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Comparison of the Outcomes of Open and Laparoscopic Radical Cystectomy

Açık ve Laparoskopik Radikal Sistektomi Uygulanan Hastaların Sonuçlarının Karşılaştırılması

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Abstract

Objective: Radical cystectomy (RC) can be performed using many methods. In this study, we compared the results of open RC and laparoscopic radical cystectomy (LRC) among patients with bladder cancer in our clinic.

Methods: Between 2019 and 2023, 64 patients who underwent ORC and 32 patients who underwent LRC were included in the study. Demographic, preoperative, intraoperative, and postoperative data of the patients were retrospectively reviewed and compared.

Results: There was no statistical difference between the two groups in terms of age, gender, and body mass index. In terms of total operation time and diversion time, the ORC group had significantly shorter operation times than the LRC group ($p<0.001$). Normal bowel function was observed in 1±0.2 days in LRC and 1.3±0.4 days in ORC, and this period was shorter in LRC ($p<0.001$). The duration of oral fluid intake was shorter in the LRC group ($p=0.008$). The length of hospital stay (LOS) was 16.7±9.9 days in the ORC group and 9.8±5 days in the LRC group and was significantly longer ($p<0.001$). There were no differences between the groups in terms of complications.

Conclusion: LRC is superior in terms of LOS, oral intake, and bowel function, whereas ORC is superior in terms of surgical duration.

Keywords: Radical cystectomy, bladder cancer, laporoscopic surgery, minimally invasive surgery

Öz

Amaç: Radikal sistektomi (RS) operasyonu birçok yöntemle yapılabilmektedir. Çalışmamızda kliniğimizde mesane kanseri hastalarında uyguladığımız açık RS ve laparoskopik radikal sistektomi (LRS) sonuçlarını karşılaştırdık.

Yöntem: 2019-2023 yılları arasında ARS uygulanan 64 ve LRS uygulanan 32 hasta çalışmada yer aldı. Hastaların demografik, preoperatif, intraoperatif ve postoperatif verileri retrospektif olarak tarandı ve verileri karşılaştırıldı.

Bulgular: İki grup arasında yaş, cinsiyet ve vücut kitle indeksi açısından istatistiksel bir fark yoktu. Toplam operasyon süresi ve diversiyon süresi açısından ARS grubu LRS grubuna göre istatistiksel olarak daha kısa sürelere sahipti ($p<0,001$). Normal bağırsak fonksiyonu LRS grubunda 1±0,2 gün, ARS grubunda ise 1,3±0,4 gün izlendi ve bu süre LRS grubunda daha kısaydı ($p<0,001$). Oral alıma geçiş süresi LRS grubunda daha kısaydı ($p=0,008$). Hastanede kalış süresi ARS grubunda 16,7±9,9 gün ve LRS grubunda 9,8±5 gün idi ve istatistiksel olarak daha uzundu ($p<0,001$). Komplikasyon açısından her iki grup arasında fark izlenmedi.

Sonuç: LRS, hastanede kalış süresi, orale geçiş ve bağırsak fonksiyonarının erken kazanılması açısından üstünken operasyon süresi açısından ARS üstündür.

Anahtar Kelimeler: Radikal sistektomi, mesane kanseri, laporoskopik cerrahi, minimal invaziv cerrahi

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Introduction

Radical cystectomy (RC), a common treatment for bladder cancer, is traditionally performed as an open surgery[1]. However, with advancements in surgical technology, laparoscopic methods have become increasingly common. This minimally invasive approach has been suggested to offer several advantages, including reduced blood loss and a shorter length of hospital stay (LOS)[2]. Nevertheless, the question remains whether the oncological and functional outcomes of laparoscopic radical cystectomy (LRC) can match or even surpass those of the conventional open method[3]. This article aimed to explore this issue by reviewing current research and comparing outcomes among patients undergoing both procedures.

Materials and Methods

Ethics committee approval was obtained from University of Health Sciences Türkiye, Ümraniye Training and Research Hospital (decision no: 173, date: 13.06.2024). The study was conducted in accordance with the ethical standards of the 1964 Declaration of Helsinki. Written informed consent was obtained from patients who participated in this study.

Patients who underwent RC for bladder cancer between January 2019 and January 2023 were retrospectively reviewed. The exclusion criteria were patients with nodal and/or distant metastases, severe medical comorbidities contraindicated for major surgery, uncorrectable bleeding diathesis, and preoperative radiation therapy to the pelvis. After the exclusion criteria, the data of 32 patients who underwent LRC and 62 open RC patients were compared.

Preoperatively, all patients underwent investigations for distant metastases, including bone scintigraphy and computed tomography of the chest, abdomen, and pelvis. All cases were considered as M0. Preoperative bowel preparation consisted of a fiber-free diet for 5 days prior to surgery and the intake of 1.5 L of macrogol 3350 solution (Colopeg®) the day before surgery. Patients received low-molecular-weight heparin injection and support stockings the day before surgery.

Preoperative parameters included age, body mass index (BMI), sex, American Society of Anesthesiologists (ASA) score, hemoglobin level, and serum creatinine. Intraoperative data included cystectomy time, diversion time, total operation time, estimated blood loss (EBL), number and type of intraoperative complications, and transfusion rate. Postoperative data included serum hemoglobin and creatinine levels, LOS, major and minor complications, transfusion rate, time to return to normal bowel function, and resumption of liquid and solid food intake. T stage, N stage, and number of lymph nodes (LN) removed were also recorded. Postoperative ileus was defined as a period of >5 days before the return of normal bowel function. Early postoperative complications were defined as those occurring within 30 days after surgery, whereas late complications were defined as those occurring more than 30 days after surgery. Minor complications were defined as those requiring only medical treatment or observation, whereas major complications were defined as those requiring intensive care unit admission, reoperation, or fatal outcomes.

Statistical Analysis

Categorical data are presented as numbers and percentages. Normally distributed numerical data are presented as mean and standard deviation values. Kolmogorov-Smirnov test was used to assess normal distribution, and Student's t-test was used for comparison. Fisher's exact test was used to compare categorical variables. In our study, values below $p<0.05$ were considered statistically significant. Statistical analysis was performed using Statistical Package of Social Sciencesversion 21 (IBM SPSS Statistics; IBM Corp., Armonk, NY).

Results

There was no statistically significant difference between the two groups in terms of age, sex, and BMI. ASA 3 was higher in both groups in terms of ASA scores from preoperative evaluations, but no difference was observed between them. Among the preoperative T stages, 16.1% of the patients in the ORC group and 15.6% in the LRC group had T1 stage. The remaining patients were in the T2 stage on preoperative T staging. There was no statistical difference in postoperative T stages between both groups. Surgical margin positivity (PSM) was 21% in the ORC group and 18.8% in the LRC group, with no significant difference. The number of LN count in the ORC group was 15±5.9 and positive LN was 1.1±0.5, whereas the number of LNs removed in the LRC group was 15.6±4.2 and positive LN was 1±0.6. In terms of total operation time and diversion time, the ORC group had significantly shorter operation times than the LRC group ($p<0.001$). No differences were found between the groups in terms of EBL. There was no difference in preoperative hematocrit and creatinine levels among the laboratory tests, but postoperative hematocrit levels decreased more in the ORC group than in the LRS group ($p<0.001$). Normal bowel

function was observed in 1±0.2 days in LRS and 1.3±0.4 days in ORS, and this period was shorter in LRC (p<0.001). Oral fluid intake time was shorter in the LRC group (p=0.008). The LOS was 16.7±9.9 days in the ORC group and 9.8±5 days in the LRC group, and it was significantly longer (p<0.001). In terms of complications, the most common Clavien 1 complication was observed more frequently in both groups, and no difference was found between the groups in terms of complications. The demographic, preoperative, and postoperative evaluations of the patients are shown in Table 1.

Discussion

RC with LN dissection is the main treatment for invasive or superficial high-grade bladder tumors that recur after conservative treatment[4]. Controlling cancer progression, rapid postoperative recovery, and satisfactory quality of life are the 3 goals of oncological surgery[5]. RC has a morbidity rate of 25-35% and mortality rate of up to 4%[6]. Surgeries performed to reduce morbidity and mortality tend to be more minimally invasive. Laparoscopic surgery has recently become one of the methods used in RC, but its advantages and disadvantages compared with open surgery are still a matter of debate[7].

The patient's condition is an important consideration when deciding on the surgical method. Some of the parameters that evaluate the patient's condition are Eastern Cooperative Oncology Group (ECOG) and ASA[8,9]. More minimally invasive surgeries may be considered in patients with high ECOG performance score and high ASA score[10]. In our study, we did not find any difference between the ECOG and ASA scores of patients in the ORC and LRC groups.

Surgical quality measures for RC include PSM rates and LN counts, both of which have effects on oncological outcomes. PSM, which has an effect on local recurrence, may increase progression to metastasis[11]. In patients undergoing ORC, PSM was found to be 1.5% if the cancer was limited to the organ, whereas it was reported to increase by up to 39% in patients with extravesical disease[12]. In terms of LRC, although the general PSM rate was 6.8%, it was reported to increase to 8.3% in T3 patients and 39% in T4 patients[13]. In our study, PSM was found in 21% and 18% of patients undergoing ORC and LRC, respectively. The high rate of PSM may be attributed to the more advanced postoperative pathological stage. We believe that there was no difference between PSM rates in patients who underwent RC according to the surgical method.

LN dissection is a measure of staging and regional control in RC[14]. There are contradictions in the literature concerning which type of operation is better in terms of the number of LNs. While LRC was found superior in some studies[14,15], ORC was found superior in some studies[16]. In some studies, LRC and ORC were not shown to be superior to each other[17]. In our study, the number of removed LN was 15 in patients who underwent ORC and 15.6 in patients who underwent LRC, and we did not find any significant difference. There was no difference in the positivity rates of the removed LNs between the two groups. We believe that there was no difference between the number of LNs removed and the surgical method in patients who underwent RC.

A short operation time is one of the factors indicating surgical success. In patients who underwent RC, the total operation time was longer in patients who underwent LRC compared with ORC[18]. In the study of Guillotreau et al.[18], the total operation time was 382 min in the LRC group, whereas it was 354 min in the ORC group, and it was shorter in ORC patients. Fadlalla et al.[15] also reported that the operative time was significantly shorter in ORC patients. In our study, similar to studies in the literature, both the total operation time and diversion time were shorter in the ORC group. One of the drawbacks of the LRC is the long operation time.

Lower EBL during surgery was associated with lower postoperative morbidity[19]. Ha et al.[19] reported that EBL was much lower in patients with LRC in their study compared with those with ORC. Similarly, Porpiglia et al.[20] reported lower EBL and less need for blood tranfusion in patients who underwent LRC. In our study, we did not detect any difference in terms of EBL between LRC and ORC patients, but the hematocrit level was found to be lower in ORC patients during postoperative follow-up.

In patients undergoing RC, early mobilization, normal bowel function, and a short time to return to oral feeding are desired. The later these factors are present, the higher is morbidity[21]. Basillote et al.[21] reported that all of these factors were shorter in patients undergoing LRC than in those undergoing ORC. Guillotreau et al.[18] reported that normal bowel function was restored in 3.9 days in patients with LRC and 7.2 days in patients with ORC, and oral intake started in 2.1 days in patients with LRC and 4.4 days in patients with ORC. These factors also affect LOS. In the study by Fadlalla et al.[15], LOS in the LRC group was 9.8 days in patients with LRC and 13.8 days in patients with ORC. In our study, both

Table 1. Comparison of demographic, preoperative, and postoperative data between the groups				
Parameters	**Total**	**ORC**	**LRC**	**p**
Age (years)	65.4±9.3	65.6±9.7	64.9±8.6	0.708
Gender				0.160
Female	9 (9.6)	8 (12.9)	1 (3.1)	
Male	85 (90.4)	54 (87.1)	31 (96.9)	
BMI (kg/m²)	27.2±2.8	27.5±2.6	26.6±3	0.181
Cigarettes (packet/year)	38.2±16	38.2±18.2	38±10.9	0,952
ASA (n, %)				0.167
1	1 (1.1)	0 (0)	1 (3.1)	
2	28 (29.8)	16 (25.8)	12 (37.5)	
3	65 (69.1)	46 (74.2)	19 (59.4)	
ECOG (n, %)				0.162
2	29 (30.9)	16 (25.8)	13 (40.6)	
3	65 (69.1)	46 (74.2)	19 (59.4)	
Preoperative T stage (n, %)				0.950
1	15 (16)	10 (16.1)	5 (15.6)	
2	79 (84)	52 (83.9)	27 (84.4)	
Postop T stage (n, %)				0.918
1	8 (8.5)	6 (9.7)	2 (6.3)	
2	23 (24.5)	15 (24.2)	8 (25)	
3	59 (62.8)	38 (61.3)	21 (65.6)	
4	4 (4.3)	3 (4.8)	1 (3.1)	
PSM (n, %)	19 (20.2)	13 (21)	6 (18.8)	0.800
Lymph node count	15.2±5.4	15±5.9	15.6±4.2	0.582
+ Lymph node count	1.1±0.4	1.1±0.5	1±0.6	0.871
Diversion time (min)	84.4±24.4	78.3±13.3	90.8±16.3	<0.001
Operation time (min)	372.7±99.2	344.1±85.4	388.1±101.9	<0.001
EBL (cc)	247±124.7	247.4±146.4	246.4±66.8	0.970
Preop hematocrit	37.3±6.2	36.6±6.5	38.5±5.4	0.172
Preop creatine (mg/dL)	1.3±0.6	1.4±0.7	1.3±0.8	0.630
Postop hematocrit	30.7±5.3	29.1±4.9	33.8±4.8	<0.001
Postop creatine (mg/dL)	1.1±0.4	1.2±0.4	1.2±0.6	0.57
Oral fluid intake (days)	1.6±0.6	1.7±0.6	1.4±0.4	0,008
Bowel function activation (days)	1.2±0.4	1.3±0.4	1±0.2	0.001
LOS (days)	14.3±9.1	16.7±9.9	9.8±5	<0.001
Complication (n, %)				0.929
Clavien 1	64 (68.1)	43 (69.4)	21 (65.6)	
Clavien 2	20 (21.3)	12 (19.4)	8 (25)	
Clavien 3	7 (7.4)	5 (8.1)	2 (6.3)	
Clavien	3 (32)	2 (3.2)	1 (3.1)	

BMI: Body mass index, ASA: American Society of Anesthesiologist, ORC: Open radical cystectomy, LRC: Laparoscopic radical cystectomy, PSM: Surgical margin positivity, EBL: Estimated blood loss, LOS: Length of hospital stay, ECOG: Eastern Cooperative Oncology Group

oral intake and bowel function activation occurred earlier in the LRC group than in the ORC group. In addition, LOS was 9.8 days in the LRC group and 16.7 days in the ORC group. We believe that LRC is superior in terms of early oral return and bowel function activation and shortens LOS.

Study Limitations

Our study has some limitations. The first reason is that it is a single-center, the second is the small number of patients, and the third is the lack of long-term follow-up results.

Conclusion

Morbidity is an important condition in patients undergoing RC, and the factors affecting it are important. When LRC and ORC are compared, a lower LOS is observed in LRC, and oral intake is started earlier. In addition, bowel function was normalized in the earlier period. The shorter operation time in ORC is advantageous.

Ethics Committee Approval: Ethics committee approval was obtained from University of Health Sciences Türkiye, Ümraniye Training and Research Hospital (decision no: 173, date: 13.06.2024).

Footnotes

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Authorship Contributions

Surgical and Medical Practices: F.Y.S., M.B., A.S.D., Ö.F.Ö., A.T., A.K., E.V.K., Concept: F.Y.S., E.V.K., Design: F.Y.S., M.B., A.S.D., A.K., Data Collection or Processing: Ö.F.Ö., A.T., E.V.K., Analysis or Interpretation: F.Y.S., A.T., E.V.K., Literature Search: F.Y.S., A.T., Writing: F.Y.S., A.T.

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