Original Article

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Is Extraperitoneal Approach in Radical Cystectomy Really Effective on Bowel Recovery? A Comperative Analysis of Extraperitoneal Versus Transperitoneal Approach

Ekrem Güner[1], Emrullah Söğütdelen[2], Kamil Gökhan Şeker[3], Osman Özdemir[1]

[1]*University of Health Sciences Turkey, Bakırköy Dr. Sadi Konuk Training and Research Hospital, Clinic of Urology, İstanbul, Turkey*
[2]*Bolu Abant İzzet Baysal University Faculty of Medicine, Department of Urology, Bolu, Turkey*
[3]*Liv Hospital Vadistanbul, Clinic of Urology, İstanbul, Turkey*

Abstract

Objective: Radical cystectomy with extended pelvic lymph node (LN) dissection is a gold standard surgical treatment for muscle-invasive bladder cancer which is a common urological malignancy in elderly people. Despite common surgical technique is a transperitoneal approach, we aimed to analyze the benefit of extraperitoneal approach radical cystectomy in the gastrointestinal system.

Materials and Methods: We retrospectively analyzed a total number of 110 (52 intraperitoneal and 58 extraperitoneal) radical cystectomy patients operated extraperitoneal or transperitoneal by 2 expert urologists between January 2016 to December 2019 in this study. All operated patients had indications for radical cystectomy and extended LN dissection and Wallace type ileal loop were performed adding to the operations. Patients have available data were included in this study and complications were assessed by Clavien- Dindo classification system.

Results: The median age of a total number of 110 patients was 66 (minimum: 43 - maximum: 82) years. There were no differences between groups in terms of surgical region infection, urinary leakage, ileus treated surgically, and emergency admission after discharge of patients. Twenty-four (46.1%) patients in the transperitoneal group needed for erythrocyte transfusion whereas, 16 (27.5%) patients in the extraperitoneal approach group (p=0.04). Additionally, 13 (19.2%) patients in the transperitoneal group had ileus treated conservatively, whereas, 8 (13.7%) patients in the extraperitoneal approach group (p=0.02).

Conclusion: Extraperitoneal approach and retroperitonealization of an ileal loop in radical cystectomy are safe and effective on oncological surgical principles. It may also provide better gastrointestinal motility after surgery.

Keywords: Radical cystectomy, extraperitoneal approach, ileus, bowel recovery

Introduction

Bladder cancer is a common urological malignancy in elderly people. Radical cystectomy with extended pelvic lymph node (LN) dissection is a gold standard surgical treatment for muscle-invasive bladder cancer (1). Despite progress in improvement even open or minimally invasive surgical techniques and postoperative medical care, there are still serious morbidity and mortality rates.

Enhanced recovery after surgery (ERAS) protocol is multimodal care before and after surgery was first used in colorectal surgery still under investigation by maintaining the preoperative organ functioning to reduce or prevent surgical complications. ERAS consisted of many evidence-based preadmission educations and counseling, all interventions and postoperative care for the aim of keeping patient earlier recovery to return to the normal activities (2). Although this kind of protocol leads to improvement in cardiopulmonary function, early return of bowel function and a reduction in complications and hospital stay, still major morbidity in radical cystectomy is due to gastrointestinal complications affects one out of three patients (3,4).

In addition to pre-and postoperative care, technical clinical improvements in surgery have been started to reduce complications. The intraperitoneal approach is frequently preferred as a major surgical technique in radical cystectomy. Kulkarni et al. (5) first described the extraperitoneal approach for radical cystectomy in 1999 and reported that the extraperitoneal

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Address for Correspondence: Ekrem Güner, University of Health Sciences Turkey, Bakırköy Dr. Sadi Konuk Training and Research Hospital, Clinic of Urology, İstanbul, Turkey
Phone: +90 532 613 89 12 **E-mail:** ekremguner@yahoo.com **ORCID-ID:** orcid.org/0000-0002-4770-7535
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approach had some advantages in decreasing gastrointestinal complications. Here, in this study, we aimed to investigate the operative and early postoperative results of the extraperitoneal versus the intraperitoneal approach of radical cystectomy.

Materials and Methods

This study was approved by Bakırköy Dr. Sadi Konuk Training and Research Hospital Clinical Research Ethics Committee by providing the decision in protocol number 2018/264 (date: 06.08.2018). We retrospectively analyzed a total number of 110 (52 intraperitoneal and 58 extraperitoneal) radical cystectomy patients operated by 2 expert urologists between January 2016 to December 2019 in this study. All patients before the operation were examined by laboratory and screening tests explained in the European Association of Urology (EAU) guidelines (1). All operated patients had indications for radical cystectomy explained in the EUA guideline and patients have available data were included in this study.

The day before surgery, polyethylene glycol for laxative and the intravenous crystalloid solution was applied for all patients. The extraperitoneal and intraperitoneal approach of radical cystectomy was performed according to described by Kulkarni et al. (5) and Hautman et al. (6) respectively. Extended pelvic LN dissection was performed after cystectomy was completed. Before the ileal loop was extraperitonealized, Wallace-type ureteroileal anastomosis was performed on all patients (7). Postoperative feeding was initiated with the resumption of nature bowel sounds and gradually increased according to patient tolerance. Ileus was described as a patient suffering from nausea or vomiting associated with abdominal distention needed for insertion of nasogastric tube or cessation of enteral feeding (8). Conservative treatment of ileus was defined as any intervention without surgical operation. All operative and postoperative complications were assessed by Clavien-Dindo classification system.

Statistical Analysis

All statistical analyses were performed using the SPSS 22.0 (IBM Corp, Chicago, USA) software. Kolmogorov-Smirnov test was applied to describe the normality of variables. Quantitative data were presented as mean ± standard deviation and median [minimum (min) - maximum (max)]. Categorical variables were expressed as numbers and percentages to define the parameters. Comparison of categorical variables was accomplished using Pearson chi-square or Fisher's Exact tests. Mann-Whitney U test and t-test were performed to compare 2 groups of quantitative data. The confidence interval was 95% and the level of significance of the value of p was considered at <0.05.

Results

The median age of a total number of 110 patients was 66 (min: 43 - max: 82) years. One hundred and four (94.5%) and 76 (69.1%) of patients were male and had a smoking history, respectively.

The average body mass index (BMI) of all patients was 26.24±3.74 and the median Charlson comorbidity index without age was 1 (min: 0 - max: 7). Demographics and preoperative biochemical results of patients were described in Table 1.

There was no statistical difference in age, gender, BMI, smoking history, Charlson comorbidity index without age, follow-up time, and biochemical parameters among the groups. In the preoperative evaluation, 8 (15.3%) patients operated by intraperitoneal approach had clinical LN positivity whereas 2 (3.4%) patients operated by extraperitoneal approach (p=0.03). However, there was no difference in pathological LN positivity and the total number of excision of LN between groups (p=0.50 and p=0.12, respectively). In the perioperative results, the mean operative time was 270±45 minutes in extraperitoneal and 245±60 minutes in the intraperitoneal approach (p=0.35). Furthermore, there was no difference between groups even minor or major complications in Clavien-Dindo classification system (p=0.17). In the postoperative follow-up, there were no differences between groups in terms of surgical region infection, urinary leakage, ileus treated surgically, and emergency admission after discharge of patients (p>0.05). Twenty-four (46.1%) patients in the transperitoneal group needed for erythrocyte transfusion whereas, 16 (27.5%) patients in the extraperitoneal approach group (p=0.04). Additionally, 13 (19.2%) patients in the transperitoneal group had ileus treated conservatively, whereas, 8 (13.7%) patients in the extraperitoneal approach group (p=0.02). There was no difference among groups in the results of patients clinical T stage or surgical margin positivity in final pathology (p=0.93 and 0.49, respectively). Comparison of groups in terms of preoperative, operative, and postoperative outcomes are summarized in Table 2.

Table 1. Demographics and preoperative biochemical results

		Mean	SD	Median (minimum-maximum)	n (%)
Age, y		64.78	8.18	66 (43-82)	
Gender	**M**				104 (94.5)
Gender	**F**				6 (5.5)
Smoking history, yes					76 (69.1)
BMI, kg/m²		26.24	3.74	26 (18-36.7)	
Chalson comorbidity index w/o age		1.42	1.38	1 (0-7)	
Preoperative Cre, mg/dL		1.18	0.63	0.98 (0.5-4.6)	
Preoperative Alb, mg/dL		3.93	0.53	4.00 (2.69-4.84)	
Preoparative Hb, g/dL		12.6	2.23	13 (7.6-17.7)	

Y: Year, n: Number, M: Male, F: Female, Cre: Creatinine, Alb: Albumine, Hb: Hemoglobine, SD: Standard deviation, BMI: Body mass index

Table 2. Preoperative, opeative, and postoperative results of extraperitoneal versus transperitoneal groups				
		Extraperitoneal n=58	**Transperitoneal n=52**	**p**
Age, y		65.4±7.6	64.1±8.8	0.40
Gender, n (%)	**M**	55 (50.0)	49 (44.5)	1.0
	F	3 (2.7)	3 (2.7)	
Smoking history, n (%)		41 (70.6)	35 (67.3)	0.44
BMI, kg/m²		26.2±4.0	26.2±3.4	0.99
Chalson comorbidity index w/o age [median (minimum-maximum)]		1 (0-7)	1 (0-6)	0.81
Preoperative Cre, mg/dL		1.07±0.34	1.29±084	0.08
Postoperative Cre (highest), mg/dL		1.45±0.64	1.33±0.61	0.34
Cre on the day 90th, mg/dL		1.00±3.78	1.19±0.54	0.07
Preoperative Alb, mg/dL		3.93±0.50	3.79±0.92	0.44
Postoperative Alb, mg/dL		2.49±0.32	2.60±0.35	0.10
Preoparative Hb, g/dL		12.62±2.30	12.65±2.11	0.93
Postoperative Hb, g/dL		10.2±1.84	10.08±1.68	0.50
Intravesical treatment, n (%)		10 (17.2)	8 (15.3)	0.79
Tumor grade, n (%)	**HG**	56 (51.4)	46 (42.2)	0.24
	LG	2 (1.8)	5 (4.6)	
CIS, n (%)		19 (32.7)	17 (32.6)	0.84
cT, n (%)	**<T2**	35 (31.8)	34 (30.9)	0.93
	T3-T4	23 (20.9)	19 (17.2)	
cN, n (%)		2 (3.4)	8 (15.3)	**0.03**
cM, n (%)		0 (0)	1 (100.0)	0.47
Abdominal surgery history, n (%)		8 (38.1)	13 (61.9)	0.13
Neoadjuvant chemoterapy, n (%)		3 (33.3)	6 (66.7)	0.20
Operation time, min		270±45	245±60	0.35
Hospital stay, d		10.8±3.5	11.3±4.4	0.50
Erytrocyte transfusion, n (%)		16 (27.5)	24 (46.1)	**0.04**
Clavien-Dindo classification system, n (%)	**1 and 2**	53 (48.2)	43 (39.1)	0.17
	>3	5 (4.5)	9 (8.2)	
Surgical region infection, n (%)		14 (24.1)	10 (19.2)	0.38
Ileus, conservative treatment, n (%)		1 (1.9)	8 (13.7)	**0.02**
Ileus, surgical treatment, n (%)		1 (1.7)	4 (7.6)	0.18
Urinary leakage, n (%)		0 (0)	1 (1.9)	0.47
Postoperative emergency admission, in the first 30 days, n (%)		12 (20.7)	11 (21.1)	0.84
Surgical margin positivity, n (%)		2 (3.4)	0 (0)	0.49
Local recurrence, n (%)		2 (3.4)	3 (5.7)	0.48
Total excision of LN,		12.3±3.8	14.0±4.4	0.12
Pathological LN positivity, n (%)		15 (25.8)	15 (28.8)	0.49
Follow-up, m		15.01±14.1	12.7±13.2	0.39

y: Year, d: Day, Min: Minute, n: Number, m: Month, M: Male, F: Female, Cre: Creatinine, Alb: Albumine, Hb: Hemoglobine, HG: High grade, LG: Low grade, cT: Clinical T stage, cN: Clinical N stage, cM: Clinical M stage, BMI: Body mass index, CIS: Carcinoma in situ. Categorical variables and quantitative data expressed as mean ± SD and n (%), respectively. Chi-square test and t-test were performed to examine the difference between groups. The value of $p<0.05$ was considered statistically significant and marked in bold

Discussion

Radical cystectomy is a challenging surgical procedure with high morbidity and mortality due to perioperative complications. Although the perioperative mortality rate of radical cystectomy is steady-state for the last decade (1-3%), the morbidity rate of radical cystectomy is still about 50% (8,9). Some techniques have been tried to develop to decrease this kind of perioperative morbidity. Extraperitonealization of ileal conduit separates the uretero-ileal anastomosis in front of the contaminated small bowel anastomosis and enables local management of infectious complications which lead to deterioration of the healing process of anastomosis. Furthermore, the importance of the extraperitoneal approach decreases an ileus not only due to the fluid loss of intestines which are exposed to more atmosphere during radical cystectomy but also adherents in case of any urinary leakage that leads to affect the gastrointestinal system (9). In this study, we detected fewer gastrointestinal complications especially postoperative ileus treated conservatively in extraperitoneal approach radical cystectomy which was highlighted by our study and brought popularity into consideration.

Postoperative bowel motility issue is the most frequent complication of radical cystectomy (3). It is thought that keeping the integrity of the peritoneal cavity in extraperitoneal approach may prevent the inflammatory process and help the functional recovery of the bowel. Some advantages like management of postoperative ileus or urinary leakage in intraperitonealization of an ileal segment and the extraperitoneal approach in radical cystectomy have been reported (5,10,11). In the retrospective analysis of Kulkarni's study at least five-year follow-up, the statistically significant difference in ileus (5% vs 15.8%) and reoperation due to urinary or bowel leaks (6.1% vs 12%) have been reported (9). Another beneficial effect of early bowel recovery is early enteral feeding and a decrease in electrolyte disturbances which positively reinforce the bowel movement. Zaytoun et al. (12) reported that the extraperitoneal approach had faster peristalsis (36 hours vs 12 hours, $p<0.001$), flatus (72 hours vs 36 hours, $p=0.001$), and stool passage (120 hours vs 96 hours, $p=0.06$) (12). Although there was no difference in the urinary leak (0% vs 1.9%, $p=0.47$) and ileus need for surgical intervention (1.7% vs 7.6%, $p=0.18$), our study is compatible with the previous studies in terms of ileus treated conservatively in an extraperitoneal approach increases the importance of keeping peritoneal integrity in radical cystectomy.

Since urologists have been performing radical prostatectomy through an extraperitoneal approach for years, they have anatomically dominated this field. Although it offers a narrower surgical area, it provides better surgical exposure since the area is not invaded by the intestines. Also, ligation of the dorsal vein complex decreases the blood loss and allows better surgical exposure in operation (12). In our study, the need for erythrocyte transfusion in a perioperative period is less in the extraperitoneal group supports this theory (27.5% vs 46.1%, $p=0.04$). Although in transperitoneal approach has better surgical space for dissection of pelvic LNs, we did find a similar number of extracted LNs and pathological LN positivity. Furthermore, surgical margin results and local recurrence are also key principles in oncological surgery in which our results demonstrate that the extraperitoneal approach is comparable to the transperitoneal approach in terms of oncological safety and efficacy ($p=0.49$ and 0.48, respectively).

Study Limitations

We have also some limitations in our study. First of all, this is a study of retrospective nature with a relatively low number of patients and a short follow-up period. We did not analyze the exact feeding day and electrolyte results of patients which may offer the opportunity to compare between groups. We did not focus on the overall complication rates in the early postoperative period. However, we included only ileal loop patients to eliminate the differences in surgical technique which is the strength of our study.

Conclusion

In conclusion, besides the extraperitoneal approach radical cystectomy and retroperitonealization of the ileal loop is safe and effective on oncological surgical principles, it may also provides better functional outcomes for gastrointestinal motility after surgery.

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Ethics

Ethics Committee Approval: This study was approved by Bakırköy Dr. Sadi Konuk Training and Research Hospital Clinical Research Ethics Committee by providing the decision in protocol number 2018/264 (date: 06.08.2018).

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Authorship Contributions

Critical Review: E.G., Supervision: E.G., Data Collection or Processing: K.G.Ş., O.Ö., Analysis-Interpreation: E.S., Literature Review: E.S., O.Ö., Writing: E.S.

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