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Is laparoscopic colorectal cancer surgery safe in patients with previous major abdominal surgery?

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ABSTRACT

Introduction: Minimally invasive surgery (MIS) has been performed safely for the past three decades. However, sometimes performing MIS is challenging such as in patients with the previous abdominal surgery (PAS). Therefore, in this study, we aimed to investigate the feasibility and safety of laparoscopic colorectal surgery (LCS) in patients with only major PAS.

Materials and Methods: Data from 59 patients who underwent LCS performed by a single surgeon between 2019 and 2022 were retrospectively reviewed. Patients were divided into two groups; those with major PAS (PAS group, n=19, 32.2%) and those were not (NPS group, n=40, 67.8%). Demographics, previous medical and surgical history, and perioperative data were evaluated and compared between groups.

Results: The median operation time was 180 (120–240) min and it was significantly longer in the PAS group ($p<0.001$). The post-operative serious complication and mortality rates were not significantly different between the groups.

Conclusion: We found that LCS, which is a complex surgery, can be performed safely even after major PAS, despite the prolongation of hospital stay and operation time and the increase in the number of ports used.

Keywords: Adhesion, Complication, Incision, Minimally invasive, Open surgery, Trocar

Introduction

Minimally invasive surgery (MIS) has been performed safely for the past three decades as a result of the developments in surgical technology and has taken its place as the gold standard treatment in colorectal surgery.[1,2] Laparoscopy has many advantages such as less surgical trauma, shorter hospital stay, less pain, and better cosmetic results.[3-5] However, sometimes performing MIS is challenging such as in patients with pulmonary or cardiac problems or with the previous abdominal surgery (PAS).[6,7] Adhesions due to PAS may make it difficult to establish a safe pneumoperitoneum and injuries to the intra-abdominal organs may occur. Nevertheless, today, MIS can be safely performed even on patients with PAS in many experienced centers.[8,9]

PAS is a general definition and, for example, previous laparoscopic cholecystectomy and previous open radical gastrectomy are in the same class, but these two won't create equal difficulty for surgeons. Therefore, in this study, we aimed to investigate the feasibility and safety of laparoscopic colorectal surgery (LCS) in patients with only major PAS.

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Materials and Methods

Ethical approval for the study was obtained from the Institutional Ethical Committee (2022/2906). Data from 59 patients who underwent LCS performed by a single surgeon between 2019 and 2022 were retrospectively reviewed. Patients were divided into two groups; those with major PAS (PAS group, n: 19, 32.2%) and those were not (NPS group, n: 40, 67.8%). Major PAS was defined according to the previous studies.[9] Post-operative complications were classified according to the Clavien-Dindo classification. Demographics, previous medical and surgical history, and perioperative data were evaluated and compared between groups.

Surgical Technique

Patients were operated on in the Lloyd-Davies position. In the NPS group, the pneumoperitoneum creation and the first port entrance were made on the superior umbilical area. Other ports were entered from the right or left lower and upper quadrants on the midclavicular line according to the surgical procedure. In addition, a port was entered from the inferior of the xiphoid and we worked with four ports. In the PAS group, the pneumoperitoneum was established through the Veres needle from the Palmer point, and ports were entered similarly with the NPS group if possible. In case of not possible, ports were entered from different localizations (Fig. 1). After adhesiolysis, we performed the surgery by the same port layout as the NPS group. Surgeries were performed under 12 mmHg intra-abdominal pressure. In patients with neoadjuvant therapy, diverting ileostomy was performed after low anterior resection. An abdominal drain was placed near the anastomosis in all patients.

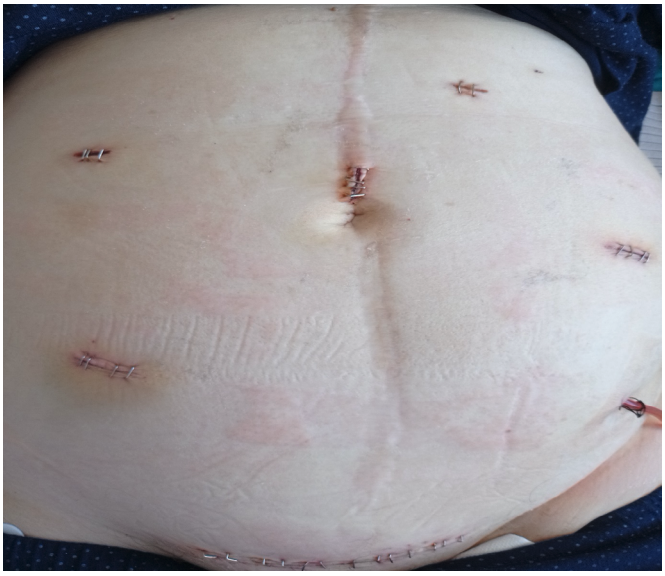

Figure 1. Port sites on a patient with previous abdominal surgery.

Statistical Analysis

The Kolmogorov–Smirnov test was performed to assess the normality of the distribution of numerical variables, they were expressed as median (interquartile range) and were analyzed through the Mann–Whitney U-test. Categorical variables were given as frequency (percentage) and analyzed using the Chi-square or Fisher's Exact test, as appropriate. A $p<0.05$ was determined as significant. All the statistical analyses were performed through IBM SPSS Statistics for Windows, version 25.0 (IBM Corp., Armonk, N.Y., USA).

Results

Demographics and pre-operative data of patients are summarized in Table 1. The median age of the study group was 64 (52–70) years and 33 patients (62.7%) were male. About half percent of the study group had at least one

Table 1. Demographics and pre-operative data of the study group and subgroups

	Whole study group (n=59)	NPS group (n=40)	PAS group (n=19)	p
Age, years	64 (52–70)	64 (52–69.75)	64 (54–72)	0.643
Male, n (%)	37 (62.7)	27 (67.5)	10 (52.6)	0.270
Comorbidity, n (%)	32 (54.2)	17 (42.5)	15 (78.9)	0.009
ASA score, n (%)				
1	4 (6.8)	4 (10)	-	0.079
2	29 (49.2)	22 (55)	7 (36.8)	
3	26 (44.1)	14 (35)	12 (63.2)	

NPS: No previous surgery; PAS: Previous abdominal surgery; ASA: American Society of Anesthesiologists.

comorbidity and the most common American Society of Anesthesiologists (ASA) score was 2. There were no significant differences in terms of age, gender, and ASA scores between the groups. The rate of comorbidities was significantly higher in the PAS group (78.9%) compared to the NPS group (42.5%) (p=0.009).

Table 2 shows the operative data of the patients. The most common tumor localization was rectum/rectosigmoid region, followed by sigmoid colon in the whole study group and both subgroups. Parallel to this the most common surgery performed was low anterior resection followed by anterior resection in the whole study group and both subgroups. No significant differences were seen between the subgroups in these data. The median port number was 4 (4–6) and it was significantly more in the PAS group compared to the NPS group (6 [6–6] and 4 [4–4], respectively, p<0.001). The most common previous surgical incision was the lower midline incision and the upper plus lower midline incision was the second. The median operation time was 180 (120–240) min and it was significantly longer in the PAS group (p<0.001). Intraoperative bleeding and conversion rate did not significantly differ between the groups.

Post-operative data of the patients are given in Table 3. The median length of hospital stay was 6 (5–10) and the patients in the PAS group stayed in the hospital significantly longer compared to the NPS group (p=0.009). Two patients died (one in each group) in the post-operative period. The post-operative serious complication and mortality rates and the tumor diameter were not significantly different between the groups.

Table 2. Operative data of the study group and subgroups

	Whole study group (n=59)	NPS group (n=40)	PAS group (n=19)	p
Tumor localization, n (%)				0.066
Rectum/rectosigmoid	28 (42.6)	19 (45)	9 (47.3)	
Sigmoid	16 (27.1)	10 (26)	6 (31.6)	
Caecum	6 (10.2)	5 (12.5)	1 (5.3)	
Splenic flexura	3 (5)	2 (5.1)	1 (5.3)	
Transverse colon	3 (5.1)	1 (2.5)	2 (10.1)	
Hepatic flexura	1 (1.7)	1 (2.5)	-	
Surgical procedure, n (%)				0.183
Low anterior resection	23 (39)	14 (35)	9 (47.4)	
Anterior resection	15 (25.4)	9 (22.5)	6 (31.6)	
Abdominoperineal resection	6 (10.2)	6 (15)	-	
Left hemicolectomy	5 (8.5)	4 (10)	1 (5.3)	
Right hemicolectomy	5 (8.5)	4 (10)	1 (5.3)	
Total colectomy	2 (3.4)	2 (5)	-	
Segmentary resection	2 (3.4)	-	2 (10.5)	
Port number	4 (4–6)	4 (4–4)	6 (6–6)	<0.001
Previous incision, n (%)				
Upper midline	2 (3.4)	-	2 (10.5)	
Lower midline	9 (15.3)	-	9 (47.4)	
Pfannenstiel	1 (1.7)	-	1 (5.3)	
Upper plus lower midline	6 (10.2)	-	6 (31.6)	
Conversion, n (%)	8 (13.6)	3 (7.5)	5 (26.3)	0.097
Operation time, minutes	180 (120–240)	145 (120–180)	250 (240–280)	<0.001
Intraoperative bleeding, ml	50 (40–100)	50 (40–75)	75 (50–100)	0.292

NPS: No previous surgery; PAS: Previous abdominal surgery.

Table 3. Post-operative data of the whole study group and subgroups

	Whole study group (n=59)	NPS group (n=40)	PAS group (n=19)	p
Post-operative serious complication, n (%) *	10 (16.9)	6 (15)	4 (21.1)	0.125
Length of hospital stay, days	6 (5–10)	5 (5–8)	9 (6–10)	0.009
Tumor diameter, cm	3 (2–4.5)	3 (2.03–5.38)	2.75 (1.73–3.5)	0.111
Mortality, n (%)	2 (3.4)	1 (2.5)	1 (5.3)	0.544

*Clavien-Dindo class ≥3 NPS: No previous surgery, PAS: Previous abdominal surgery.

Discussion

Previously, PAS was considered a relative contraindication for LCS.[3,4] The reason for this was that the entry to the abdomen was not safe due to adhesions, because an injury might occur. Especially adhesions are more common after conventional open surgery, compared to laparoscopy.[10-12] Parallel to this, in our experience too, adhesions occur more after open surgery. In a study, it was found that 75% of the patients developed adhesions after surgery, omental adhesions were seen in 96%, and intestinal adhesions were seen in 29%.[13] In our clinic, minor surgeries such as cholecystectomy or some urological and obstetric interventions, in patients with PAS are performed with MIS techniques in recent years; however, LCS is not performed very often. The reasons for this were LCS that requires a larger dissection, reconstruction after LCS is complicated, and therefore, it is affected more by adhesions due to PAS.

In some previous studies, the operation time was found to be longer in laparoscopic surgery performed in patients with PAS,[1,10,14] while some others found no difference.[15-17] In this study, we found a significantly longer operation time in the PAS group. The reasons for this were spending more time on abdominal entry, and time spent for revealing the anatomy and adhesiolysis. The same reasons also explain the significantly more port numbers in the PAS group.

The conversion rate is expected to be higher in the surgery to be performed after PAS due to the inability to reveal the anatomy, difficulties in adhesiolysis, and possible enterotomies and this has been shown in many studies.[1,14,18] Contrary to the literature, in our study, conversion rates were similar in both groups. We think that this may be due to the small number of patients.

Length of hospital stay is one of the main factors for the risk of complications, hospital-acquired infection, psychological problems, and cost. While many studies revealed no effect of PAS on the length of stay;[1,9,14,18] in our study, we found a significantly longer hospital stay in the PAS group. We think that the reasons for this may be the delayed start of oral intake due to prolonged operation times and extensive adhesiolysis, and delayed removal of the drains.

Some previous studies pointed out that, the complication rate was higher in patients with PAS.[10,19,20] Contrary to this some others stated no difference.[1,14,18] These controversial results may originate from not dividing the PAS into major and minor. In some studies separating the PAS as minor and major, complication and conversion rates were found to be high in the PAS groups.[6,7,9] In this study, we did not find any difference in terms of post-operative major complications and mortality. There are studies reporting that performing abdominal insufflation from the palmer point if possible and inserting the first trocar away from the incision line reduces the complication and conversion rates in patients with PAS,[8] and our opinion is the same as mentioned above.

This study has some limitations. These were the retrospective design of the study and a small number of patients in the study group.

Conclusion

We found that LCS, which is a complex surgery, can be performed safely even after major PAS, despite the prolongation of hospital stay and operation time and the increase in the number of ports used. Prospective randomized studies are needed for more certain results.

Disclosures

Ethichs Committee Approval: Ethical approval for the study was obtained from the Institutional Ethical Committee (2022/2906).

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Concept – Ö.G.; Design – Ö.G.; Supervision – Y.M.B.; Materials – Ö.G.; Data collection and/or processing – Ö.G.; Analysis and/ or interpretation – Y.M.B.; Literature search – Ö.G.; Writing – Ö.G., Y.M.B.; Critical review – Ö.G., Y.M.B.

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