications such as hernias and infections.[11]

Our study comparing port site closure (group C) versus non-closure (group N) in BS revealed several significant findings regarding operative outcomes and recovery. The operative duration was notably longer in group C, consistent with the additional time required for fascial closure. This observation aligns with previous research by Kimura et al,[12] who developed specialized closure devices to improve efficiency, and Andraos,[1] who noted increased operative times with conventional suturing methods.

Pain assessment showed significantly higher scores in group C compared to group N, likely due to the additional tissue manipulation and suture placement required during closure. This finding differs from Hamdan and Zulkifli's study,[13] which reported better pain outcomes in their non-closure group, possibly due to variations in closure technique and materials.

Despite longer operative times and increased post-operative pain, group C demonstrated significantly faster wound healing and recovery times compared to group N. This accelerated healing process may be attributed to better tissue approximation and reduced wound edge tension. While hospital stay duration remained comparable between groups, the enhanced recovery in group C suggests that the benefits of port site closure extend beyond the immediate post-operative period.

These findings are particularly relevant for the bariatric population, where wound complications are more prevalent due to factors such as increased subcutaneous tissue thickness and reduced tissue oxygenation. The improved healing times in our closure group indicate that proper fascial closure may help mitigate these risk factors in morbidly obese patients undergoing BS, despite the initial trade-offs in operative time and post-operative pain.

Port site hernias occurred in 3 cases of group N but were absent in group C, with one obstructed hernia in group N requiring reintervention. Port site bleeding was more frequent in group N than group C (3 cases vs. 1 case), as was infection (3 cases vs. 4 cases). Although differences were not statistically significant, the findings suggest fewer complications with port site closure. Neither group required conversion to open surgery.

Our findings regarding port site herniation align with previous research demonstrating the potential protective effect of port site closure. Andraos,[1] observed no hernias in their closure group compared to seven in their control group (p=0.005) over a two-year follow-up. Similarly, Almalki,[14] reported no cases of trocar site herniation using an innovative omental plug technique for closing trocar sites ≥10mm. The case report by Vineet et al.[15] further emphasizes the importance of proper rectus sheath closure, describing a morbidly obese woman who developed acute small bowel obstruction due to port-site herniation. Botea et al.,[16] demonstrated the long-term efficacy of proper fascial closure, reporting no port-site hernias over a mean follow-up of 23.9 months. Although not statistically significant in our study, the absence of port site hernias in our closure group remains clinically relevant given the potential morbidity associated with this complication in the bariatric population. Regarding wound complications, our lower infection rate in group C corresponds with Andraos,[1] who reported no infections in their closure group compared to 9.8% in their control group (p=0.055).

The findings from Maharaul et al,[17] support our conclusions, emphasizing that careful port site management, including sheath closure with appropriate techniques, can reduce complications in laparoscopic surgeries. Similarly, Botea et al.,[16] demonstrated the long-term safety and efficacy of their fascial closure technique, with no port-site hernias over an extended follow-up period.

Future research should focus on optimizing closure techniques to minimize operative time and postoperative pain while maintaining the benefits of reduced complications.

The potential for selection bias due to the study's retrospective methodology is one of its limitations. The sample size may be insufficient to detect rare complications. Additionally, the single-center setting could influence the generalizability of the outcomes. Three months is a really short time to assess serious issues such as port site hernias. Furthermore, the study did not account for surgeon experience, which could influence outcomes and complication rates in both groups.

Conclusions

The study demonstrates that port site closure in morbidly obese people undergoing LBS is associated with longer operative time and higher immediate postoperative pain scores but results in significantly faster wound healing and recovery times. While port site closure requires additional operative time, it appears to confer advantages in terms of overall recovery without increasing complication rates.

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Conflict of Interest: Nil

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