

Fighting Beyond The Colon: Early Surgical Outcomes Of Urinary System Involvement In Locally Advanced Colorectal Cancer

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Abstract

Introduction: Locally advanced colorectal cancers (LACRCs) frequently invade adjacent organs, most commonly the urinary bladder and ureters, requiring multivisceral en bloc resections. Genitourinary involvement complicates the surgical approach and often necessitates collaboration with multiple surgical disciplines. This study evaluates the clinical characteristics and early postoperative outcomes of patients undergoing surgery for LACRC with urinary system invasion by a single surgical oncology team.

Materials and Methods: This retrospective study included 23 patients who underwent en bloc resection for LACRC with concurrent urinary system involvement at Ankara Etlık City Hospital between January 2023 and January 2025. Surgical procedures included partial cystectomy, ureteral resection, and ureteroneocystostomy. Clinical, demographic, and pathological data were collected, and postoperative complications were analyzed.

Results: Of the 23 patients, 65.2% were female, with a mean age of 65.2 ± 7.2 years. The most common procedure was ureteroneocystostomy (56.5%). Open surgery was performed in 56.5% of cases, and 52.2% received neoadjuvant therapy. R0 resection was successfully performed in 95.7% of the cases. Postoperative complications included wound infections (65.2%), ileus (43.5%), and urinary infections (17.4%). Urinary anastomotic leakage occurred in one patient. No reoperations were required, and 1-year mortality was 4.3%. Wound complications were significantly more frequent in patients who received neoadjuvant therapy.

Conclusion: En bloc resection of LACRC with genitourinary invasion can be safely and effectively performed by a dedicated surgical oncology team, achieving high R0 resection rates and acceptable complication rates. These findings highlight the feasibility of single-team management in specialized centers. However, larger multicenter studies are warranted to confirm long-term outcomes and improve patient selection and perioperative care.

Key words: Colorectal neoplasms; neoplasm invasiveness; multivisceral resection; cystectomy.

Introduction

Colorectal cancer represents one of the most prevalent malignancies globally and stands as the second leading cause of cancer-related mortality, responsible for nearly 9.3% of all cancer deaths based on GLOBOCAN 2022 statistics (1). Locally advanced colorectal cancers (LACRCs) constitute approximately 30–50% of all colorectal cancer cases and represent a clinically significant subgroup (2). In locally advanced colorectal tumors, invasion of adjacent organs is a frequent finding, often necessitating multivisceral en bloc resection. Among the most commonly resected adjacent organs are the small intestine and the urinary bladder (3). In particular, genitourinary system invasion (including structures such as the bladder, urethra, and vagina) is observed in approximately 3–10% of these patients and complicates the surgical approach (4). Such cases

frequently require the simultaneous involvement of multiple surgical specialties during the operation. Genitourinary invasion is most commonly observed in tumors located in the sigmoid colon and upper rectum. One of the most critical prognostic factors in these cases is the achievement of a complete en bloc resection with negative surgical margins (5). Surgical approaches to achieve this may include radical procedures such as total pelvic exenteration (TPE), as well as bladder-sparing surgeries and ureteral resections in selected patients. Surgical oncologists, by virtue of their training and scope of specialization, are qualified to perform en bloc resections involving adjacent anatomical structures and their subsequent reconstructions as a single operative team. In surgical oncology clinics, procedures involving genitourinary invasion are also

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performed within this context. This study aims to present the clinical, demographic, and pathological characteristics of patients with locally advanced colorectal cancer and urinary system invasion, as well as the early postoperative outcomes of surgeries performed by a single surgical oncology team.

Materials and Methods

This retrospective observational study included patients who underwent surgery for locally advanced colorectal tumors with concurrent urinary system resection at the Surgical Oncology Department of Ankara Etlik City Hospital between January 2023 and January 2025. A total of 23 patients who underwent partial cystectomy, ureteral resection, and related pelvic procedures were included in the study. Only patients with intraperitoneal bladder invasion who underwent en bloc resection were eligible. Emergency surgeries and urinary system resections performed for benign conditions were excluded. All patient data were retrospectively obtained from the hospital information management system. Collected data included age, sex, body mass index (BMI), comorbidities, American Society of Anesthesiologists (ASA) score, type of surgical procedure (e.g., partial cystectomy, ureteral resection), surgical approach (open or laparoscopic), receipt of neoadjuvant therapy, postoperative complications (e.g., urinary anastomotic leakage, wound complications, intra-abdominal infection, urinary complications), intensive care unit and total hospital stay, need for reoperation, and 1-year mortality.

Ethical Approval: This study was approved by the Ankara Etlik City Hospital Scientific Research and Ethics Review Committee on 22 July 2025, with decision number 262. Written informed consent was obtained from all patients. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Statistical Analysis: Data were analyzed using IBM SPSS Statistics Version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were presented as mean \pm standard deviation, median (min–max), and frequencies with percentages. Categorical variables were compared using the Chi-square or Fisher's exact test. A p-value <0.05 was considered statistically significant.

Results

A total of 23 patients who underwent surgery for locally advanced colorectal tumors with concurrent urinary system resection were included in the study. Of these patients, 65.2% were female (n=15) and 34.8% were male (n=8). The mean age was 65.2 ± 7.2 years, and the mean body mass index (BMI) was 27.8 ± 4.0 kg/m². The most common ASA (American Society of Anesthesiologists) score was 3, observed in 17 patients (73.9%). The most frequently performed surgical procedure was ureteral resection with ureteroneocystostomy, applied in 13 patients (56.5%). This was followed by partial cystectomy in 9 patients (39.1%) and combined partial cystectomy with ureteroneocystostomy in 1 patient (4.3%) due to tumor invasion of the trigone. Regarding surgical approach, open surgery was performed in 13 patients (56.5%) and laparoscopic surgery in 10 patients (43.5%). Neoadjuvant therapy was administered to 12 patients (52.2%), while 11 patients (47.8%) did not receive any neoadjuvant treatment (Table 1).

Table 1: Patient demographics

	Mean \pm SD	n	%
Age	65.2 \pm 7		
BMI(kg/m ²)	27.8 \pm 4.0		
Sex	F	15	65.2
	M	8	34.8
Operation	UN	13	56.5
	PC	9	39.1
	PC+UN	1	4.3
Open/ Laparoscopic	Open	13	56.5
	Laparoscopic	10	43.5
Neoadjuvant chemotherapy	Yes	12	52.2
	No	11	47.8

UN: Ureteroneocystostomy , **PC:** Partial cystectomy, **SD:** Standard Deviation

In the postoperative period, urinary anastomotic leakage occurred in 1 patient (4.3%), intra-abdominal infection in 4 patients (17.4%), wound complications in 14 patients (60.9%), and urinary complications in 4 patients (17.4%). The patient with urinary anastomotic leakage had undergone partial cystectomy, and the leakage resolved after maintaining the urinary catheter for three weeks. None of the patients required reoperation. The mean intensive care unit (ICU) stay was 1.8 ± 1.4 days, and the mean length of hospital stay was

13.3 ± 7.0 days. Regarding resection margins, R0 resection was achieved in 22 patients (95.7%), while R1 resection was identified in 1 patient (4.3%). The patient with R1 resection had undergone open surgery and subsequently developed both wound complications and intra-abdominal infection. This patient later received chemoradiotherapy. The 1-year mortality rate in this cohort was 4.3% (n=1). (Table 2).

Table 2: Postoperative outcomes and complications

		n	%
Urinary Anastomotic Leakage	Yes	1	4.3
	No	22	95.7
Bleeding	Yes	0	0
	No	23	100
Ileus	Yes	10	43.5
	No	13	56.5
Intraabdominal Infection	Yes	4	17.4
	No	19	82.6
Wound Complication	Yes	15	65.2
	No	8	34.8
Pneumonia	Yes	1	4.3
	No	22	95.7
Cardiac Complication	Yes	1	4.3
	No	22	95.7
Urinary Complication	Yes	4	17.4
	No	19	82.6
Resection Status	R1	1	4.3
	R0	22	95.7
Reoperation	Yes	0	0
	No	23	100
Mortality (1 year)	Yes	1	4.3
	No	22	95.7%

The incidence of wound complications was found to be significantly higher in patients who received neoadjuvant therapy compared to those who did not ($p = 0.043$). Although a notable difference was observed between surgical approach and the development of intra-abdominal infection, this difference was not statistically significant ($p = 0.084$). The only patient who developed urinary anastomotic leakage had received neoadjuvant therapy and underwent open surgery. Thirty-day mortality was observed in only one patient and was not found to be associated with any significant clinical variable.

Discussion

In locally advanced colorectal cancer, the presence of adjacent organ invasion complicates the surgical approach and necessitates meticulous planning within a multidisciplinary framework. The Beyond TME Collaborative group has emphasized that extended surgical resections

beyond the total mesorectal excision (TME) plane are essential to achieve clear surgical margins (pathological R0 resection), which is one of the most critical factors influencing long-term survival in locally advanced pelvic tumors (6). Pathological R0 resection is widely accepted as a key prognostic factor for long-term survival in this patient population (7). In the literature, the rate of R0 resection in locally advanced colorectal cancers with urinary system invasion ranges between 75% and 87% (8). In our study, this rate was 95.7%. The single patient who did not achieve R0 resection received adjuvant chemoradiotherapy after surgery. To achieve R0 resection, radical procedures such as partial or total cystectomy, ureteral resection, prostatectomy, vaginal resection, and, when necessary, total pelvic exenteration (TPE) are frequently employed in patients with genitourinary invasion. In a study by Peacock et al. including 646 patients undergoing surgery for locally advanced or recurrent pelvic malignancies, genitourinary resection was performed in 226 patients (35%) (9). Among these, 77 (34%) underwent partial cystectomy, 89 (39%) total cystectomy with ileal conduit formation, 35 (15%) ureteral resection (reimplantation or ligation), and 25 (11%) urethral resection (9). In our cohort, ureteroneocystostomy was performed in 56.5%, partial cystectomy in 39.1%, and combined partial cystectomy with ureteroneocystostomy in one patient (4.3%). Hospital and ICU stays are reported to be significantly longer in patients undergoing genitourinary resections (9). In a study by Kondo et al., the mean ICU stay for patients who underwent partial cystectomy was 1.9 days, and the average hospital stay was 18 days (10). In our study, the mean ICU stay was 1.8 ± 1.4 days and the hospital stay was 13.3 ± 7.0 days, which aligns with the literature. En bloc resections performed in patients with genitourinary invasion in locally advanced colorectal cancer require high technical expertise and are associated with substantial morbidity and mortality. Several studies have reported significantly higher complication and mortality rates in patients undergoing genitourinary resections compared to those without such procedures. In a multicenter study involving 23 centers in France, the overall mortality was reported as 15%, with minor and major morbidity rates of 55% and 18%, respectively (8). Yoshida et al. also reported morbidity rates approaching 50% (11). In our study, 1-year mortality was 4.3%. Postoperative complications are frequent in patients undergoing genitourinary resections for locally advanced

colorectal cancer and can originate from both gastrointestinal and urinary systems. The incidence of gastrointestinal anastomotic leakage is reported as 3.7% in the literature (2), while urinary anastomotic leakage can reach up to 5.2%, especially in patients undergoing total cystectomy (12). In our study, urinary anastomotic leakage was observed in 1 patient (4.3%). Intra-abdominal abscesses occur in 10–14% of cases and are a significant source of infectious morbidity (9). In our series, 4 patients (17.4%) developed intra-abdominal abscesses, consistent with the literature. Urinary tract infections are reported in 12.5% of cases (8), and in our cohort, 4 patients (17.4%) developed urinary infections. The incidence of ileus varies between 10% and 18%, usually attributed to prolonged operative time and the extent of pelvic dissection (13). In our study, ileus occurred in 10 patients (43.5%), a higher rate than reported in the literature, potentially due to the additional organ resections performed in our cohort. Bleeding rates are reported to range from 14% to 20%, with many cases requiring blood transfusion (9). However, no bleeding complications were observed in our study, possibly due to the limited sample size. Among systemic complications, pneumonia is reported in 3–6% and pulmonary embolism in 1–2% of cases (13). In our study, pneumonia occurred in 1 patient (4.3%), and 1 patient (4.3%) experienced cardiac complications. Reoperation rates following surgery are reported to range from 8% to 12% in the literature (9,10), yet none of the patients in our study required reoperation. There are several limitations associated with this study. First, the relatively small sample size and single-center nature of the analysis limit the generalizability of the findings. Furthermore, the one-year follow-up period restricts the evaluation of long-term oncological and functional outcomes, including local recurrence rates and quality of life. The main strength of this study is that all surgeries were performed at a single high-volume center by an experienced surgical oncology team, ensuring consistency in surgical technique and postoperative care. Additionally, the inclusion of a homogeneous patient group with intraperitoneal bladder and ureteral invasion, all treated with en bloc resection, enhances the internal validity of the study.

Conclusion

En bloc resections in locally advanced colorectal cancers with genitourinary system invasion can be safely performed by a single, experienced surgical oncology team, with morbidity and resection

margin outcomes consistent with the existing literature. However, larger, multicenter studies are needed to validate these findings.

Ethical approval: This study was approved by the Ankara Etlik City Hospital Scientific Research and Ethics Review Committee on 22 July 2025, with decision number 262.

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